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SIMPLE TRICKS FOR Better-Looking Projects p.44

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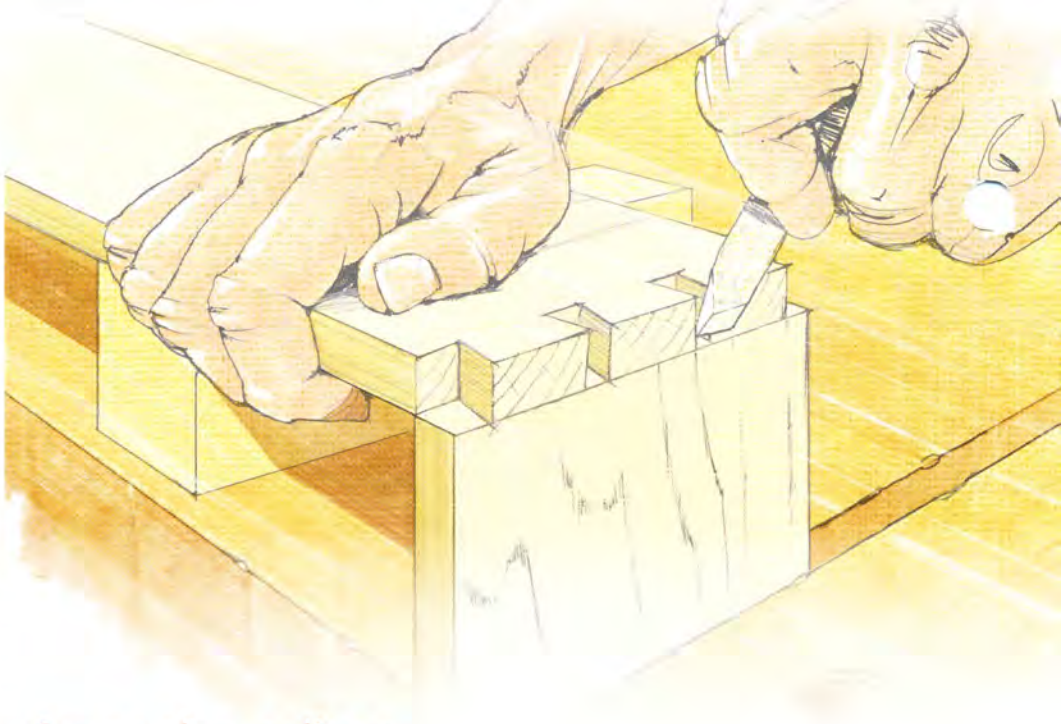

from the editor

Sawdust

This issue of Woodsmith marks our 35th anniversary. And whether you've been with us from the start or just picked up your first issue within the last year, you're the reason we've been successful. For that, you have our sincere thanks and appreciation.

New Look. Starting with this issue, you'll also notice a few changes here and there to the look and feel of the magazine. As always, you'll still find the best woodworking information around — great tips, techniques, and projects.

So what's different? Some of the changes are subtle, like easier-to-read type styles. The more obvious changes are the use of a brighter set of colors to make the drawings and copy more vibrant. And we've simplified finding the sources of hard-to-find items by incorporating them into each article. This helped free up space in the magazine for more woodworking information, like the expanded clamping article on page 48.

New Face. Speaking of changes, Robert Kemp joined us as an editor about three months ago, and he's been working hard ever since. But I have to apologize for neglecting to introduce him in the last issue. I guess it had to do with the fact that he is a familiar face. Robert worked in our circulation department for several years. He's an avid woodworker and was just waiting for the chance to move to the editorial side of the house. We're happy to have him onboard.

Previous Issue. The last issue featured an article on glue joint router bits. Unfortunately, the article wasn't clear about how versatile these bits really can be in the shop. At *Woodsmith.com/magazine/extras*, you'll find an updated article that provides all the details on using these bits.

Bryan

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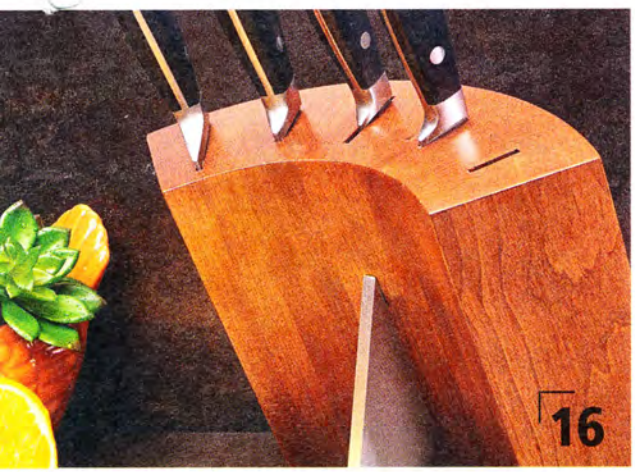

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heirloom project
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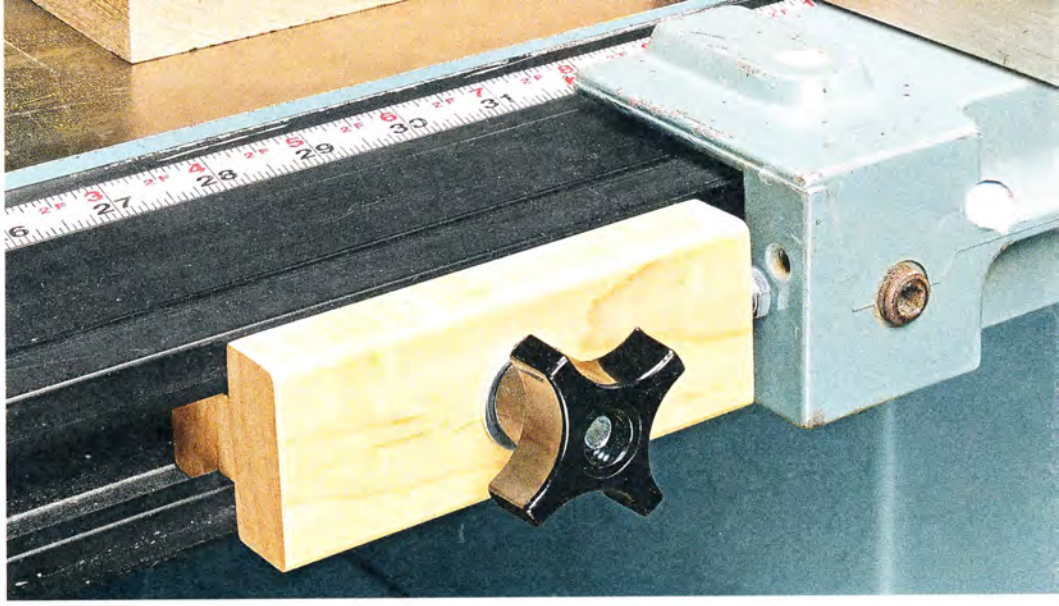
A linen press is all about storage. And this one has a ton of it. Whether it's linens, serving ware, or something in between, it's the perfect choice to satisfy a wide range of storage needs.

from our readers

Tips & Techniques



Unifence Stop Block

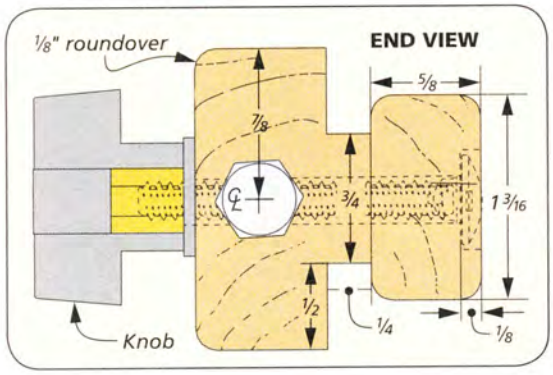
Making consistent, repeatable cuts on the table saw is simple using a rip fence. But recently, while making stiles and rails for some frame and panel doors, I found it challenging to return the table saw fence to the exact same position after moving it to make some crosscuts with my miter gauge.

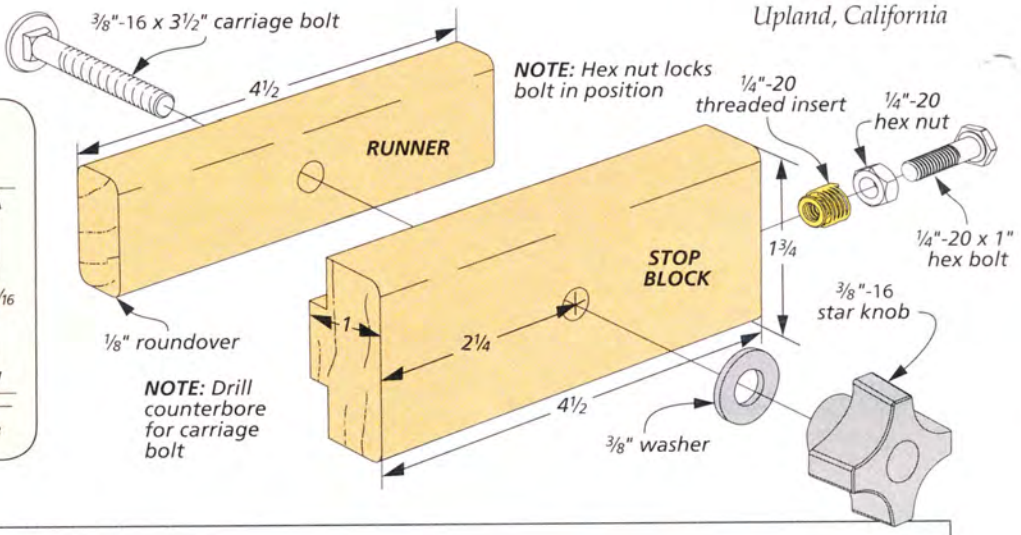
To solve this problem, I came up with a stop block that attaches to my *Unifence* rail, as shown in the main photo above. The stop block allows me to return my table saw fence to an exact location to continue ripping stock.

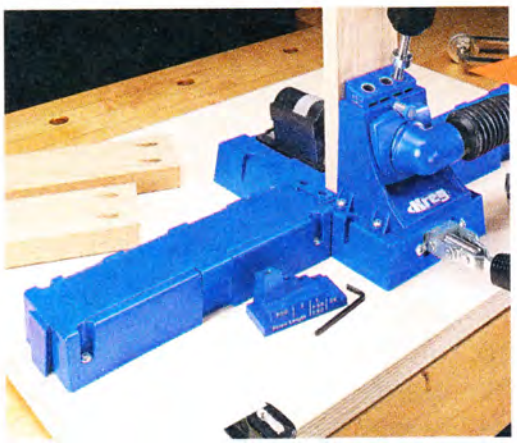
STOP BLOCK DETAILS. The stop block consists of two main pieces, a runner and a stop block. The runner is just a rectangular blank sized to slide in the front channel of the *Unifence* rail. A counterbored hole drilled in the middle of the runner accepts a carriage bolt.

The stop block has two rabbets cut on the back face to fit the slot in the fence rail. A hole drilled in the middle allows the carriage bolt to pass through. A washer and knob secure the two parts. One end of the stop block features a threaded insert that accepts a bolt and nut. This allows me to make micro-adjustments to the fence position.

Richard Potter
Upland, California







Win This KREG K5 Jig

Simply send us your favorite shop tips. If your tip or technique is selected as the featured reader's tip, you'll win a *KREG K5 Jig* just like the one shown here. To submit your tip or technique, just go online to Woodsmith.com and click on the link, "SUBMIT A TIP." You can submit your tip and upload your photos for consideration.

The Winner!

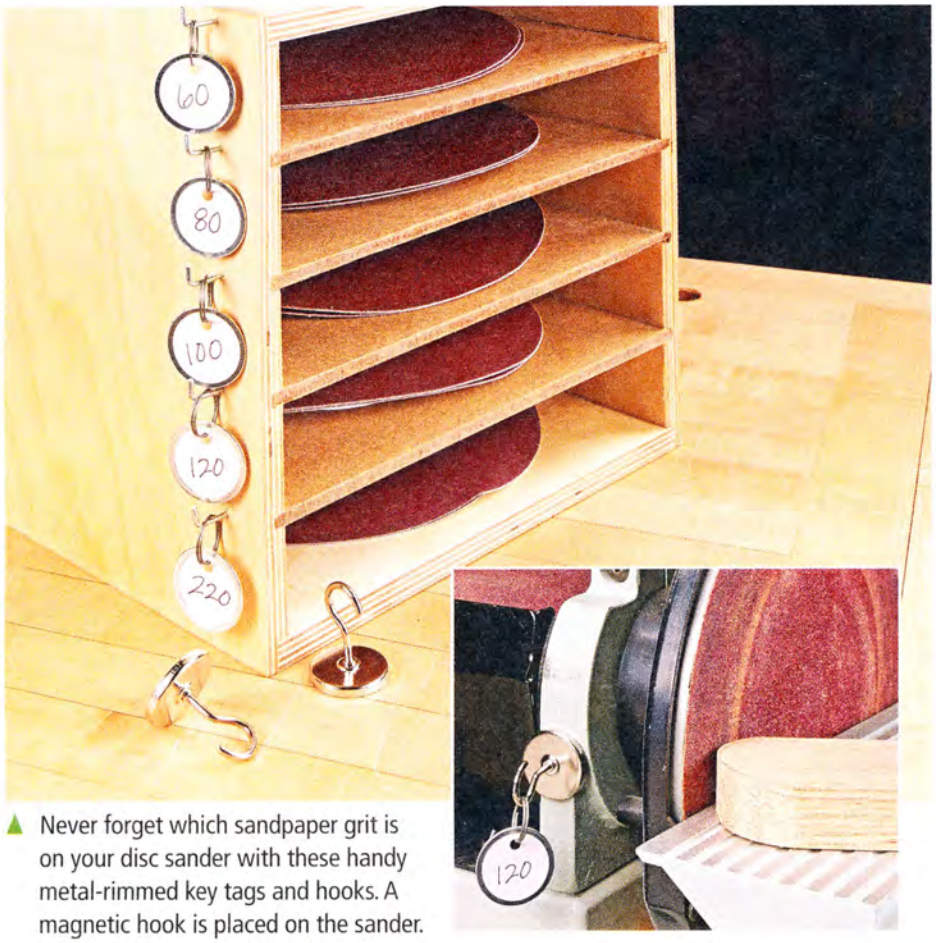
Congratulations to Bill Wells, the winner of this *KREG K5 Jig*. To find out how you can win this jig, check out the information on the next page.

Sandpaper Grit Reminder

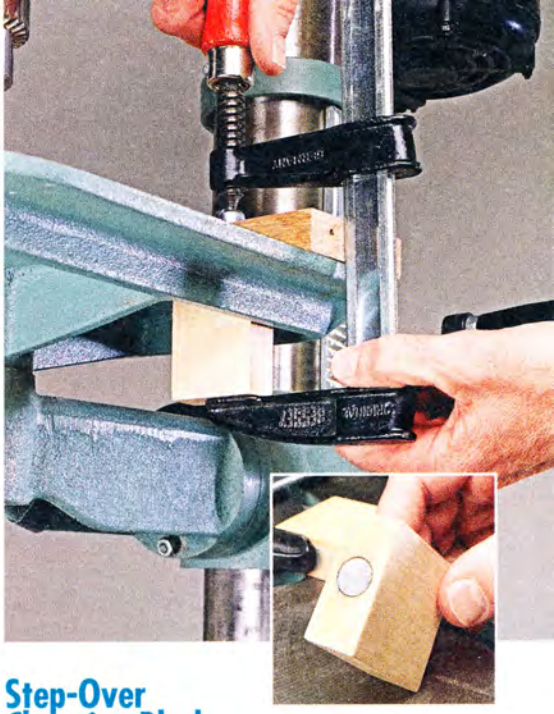
I use my disc sander for all sorts of tasks in my shop. Because of this, I end up changing the discs quite often. To help me remember which grit disc is currently on the machine, I came up with the simple solution you see below.

KEY TAGS & HOOKS. Since I store my extra sanding discs in a wood storage "tower", I was able to drill a series of holes down the side and install hooks in each position. I then wrote the grit numbers on metal-rimmed key tags. When I pull out a disc to put on my sander, I remove the same key tag from the hook on the storage tower and place it on a magnetic hook that I leave on the disc sander. This way, I always know which grit disc is on the sander.

Kelly Churchill
Medford, Oregon



▲ Never forget which sandpaper grit is on your disc sander with these handy metal-rimmed key tags and hooks. A magnetic hook is placed on the sander.



Step-Over Clamping Block

Because of the cast webbing on the underside of my drill press table, it can be difficult to clamp a fence or workpiece to the table. To solve this problem, I made these simple clamping blocks. The blocks, along with a regular, F-style bar clamp, allow you to "step over" the webbing to secure items to the table.

MAGNETS. So you don't have to fumble holding the block and clamp, a rare-earth magnet is recessed in the end of the block, as shown in the inset photo above. I like to keep several sizes of blocks by my drill press to accommodate varying sizes of items that may need to be clamped to the table. Simply stick the magnet end of the block to the underside of the table and clamp it in place.

Charles Mak
Calgary, Alberta

DIGITAL WOODSMITH

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If you have an original shop tip, we would like to hear from you and consider publishing your tip in one or more of our publications. Go to:

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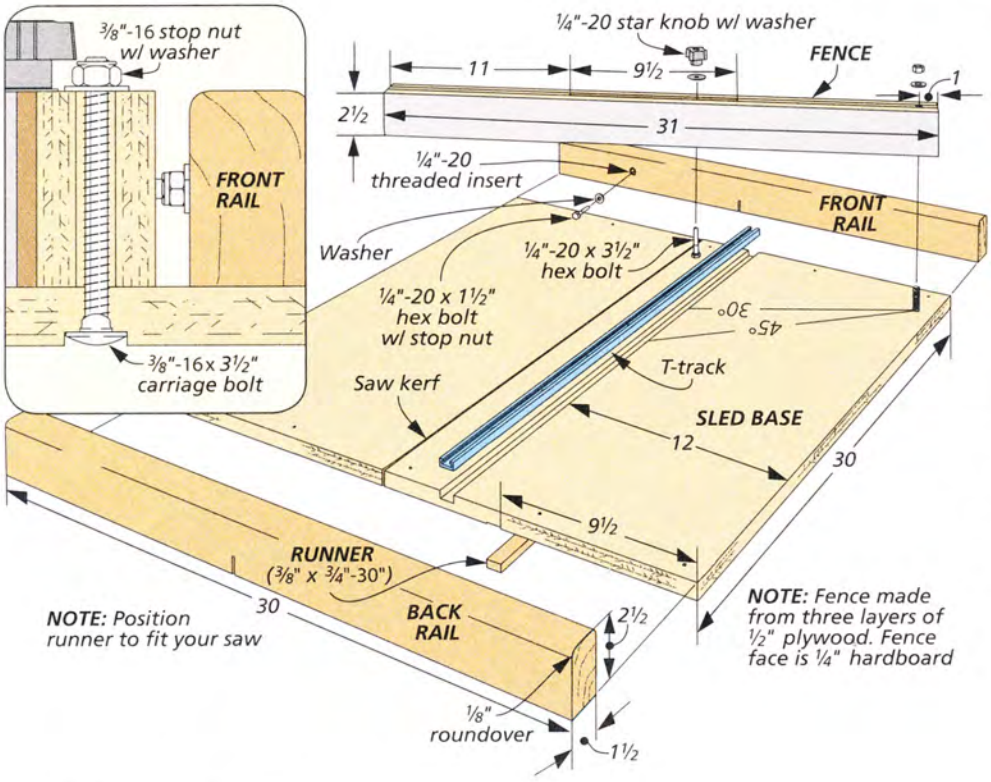
Pivoting Fence on a Crosscut Sled

The table saw crosscut sled is the most used jig in my workshop. However, on it's own, it's not very practical for making angled cuts. To make my sled even more versatile, I decided to modify it by adding a pivoting fence. This allows me to easily make angled cuts.

SLED DETAILS. The illustration below shows the dimensions for my sled. It consists of a ¾" plywood base with hardwood stock used for the rails and the runner. After removing the rails, I cut a dado for a length of standard, ¾" T-track. The T-track is used to lock the pivoting fence in place as well as secure the material hold-down clamp.



PIVOTING FENCE. I made my fence out of three layers of plywood with a hardboard face. The middle layer consists of two shorter pieces. This creates a slot for the knob. A hole drilled near the end of the fence anchors it to the sled base and serves as the pivot point for the fence. To keep workpieces from sliding during use, I also attached a strip of adhesive-backed sandpaper to the fence face.

90° POSITIVE STOP. Since I still want to be able to quickly make 90° cuts on the sled, I installed a bolt on the inside face of the front rail to act as a positive stop. This is simply a threaded insert with a bolt and lock nut screwed into the insert.

USING THE FENCE. To adjust the fence, simply loosen the knob, pivot the fence to the desired location, and then lock the fence in place with the knob. You can then position your workpiece against the fence and secure it in place with a hold-down clamp. In order to make the fence easy to use, I also marked lines on the base of the sled at 30° and 45° for quick reference. These are two common angles that I use frequently.

Bill Wells
Olympia, Washington

Narrow Sanding Block

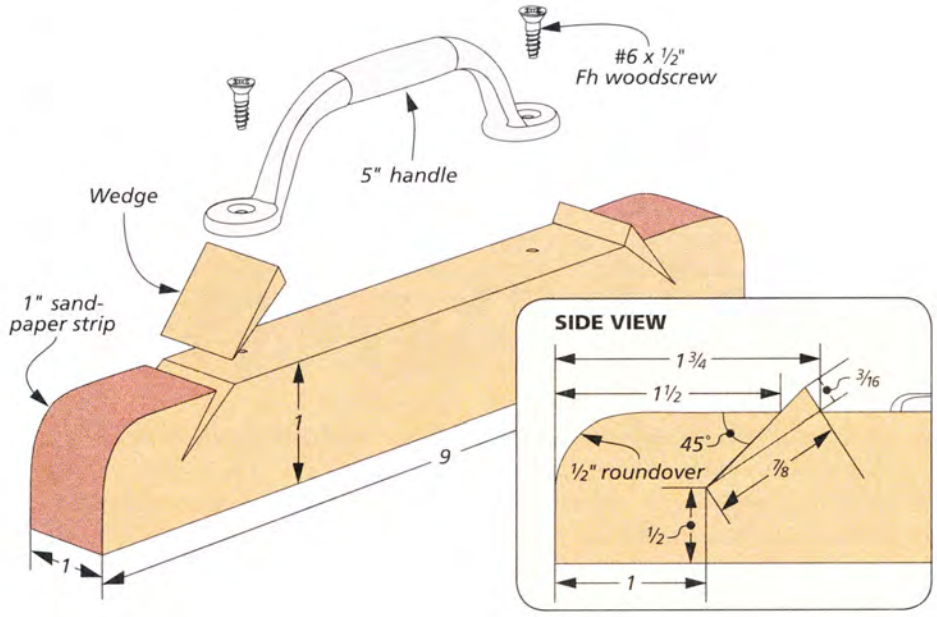
My regular sanding block is too big to sand rabbets and other narrow areas without the block tipping and rounding over the edges. To fix this problem, I made this handy edge sander that easily cleans up narrow rabbets. It has two wedge-shaped slots cut on the top to hold the sandpaper. A pair of wood wedges fit in the slots to keep the sandpaper in place. I sized my edge sander to accommodate commonly available 1" strips of sandpaper.

EDGE SANDER DETAIL. The edge sander is cut from an oversize blank. Make sure to run the blank you'll be using through the jointer to ensure the bottom edge is truly flat. After cutting the block to length, I rounded the top corners on the front and back edges. A band saw makes quick work of the wedge-shaped slots on the top edge.

WEDGES. The biggest challenge of this sanding block is cutting the small wedges. When cutting small parts like this, I prefer to start with an oversize blank. This makes it easier to keep fingers away from the blade. Be sure to cut the wedges the same width as the sanding block, or slightly narrower.

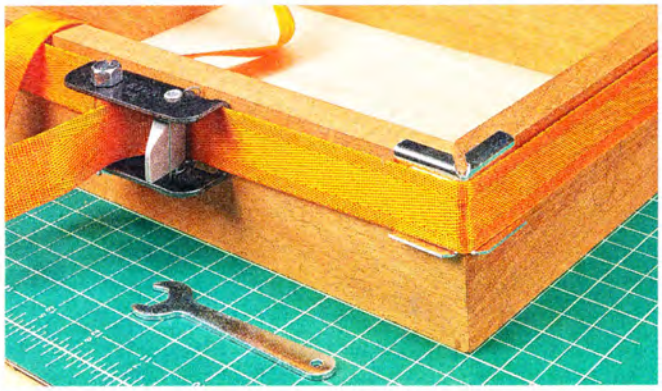
FINISH UP. To make the sander easier to hold, I also added a screen door handle. Now just add a strip of sandpaper and this block is ready for use.

Jeffrey Noyes
Port Richey, Florida



QUICK TIPS

Screen Spline Spacers. Recently, while building cabinet doors, *Doug Chasse* of Kittanning, Pennsylvania ran out of "space balls" to fit in the grooves on the stiles and rails. Instead, he used ⅛" window screen spline. The screen spline can be used in short lengths or long strips.



Simply Square. *Mike Aicklen* of Mandeville, Louisiana uses a self-healing cutting mat on his workbench surface to help check projects for square during glueups. The mats also have 45° and 60° lines marked which come in handy for quickly checking miters.

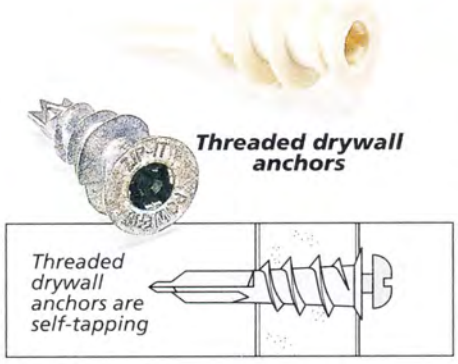
all about

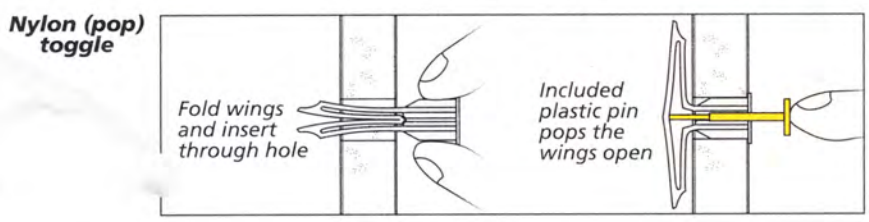
choosing & using
Wall Anchors

Building wall mirrors and shelves can be fun, satisfying projects. Getting them hung securely on the wall, however, can be a little daunting. In an ideal world, the studs in the wall would be located exactly where you need them to anchor your project solidly. But we all know that reality is usually far from ideal. Fortunately, there are wall anchors available that will give your project the extra support it needs.

Before we get into the specific anchors available, let me mention a couple precautionary notes. You should never rely solely on the anchors to secure anything but the lightest of items. The anchors are there to assist in supporting a project, not to hold the entire weight. In most instances you'll want at least one connection point with a wall stud. Wall material failure will be far more common than anchor failure.

Also, all of the anchors featured here can be used in drywall and plaster. Some are even rated for brick, concrete, and tile. Be sure to check the manufacturer's recommendations when making your selection. With this in mind, let's take a look at some of the more common, and not so common, wall anchors available.





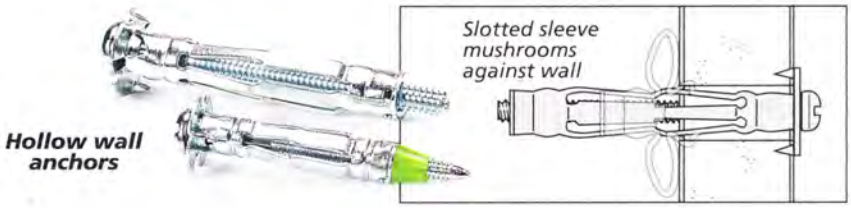
LIGHT-DUTY WALL ANCHORS

When it comes to hanging mirrors, picture frames, or other objects less than 20 lbs., there are a number of light-duty wall anchors to choose from.

THREADED DRYWALL ANCHORS. Perhaps one of the most used anchors is the threaded drywall anchor. Sold under various brand names, this anchor is nothing more than a screw with oversized threads. A crosshead hole for a Phillips screwdriver is used to install it and accepts the mounting screw. Once inserted in the wall, the mounting screw can be inserted and removed as often as necessary. Available in more durable zinc or non-conductive nylon, these anchors are a safe, lightweight option.

NYLON TOGGLES. Also known as "winged toggles" or "pop toggles," this anchor offers a nice balance between cost and strength. The plastic design makes them less expensive than metal anchors, but the wings provide much better holding power than threaded drywall anchors. As shown in the illustration at left, the wings of the toggle are folded to fit through a pre-drilled

hole in the wall. The plastic pin provided with the anchors is then inserted in the anchor. This "pops" the wings open on the backside of the wall before you install the screw.



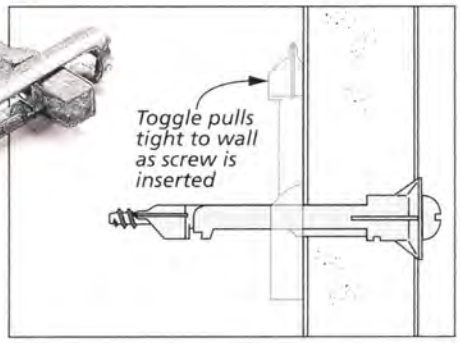
Hollow wall anchors

MEDIUM-DUTY WALL ANCHORS

This next category of wall anchors provides more tensile (pullout) strength than the previous group. This allows them to be used for wall hangings that have more depth, like small cabinets and wall shelves.

HOLLOW WALL ANCHORS. Formerly sold under the trademarked name "molly bolt," this anchor is available in a pointed version that can be driven into drywall with a hammer, or a blunt end version that requires a pilot hole for installation. Turning the screw "mushrooms" a slotted metal sleeve against the back of the wall as shown above. And much like the two previous anchors, once these anchors are installed, the screw can be removed, leaving the threaded sleeve in place.


Drywall toggle

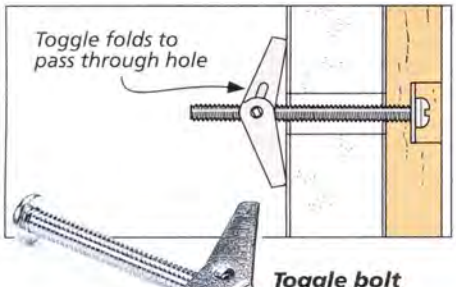


DRYWALL TOGGLES. Capable of being installed with just a screwdriver, this anchor is easy to use and offers some of the holding power of a standard toggle bolt (shown below). The illustration to the right shows how this anchor works. Conveniently, after the toggle is pulled snug to the backside of the wall, the screw can be removed as often as needed.

HEAVY-DUTY WALL ANCHORS

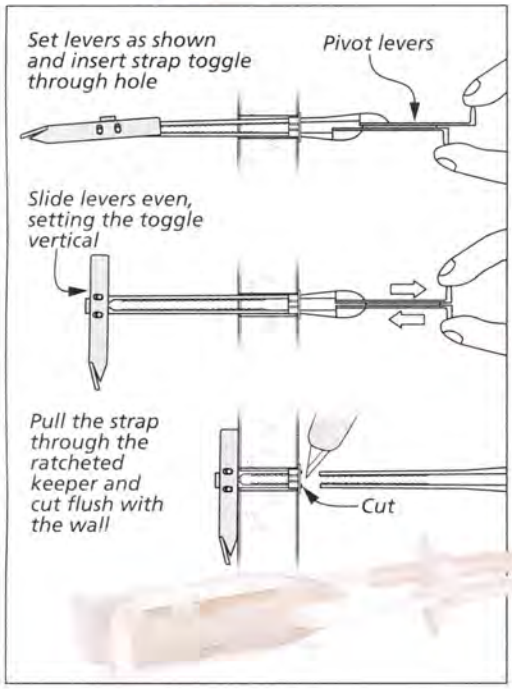
The next three anchors are the "big dogs" in the wall anchor world. They are capable of holding weights that will far exceed the strength of many wall materials. Which is why it's even more important to attach your wall hanging to a wall stud in at least one location.

TOGGLE BOLTS. Consisting of only a metal screw and a pair of spring-loaded wings, toggle bolts are one of the most widely recognized and used wall anchors. They have tremendous strength and are even recommended for hanging objects from ceilings. However, there are a few drawbacks to using toggle bolts. They require large pilot holes for installation and if the screw is ever removed, the toggle is lost in the wall cavity. Also, objects being hung must be installed on the screw before the toggle bolt assembly is inserted in the wall. This can be a very cumbersome task for larger items.



Toggle bolt

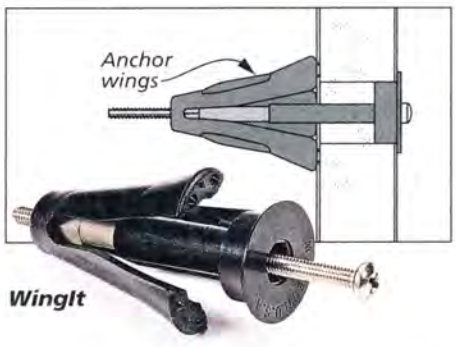
STRAP TOGGLES. Offering several advantages over regular toggle bolts, strap toggles have gained many fans in the wall anchor arena. First, they require a smaller pilot hole than a similarly rated toggle bolt. Second, once installed, they provide a permanent mounting hole allowing removal and reinstallation of the object. And third, they can be used on walls up to $2\frac{1}{2}$" thick. The unique installation process is shown in the illustration at the lower left.



Strap toggle

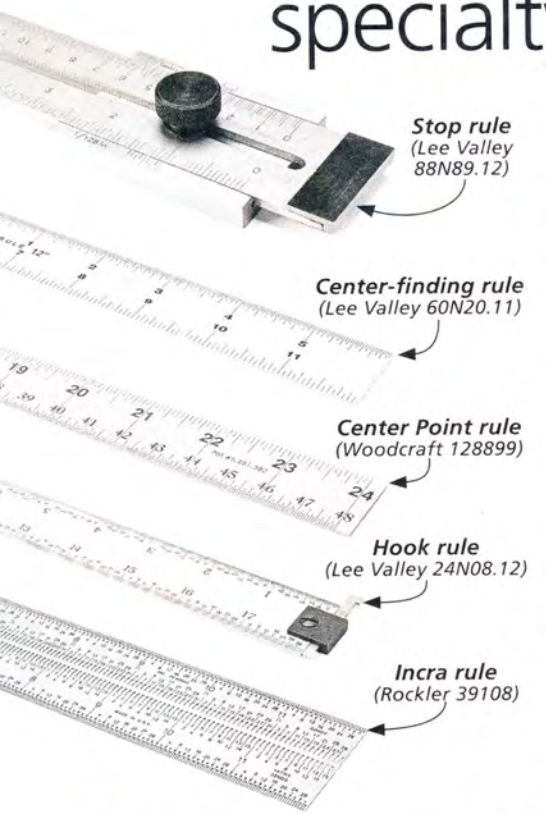
WINGITS. Billing themselves as the "world's strongest fasteners," *WingIts* are a relatively new wall anchor design. As shown below, this anchor has three "wings" that can be compressed to fit through a $\frac{3}{4}$"-dia. pilot hole and then pop open on the backside of the wall. Much like strap toggles, *WingIts* also provide a permanent anchor point once installed. This heavy-duty design was originally developed for the health care and hospitality industries but, like all of the anchors shown here, is readily available in the retail market.

After spending so much time and effort to build a beautiful, wall-mounted woodworking project, you don't want to overlook the importance of choosing the proper hardware to hang it. So for your next wall shelf, cabinet, or mirror, keep these wall anchors in mind. You're sure to find the right one to give your project the support it needs. W



WingIt

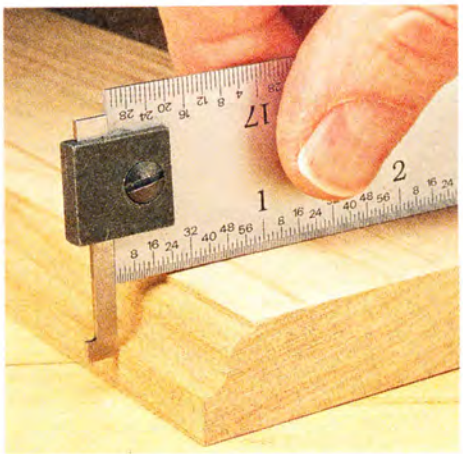
specialty Metal Rules



▲ Specialty metal rules are available in a variety of styles that are useful for specific woodworking applications.

You've undoubtedly heard the old saying, "finding the right tool for the job is half the battle." But typically, when it comes to metal rules, most of us reach for a standard cabinetmaker's rule when performing layout work on a project. While this rule will generally do an admirable job for most of the tasks it's put to, there are times when having a specialty rule made just for the task at hand is the way to go.

STOP RULE. Take for instance the stop rule shown in the main photo. The wide, movable stop offers a consistent reference point that makes it perfect for machine setup and layout work. This rule also comes in handy for positioning hardware mounting holes and drawing layout lines parallel to an edge or flat surface, as shown in the inset photo above. Perhaps my favorite feature is the heft and overall quality feel of this rule. It gives you the confidence that it will hold up to everyday shop use.



▲ Accurately dimensioning a workpiece with a profiled edge is simple with an adjustable hook rule.

ADJUSTABLE HOOK RULE. Getting an accurate measurement from the edge of a board using a standard rule can be difficult at best, especially if that board has a profiled edge. That's where a hook rule is almost indispensible. As shown

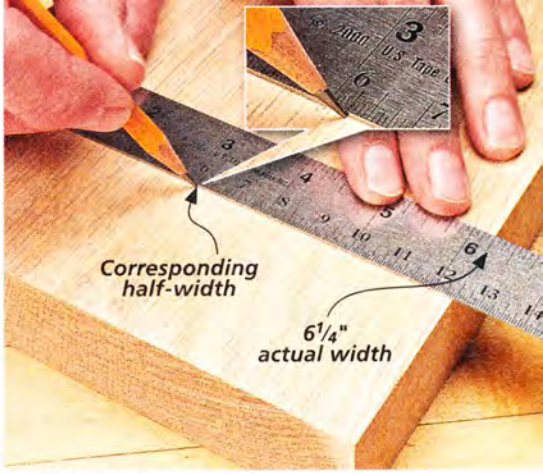
in the bottom right photo on the opposite page, the hook on this metal rule allows you to find a quick registration point on the edge of a workpiece.

Hook rules are available with fixed hooks that can be removed with a set screw, or as an adjustable version like the kind shown on the opposite page. The adjustable hook rule allows you to slide the hook all the way to one side, so it will not interfere with the rule edge when not needed. If you opt for the fixed hook rule, be careful to store the hook and set screw in a safe place. It's very easy to misplace these small parts.

CENTER-FINDING RULES. Locating the center of a board is a common woodworking task. But on-the-spot calculations can also be one of the biggest sources of errors. Using a center-finding rule is one good way to avoid those errors.

▲ The *Incra Rigid Bend Rule* (*Rockler* 39116) is perfect for accurately marking dimensions on two faces of a workpiece.

▲ This center-finding rule provides a reliable way to lay out hardware locations on the face of a workpiece.



▲ A *Center Point* rule offers perhaps the quickest, most foolproof way to find a workpiece center.

There are two versions of center-finding rules available. Which one you choose really comes down to preference.

The basic center-finding rule, shown in the upper left photo, is graduated out in both directions from the center. This type of rule makes laying out hardware or hole locations a breeze.

Perhaps an even easier method to locate center is to use a *Center Point* rule. Shown in the right photo above, the upper edge of a *Center Point* rule has normal graduations, with half-scale graduations on the lower edge. Simply find the identical measurement from the top scale on the lower scale, and you have your workpiece center.

INCRA PRECISION RULES. Some woodworking tasks call for dead-on accuracy. *Incra* precision rules are made just for this need. Designed for use with a regular 0.5mm lead mechanical pencil, these rules have micro-fine guide slots and holes every 1/64", so you can locate a fine pencil point to mark exactly where needed. The marking guides, along with the ultra thin blade, eliminates the possibility of parallax errors.

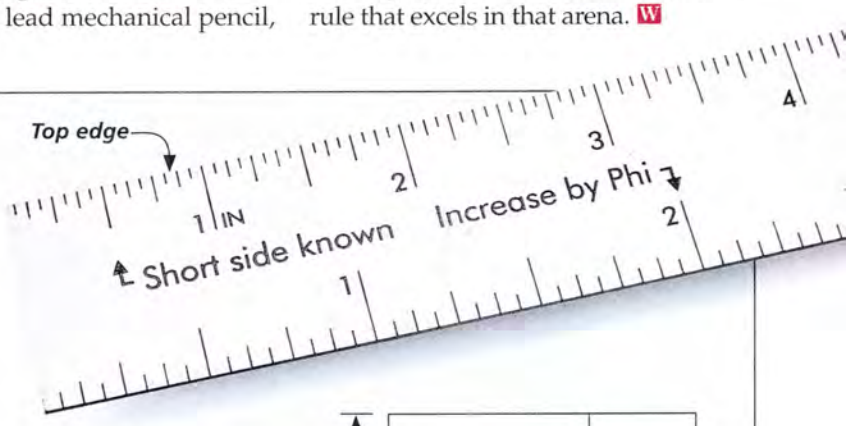
As shown in the margin photo on the opposite page and the photo at left, the *Incra* rules are available as either a flat rule or as a rigid bend rule. The bend rule has wrap-around slots along the edge, making it perfect for marking the face and edge of a workpiece.

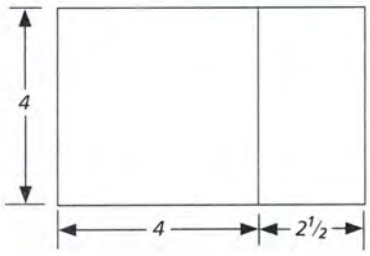
So do you need to run out and purchase one of each of these rules? Probably not. But it's possible that one or more of these specialty rules might just give you an advantage that a standard cabinetmaker's rule can't match. And if you ever dabble in furniture design, keep reading below about another specialty rule that excels in that arena. W

PHI "GOLDEN RATIO" RULE

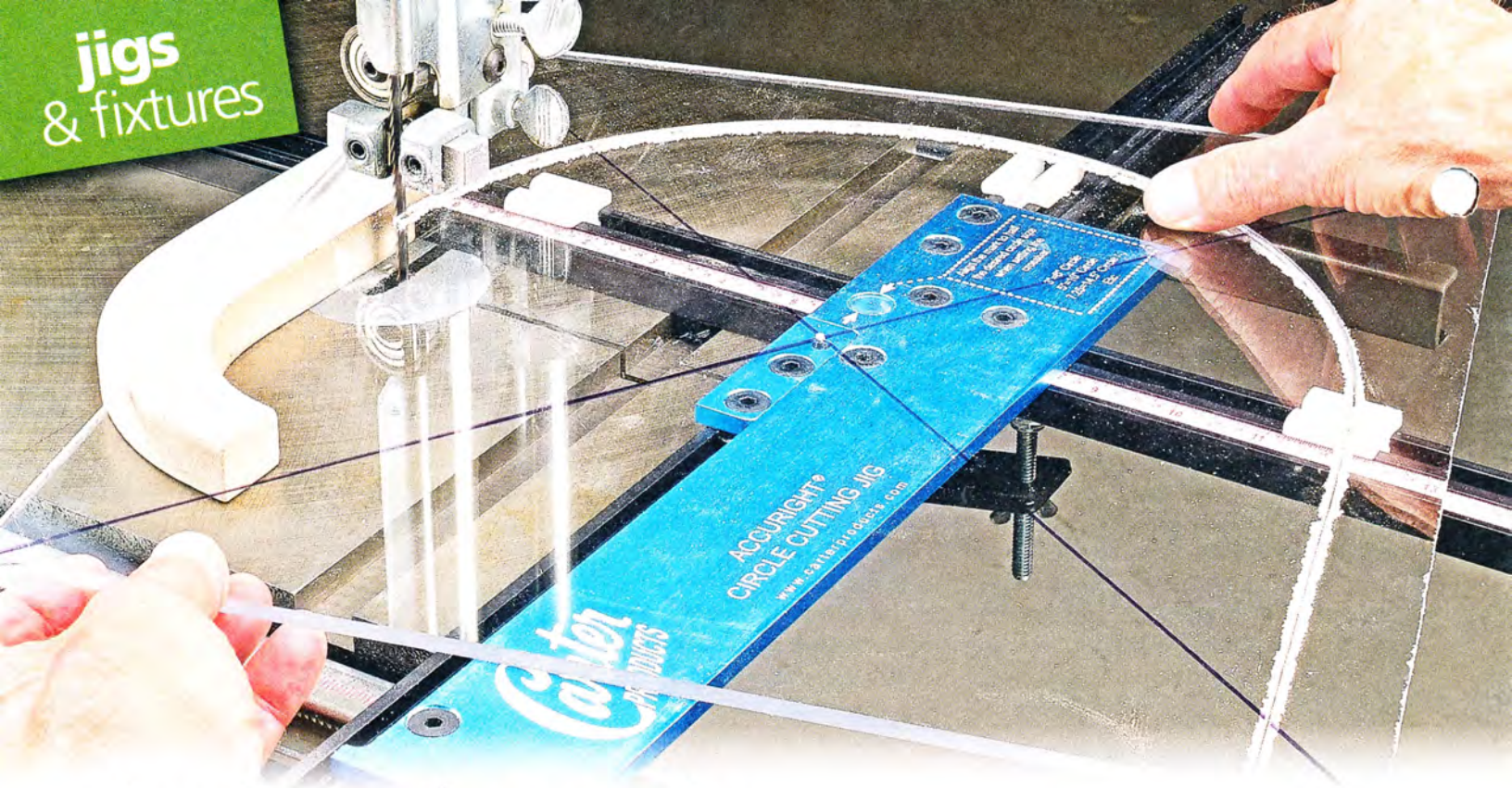
Phi is a value of approximately 1.618 and is often referred to as the "golden ratio." Throughout modern history, this distinctive number has played a notable role in furniture design. It is often used to proportion objects for better aesthetic appeal. That is why you'll often see dining room tabletops that are 1.6 times longer then they are wide, for example. The *Phi Rule* (*Lee Valley* 06K30.24) was created to take full advantage of this design concept.

With a *Phi* rule, the top edge of both sides has normal graduations, while the bottom edge has *Phi*-scale graduations. If the short side measurement of the table is known, the bottom edge will increase that amount by *Phi* to find the long side measurement. The other face does the opposite.





Perfect Proportions. A drawer front that is 4" high should be about 6½" wide.



simple jig for cutting

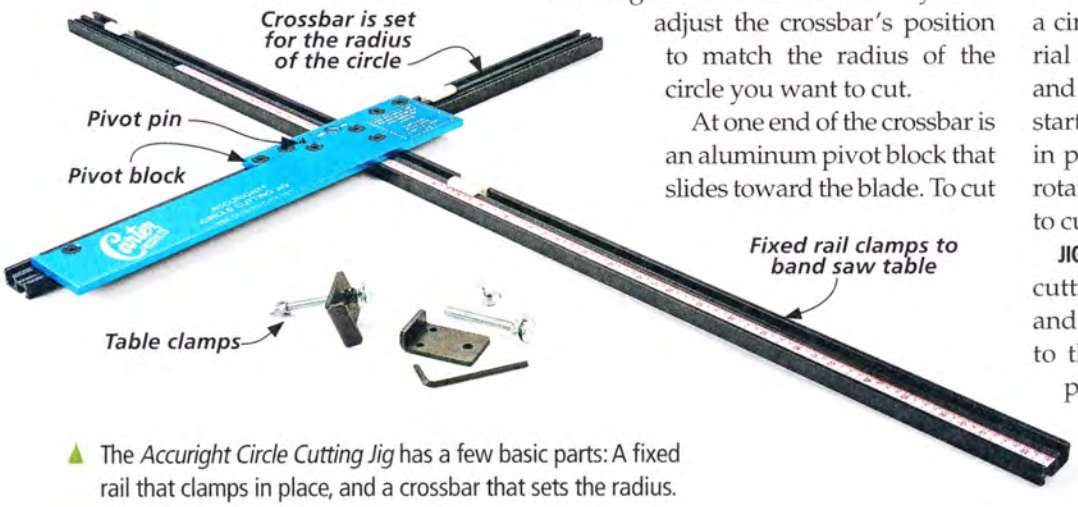
Band Saw Circles

When it comes to cutting a circle in wood or sheet goods, there are a lot of ways to go about it. Some woodworkers choose to equip a drill press with a circle-cutting tool, while others use a router outfitted with a trammel.

A band saw is another viable option for cutting circles. But in order to get good results, you need a method for holding the workpiece in a fixed position as you rotate it through the band saw blade. A jig from *Carter Products* promises to do that relatively easily and inexpensively. It's known as the *Accuright Circle Cutting Jig*.

HOW IT WORKS. The concept of the jig is simple. A long rail is clamped in a fixed position behind the blade and perpendicular to the band saw's miter slot. This fixed rail accepts an adjustable crossbar that can be positioned anywhere along the length of the rail. It allows you to adjust the crossbar's position to match the radius of the circle you want to cut.

At one end of the crossbar is an aluminum pivot block that slides toward the blade. To cut a circle, you simply position the material on top of a pin in the pivot block, and slide the workpiece into the blade to start the cut. Once the pivot block locks in place against a magnetic catch, you rotate the material clockwise on the pin to cut the circle (main photo above).

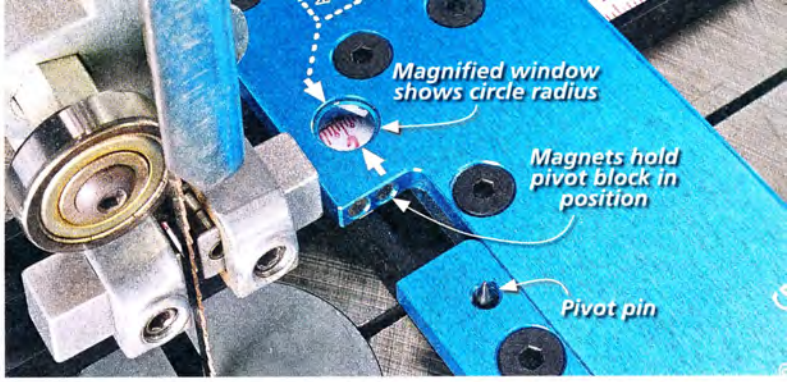


▲ The *Accuright Circle Cutting Jig* has a few basic parts: A fixed rail that clamps in place, and a crossbar that sets the radius.

▲ An optional MDF block supports the blank on the waste side of the workpiece. It's a worthwhile addition for the jig.

JIG SETUP. One nice aspect of this circle-cutting jig is how simple it is to set up and use. The fixed rail simply clamps to the band saw table courtesy of a pair of table clamps. Still, it does require a bit of squaring up and alignment of the rail, crossbar, and pivot pin as you

▲ Set up the jig so that the fixed rail is perpendicular to the miter slot, the crossbar is parallel to the miter slot, and the pivot pin is perfectly aligned with the front of the blade (above).



▲ The circle blank slides back and forth on a pin in the pivot block. When the pivot block contacts the magnets shown, you can then begin rotating the blank clockwise to cut out the circle.

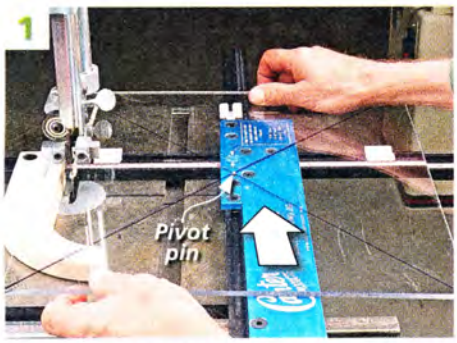
install the jig. Part of this process is shown in the photo above.

The crossbar moves easily along the fixed rail. It incorporates a scale and a magnifying glass for helping to cut circles of a precise diameter. The pivot block slides smoothly on the crossbar and locks securely in position thanks to a pair of built-in magnets (photo, above right). The jig is also available with an added support assembly. This is just a hook made from MDF (right photo, opposite page). It matches the thickness of the jig and provides additional support for the workpiece.

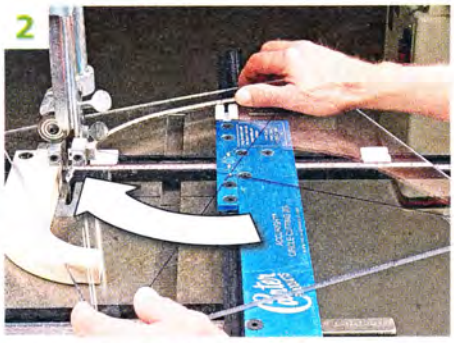
USING THE JIG. The first step, as when cutting any circle on the band saw, is to choose the right blade. For circles less than 12" in diameter, a ¼" blade works best. Larger than 12", and you can use a ⅜" or ½" blade. Once you cut a square blank to rough size, you can find the center by drawing intersecting diagonal lines and dimpling the center (photo, below left). This allows the workpiece to fit more securely on the pivot pin.

Now position the crossbar to match the radius of the circle you're planning to cut, and lock it in place by securing the Allen screws. Set the workpiece on the pivot pin, and start the band saw. Slide the workpiece and pivot block toward the blade, and cut into the workpiece until the pivot block contacts the magnets (Step One at left). Rotate the workpiece to complete the circle (Step Two). Once the circle is done, just shut off the saw to remove the circle and the waste piece.

A GOOD OPTION FOR CIRCLE CUTTING. Overall, I found the *Accuright Circle Cutting Jig* very easy to set up and use. If you cut a lot of circles for your woodworking projects, then I think it'll be a worthy investment for your shop at a reasonable price. W



▲ Dimple the center point on the back of the blank (below), position it on the pivot pin, and advance the blank into the blade.



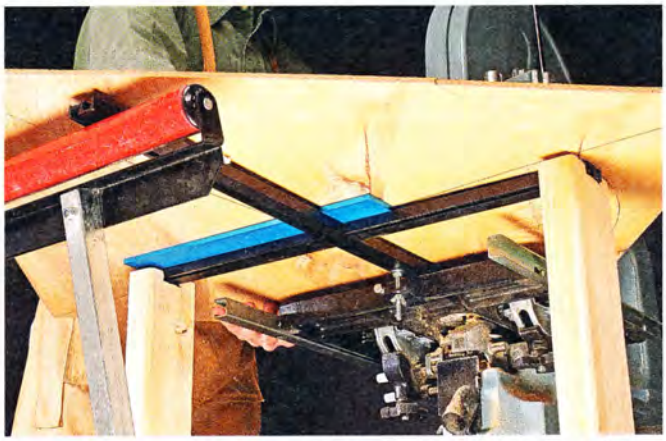
▲ Once the pivot block hits the magnets, you rotate the blank clockwise into the blade until you've completed the circle.

CUTTING LARGE CIRCLES

You can cut circles up to 4' in diameter with the jig. However, the center of a larger circle will be located well beyond the edge of the band saw table. That means you'll need to support the crossbar and the fixed rail as you cut the circle.

▲ To find the center, draw lines from the opposite corners and dimple the intersection.

To do this, I made support posts out of 2x4s, and notched the ends to surround and support the ends of the crossbar. Then I used an adjustable roller stand to support the end of the fixed rail, as shown in the photo at right.



▲ Notched 2x4 posts support the ends of the crossbar. A roller stand holds up the end of the fixed rail and keeps the jig level when cutting a larger circle on the band saw.

techniques from our shop

8 great shop secrets for Perfect Projects

No matter what your woodworking experience level happens to be — from novice to expert — great projects are achievable for everyone. Creating projects that look "perfect," rather than ones with noticeable gaps and flaws, comes down to learning the common points in projects where errors occur. Once you understand how mistakes happen, you can develop systems of work to eliminate those flaws. These tips and techniques will help you zero in on problem areas and incorporate reliable methods for building great projects.

[1] Joint, Then Plane

Wood by its nature is not always consistent. Even if it looks okay to the naked eye, an edge might not be square, or the face might not be flat. So after rough-cutting parts, it's best to address this first by flattening the face and squaring one edge on a jointer. After the jointer work is complete, you can switch to the planer and table saw to achieve consistent thickness and width among parts.

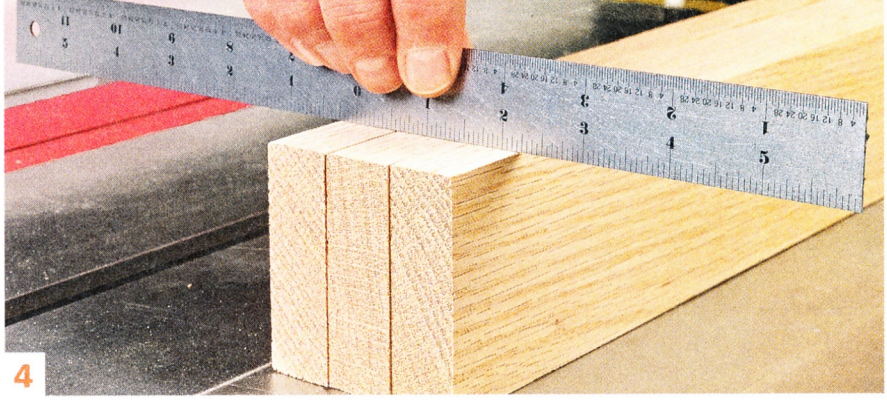
[2] Rip All Parts at Once

Even though parts may be added to a project at different times throughout the building process, you can do yourself a big favor by ripping all the parts that are the same width at the same time. This is a good practice, as once you move the rip fence, it can be difficult to set it in exactly the same position for a cut later on.

[3] Use a Miter Gauge Fence

When it comes to crosscutting parts to the same length, the tried and true approach is to use an auxiliary miter gauge fence equipped with a stop block

on the table saw. The stop block helps you cut parts to a consistent length if you butt each piece against it before cutting. The fence further ensures accuracy by backing up the cut and preventing chip-out. Adding a strip of adhesive-backed sandpaper keeps the pieces from shifting while making the cut.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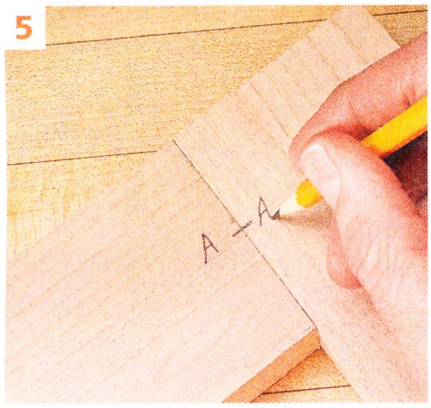
[4] Check Your Progress

Of course, you can use calipers or a metal rule to check part dimensions. But for many projects, the most important factor is consistency in thickness, width, or length from part to part. If that's the case for your project, the easiest solution for checking this is to simply line parts up side by side and check your progress. Make sure to do this on a dead-flat surface, such as the top of a table saw.



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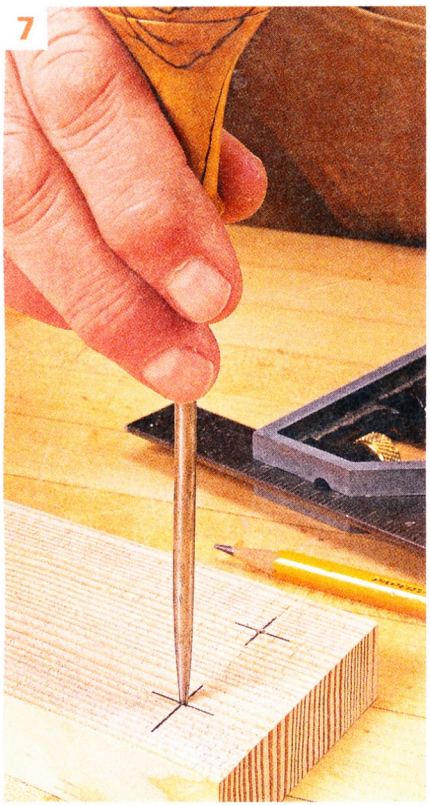
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[5] Label, Label, Label

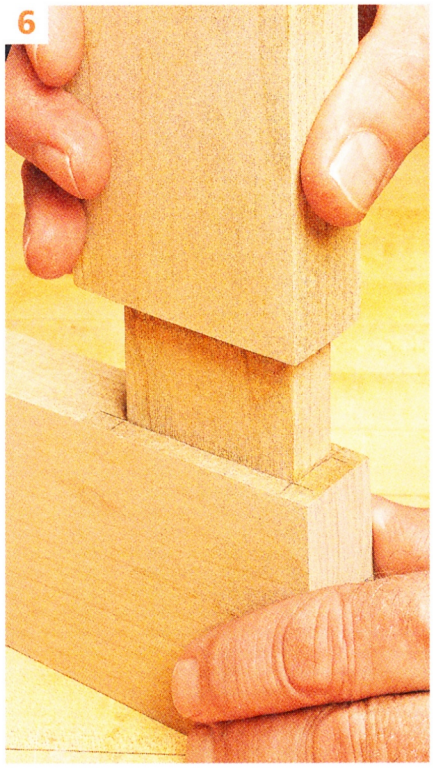
It's easy to get mixed up when working with a lot of parts. So when the parts are sized and ready for joinery, the strategy I suggest is to mark each workpiece to keep everything straight. You can write corresponding letters on mating pieces; mark inside and outside faces; and lay out locations for curves, mortises, and tenons, for example. These markings will prevent any mix-ups as you build, and they can all be sanded off later on.

[6] Mortises First, Then Tenons

If you cut mortises and tenons independently of one another going just by the dimensions, you may end up with a poor-fitting joint. A better approach is to complete the mortises first. Then, you can "sneak up" on the fit of the tenons, testing them in the mortises as you fine-tune them for a perfect fit.

[7] Dimple Hole Locations

If you want to make sure that holes are drilled exactly where they're supposed to be, use a scratch awl to create a small dimple right at the centerpoint of the hole. This provides a precise point for aligning the tip of the drill bit. And it's sure to eliminate any misaligned holes in your project parts.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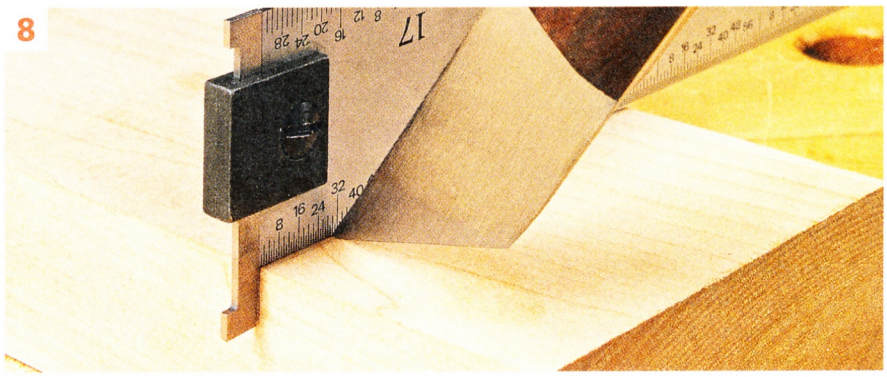
[8] Measure Consistently

Some simple steps to eliminate layout problems include always using the same tools for measuring, rather than multiple rules or tape measures. Also, I suggest placing rules on edge to get a more precise mark against the etched mark on the ruler. Finally, choose a marking knife rather than a pencil for a more precise layout line. (For more on marking knives, refer to page 46.) W


8

Weekend Project

Custom Knife Block

With its sleek look and modern design, this knife block will not only keep your fine cutlery safe and sharp, it will do it in style.

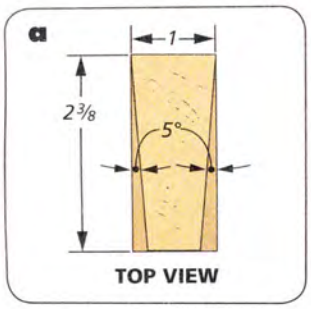
Knife blocks are certainly not a new project idea to woodworkers. Because they require just a small amount of lumber, they're the perfect project when your woodworking funds are running low. In fact, they're such good little projects, the only real drawback is finding a new and unique design that breaks out of the mold of the basic "square" knife block.

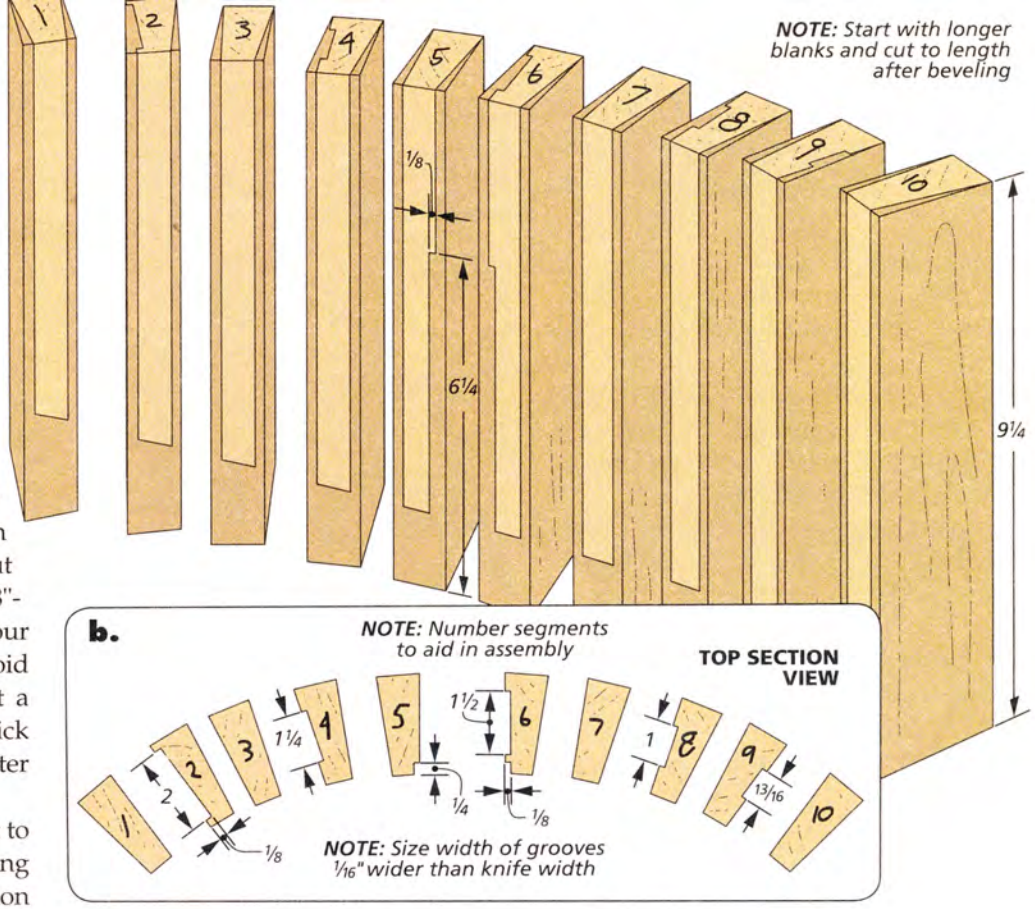
I think that's been accomplished with this design. Using just over three board feet of lumber, this knife block won't break the bank. And, for such a small project, it's packed with plenty of unique woodworking challenges. But don't worry; I've broken the whole process down into easy-to-follow steps that will ensure your success.

MATERIALS. Before you get started, I want to make a quick mention about the materials used to construct the knife block. I chose cherry lumber and was able to get all of the components from one 5/4 board. The ¼" aluminum for the stand can be ordered online or is available at many home centers.

MAKING THE SEGMENTS

The knife block consists of ten segments that are beveled on both faces. When glued together, these form an arc, as shown in the photo above. Five of the segments have a groove cut down the center of one face to form the slot for the knives. And the two center segments have a stopped rabbet cut on their inside





front edges to house the aluminum stand (drawing at right).

SEGMENTS. Start by ripping your board for the segments to final width on the table saw. Then it's easy to cut the stock into three manageable, 48"-long blanks. This allows you to get four segments out of each blank and avoid any defects in the stock. I also cut a couple 48"-long pieces from ¾"-thick stock for use as clamping blocks later on during assembly.

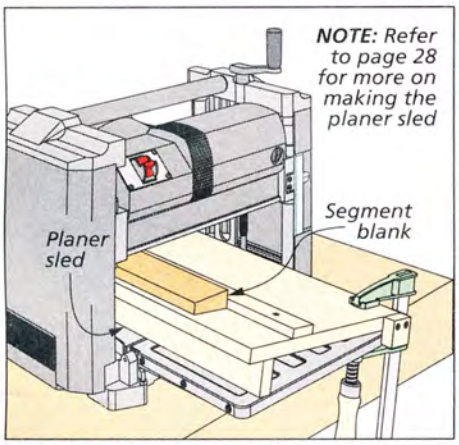
PLANER JIG. With the rough stock cut to size, it's time to bevel both faces using the planer. The lower left illustration and Shop Notebook on page 28 show the simple, shop-built sled I used to easily perform this task. Be sure to plane the material for the clamping blocks at the same time. You only need to bevel one face of these boards.

After beveling both faces of the project blanks, you can cut each segment to rough length, as shown in the drawing above. Now is the time to number each of the segments. This helps keep them organized for the next steps.

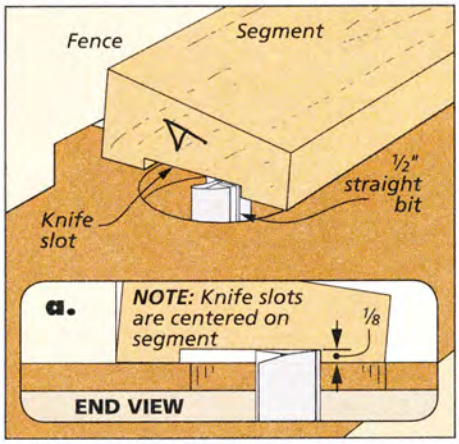
ROUT THE GROOVES. Routing the grooves for the knife slots is a simple process at the router table. Lay out the groove width on one end of each piece. (Be sure to size the width of each groove to fit your knives.) You want the groove to be about 1/16" wider than the knife blade. Now, run each piece over a straight bit on the router table, as shown in the box below. Move the fence back for each subsequent pass until the groove is full width.

RABBETS. Segments 5 and 6 have a stopped rabbet cut on the front edge to accommodate the aluminum stand. The right drawing below shows how I cut this rabbet with the same bit used to cut the knife slots. The stopped rabbet in segment 6 can be routed with the piece laying flat (detail 'a,' below). Segment 5 needs to be stood on edge to avoid back-routing (detail 'b'). Square up the ends of the rabbets using a chisel.

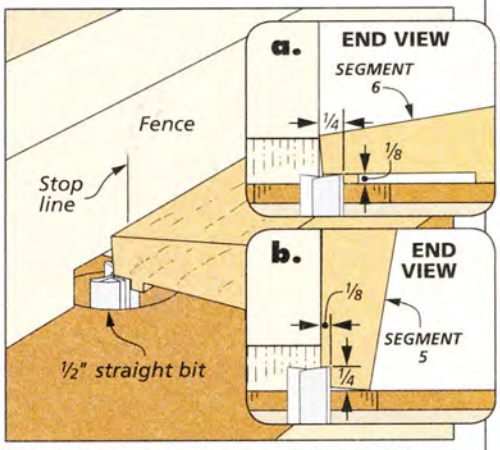
How-To: MACHINE THE BLANK



Planer Sled. A sled attached to the planer allows you bevel the boards for the segments all at once.

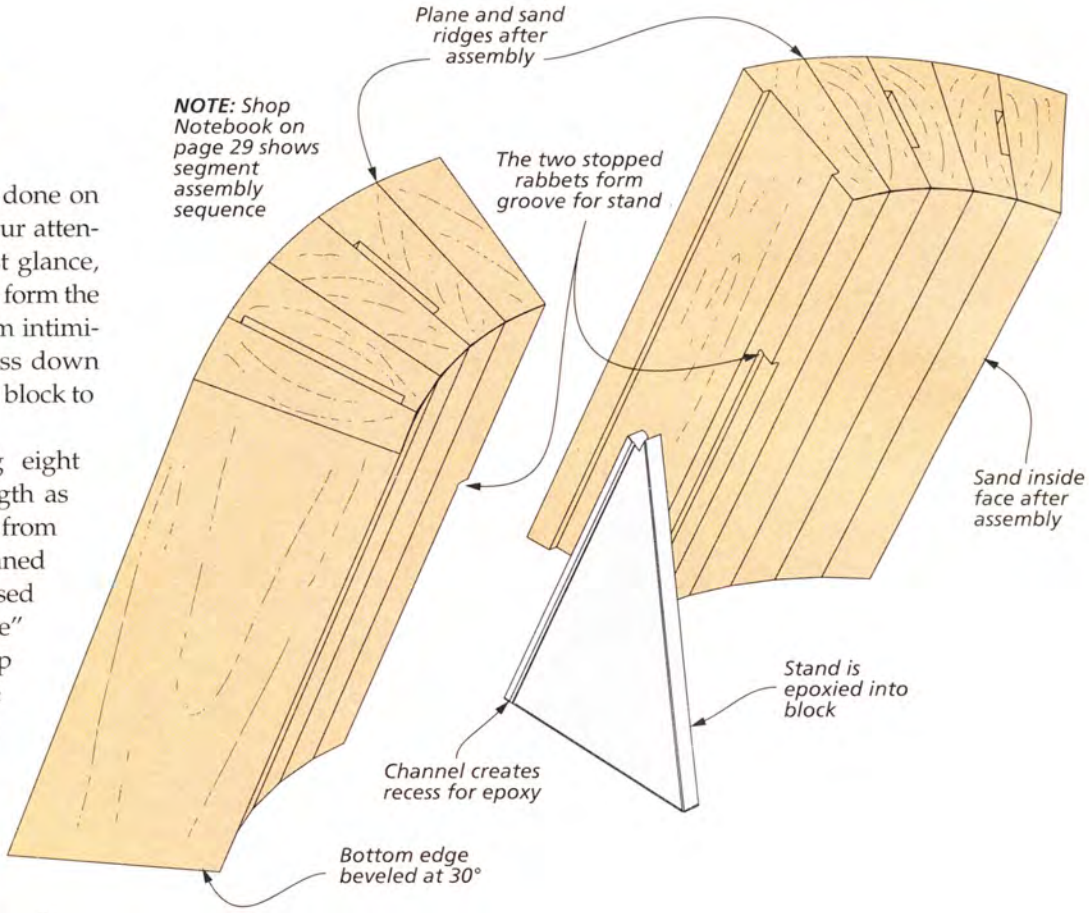


Knife Slot. A straight bit in the router table makes quick work of cutting the knife slots in the segments.



Rabbets. A stop line marked on the fence and the segment piece shows the end point of the rabbets.

Making the **BLOCK**



With all of the machine work done on the segments, you can turn your attention to some assembly. At first glance, gluing the segments together to form the arc of the knife block may seem intimidating. But I broke this process down into simple steps that allow the block to go together smoothly.

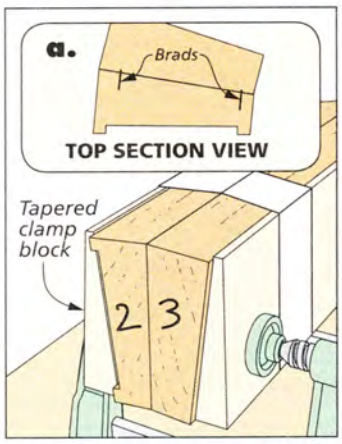
GLUE IT UP. Start by cutting eight clamp blocks to the same length as the segments. These are cut from the two extra boards you planed earlier. These blocks will be used to keep the segments "square" to the clamps in the first glueup sequence, as shown in the lower left illustration. The tapered faces of the clamp blocks should be facing in toward the segments.

To help keep the segments from slipping out of alignment, I drove a few small brads into one segment and clipped the heads off just proud of the surface (detail 'a' below left). Because the bottom edge will be beveled after the assembly is complete, keep the brads out of the lower few inches of each segment. In addition to the pair of segments shown below, you can also glue together segment pairs 4 & 5, 6 & 7, and 8 & 9. Shop Notebook on page 29 shows the remaining glueup sequence as well as the tips and techniques I used for gluing up the rest of the knife block.

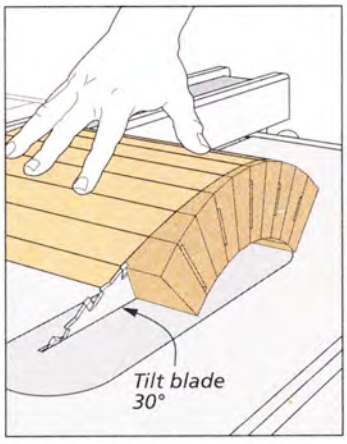
SQUARE UP & BEVEL. With the segments all glued together, the top edge can be squared up at the table saw. To bevel the bottom, I used the table saw with the blade tilted 30°, as shown below. The convex surface should be facing up with the top edge of the knife block riding along the rip fence. A 10" table saw blade won't cut all the way through. So I used a hand saw to complete the last little bit of the cut. Using adhesive-backed sandpaper on a flat surface, sand the top and bottom of the block flat.

ROUND IT OUT. Now it's just a matter of smoothing the ridges on the convex face with a block plane, as shown below. Then you're ready to sand the outside

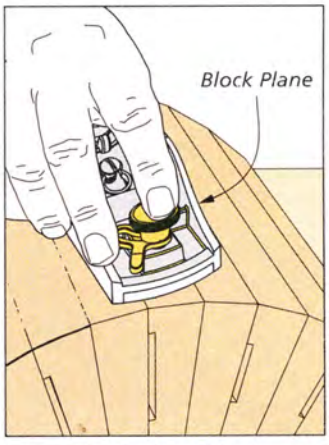
How-To: COMPLETE THE BLOCK



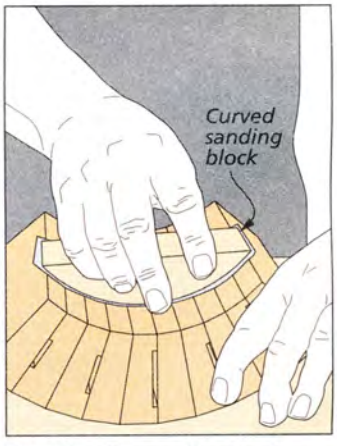
Glue Up Pairs. Start the assembly by gluing these segments together.



Bevel The Bottom. Raise the blade all the way up, then finish the cut with a hand saw.



Smooth Back. A block plane and sandpaper make quick work of the outer face.



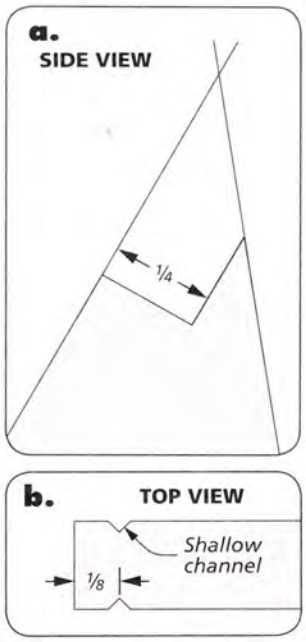
Sanding Inner Curve. A sanding block was used to smooth the inner face.

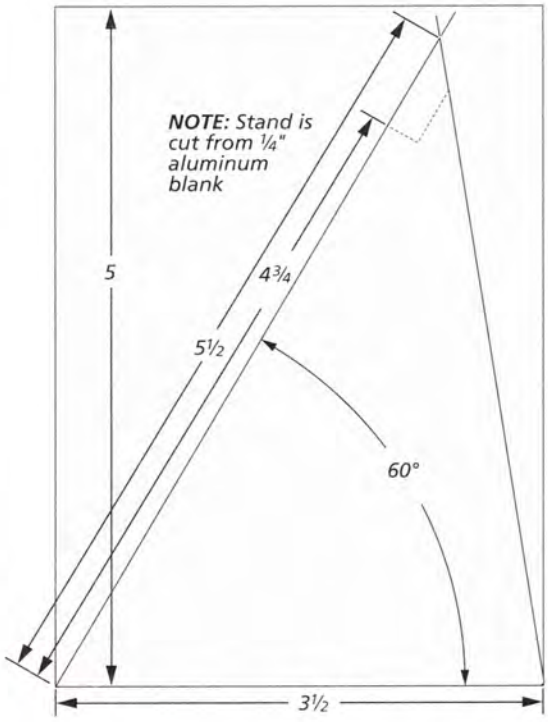
face smooth. For the inside face, I made a sanding block by tracing the shape of the curve onto a thick scrap piece and cutting it out at the band saw (bottom right drawing, opposite page).

ALUMINUM STAND. With the woodworking portion of the knife block complete, it's time to do a little metalworking to make the stand. Start by cutting the aluminum stand to the size shown, including the notch on the top edge. I used a jig saw with a metal-cutting blade to make these cuts. The aluminum blank is very easy to cut with it securely clamped to your workbench. A file and sandpaper make quick work of cleaning up the saw marks on the edges.

GROOVE. The aluminum stand fits into the stopped groove on the inside face of the block and is held in place with epoxy. To give the epoxy a little room to grab, and to give this joint some mechanical strength, I cut a couple of shallow V-grooves along the inside edge of the stand. The top middle box below shows how I made these grooves at the table saw.

FILE & SMOOTH. With the grooves complete, the outside edge of the stand can be eased with a file and sanded smooth.

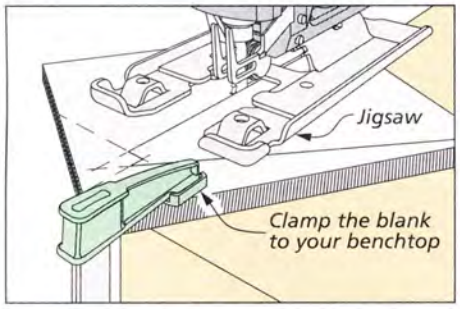




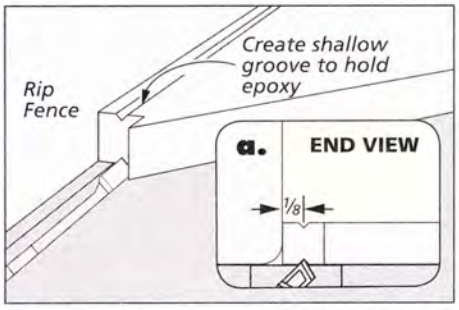
Next, I used an abrasive pad and cleaned up both faces of the aluminum stand, being sure to keep the sand marks oriented in the same direction.

EPOXY & FINISH. All that's left is to apply the finish and glue the stand to the block. To bring out the beauty of the cherry, I used *General Finishes'* Antique Cherry stain. As shown in the middle box below, I then taped off the stand and block to keep the epoxy off of the stained surfaces. With the stand in place, set the knife block upright on a flat surface while the epoxy sets up. Then it's just a matter of applying three coats of lacquer to the block. W

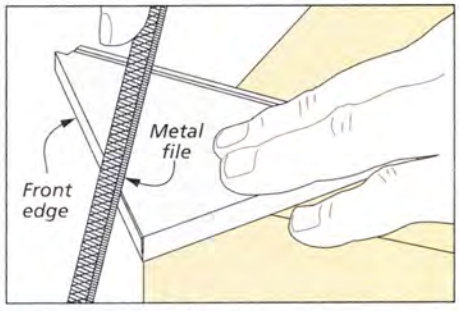
How-To: MAKE & INSTALL THE STAND



Cut To Size. A jigsaw with a metal cutting blade works perfectly to cut the aluminum stand to size.

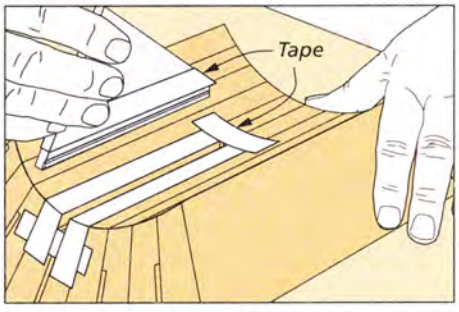


Groove. Using the rip fence as a guide, cut a groove on both faces with the table saw blade tilted to 45°.



Round Over Edge. Use a flat metal file to ease the front edge of the stand. Then sand the edge smooth.

Sand Faces. Use an abrasive pad to clean up the stand faces. Keep the sanding marks oriented in the same direction.

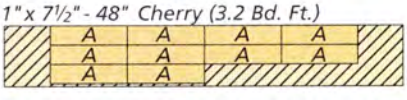


Epoxy. Tape off the surrounding areas on the stand and block. Remove the tape before the epoxy sets.

Materials & Cutting Diagram

A	Segments (10)	1 x 2 3/8 - 9 1/4
B	Stand (1)	1/4 Alum. x 3 1/2 - 5

1" x 7 1/2" - 48" Cherry (3.2 Bd. Ft.)



Designer Project

Stylish Curved Bench

Form and function combine in this sleek-looking seat. It's a bench that will look at home in an entryway or any room in the house.

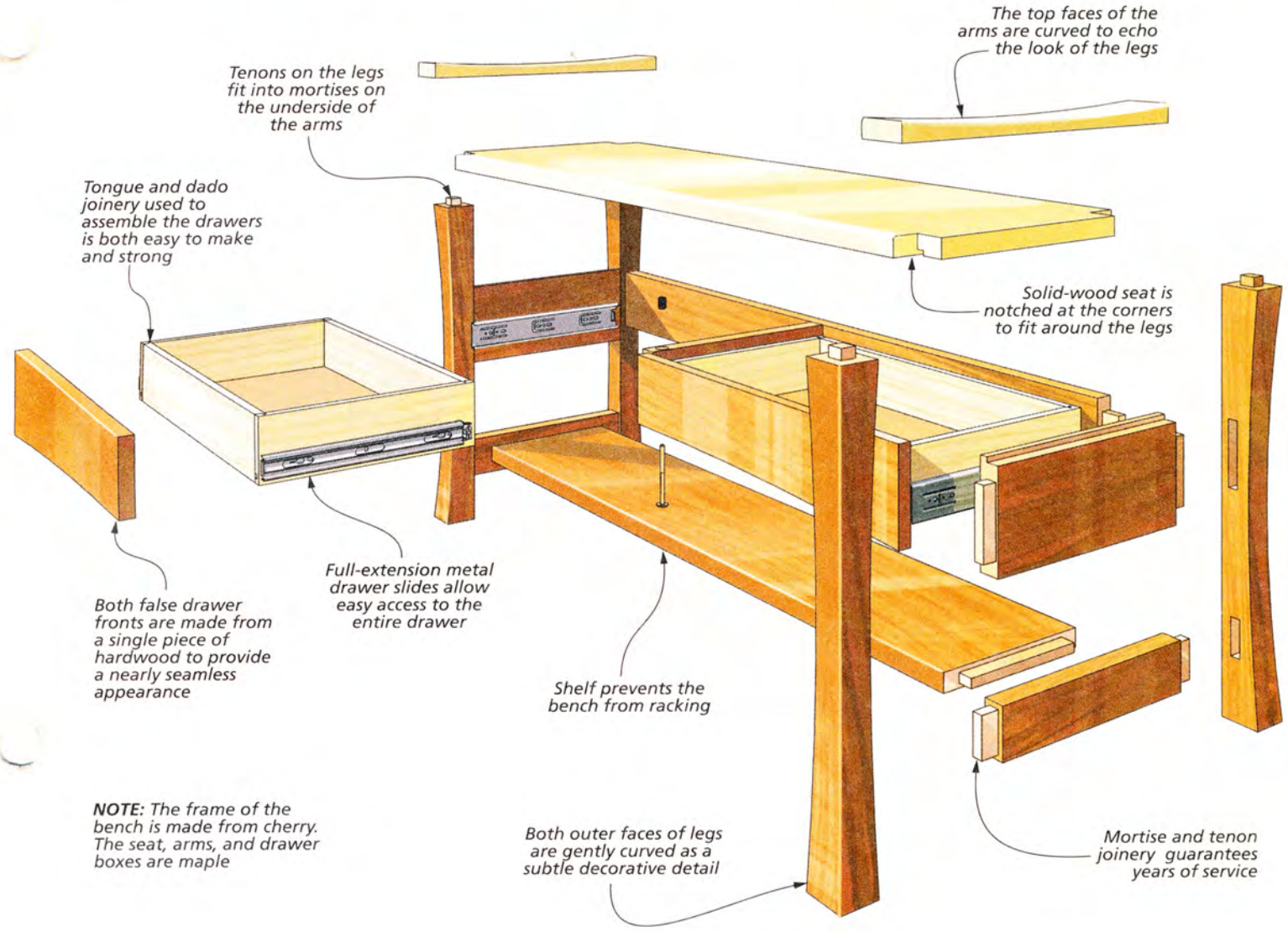
No entryway or mudroom should be without a bench. It's a utilitarian piece of furniture that provides the perfect place to sit down while removing your shoes after entering the home. But it's often an afterthought or an old hand-me-down.

This bench is anything but. The elegant curves of the legs and arms and the beautiful, contrasting hardwoods make it a welcome piece of furniture, no matter where you place it. I chose cherry for the main body and maple for the seat and arms, but a little shopping around will help you find a combination of hardwoods that's right for your home.

In addition to being a handy seat, it also features a pair of drawers for stowing items like gloves and stocking caps out of the way. A low shelf under the bench serves as a stretcher between the ends and adds even more storage space for larger goods.

The bench also features some woodworking techniques that you'll enjoy. The curved legs, for instance, might look difficult, but I'll show you a simple way to make them all identical. And the drawers couldn't be easier. From the tongue and dado joinery to the full-extension drawer slides, they're quick and easy to construct. It's a project that won't take long to build but will provide a lifetime of service.

Construction Overview / OVERALL DIMENSIONS: 46½"W x 18"D x 23"H



▲ The handy drawers are covered with false fronts made from a single piece of cherry. This allows them to remain "hidden," but they offer plenty of bonus storage when opened up.

◀ The contrasting cherry and maple, coupled with the curved design, combine for an elegant look.

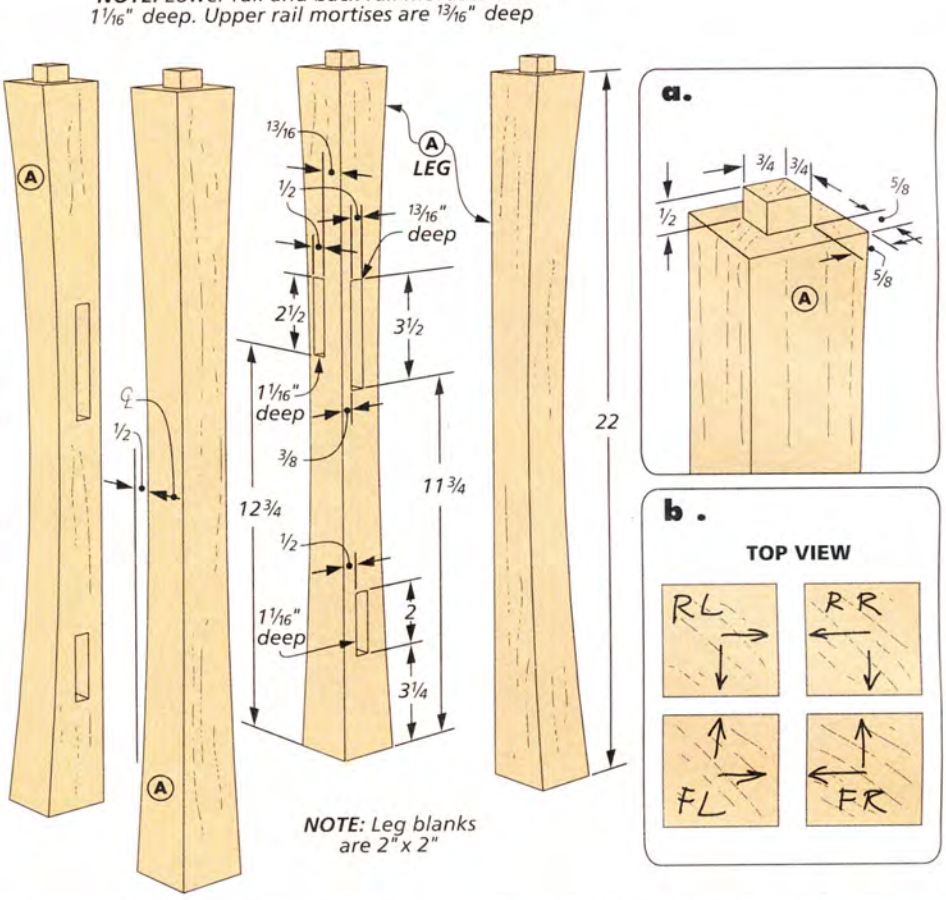
Start with the LEGS & RAILS

The legs are not only a point of visual interest for the bench, but they also include mortises that will accept tenons on the rails. Each leg also has a tenon on the top that fits into mortises on the arms.

LEG BLANKS. For the leg blanks, I used 2"-thick cherry. But you could also make blanks glued up from thinner stock. After marking the outside faces, stand the legs together and mark the position on the top of the blank (detail 'b').

MARKING. Now you can mark the location of the mortises that will accept the upper and lower rails. There's one unusual thing about the position of the mortises. The mortises for the upper rails are ⅛" closer to the inside edge than the lower mortises. This way, the upper rails will be flush with the inside edge of the leg, so when it comes time to install the drawers, you'll have a flush surface for the metal slides. The rear legs also need a mortise for the back rail. Note that it's offset so it doesn't interfere with the mortise for the upper rail. Lay it out and mark it now, as well.

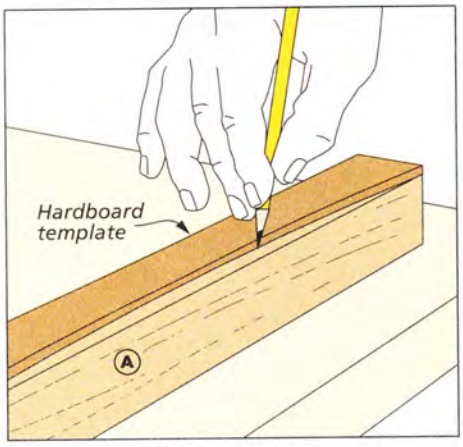
CUT THE MORTISES. I drilled out the waste for all the mortises at the drill press and squared up the ends with a chisel. Make sure the walls are as smooth as possible for the best glue bond.



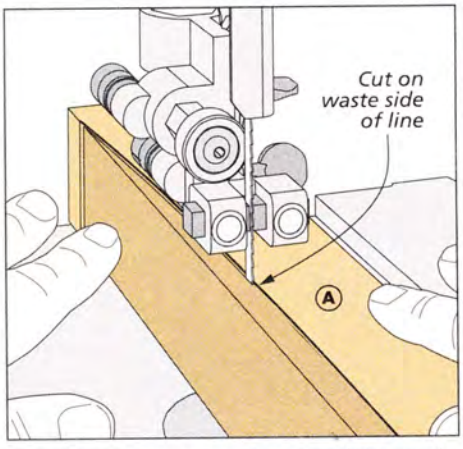
TENONS. With the mortises complete, you're ready to cut the tenons on the tops of the legs (detail 'a'). For this, I installed a dado blade and used a miter gauge to cut the tenons.

CURVES. In order to lay out the curves on the legs, I made a hardboard template. With the template, you can trace the curve on the appropriate faces of each blank. To make the template, hold a metal rule or thin piece of hardwood at each end of the hardboard template blank and bend it in so the center of the arc is ½" in from the edge. Trace the arc and cut out the template at the band saw. After sanding the template smooth, mark the curves on the legs and cut them to shape at the band saw. Use the template to flush-trim the blanks with your router (box below).

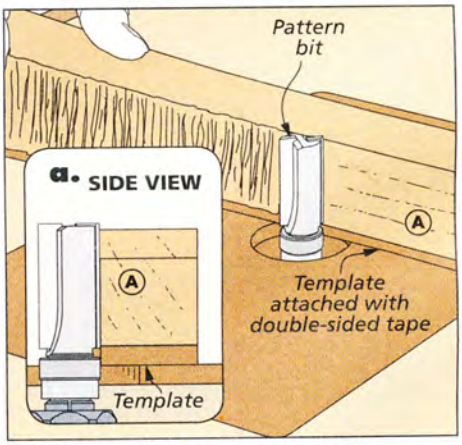
How-To: SHAPE THE CURVED THE LEGS



Mark the Curve. Use the hardboard template to trace the arc on the two outside faces of the leg blanks.



Band Saw. Remove the template, and cut the curve on the band saw, staying on the waste side of the line.



Flush Trim. With the template attached, clean up the saw marks by trimming the workpiece flush.

RAILS & ARMS

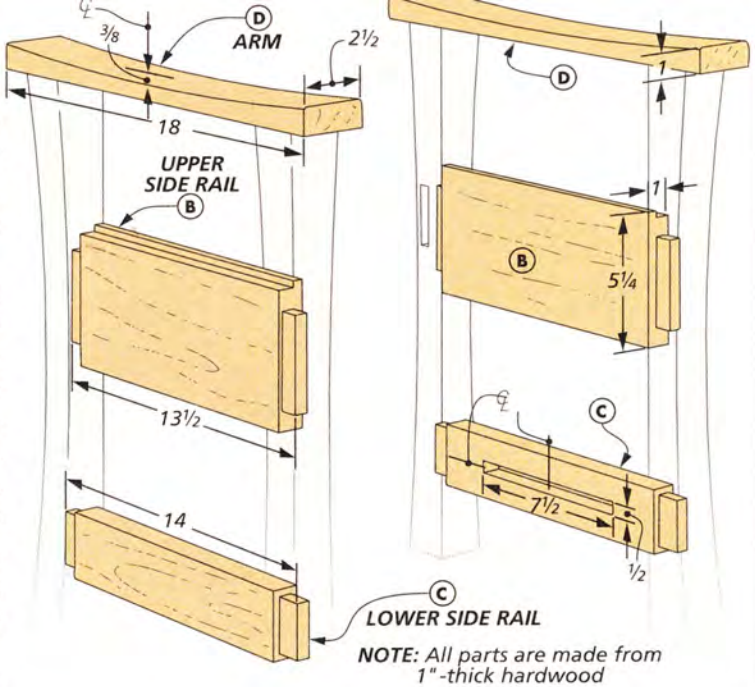
Now that you've completed the four legs, the next step is to add a pair of rails to build two end assemblies. Then, mortises in the gently curved arms fit on tenons on the legs to cap each end.

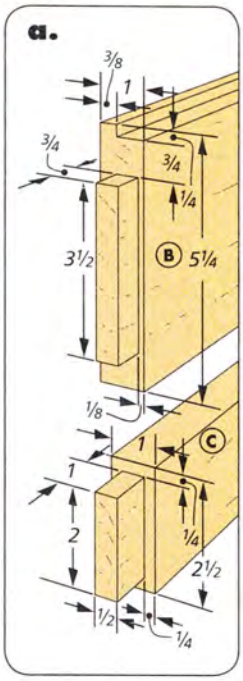
SIDE RAILS. To make the bench sturdy, I used 1"-thick stock for most of the parts. The first step is to cut the two upper and lower rails to size. Note that the length is different for the two due to the difference in the length of the tenons. As is the case with the mortises you cut earlier, the tenon on the upper rail is shorter so it won't interfere with the back rail. The important thing is to make sure the shoulder-to-shoulder length for all the pieces is the same.

UPPER SIDE RAIL. As I said earlier, I designed the upper rail to fit flush with the inside edge of the legs. That's why the tenon and the mortise on the leg are offset (detail 'b').

To cut the tenons, I started with the shallower of the two cheek cuts, and then raised the blade for the second cut (left drawing below). After completing the tenon, adjust the blade and fence to cut a rabbet on the top edge of the rail. This forms a tongue that fits in a dado on the seat you'll add later.

LOWER SIDE RAILS. The lower rails are pretty straightforward. The tenons are centered on the ends, as is the long mortise on the inside face that holds the shelf (center drawing below). The thing to note is that the tenons are a full 1" long, as shown in details 'a' and 'b.'

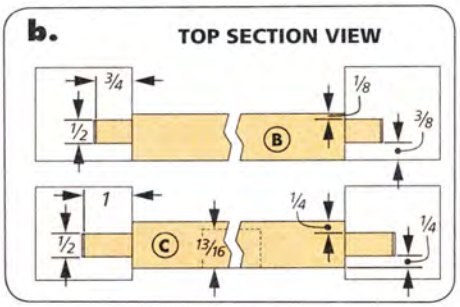




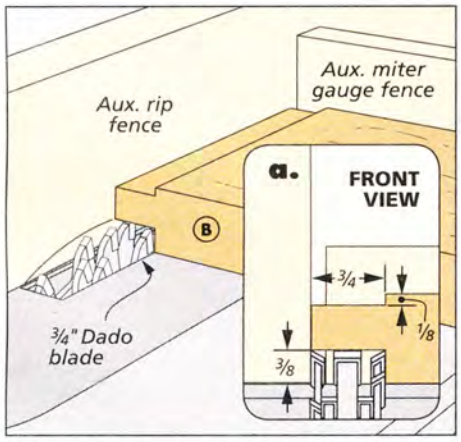
ASSEMBLY. At this point, you can dry fit the ends and inspect the joints to make sure there are no gaps. Then, add glue and clamps to each end assembly.

ARMS. Now you're ready to add the maple arms. Here again, the pieces are curved to complement the legs. But for now, leave them square while you cut the mortises that fit over the legs. After planing the arms to thickness and cutting them to final size, you can use the end assemblies to lay out the location for each mortise (right drawing below).

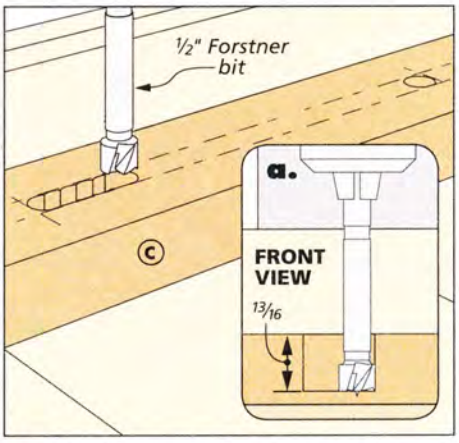
I started by cutting a pair of 1"-thick spacer blocks. By placing a block at each end, you can position the end assembly on the underside of the arm and trace the mortise locations. Now drill out the waste and square up the sides with a chisel. With the mortises done, lay out the gentle curve on the arms and cut the curve at the band saw. After cleaning up the cut surface and easing the sharp edges of the arms with a bit of sanding, attach them to the end assemblies with glue and clamps.



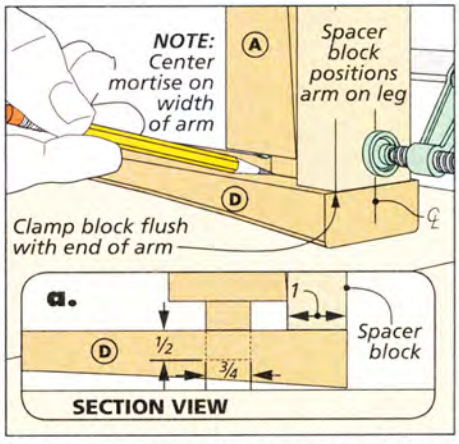
How-To: COMPLETE RAILS & ARMS



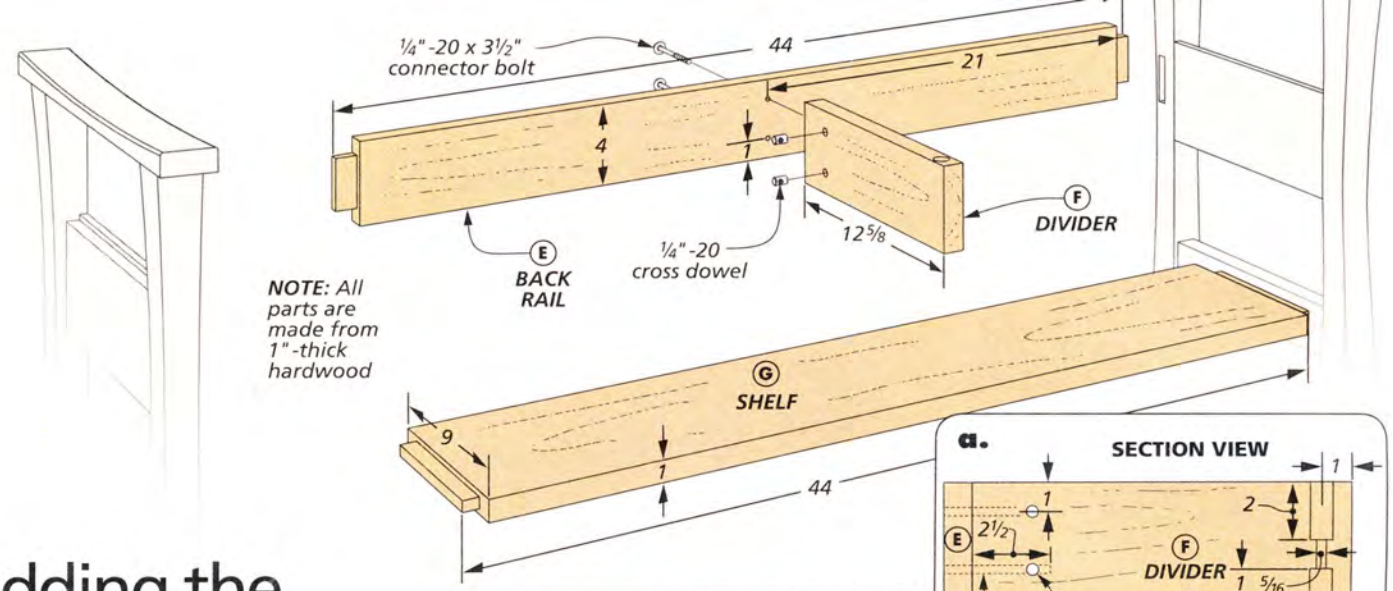
Deep Cheek. To cut the offset tenon on the upper rail, you'll need to raise the blade for the second pass.



Mortise Lower Rail. A Forstner bit makes short work of removing the waste in the mortise. Clean up with a chisel.



Mortise Layout. Clamp a spacer block to the leg while you mark the mortise locations with a sharp pencil.



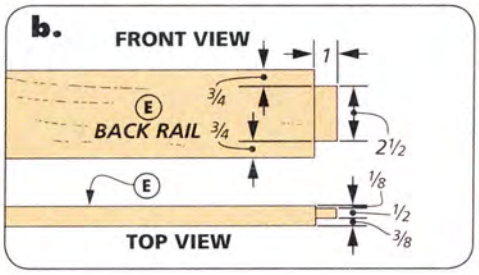
Adding the SHELF & SEAT

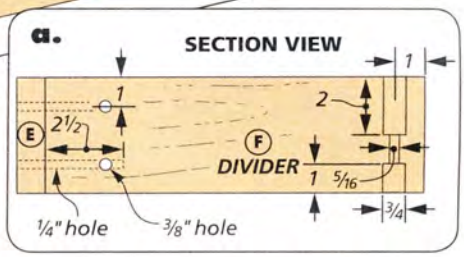
With the end assemblies complete, you're ready to add the back rail, shelf, and seat. In addition, this is the time to install a divider that separates the two drawers that will be added later.

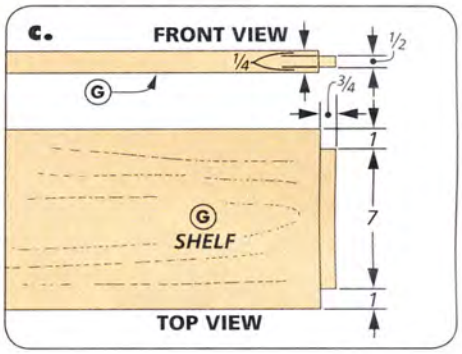
BACK RAIL. Along with the seat, the back rail and the shelf tie the ends together. The mortises for the rail are offset, as is the tenon, to clear the adjacent mortises for the upper side rails (detail 'b').

The back rail also serves to hold the divider. As you can see in the main drawing, the divider is attached using connector bolts and cross dowels. Start by marking the location for the two shank holes for the connector bolts at the center of the rail. After drilling the holes, use a pair of dowel centers in the holes to mark the location on the end of the divider. You'll need to place both pieces on a level surface and tap the divider with a hammer to transfer a mark for the exact spot to drill the matching holes.

DIVIDER. Now you can drill two holes into the end of the divider. I clamped the workpiece in a vise and used a doweling jig to drill the holes (left drawing below). The doweling jig not only ensures the correct hole location, but it also keeps the bit square as you drill into the end grain.







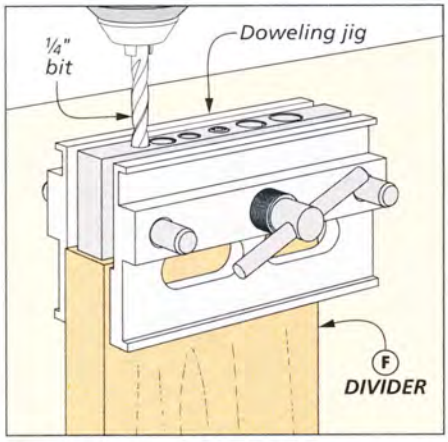
As you can see in the right drawing below, you'll also need a pair of holes in the face of the divider for the cross dowels that secure the connector bolts from the back rail. I drew a line through the center of the holes and transferred that line to the face of the divider with a square so I could set the drill press fence to drill the matching holes.

Finally, drill the opposite end of the divider to house another connector bolt that fits into a threaded insert in the seat. Detail 'a' has the information you need to drill the correct depths for the shank hole and the two counterbores.

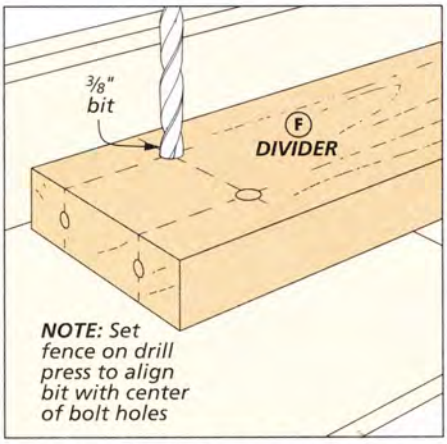
SHELF. The shelf helps connect the two end assemblies. I had to glue up narrower stock to reach the necessary width for the shelf. After that, just cut the tenons on the ends (detail 'c').

ASSEMBLY. Before you assemble the base, it's a good idea to take time for a dry fit. The shoulders on the back rail and the shelf must seat properly for the joints to close. If they don't, you might need to do some trimming for a better fit. After that, assemble the bench frame with glue and clamp it up.

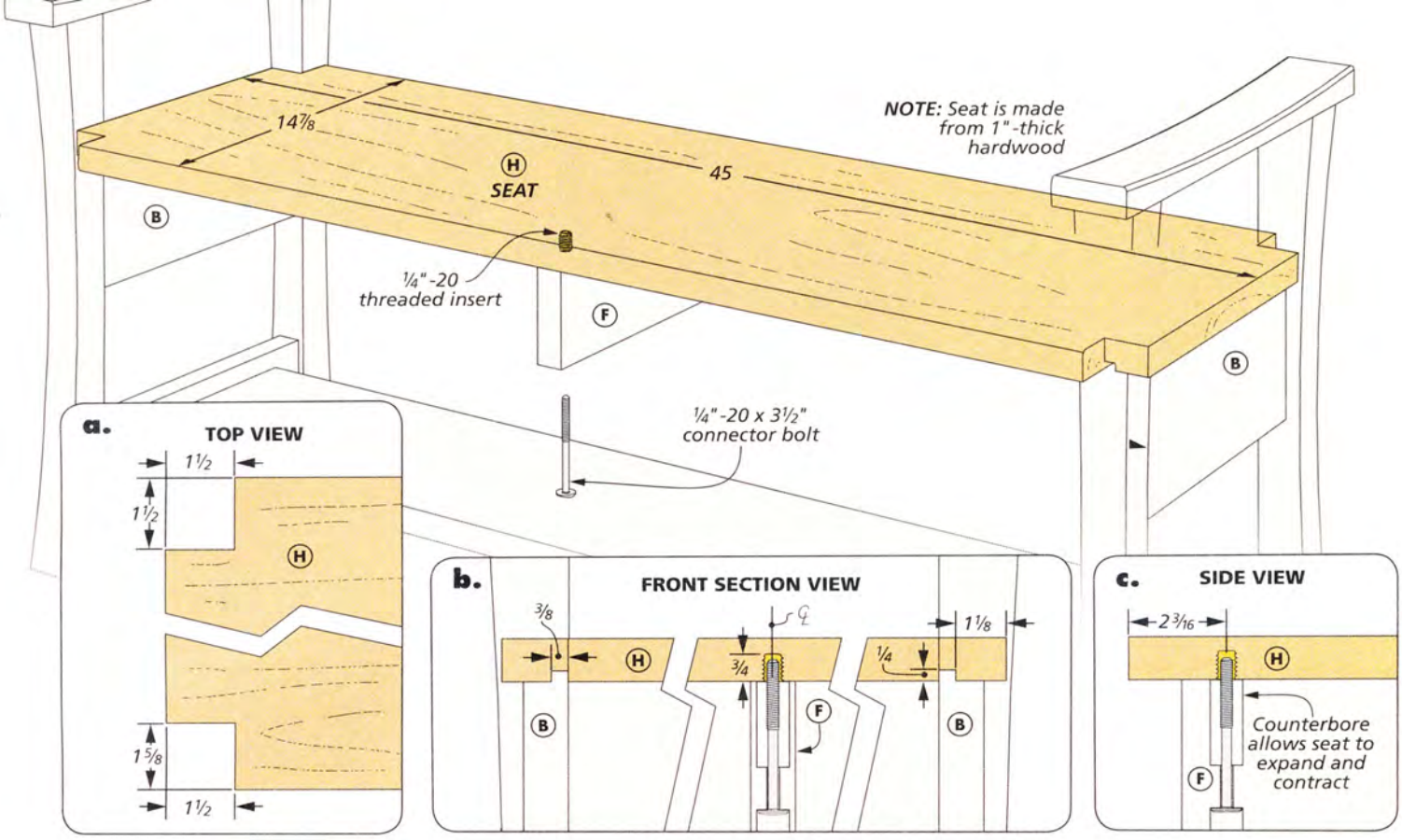
How-To: DRILL THE DIVIDER



Doweling Jig. With the divider held in a vise, use a doweling jig to drill the holes for the connector bolts.



Drill. Transfer the layout marks from the end to the face of the blank and drill holes for the cross dowels.



THE SEAT

It wouldn't be much of a bench without a good place to sit down. The solid maple seat is notched to fit around the legs. It also serves as the top that hides the drawers underneath. I started by making the seat and fitting it first. After that, adding the drawers is a breeze.

SEAT BLANK. I glued up three narrower pieces to make a blank for the seat. This is where having a little extra stock comes in handy, so you can grain-match the pieces for the best look. I chose to glue up two pieces first, so I could run them through my planer after the initial assembly. After the glue has dried, scrape away the excess and plane all the stock to final thickness. Then joint the edges and glue the final piece to the assembly. This way, you only have one glue line to clean up by hand. Then you can sand the blank smooth.

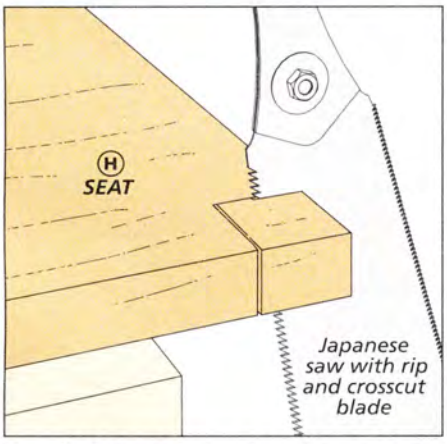
COMPLETING THE SEAT. There are still a couple of things to take care of to complete the seat. First up are the notches on each of the four corners that accommodate the legs. I found it faster and easier to cut these notches with a hand saw. The left drawing in the box below shows how I used a Japanese *ryoba* saw. It has both rip and crosscut teeth to cut the notches, since both types are required. Note in detail 'a,' above, that the notches in the front and back of the seat are different sizes to allow the seat to fit flush with the back edge of the back rail.

Before cutting the dadoes, you can fit the seat in position inside the legs and mark the dado locations by tracing the tongues on the seat. By continuing the mark up the edge, you can align the cut with the dado blade for a good fit. While you have the seat in position, insert a long drill bit through the hole in the divider to mark the location for the threaded insert in the underside of the seat.

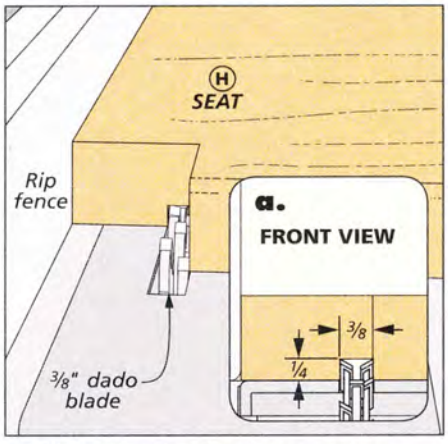
With the layout complete, I installed a ⅜" dado blade to cut the dado near each end of the seat. The dadoes are sized to fit over the tongues on the upper rails.

After drilling a hole and installing a threaded insert in the underside of the seat, you can temporarily attach it to the bench. But don't glue it to the upper rails just yet. You'll want to be able to remove it for staining and finishing.

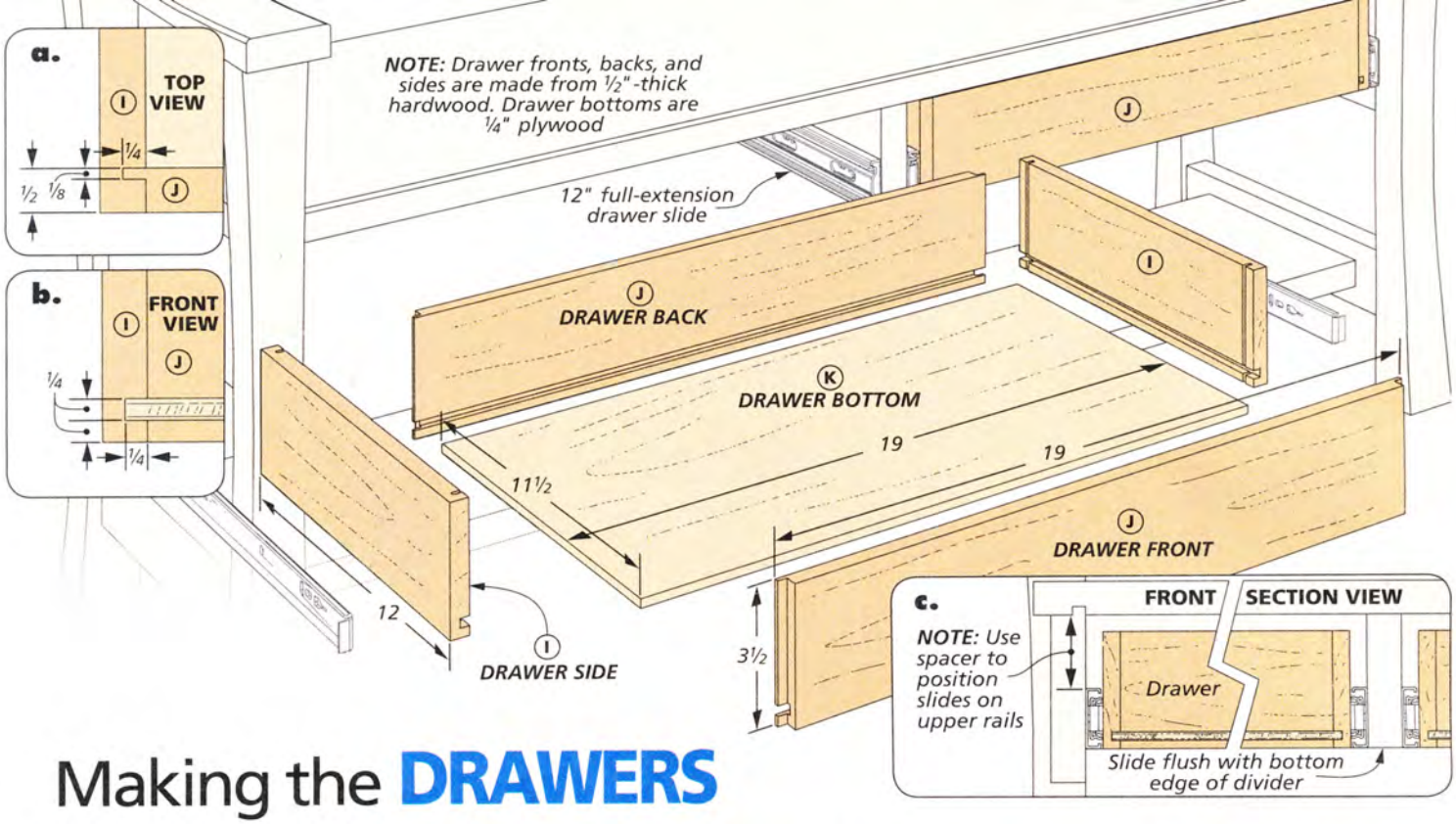
How-To: PREPARE THE SEAT



Notch Corners. Cutting the notches with a hand saw is quick and easier than setting up a jig for a power tool.



Dado Ends. Set the dado stack to match the tongue on the upper rails and then cut the shallow dado.



Making the DRAWERS

A pair of drawers completes the bench. And by using tongue and dado construction to assemble them, it couldn't be easier. But the real magic comes when you make the false fronts out of a single, long workpiece. The continuous grain on the face of the two drawers is a great decorative visual detail.

JOINERY. Tongue and dado joinery is perfect for drawers like these. The joint features plenty of mechanical strength in addition to the added strength of the glue bond (detail 'a'). But the real attraction is how easy it is to cut these joints. It's all done at the table saw. The box below shows the simple, two-step process. Using test pieces to set up the cuts allows you to sneak up on the perfect fence position and blade height, the two factors that make for tight joints.

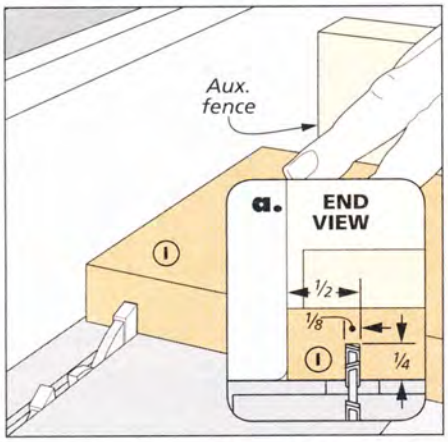
The only thing you need to be mindful of before cutting the joints is that the stock is straight and square. If the ends aren't square, the drawers won't be either. After cutting the tongues and dadoes, you can cut the groove on the bottom edge of the drawer parts to hold the plywood bottom (detail 'b').

ASSEMBLY. Clamping up the drawers is pretty easy, as well. For the most part, this type of joinery is easy to square up, especially with the addition of the plywood bottom. But I still check the assembly with a square to make sure everything's as it should be.

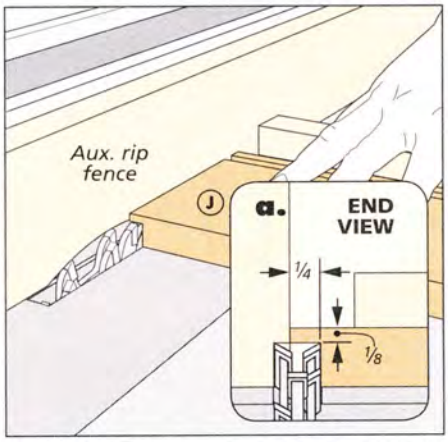
HARDWARE. After assembling the drawers, you can attach the drawer slides to the ends of the bench and on the divider. I normally use a spacer resting on a cabinet bottom to make sure the slides are positioned evenly. In this case, I had to turn things around a bit. First, I installed the slides on the divider, flush with the bottom edge. Then I cut a spacer to fit between the drawer slide and the seat. I used this spacer to position the slides on the upper rails (detail 'c'). This ensures that all the slides are positioned at the same level.

FALSE FRONTS. The curved false drawer fronts are the final decorative touch to the bench. I made these from a single piece of stock with an attractive grain pattern. You can begin by cutting the gentle curve in the blank. Then just cut it at the centerpoint and mount both halves to the drawers. Shoot for a ⅛" gap all around as you align the false fronts. Hold them in place with double-sided tape while you drill screw holes.

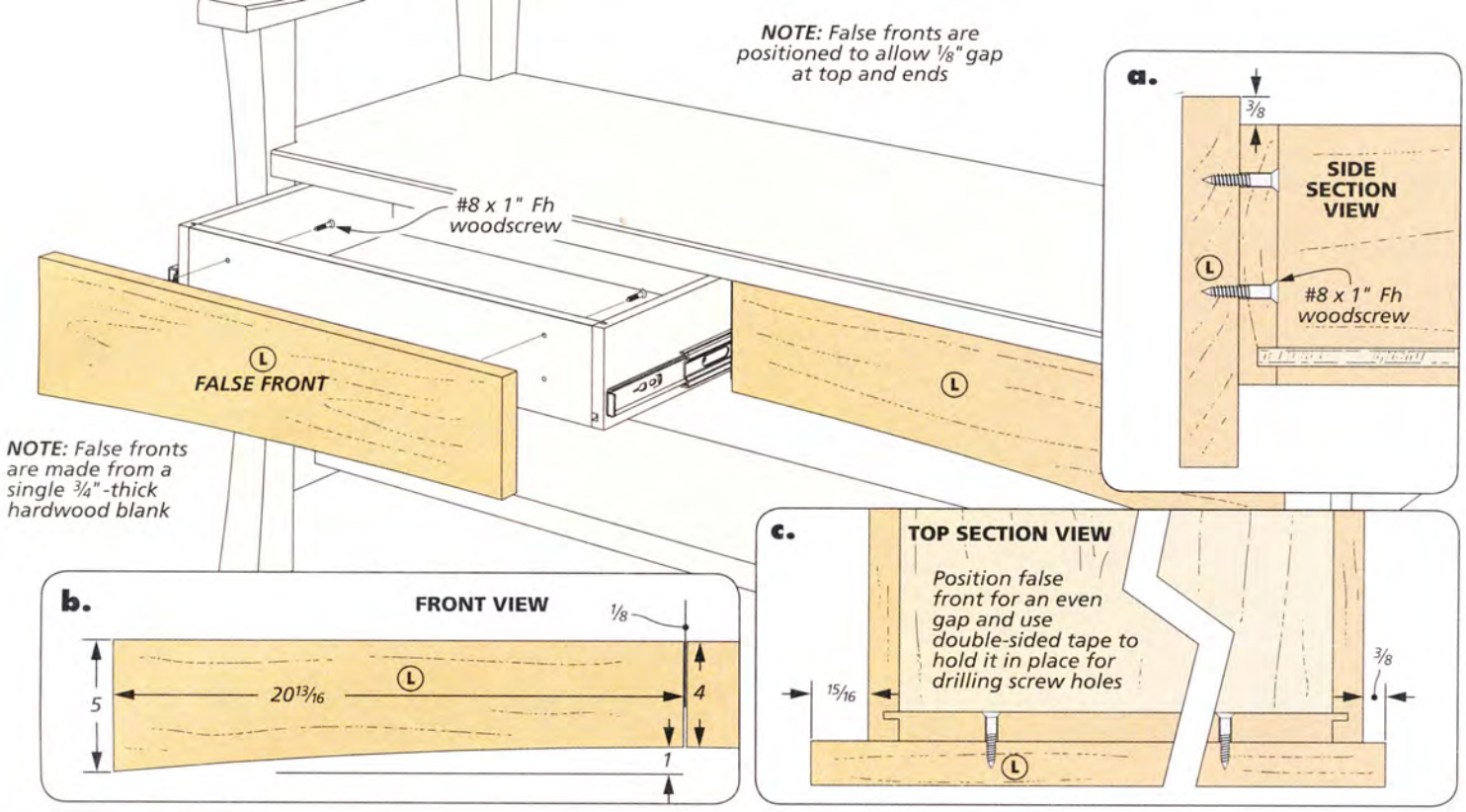
How-To: TONGUE & DADO DRAWER JOINERY



Dado. Install an auxiliary fence on the miter gauge and use the rip fence as a stop to position the dado.



Tongue. With the dado blade partially buried in an auxiliary rip fence, rabbet the end to form the tongue.



FINISHING. Before going any further, it's best to apply the stain and finish. All you need to do is remove the drawers and seat so you can easily access the inside. I also masked the tongues on the upper rails to prevent finish from spoiling the glue surfaces.

I didn't stain the maple parts of the bench, but I did add some color to the cherry pieces. I mixed three parts of *Zar* cherry with one part *WoodKote Jel'd* cherry stains. After that, I sprayed on a few coats of clear lacquer. A clear polyurethane finish would also be a good choice as it provides a lot of protection. For a bench, a durable finish is important.

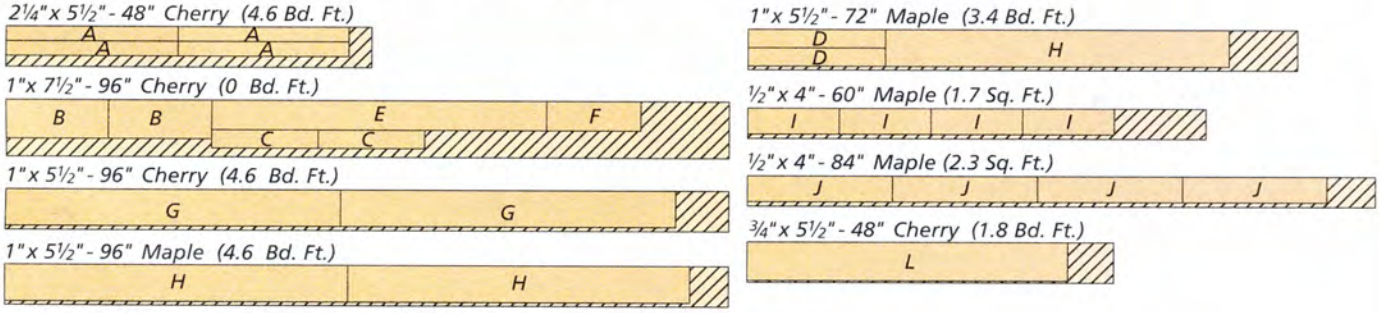
FINAL ASSEMBLY. After the finish dries, you can attach the seat to the frame. The first thing to do is add a little glue on the tongues of the upper end rails and fit them into the dadoes on the seat. Then you can install the connector bolt through the hole in the divider into the threaded insert in the underside of the seat. Tighten the connector bolt and add a few clamps on the corners.

By now, I'm sure you have the perfect place in mind for the bench. So all that remains is for you to get it out of the shop and into your home. (I advise getting a helper to move it.) This sturdy and beautiful bench is sure to provide many years of service. W

Materials, Supplies & Cutting Diagram

A	Legs (4)	2 x 2 - 22½
B	Upper Side Rails (2)	1 x 5¼ - 13½
C	Lower Side Rails (2)	1 x 2½ - 14
D	Arms (2)	1 x 2½ - 18
E	Back Rail (1)	1 x 4 - 44
F	Divider (1)	1 x 4 - 12⅝
G	Shelf (1)	1 x 9 - 44
H	Seat (1)	1 x 14⅞ - 45
I	Drawer Sides (4)	½ x 3½ - 12
J	Drawer Fronts/Backs (4)	½ x 3½ - 19
K	Drawer Bottoms (2)	¼ ply. - 11½ x 19
L	False Front Blank (1)	¾ x 5 - 42 rgh.

- (3) ¼"-20 x 3½" Connector Bolts (Rockler 31864)
- (2) ¼"-20 x 16mm Cross Dowels (Rockler 31823)
- (1) ¼"-20 Threaded Insert (Rockler 33183)
- (2 pr.) 12" Full-Extension Drawer Slides (Rockler 32466)
- (8) #8 x 1" Fh Woodscrews



ALSO NEEDED: *One 24"x 24" Sheet of ¼" Cherry Plywood*

tips from our shop

Shop Notebook

Planing Sled

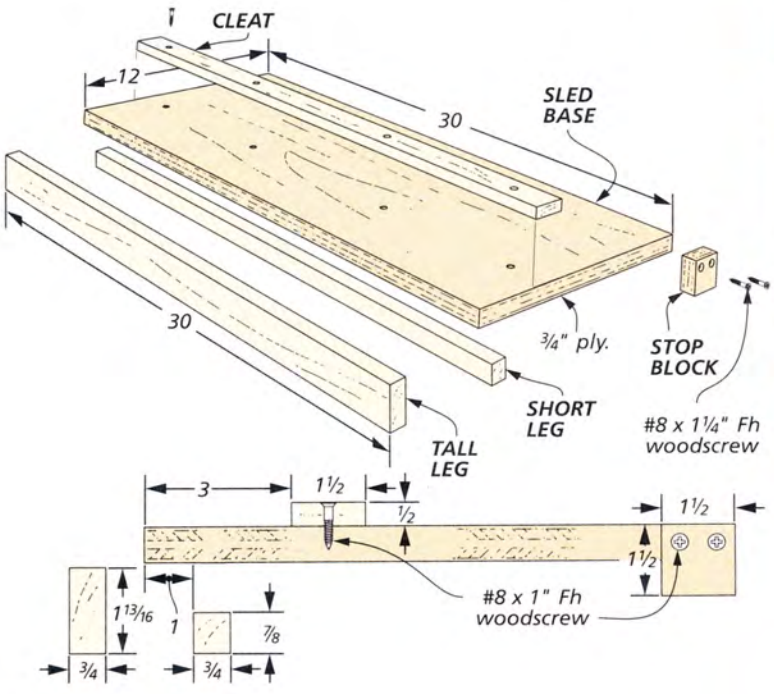
The custom knife block on page 16 is built from individual segments that are beveled on both faces before being glued together. To ensure precise, smooth bevels, I built this simple sled to hold the workpiece at the proper angle as it passes through the planer.

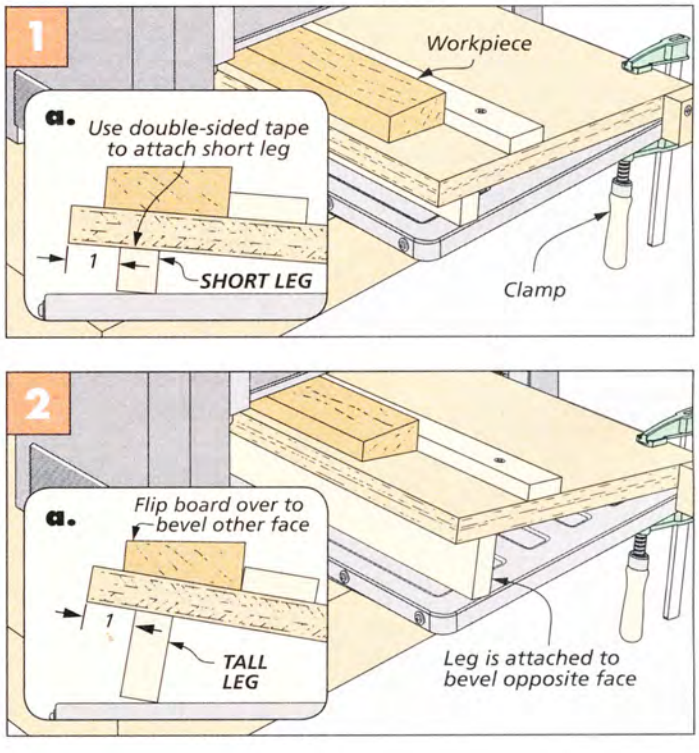
BUILDING THE SLED. The construction of the sled is fairly simple. The base is made from plywood, and the cleat and legs can be made from any straight stock that you have available.

Start by laying out the location for the cleat on the top of the sled. This cleat will support the stock as it's passed through the planer. A few screws are all that's needed to hold the top cleat in place.

Next, rip two boards for the legs on the bottom of the sled. The width of these legs determines the angle of the bevel on the boards. I also cut a small stop block and screwed it to the front of the sled. This block, along with a couple clamps, keep the sled from moving during use.

USING THE PLANER SLED. The legs get attached using double-sided tape. Use the short leg first to achieve the 5° bevel on one face of the stock (Figure 1). It's a good idea to make multiple passes through the planer until the entire width of the workpiece is planed flat. Remove the short leg and replace it with the tall leg (Figure 2). Simply flip the stock over and run it through the planer to bevel the other face until the final thickness is reached.

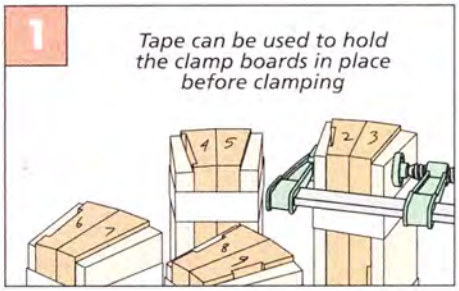


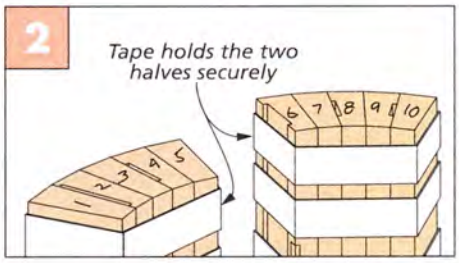


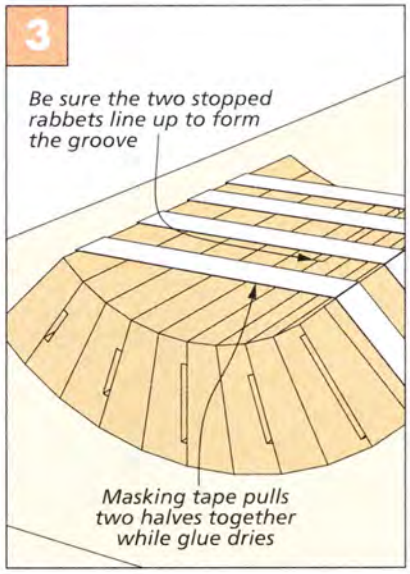
Pinned Glueup

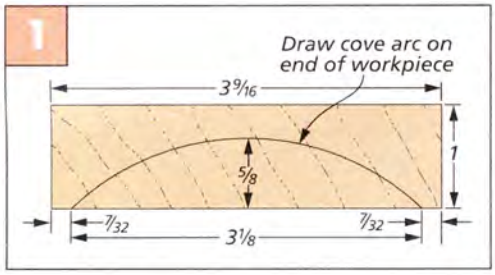
To assemble the segments for the knife block, I used a series of steps. Breaking the assembly process up ensures that you're never gluing more than one or two joints at a time. Figure 1 shows the segment pairings for the initial glue-up. Even with the brads between the segments to keep them in position, a third hand is necessary to get the clamp boards in place. So I used some masking tape to hold the clamp boards to each assembly and then clamped them together.

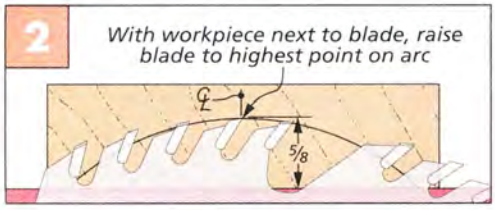
Using brads between the segments and tape as clamps, I completed the block as shown in Figures 2 and 3. In order to glue the two halves together, I found it best to lay the strips of tape out on my benchtop. I could then apply glue and secure the tape around the block.

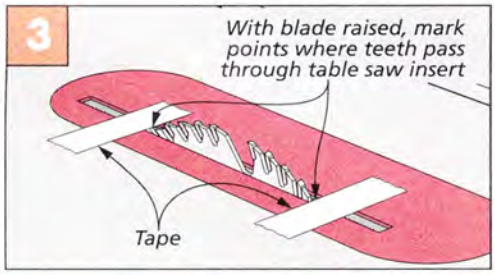


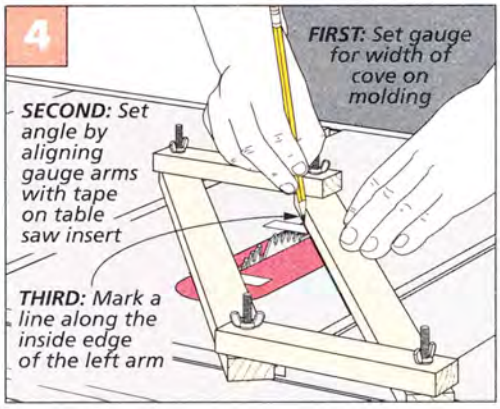


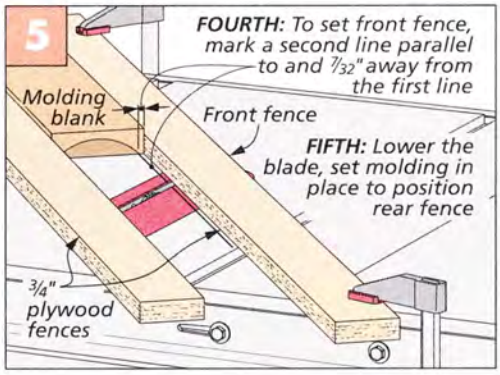












Crown Molding Setup

To cut the crown molding for the linen press (page 30), you'll need to pass the workpiece over the table saw blade at an angle in a series of passes. This cut isn't difficult to make, but it's important to set up a pair of guide fences at the correct angle for guiding the workpiece.

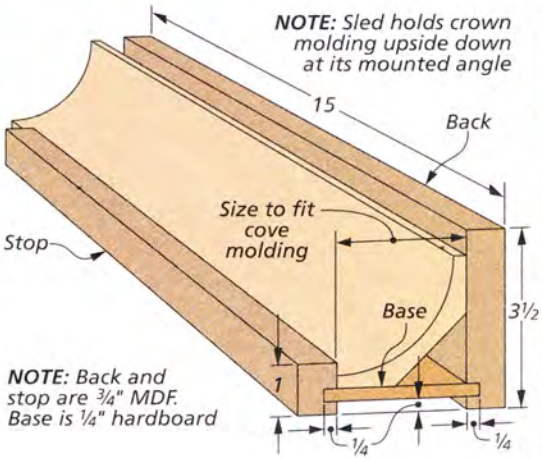
The best way to do this accurately is to use an adjustable gauge like the one shown in Figure 4 at left. The gauge is just four scrap pieces that are joined at the corners with bolts and wing nuts.

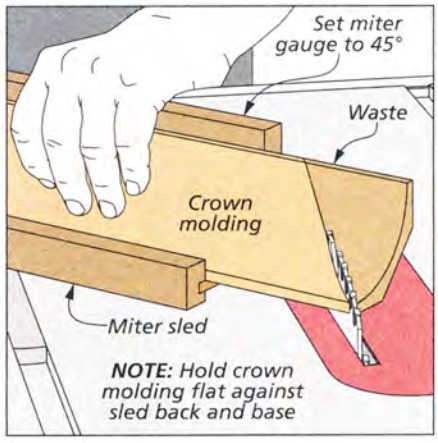
You can adjust the gauge opening to match the overall width (3 1/8" in this case) of the cove arc shown in Figure 1. Then simply follow the sequence of drawings to establish the location of the guide fences. Once that's done, make the crown molding as explained on page 38.

Crown Molding Miter Sled

The crown molding on the linen press is mitered to wrap around the edges. Because crown molding is installed at an angle, cutting this miter accurately can be tricky.

The solution is to cut the miter with the molding positioned at its mounted angle. This way, you simply set the miter gauge to 45° to make the cut. But it can be difficult to hold the molding securely at this angle while mitering it. The sled shown at right takes care of that. After building it, simply attach it to the miter gauge before cutting the molding. W





Heirloom Project

Linen Press

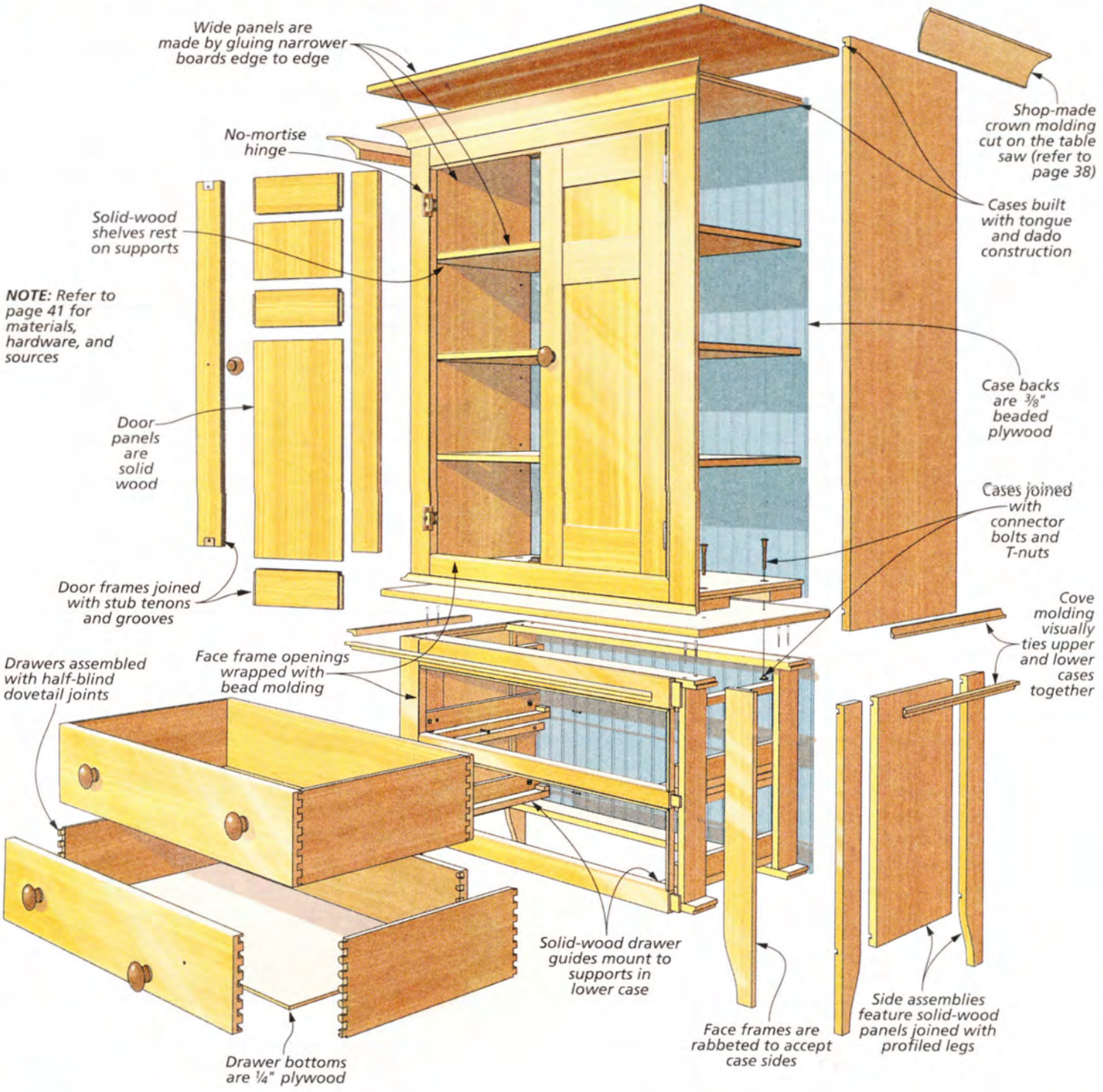
This stylish revival of a traditional furniture project will be a welcome addition to your home, as well as an heirloom to last for generations.

The linen press is a piece of furniture seldom seen in modern homes. But this cupboard that stores sheets, linens, and other textiles was essential in a previous era. Today, linen presses are often big-ticket items at antique furniture stores.

Made almost entirely from vertical-grain Douglas fir, this project is true to the tradition of the linen press and is sure to be a treasured heirloom in your family for many generations. Though it's a large project, the construction is fairly simple, with a few unique woodworking challenges mixed in for good measure.

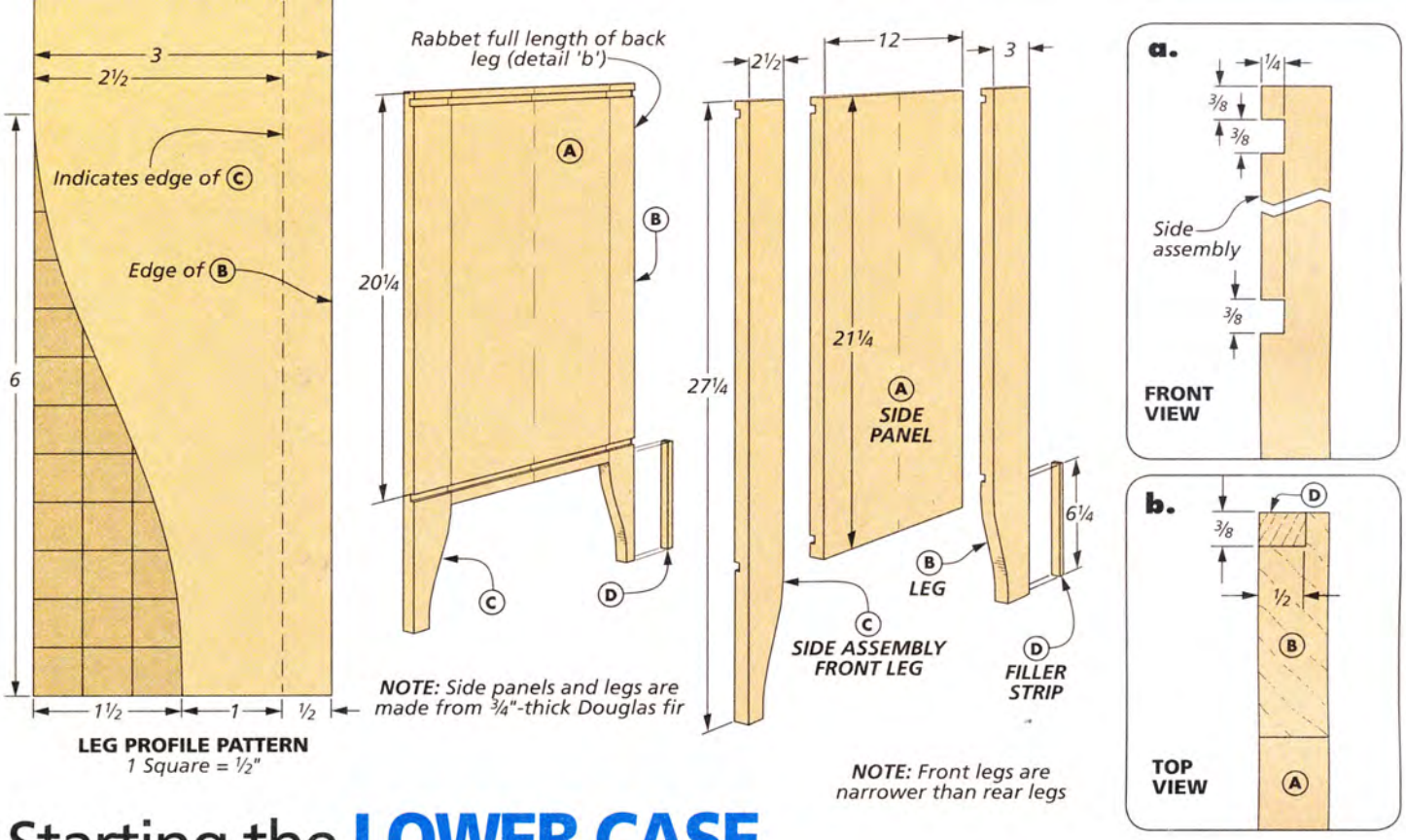
As you begin the project, you'll notice nearly every part is made from solid wood. So it pays to have a keen eye for matching grain on the lumber you choose.

Construction Overview / OVERALL DIMENSIONS: 45"W x 20½"D x 78"H



Timeless details like mitered cove molding, bead molding, and half-blind dovetails make this linen press a true heirloom woodworking project.

The crown molding at the top of the case is made by passing a board over the table saw blade at an angle. You can see how it's done on page 38.



Starting the LOWER CASE

The linen press is unquestionably a traditional piece of furniture. So making this project fit the definition of "heirloom" calls for not cutting any corners.

That meant choosing a wood, vertical-grain Douglas fir, that's sure to look good for generations. And there's very little plywood used in this project. Instead, I opted for solid-wood, glued-up panels throughout the construction.

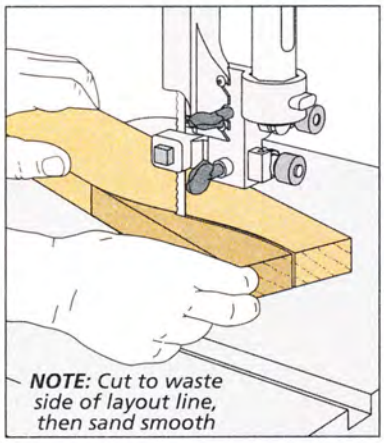
Choosing boards that look good next to one another is an important part of any woodworking project. But with all the glued-up panels in this project, matching the grain is especially important here. Before you begin this project, it's a good idea to take your time choosing lumber with a keen eye for consistent color and grain. An article with more information on grain-matching is on page 42.

LOWER CASE SIDE PANELS. Once you have selected the lumber, the lower case is a good place to start. It holds two drawers and features profiled legs at the corners. The case's two side assemblies are made up of glued-up panels joined with legs.

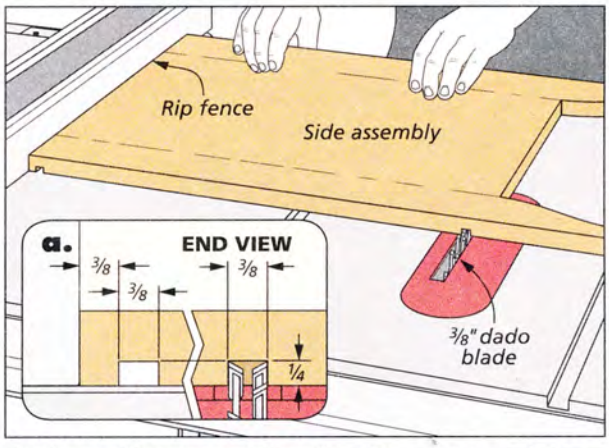
After spending some time at the planer thicknessing boards for this project, I got started by gluing up boards for the side panels. Once the glue dries, you can cut these panels to their final size.

LEGS. The next step is to prepare the legs. It's important to note that the front leg of each side assembly is narrower

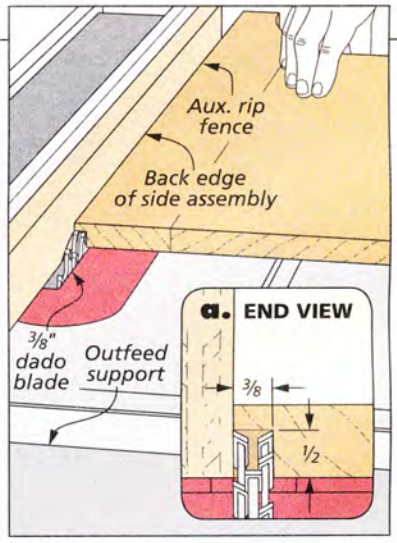
How-To: CREATE SIDE ASSEMBLIES



Cut Profile. Using the pattern above, trace and cut the profile on each leg at the band saw.



Dadoes. After assembling the sides, cut two dadoes on the inside face of each side at the table saw. Use the rip fence to guide the side over the dado blade.



Rabbet. To form a tongue, cut a rabbet on the back edge of each side assembly using a dado blade.

than the back leg. Later on, the front leg will fit in a rabbet in the face frame, which balances out the appearance of the legs.

Despite the different widths, the profile on each leg is the same (see the pattern on the opposite page). This profile can be cut on the band saw as shown in the lower left drawing on page 32.

SIDE ASSEMBLIES. After cutting the profile on the legs, you can focus on completing the side assemblies. The first step is to glue the legs to the side panels. Next you can cut a pair of dadoes in each side assembly (middle drawing, opposite page). Finally, you'll cut a rabbet along the back edge (right drawing, opposite page), and then glue in a filler strip at the bottom. Later on, the case's beaded plywood back will get attached above these filler strips.

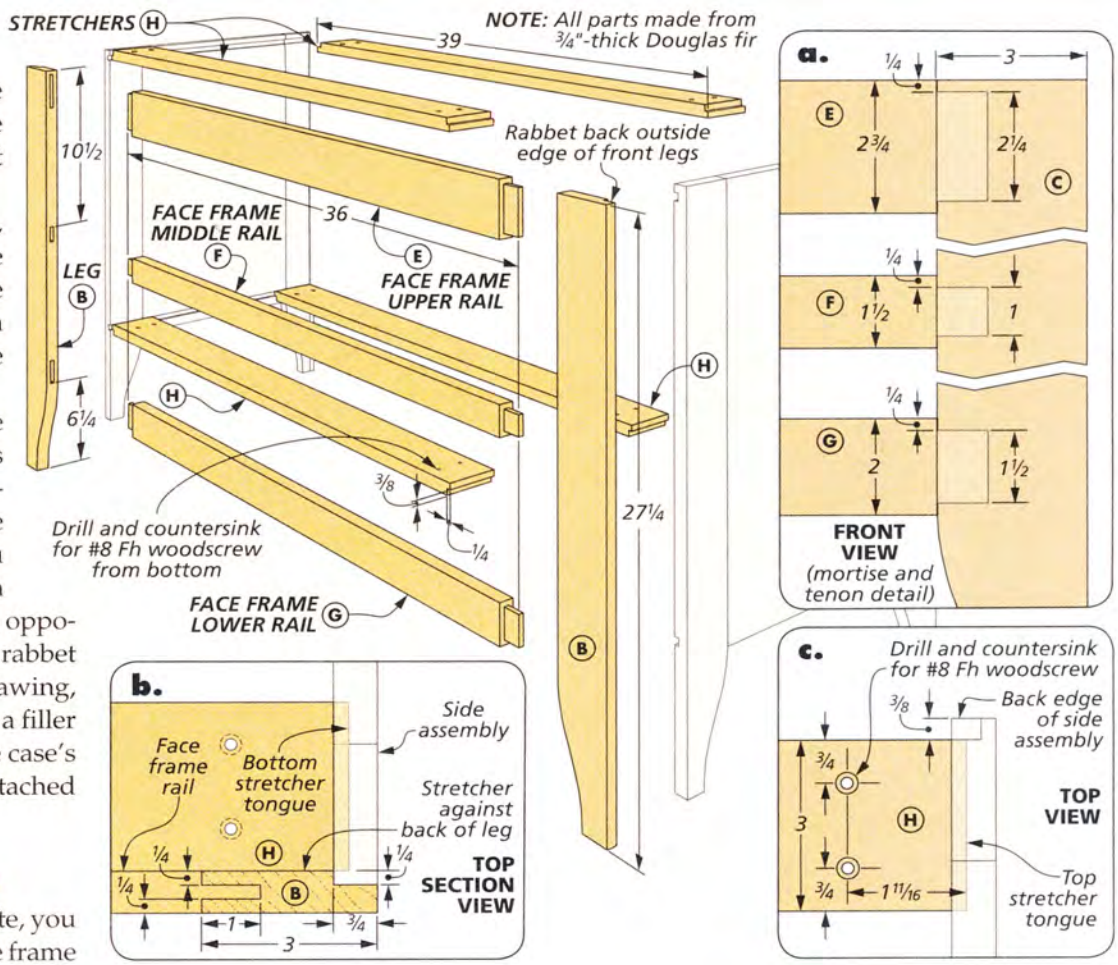
FACE FRAME & STRETCHERS

With the side assemblies complete, you can turn your attention to the face frame and stretchers that connect them to one another. Along with two legs, the face frame has three rails that are different widths. Tenons on the rails fit into mortises in the legs. The four stretchers have tongues on the ends that fit in the dadoes in the side assemblies.

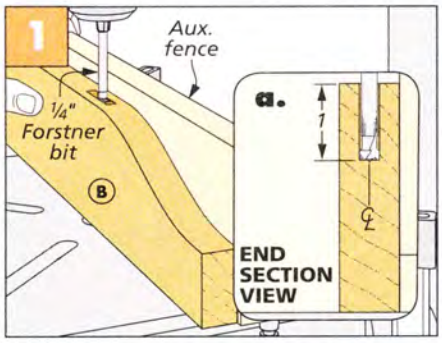
The legs of the face frame are identical to the rear legs of the side assemblies. After cutting them to shape, lay out and cut the mortises in the legs at the drill press (Figure 1). A chisel takes care of the rest. There's also a rabbet on the outside edge of each leg, as shown in Figure 2. This rabbet will fit around the front leg of the side assembly later on.

Now cut the rails and stretchers to size, and form tenons on the rails (Figure 3). Check the fit in the mortises as you go. The tongues on the stretchers are made similarly (Figure 4). You can also drill holes in the stretchers as shown above.

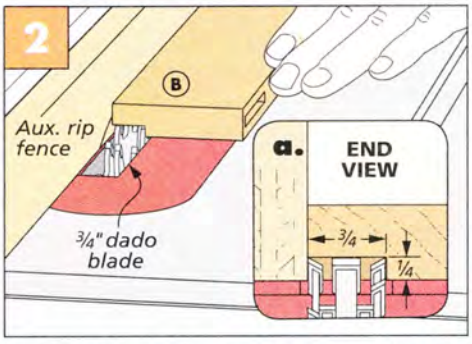
At this stage, you're ready to assemble the lower case components. First, glue the face frame together. Once it's dry, you can fit the side assemblies in the rabbets in the face frame, and slip the stretchers into the dadoes in the side assemblies. Apply glue and clamp the whole assembly together, checking for squareness as you tighten the clamps.



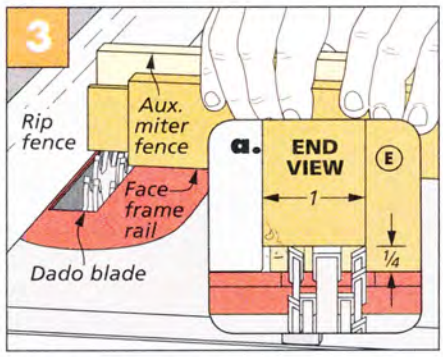
How-To: FACE FRAME & STRETCHERS



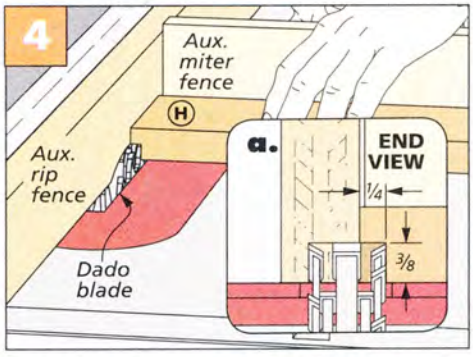
Drill Mortises. Cut the mortises in the face frame legs at the drill press, then clean up the waste with a chisel.



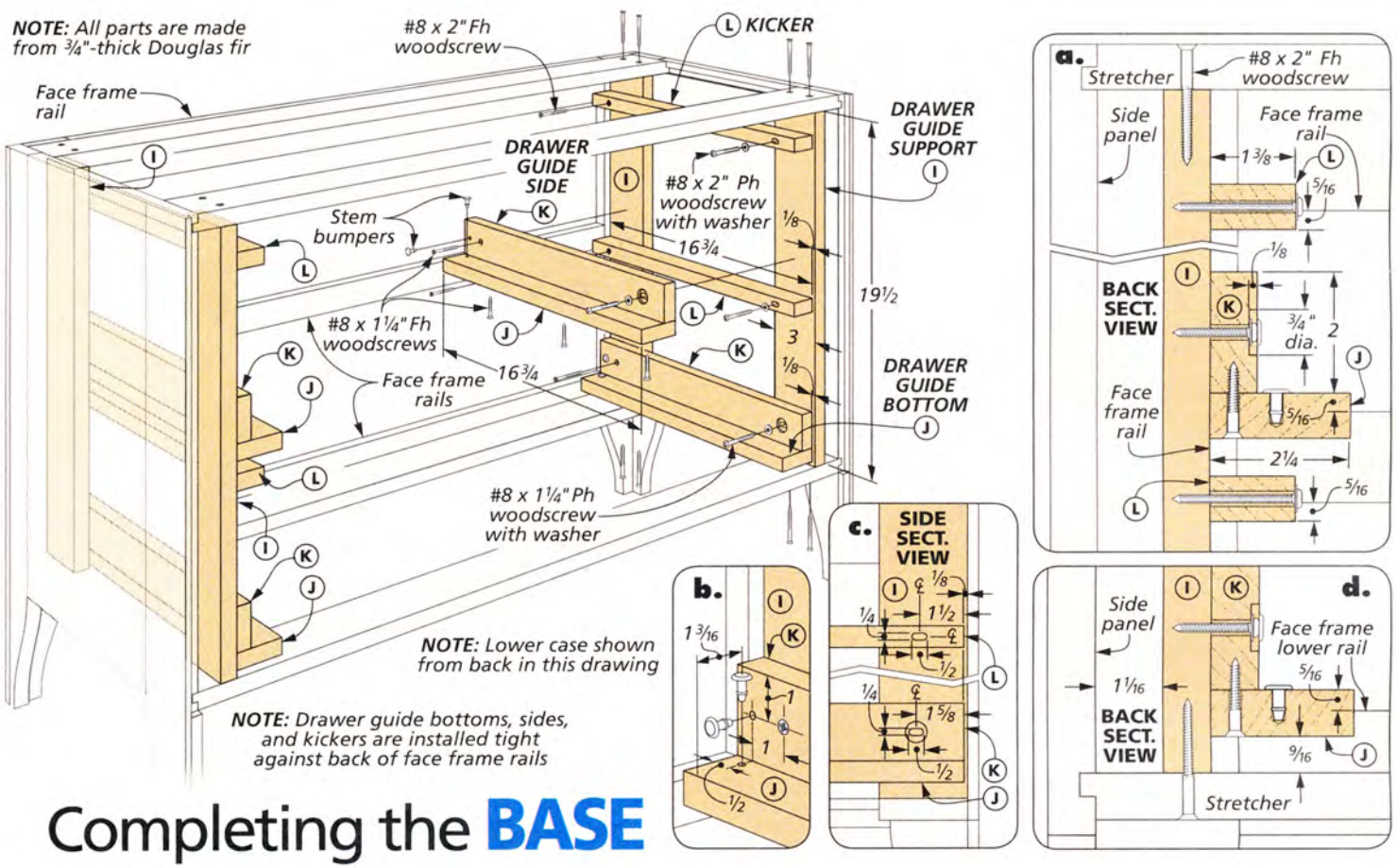
Rabbet Legs. The outside edge of each face frame leg gets rabbeted to receive the side assemblies later on.



Cut Tenons. The tenons on the three face frame rails are easy to make at the table saw with a dado blade.



Stretcher Tongues. Form the tongues on the ends of the stretchers using a dado blade and an auxiliary rip fence.



Completing the BASE

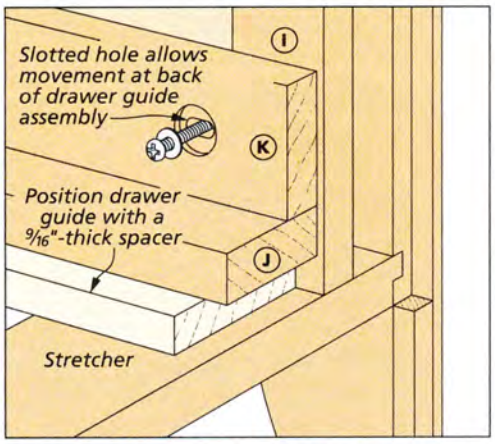
At this stage, the basic structure of the lower case is complete. However, there are a few pieces to add that will help the lower case accommodate drawers and support the upper case. Those parts include drawer guide supports, drawer guide assemblies, a top, as well as a few different kinds of molding. I'll walk you through the process of making and adding all these parts to the case.

DRAWER GUIDE SUPPORTS. The first parts to add to the lower case are the drawer guide supports. As you can see above, these are nothing more than vertical, solid-wood pieces that fit between the upper and lower stretchers. They're secured with screws and provide a stable mounting surface for the drawer guides and kickers that go in next.

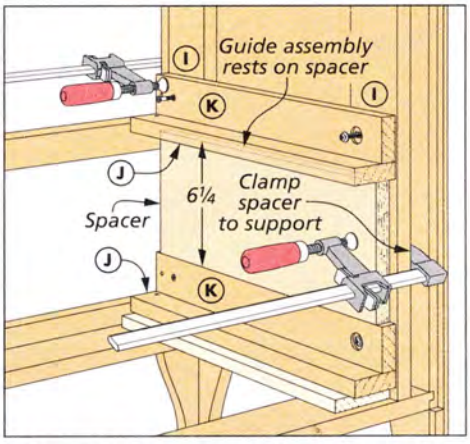
After cutting the supports to size, simply slip them in place between the stretchers. As you can see in detail 'd' above, they are spaced away from the side assemblies a bit, so you'll want to cut some small spacers to position the supports properly. Once they're in place, drill pilot holes into the supports using the holes in the stretchers as guides. Now attach them with woodscrews.

DRAWER GUIDES & KICKERS. The drawers ride on four L-shaped drawer guide assemblies. Each assembly consists of a bottom and side that are glued and screwed together. To account for wood movement, each guide has an oversized, slotted mounting hole at

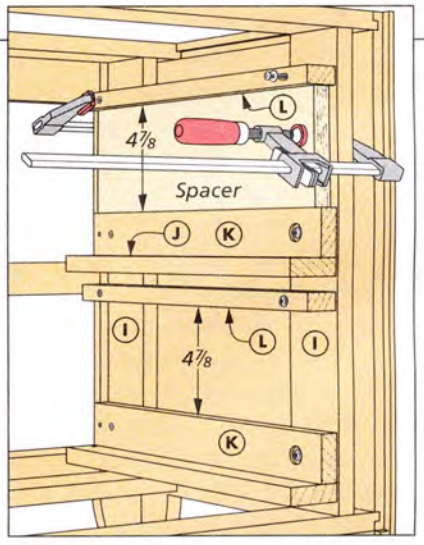
How To: INSTALL GUIDES & KICKERS



Hole. This slotted hole with a counterbore allows for wood movement. To make it, drill holes side by side and chisel out the waste.



Spacers. Spacers made from plywood correctly position the drawer guides on either side of the case for mounting.



Kickers. The kickers prevent the drawers from tipping. Here again, use spacers when installing them.

the back (detail 'c' on the opposite page). The front mounting hole is a countersunk pilot hole.

Each guide has a pair of stem bumper glides installed on it. Detail 'b' on page 34 provides the locations for these.

To ensure that the drawer guides are located accurately in the openings, I used spacers to position them, as shown in the How-To box on the opposite page. Once you get the guides positioned correctly, just screw them in place.

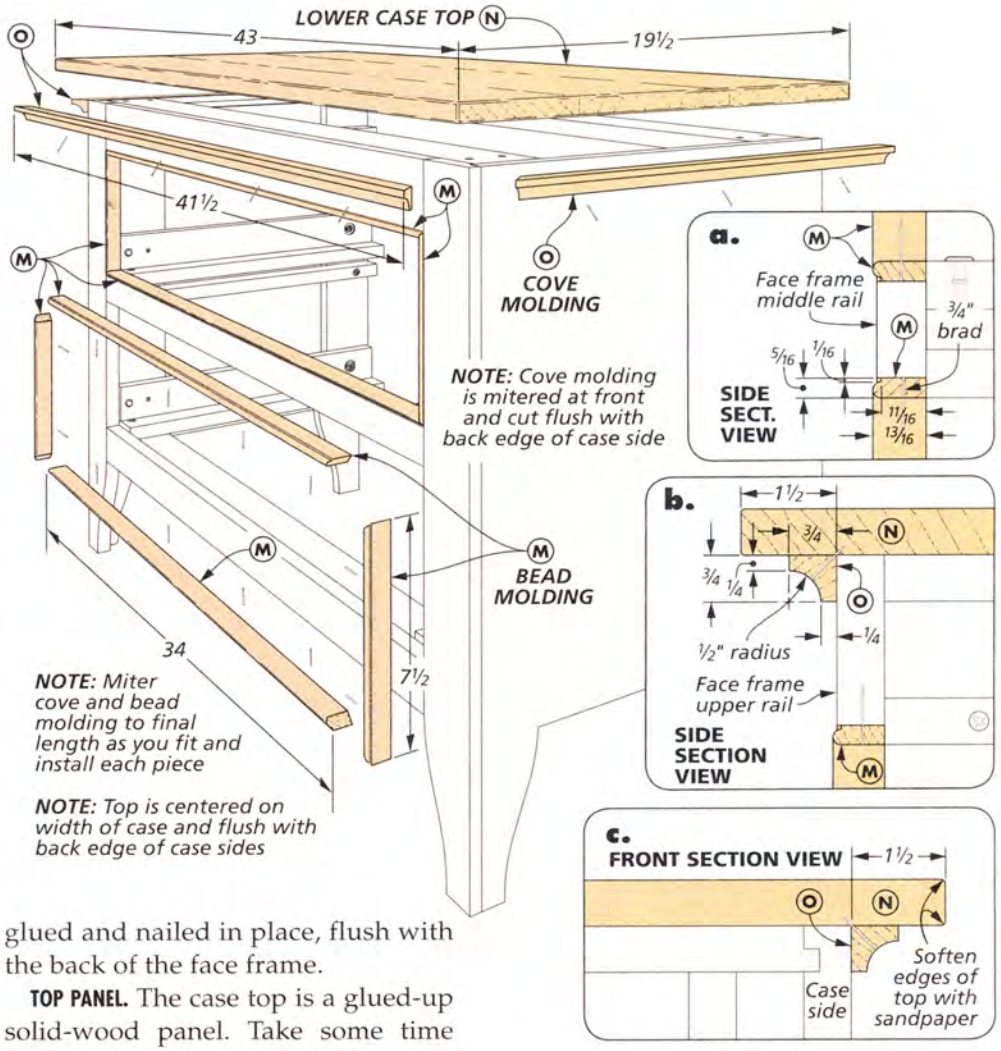
The last parts to go on are kickers, which prevent the drawers from tipping when opened fully. These are installed similarly to the drawer guides, but they require longer screws, as shown in the main drawing on the opposite page.

ADD MOLDINGS & A TOP

The lower case is just about complete. I finished things off by applying bead molding around the drawer openings in the face frame, adding a solid-wood top, and wrapping the underside of the top with cove molding.

BEAD MOLDING. The bead molding might look elaborate, but it's pretty easy to make. In fact, the left and middle drawings below show you how to make two pieces from a wider blank.

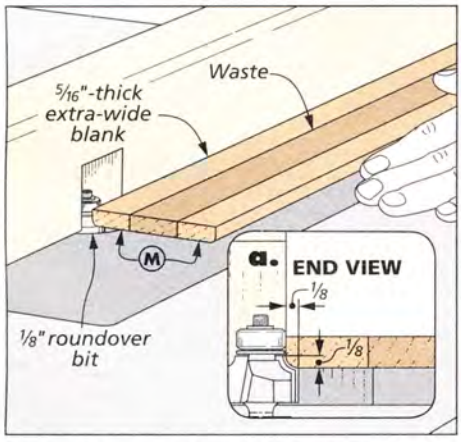
Just one more note on this bead molding: You'll also use it to wrap the opening in the upper case, so now is a good time to make enough molding for both cases and then set some aside. The molding for the lower case is mitered to fit the openings and then glued and nailed in place, flush with the back of the face frame.



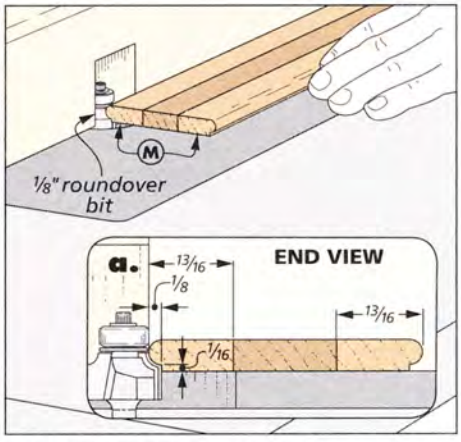
TOP PANEL. The case top is a glued-up solid-wood panel. Take some time to find a good grain match among pieces, and then glue and clamp them together. Cut the panel to final size, and ease the edges with sandpaper. Then position the top, and glue and clamp it on to the lower case.

COVE MOLDING. The underside of the top is wrapped with cove molding. It's easy to make as shown in the drawing, below right. Here again, it's a good idea to make some extra now to go around the upper case later on. After completing the molding, miter the pieces to size. Then pin them to the case as shown above.

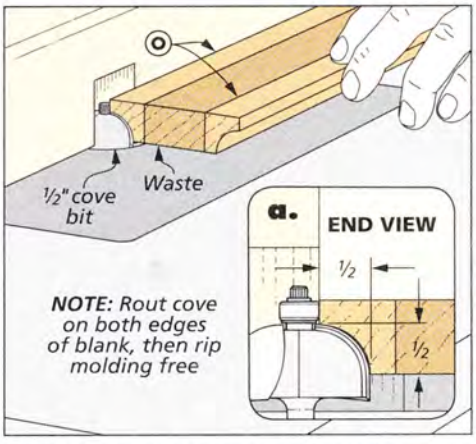
How-To: ROUT MOLDINGS



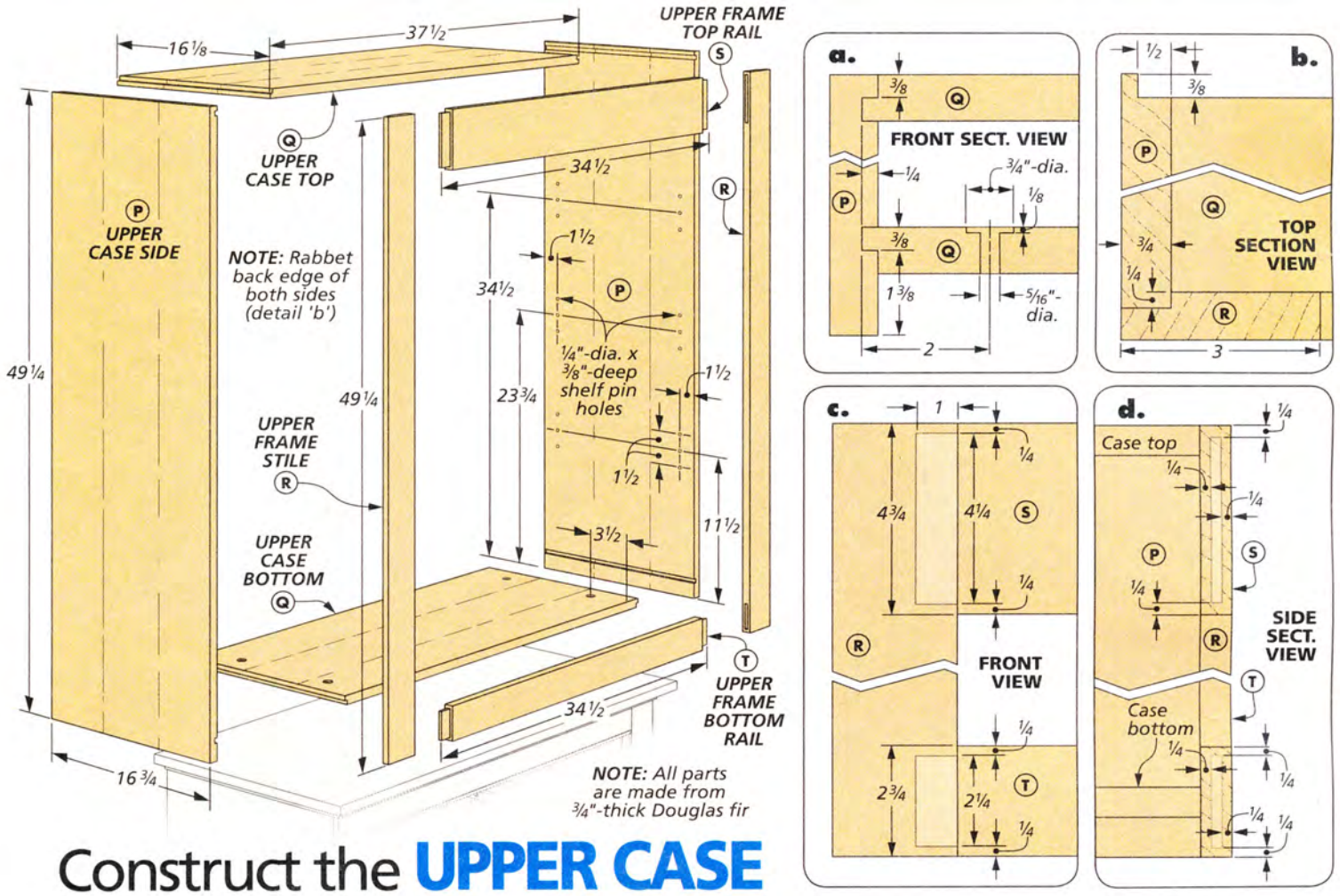
Roundover. To start two pieces of bead molding, rout a roundover on both edges of a wide blank.



Raise Bit. For the second edge, raise the bit slightly. Then rip the individual molding strips to width.



Cove. Make the cove molding with a cove bit. Here again, a wider blank yields two pieces of molding.



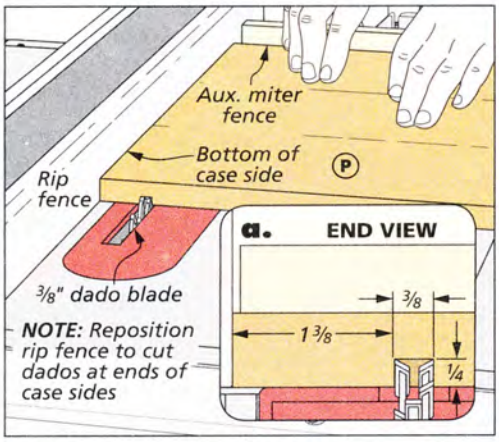
Construct the UPPER CASE

The upper case is taller and narrower than the lower case. Like the lower case, it's assembled almost entirely from solid wood, with the exception of the beaded plywood back. Since the top, bottom, and sides are all made from glued-up, solid-wood panels, a good place to start is to select lumber for these project parts and get all the panels glued together. When the glue dries, cut them to size. Note that the top and bottom are narrower than the sides to account for the face frame at the front and the back panel at the back.

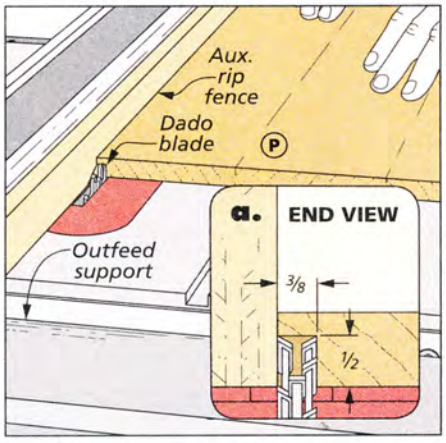
CASE JOINERY. The case parts are connected with tongue and dado joints, so you can get started on those next. You'll also use a dado blade to cut a rabbet in the back of the case sides, so it's a good time for that cut, as well. The drawings below walk you through all three cuts.

The case sides receive a series of holes for shelf supports. Use a shelf pin jig or careful work with a drill press for these. In addition, there are four shallow counterbored holes drilled in the case bottom (detail 'a'). These holes are

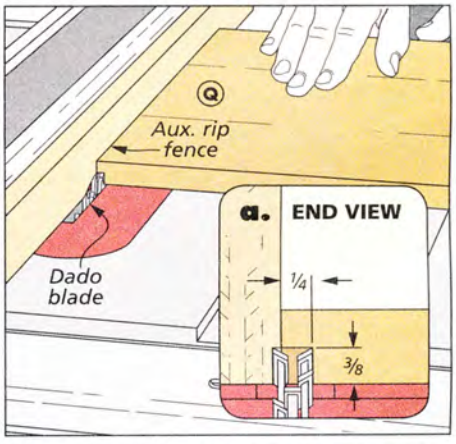
How-To: CREATE DADOES & RABBETS



Dadoes. Use a dado blade to cut a dado in each end of the case side. Reposition the rip fence between cuts.



Rabbets. Now bury the blade in an auxiliary rip fence to cut the rabbets on the back edges of the case sides.



Tongues. With a minor adjustment to the dado blade setup, you can form the tongues in the top and bottom.

for connector bolts that join the upper and lower cases to each other later on.

FACE FRAME. The upper case face frame is the next order of business. Like the lower case face frame, it features rails and stiles connected with mortise and tenon joints. However, this face frame only has two rails.

Details 'c' and 'd' on the facing page show you the details of the joints, and they are machined as before. Note that there's also a rabbet on the edge of each stile to fit over the case sides, as shown in detail 'b' on the opposite page. Once all those cuts are made, the face frame can be assembled.

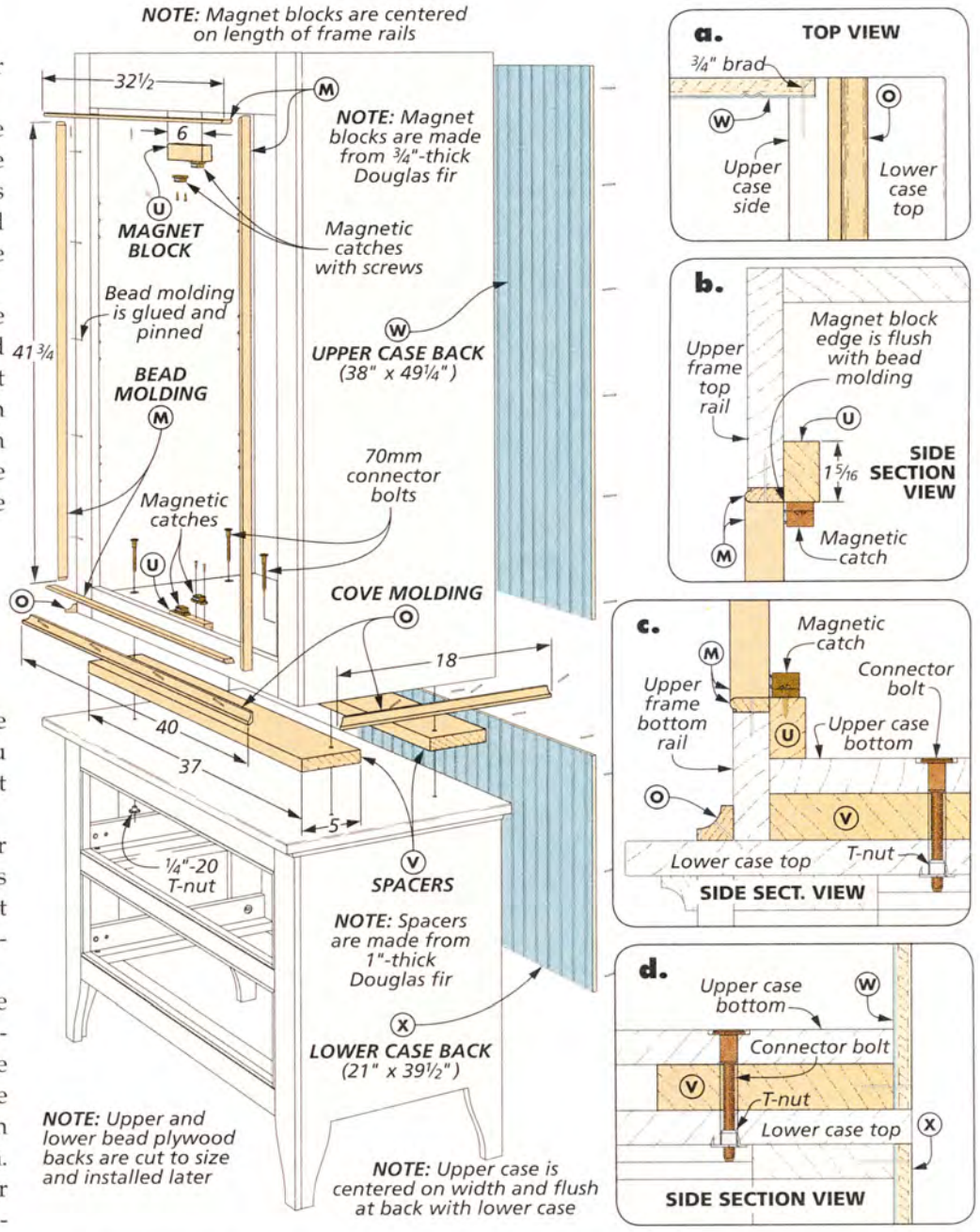
CASE ASSEMBLIES. Now you're ready to bring in the glue and clamps and assemble the upper case. Add the face frame, as well, to keep everything square as you tighten the clamps. You can also apply bead molding around the opening in the face frame, just as you did with the lower case. The drawing at right provides the details.

With the case assembled, I added a pair of wood blocks with magnetic catches to hold the doors closed. The blocks fit behind the face frame rails and are centered on the width of the cabinet.

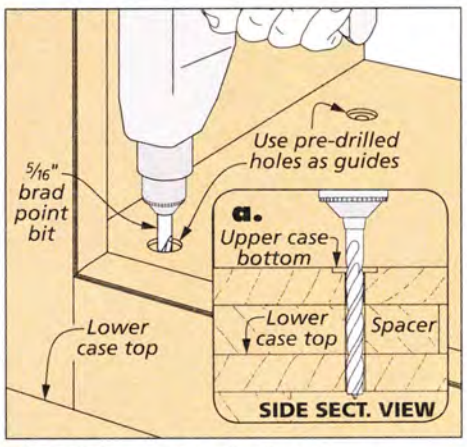
Before attaching the upper case to the lower case, you'll want to add two spacers to the cavity on the underside of the upper case. Then you can position the upper case above the lower case, flush with the back and centered on the width.

At this point, you can join the upper case to the lower case. This is accomplished with connector bolts and T-nuts, as shown in details 'c' and 'd.' To do this, use the counterbored holes as guides to drill through the spacers and lower case top, as shown in the drawing at right. Now reach into the lower case and slip a T-nut into the hole from below. Add a connector bolt into the hole from above, and screw the two fasteners together using an Allen wrench to draw them tightly to one another (far right drawing).

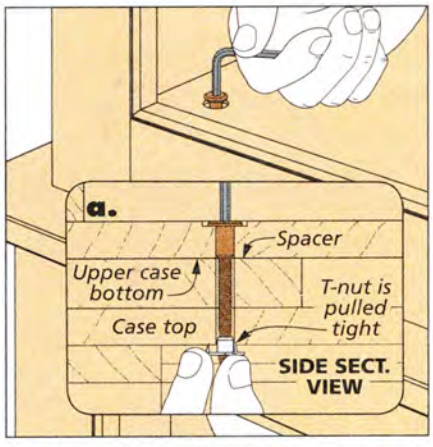
FINAL TOUCHES. The seam between the upper and lower cases is wrapped with cove molding. This can be mitered, glued, and nailed in place just as before. It's also a good time to cut the two case backs to size from beaded plywood. If you plan to paint them as I did, I'd wait until they're painted to attach them. (Paint information is on page 40.)



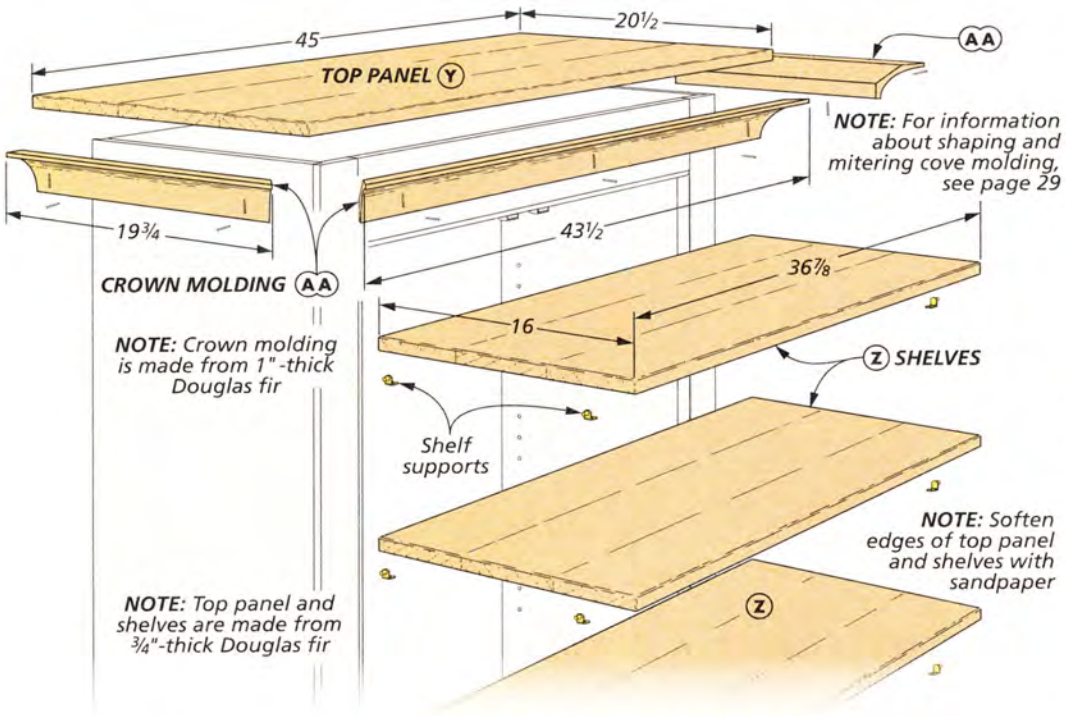
How-To: CONNECT THE CASES

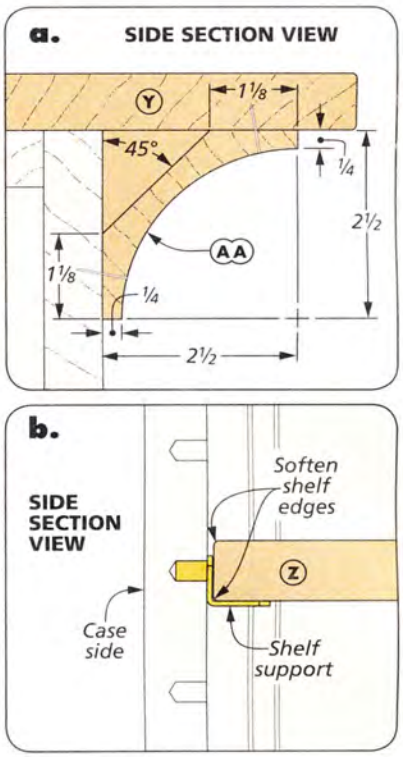


Pilot Holes. Using the holes in the case bottom as a guide, drill pilot holes down through the lower case top.



Connect Them. Tighten a connector bolt into a T-nut below to draw the fasteners, and cases, tightly together.





Building the TOP & DOORS

Now that the upper and lower cases are connected, just a handful of parts remain for completing this heirloom linen press. Those include three adjustable shelves for the upper case, a solid-wood top, crown molding, and doors.

SHELVES & TOP. At this stage of the project, assembling great-looking, solid-wood panels from Douglas fir is probably old hat. Here again, the three shelves and top are all glued-up panels, so I suggest doing all four at once. Once you have them assembled and cut to size, use sandpaper to ease all the ends and edges of the panels. Now set the shelves aside until the linen press is complete, at which point they can be mounted on shelf supports as shown in detail 'b' above.

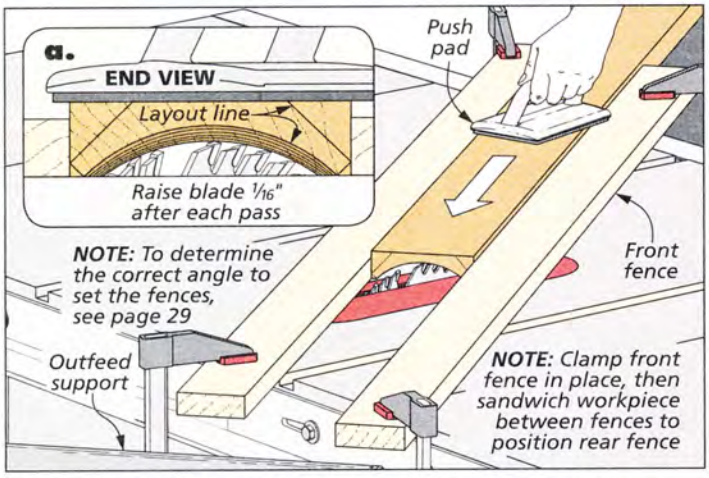
As for the top panel, it's mounted much like the upper and lower case tops for this project: Position it flush with the back and centered on the width of the linen press, and then glue and clamp it in place.

CROWN MOLDING. The next part of the project is crown molding that wraps the underside of the top panel and gets glued and nailed to the upper case. I used a unique technique to make the molding on the table saw.

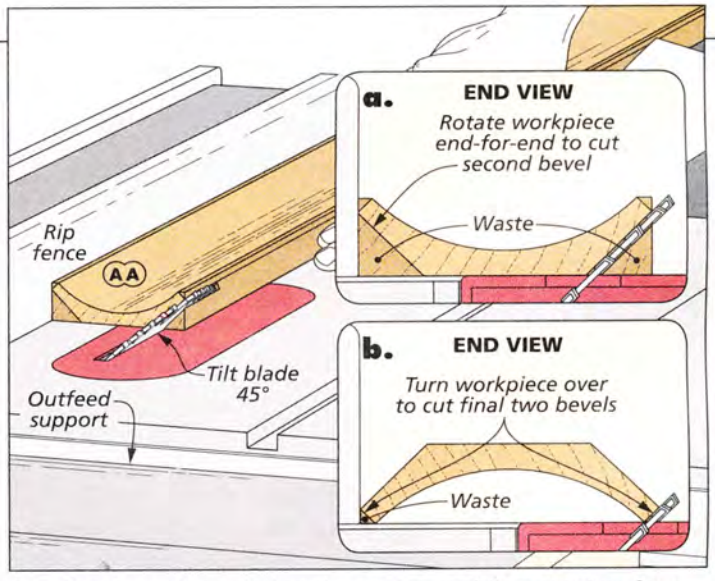
To see what I mean, take a look at the illustrations below. If you've never cut a molding at the table saw like this, I'm sure that it looks a little unusual. But I assure you that when you set up the cut properly — and take very small "bites" out of the workpiece with each pass over the blade — it's quite effective.

SET UP THE CUT. To cut the crown molding, the first thing you need to do is establish the angle of the cut. You'll find a

How-To: MAKE CROWN MOLDING



Cut the Cove. Once the fences are positioned at the proper angle, cut the cove by passing the workpiece over the blade at an angle. Remove a small amount of material with each pass.



Bevel Edges. Completing the crown molding requires four 45° bevel rip cuts at the table saw. Just rotate the workpiece between cuts to complete all the bevels.

setup gauge that simplifies this process in Shop Notebook (page 29). Using the gauge, you can set the two fences for guiding the workpiece over the blade, as shown in the lower left drawing on the opposite page.

CUTTING CROWN. After the fences are clamped onto the saw table, cutting the molding is easy. The secret is to cut the cove in multiple passes, only removing about 1/16" of material with each pass. Once the cove is the proper depth, you can complete the crown molding with a few bevel cuts (lower right drawing, opposite page).

MOUNTING MOLDING. The only other trick with this molding is mitering it at the corners. The easiest way to do this is to hold the molding at its installed angle while mitering it. Here again, you'll find the details for doing this in Shop Notebook on page 29. After the miters are cut, the molding can be glued and nailed in place just like the other moldings.

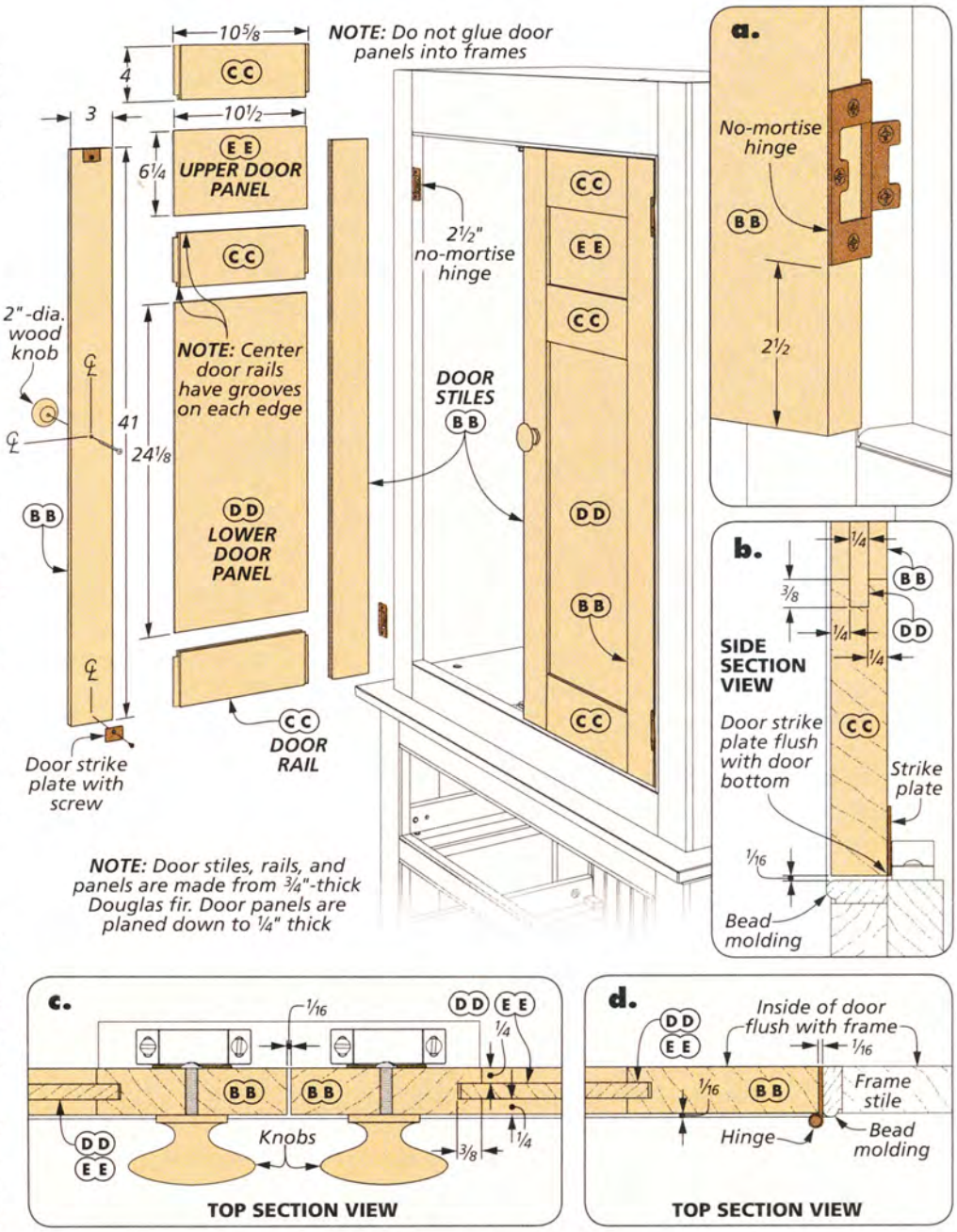
ADDING DOORS

The two doors that enclose the upper case are a fairly simple build. They feature two stiles joined to three rails with stub tenon and groove joints. The frame surrounds two panels made from solid wood.

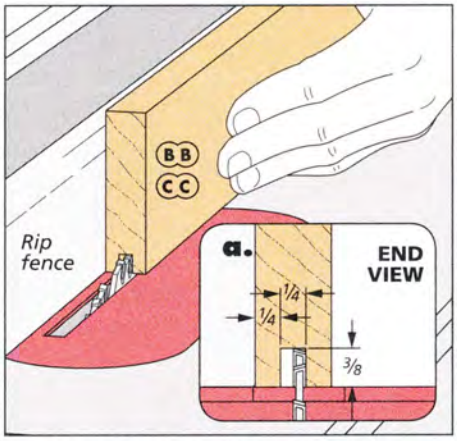
To make the door panels, I suggest gluing up thicker panels, and then planing them down to final thickness before cutting them to size. A thinner panel might bow as you apply clamps to it.

As for the stub tenon and groove joinery, it's easy to knock out at the table saw as shown in the two illustrations on the right. Then you can assemble the doors by gluing the rails and stiles around the panels. A bead of glue applied to the center of the top and bottom of the panels will prevent rattling, while still allowing for expansion and contraction.

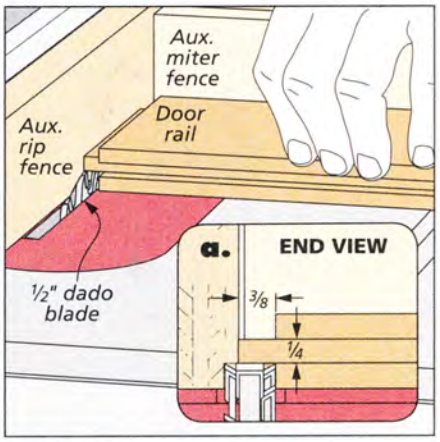
COMPLETE THE DOORS. Each door has a wood knob that's centered on the inner stile, as shown in the main drawing above right. And the doors are mounted to the face frame with no-mortise hinges. Once the doors are installed, you'll want to add the strike plates to the backs of the doors so that they line up with the magnetic catches inside the upper case.



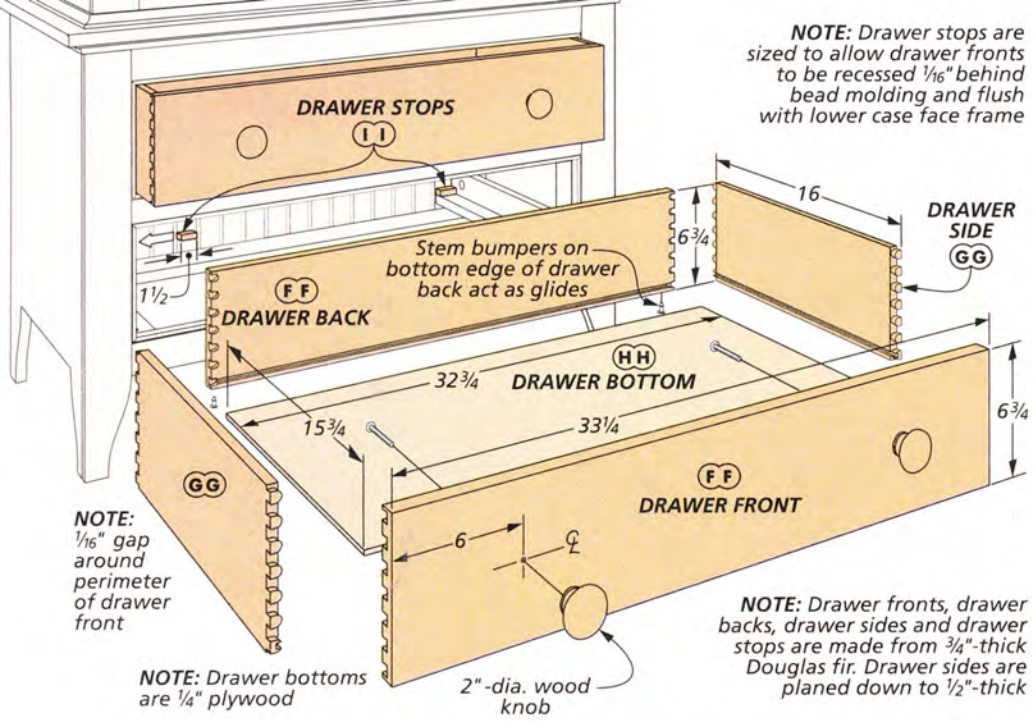
How-To: CUT DOOR JOINERY

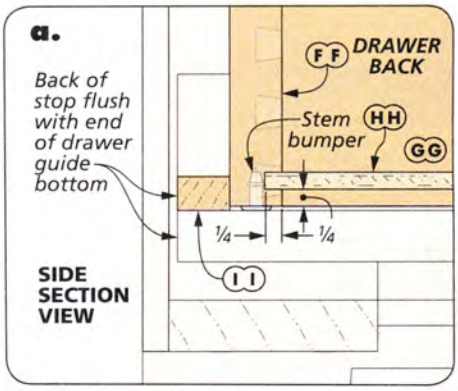


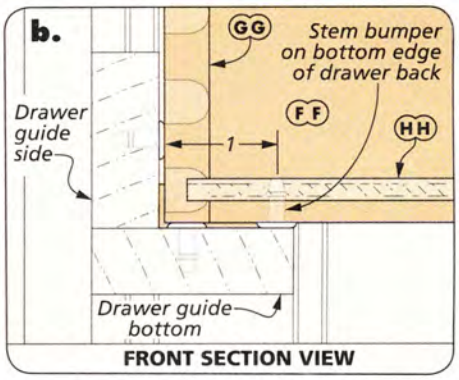
Centered Groove. Make two passes over a standard blade to cut a centered groove on each door part.



Stub Tenon. Use a dado blade to "sneak up" on the stub tenon. Test its fit in a groove as you go.







Finish with the DRAWERS

This linen press is almost complete, but it needs a pair of identical-size drawers to fill out the lower case. And there's so much traditional detail throughout this project that I wanted to make sure the drawers continued with this theme.

DOVETAILED DRAWERS. To that end, I joined the drawer fronts and backs to the sides using half-blind dovetail joinery. And if you think this is going to be a fussy or time-consuming process, don't worry. A dovetail jig (such as the *Porter-Cable* model that I used) makes quick work of the joints and allows you to rout both parts of the joint in one operation.

The drawings below give you a good overview of how this works. Essentially, you clamp the front or back and side in the jig with an offset between the parts. Then you rout along the jig template using a router equipped with a bushing and a dovetail bit to create the joints.

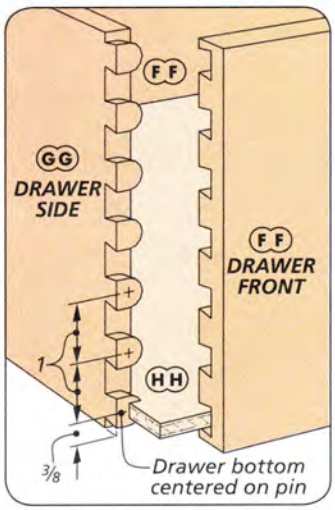
Once the joinery is complete, just cut a groove in all four parts to accept the bottom (lower right drawing) and then assemble the drawers. Add the knobs and stem bumpers, and the drawers are ready to slide in place.

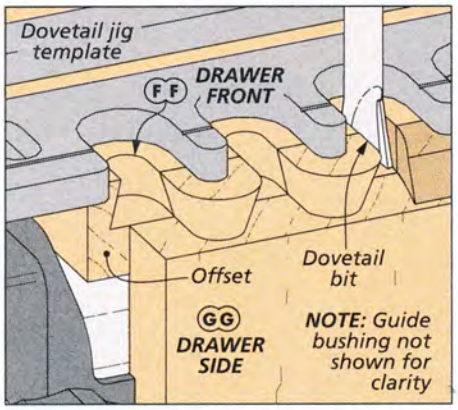
DRAWER STOPS. All that's left is to cut some drawer stops to position the drawer fronts flush with the face frame. The drawer stops fit in the back of the lower case and are glued in place on the drawer guide bottoms (detail 'a').

FINISH. At this point, you can take the doors off the hinges and apply some finish to make this linen press look its absolute best. I painted the beaded back panels with *Benjamin Moore*'s "Dusty Cornflower" (CSP-605). The rest of the parts were wiped down with *General Finishes' Seal-A-Cell* and then sprayed with two coats of satin lacquer.

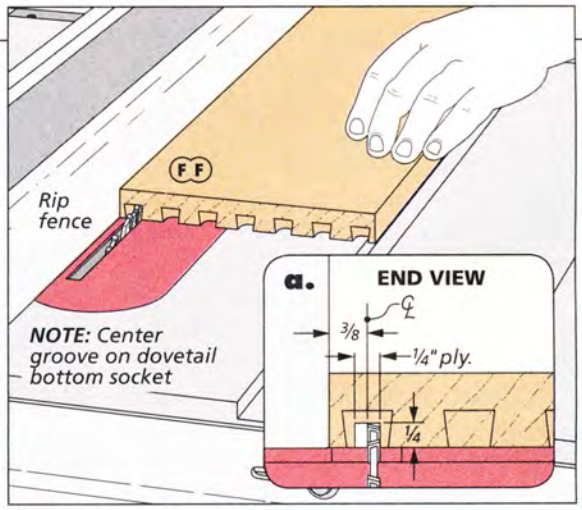
Put the backs, shelves, doors, and drawers in place, and the linen press is done. This heirloom is sure to be treasured by your family for generations.

How-To: ROUT DOVETAILS





Dovetails. A dovetail jig and a router with a guide bushing make quick work of the half-blind dovetail joints.



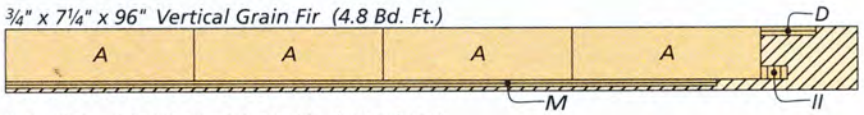
Grooves. The drawer fronts, backs, and sides all receive a groove to accept the bottom. Cut this in two passes on the table saw.

Materials, Supplies & Cutting Diagram

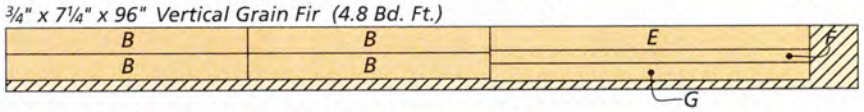
A	Side Panels (2)	3/4 x 12 - 21 1/4
B	Legs (4)	3/4 x 3 - 27 1/4
C	Side Legs (2)	3/4 x 2 1/2 - 27 1/4
D	Filler Strips (2)	3/8 x 1/2 - 6 1/4
E	Face Frame Upper Rail (1)	3/4 x 2 3/4 - 36
F	Face Frame Middle Rail (1)	3/4 x 1 1/2 - 36
G	Face Frame Lower Rail (1)	3/4 x 2 - 36
H	Stretchers (4)	3/4 x 3 - 39
I	Drawer Guide Supports (4)	3/4 x 3 - 19 1/2
J	Drawer Guide Bottoms (4)	3/4 x 2 1/4 - 16 3/4
K	Drawer Guide Sides (4)	3/4 x 2 - 16 3/4
L	Kickers (4)	3/4 x 1 3/8 - 16 3/4
M	Bead Molding	5/16 x 13/16 - 320 rgh.
N	Lower Case Top (1)	3/4 x 19 1/2 - 43
O	Cove Molding	3/4 x 3/4 - 160 rgh.
P	Upper Case Sides (2)	3/4 x 16 3/4 - 49 1/4
Q	Upper Case Top/Bottom (2)	3/4 x 16 1/8 - 37 1/2
R	Upper Frame Stiles (2)	3/4 x 3 - 49 1/4
S	Upper Frame Top Rail (1)	3/4 x 4 3/4 - 34 1/2
T	Upper Frame Bottom Rail (1)	3/4 x 2 3/4 - 34 1/2
U	Magnet Blocks (2)	3/4 x 1 5/16 - 6
V	Spacers (2)	1 x 5 - 37
W	Upper Case Back (1)	3/8 bead. ply. x 38 - 49 1/4
X	Lower Case Back (1)	3/8 bead. ply. x 21 - 39 1/2
Y	Top Panel (1)	3/4 x 20 1/2 - 45
Z	Shelves (3)	3/4 x 16 - 36 7/8
AA	Crown Molding	1 x 3 9/16 - 90 rgh.
BB	Door Stiles (4)	3/4 x 3 - 41
CC	Door Rails (6)	3/4 x 4 - 10 5/8
DD	Lower Door Panels (2)	1/4 x 10 1/2 - 24 1/8
EE	Upper Door Panels (2)	1/4 x 10 1/2 - 6 1/4
FF	Drawer Fronts/Backs (4)	3/4 x 6 3/4 - 33 1/4
GG	Drawer Sides (4)	1/2 x 6 3/4 - 16
HH	Drawer Bottoms (2)	1/4 ply. x 15 3/4 - 32 3/4
II	Drawer Stops (4)	1/2 x 3/4 - 1 1/2

- (20) #8 x 2" Fh Woodscrews
- (16) #8 x 1 1/4" Fh Woodscrews
- (12) Stem Bumpers
- (8) #8 x 1 1/4" Ph Woodscrews
- (4) #8 x 2" Ph Woodscrews
- (8) #8 Flat Washers
- 3/4" Brads
- (4) 1/4"-20 T-Nuts
- (4) Connector Bolts (Lee Valley 00N1570)
- (6) Wood Knobs (Lee Valley 02G1123)
- (4) No-Mortise Hinges (Lee Valley 00H5123)
- (4) Magnetic Catches (Rockler 26559)
- (12) Shelf Supports (Rockler 22765)

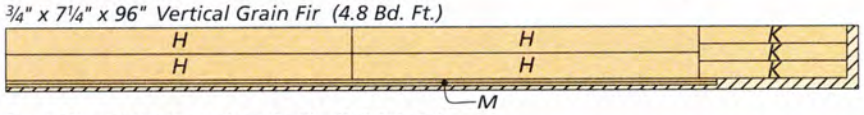
3/4" x 7 1/4" x 96" Vertical Grain Fir (4.8 Bd. Ft.)



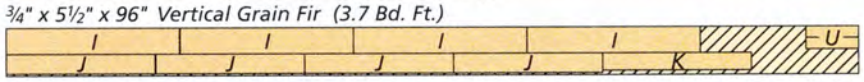
3/4" x 7 1/4" x 96" Vertical Grain Fir (4.8 Bd. Ft.)



3/4" x 7 1/4" x 96" Vertical Grain Fir (4.8 Bd. Ft.)

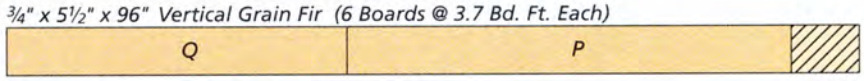


3/4" x 5 1/2" x 96" Vertical Grain Fir (3.7 Bd. Ft.)

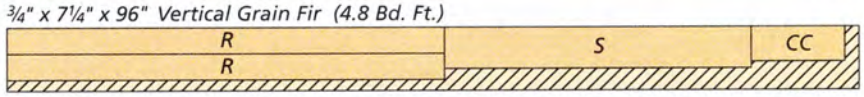


3/4" x 5 1/2" x 96" Vertical Grain Fir (2 Boards @ 3.7 Bd. Ft. Each)

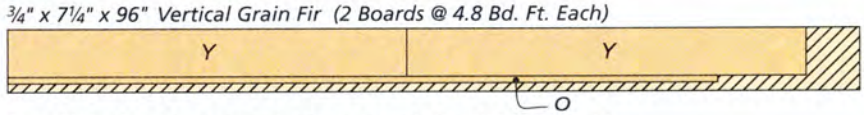
3/4" x 5 1/2" x 96" Vertical Grain Fir (6 Boards @ 3.7 Bd. Ft. Each)



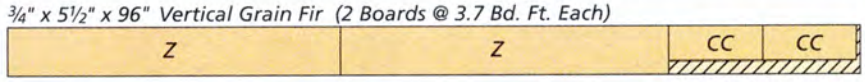
3/4" x 7 1/4" x 96" Vertical Grain Fir (4.8 Bd. Ft.)



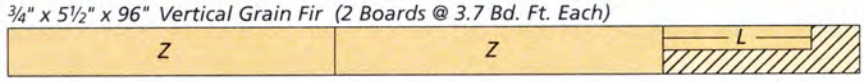
3/4" x 7 1/4" x 96" Vertical Grain Fir (2 Boards @ 4.8 Bd. Ft. Each)



3/4" x 5 1/2" x 96" Vertical Grain Fir (2 Boards @ 3.7 Bd. Ft. Each)

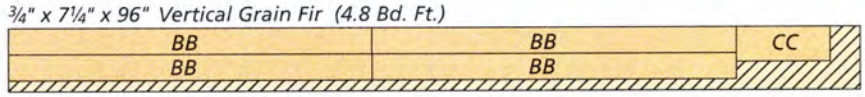


3/4" x 5 1/2" x 96" Vertical Grain Fir (2 Boards @ 3.7 Bd. Ft. Each)



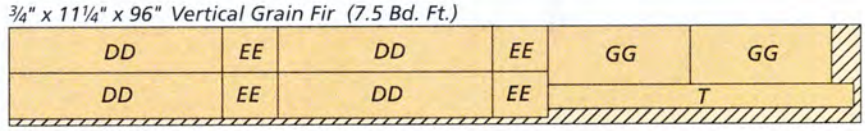
3/4" x 5 1/2" x 72" Vertical Grain Fir (2.8 Bd. Ft.)

3/4" x 7 1/4" x 96" Vertical Grain Fir (4.8 Bd. Ft.)

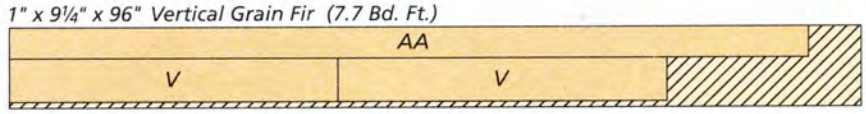


3/4" x 7 1/4" x 96" Vertical Grain Fir (2 Boards @ 4.8 Bd. Ft. Each)

3/4" x 11 1/4" x 96" Vertical Grain Fir (7.5 Bd. Ft.)



1" x 9 1/4" x 96" Vertical Grain Fir (7.7 Bd. Ft.)



NOTE: *Parts DD and EE are planed to 1/4", and parts GG are planed to 1/2" thick*

ALSO NEEDED: *One 48" x 96" Sheet of 3/8" Beaded Plywood*
One 48" x 48" Sheet of 1/4" Birch Plywood

woodworking technique

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Grain Matching

As woodworkers, we're all aware of the need for tight joinery, smoothly planed and sanded surfaces, and even the importance of a durable finish. So we soak up techniques for getting the results we want in those areas and move on to the next project. In our haste, however, it's easy to forget about choosing the right color or grain for a particular part.

▲ Both straight grain (top) and cathedral grain (bottom) can be useful in projects. The key is knowing what you need before you buy.

If the wood grain isn't considered early on, there's liable to be something "off" about the look of the finished piece. But when you get it right, the project really shines. For a great example, take a look at the linen press on page 30. Without giving some thought to the grain and color early on, the straight-grained Douglas fir used in the linen press could have been a nightmare.

GETTING STARTED. You've probably heard that building a beautiful project begins at the lumberyard. It can take a little time, but choosing stock that's consistent in color and grain is a crucial first step. If you're lucky, you might find a new shipment of wood that contains pieces from the same log, sometimes even a bookmatched set or two. These characteristics virtually guarantee good options for matching the grain.

▲ A little water on the surface of the lumber gives you a reasonably good idea of what it will look like when a finish is applied.

EXTRA STOCK. Of course, you'll also want to find boards that are as close as possible in color to get a consistent look. While you're shopping, buy at

least 10% to 15% extra to give yourself a better chance to match properly and make test pieces. I often carry a bottle of water to dampen the surface of a board to get an idea of what it will look like after a clear finish is applied (bottom right photo on the opposite page). After all, the finished color is what matters.

KNOW WHAT YOU NEED. A parts list can help you identify what kind of grain you need for the major parts of the project. I look for the straightest riftsawn or quartersawn pieces I can find for door rails and stiles (left photo below). But I also like to have a few flatsawn pieces with cathedral grain for the door panels. And if I need to make some legs out of thicker stock, I want to find grain that runs at about a 45° angle, so it presents a similar pattern on all four surfaces (bottom right photo).

If your project requires gluing up boards to make a wide surface, give these pieces a long, hard look to make sure they'll work side-by-side. The tabletop in the main photo and the panel in the left door, below, are two examples.

IN THE SHOP. When you get the lumber home, lay out the pieces and make the initial sorting of color and grain. A pair of sawhorses is perfect for this (photo above). Take the time to examine each board as you go, marking any defects. I often mark out the major or most visible parts in chalk on the face of the lumber to be sure I have what I need. (I'd rather go back to the lumberyard now while the same batch of boards is there rather than wait a few weeks until the opportunity is gone.) After that, sticker the lumber for a week or two while it acclimates to your shop.

When you're ready to start on the project, repeat the inspection process as you plane the stock to final thickness. Remember to plane that extra stock, too. It's nice to have a piece already planed if you need to remake parts.

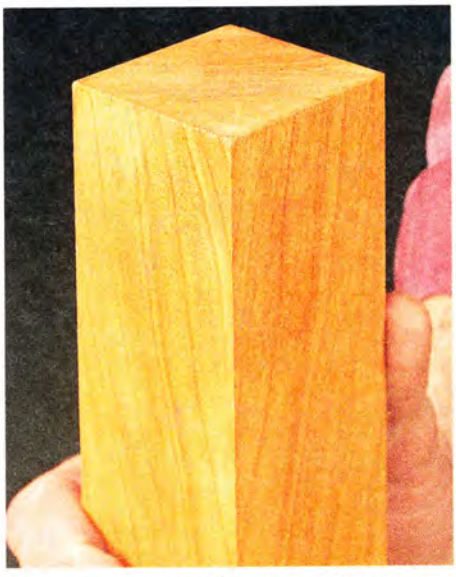
After planing, things might look a bit different, so make sure you examine both faces of the lumber and use as much light as you can find, especially natural light if your shop has windows. Don't be afraid to change your mind from your original assessment. Once you're satisfied, mark out the pieces.

DRY FIT. Once you've cut the individual pieces and the joinery, a dry fit gives you a final opportunity to make any changes. This is where it's easy to tell yourself, "It's good enough," even if it isn't. A little time spent now remaking a mismatched part is nothing to worry about. In fact, doing so only affirms your good craftsmanship.

After following this process for awhile, you'll notice an improvement in your finished projects. And you'll never let grain problems happen again. W

▲ A pair of sawhorses makes the perfect platform for doing a rough check of the grain of stock that you bring home from the lumberyard. It's an easy way to make sure you have the color and grain matches you need for a tabletop or other large, glued-up assemblies.

▲ The door on the left features straight-grained rails and stiles with a bookmatched panel in the center. The door on the right was made by simply grabbing the next board in the stack to make the parts. You can see the difference that a little time spent choosing the pieces makes.



▲ Legs can be a problem since all four faces are visible. Diagonal grain through the piece presents a consistent appearance.

secrets of Sanding Success

Sanding is hardly the most enjoyable aspect of woodworking. But it is essential for creating projects that both look and feel great. With tools ranging from detail sanders to belt sanders — and paper grits ranging from 36 to over 1,000 — it's easy to get overwhelmed by all the options when it comes to sanding.

In my shop, I've found that the best approach to sanding is to keep it simple: Keep on hand only the tools and sandpaper that you really need. While this doesn't necessarily make sanding more enjoyable, it does make it easier. Plus, it improves both the appearance and the surface of my projects.

WHAT GRITS TO USE? It's accepted woodworking wisdom that you're supposed to work through a progression of sanding grits to achieve a smooth surface on your wood projects. While this is true, it certainly doesn't require running through the whole range of grits. In fact, it might require fewer steps (and therefore less work) than you think.

The grits of sandpaper that I keep on hand in my shop are 80, 100, 120, 150, 180, 220, and 320. But I don't use them all on every project. In fact, 80-grit and 100-grit are used infrequently. These grits are my starting point only for the roughest lumber with very prominent mill marks or scratches.

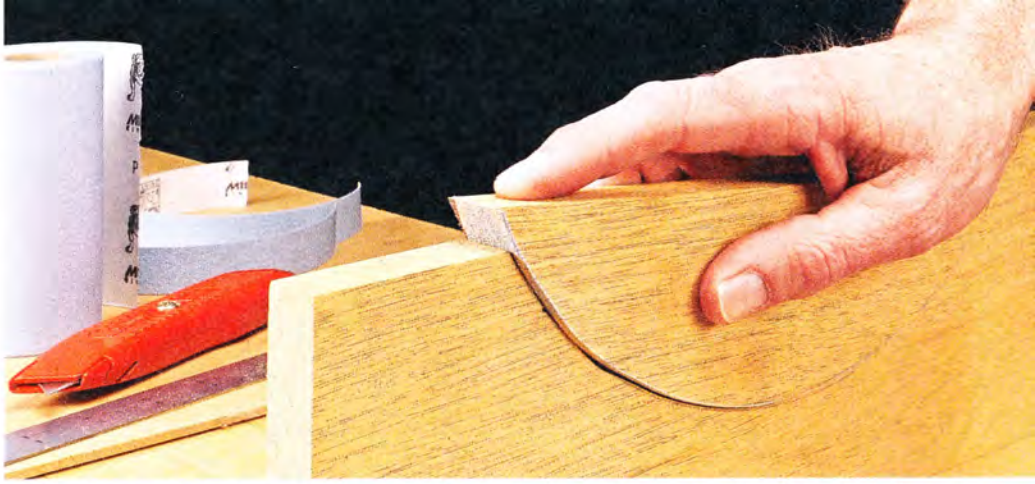
For most boards, I start with 120-grit. If the project is getting painted, this is where I stop, as well. For a project that receives stain, oil, or varnish, however, I'll switch to 150-grit, followed by 180-grit. 180 is the last grit for a project that gets a film-building finish like varnish. For an oil finish, I find it best to proceed all the way to 220-grit.

▼ You don't need a lot of supplies to get good results sanding. I rely on the items shown here.

You can also use these finer grits for light sanding in between coats of paint or varnish. As the coats build up, sanding and wiping away dust will produce a smooth surface. For a glass smooth surface with an oil finish, I'll wet-sand between coats with the 320-grit sandpaper.

THE TOOLS YOU'LL NEED. Just as I only use a handful of grits, my sanding supplies only include a couple of frequently used tools, as well. When it comes to hand sanding, I generally stick to sheet sandpaper and a basic cork sanding block (main photo, opposite page). These two items handle the majority of my hand-sanding tasks.

For other hand-sanding challenges that come up, such as curves or profiles, I don't get too caught up in purchasing fancy sanding blocks or tools for these situations. For a curved cut made on the band saw, for example, you can use the waste piece to create a perfectly matched sanding block. Stick a piece of adhesive-backed sandpaper on it, and your sanding block is ready to go (photo above). In other situations, you can simply hold the sandpaper in your hand and bend it to the contour or profile as you sand.



I tend to rely on basic tools and supplies for sanding. For example, there's often no need to invest in fancy-shaped blocks for sanding curves or arcs. In many cases, the cutoff piece and some adhesive-backed sandpaper are all you'll need.

POWER SANDING. If there's only one power sanding tool you own, it should be a 5" random-orbit sander. This is what I turn to for the bulk of my sanding work. It's really best to reserve it for the faces of workpieces, however, or careful work on edges. To prevent unwanted roundovers, you can clamp "outriggers" to the edges of your boards to provide extra support for the sander, as shown in the photo at left. And I try to avoid using it on workpiece ends, as it's just too prone to rounding the work.

To prevent rounded edges and ends when power sanding, clamp on "outriggers." These are scrap boards that match the thickness of the workpieces.

The only other power sander that you might deem essential is a finish sander. This sander can take care of your final passes on boards with a finer, less aggressive touch than the random-orbit style of sander (photo, below right). This type of sander is also less likely to produce the circular swirl marks that a random-orbit sander sometimes leaves behind.

OTHER SANDING ACCESSORIES. Other than the tools that do the actual sanding, I recommend a few other items to ensure sanding success. A non-slip mat is a good investment. You can see this style of mat in the photo at left and below. Simply place it under your workpiece to prevent it from sliding around as you sand.

I also keep mineral spirits close by. You can wipe some on your work to highlight imperfections without raising the grain, and it dries quickly (far left photo).

Finally, dust removal after sanding is essential. I recommend hitting it with a one-two punch of a shop vacuum and a tack cloth. I try to avoid using compressed air, as this can blow dust into nooks and crannies of the project, as well as into the air.

As you can see, with just a few basic tools and supplies, it's easy to get smooth worksurfaces without making sanding a big, complicated production. W

SANDING QUICK TIP

A quick wipe of mineral spirits will reveal any surface imperfections without raising the grain.

The palm, or finish, sander, does have its place. I like to equip it with 180- or 220-grit paper for the final pass on flat panels or other wide workpieces.

selecting a Marking Knife

When your goal is dead-on accuracy, put away your carpenter's pencil and pick up a good marking knife instead.

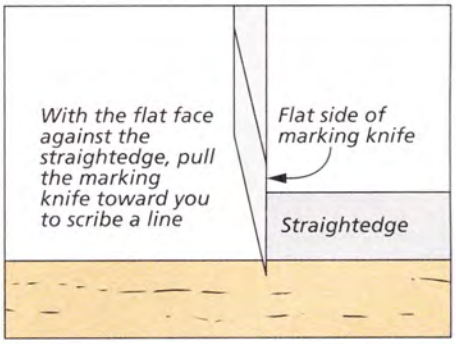
▲ Both Western and Japanese-style marking knives are available with either a single or double-bevel blade.

Measuring and marking project parts and joinery locations accurately is a fundamental skill. But how you mark a workpiece can vary, depending on the kind of work that needs to be done.

For power tool operations, you can use a pencil mark to line up a blade to cut on the correct side of the line. But more often than not, it's just a matter of setting a fence and making the cut.

When you're marking a position that will need further refinement with hand tools, like a mortise location, I prefer to use a marking knife (sometimes called a striking knife). Not only is the thin line of a knife more precise, but it offers a groove to position the blade of a chisel (top right photo on the facing page).

MARKING KNIFE. Not every knife is right for marking precise lines. For example, a pocket knife isn't a good choice. It's beveled on both faces so the actual cutting edge isn't flush with either face.



In order to scribe a line when using a square or rule as a guide, you want a flat face against the straightedge. The illustration above shows the correct position, allowing the bevel to force the knife against the straightedge.

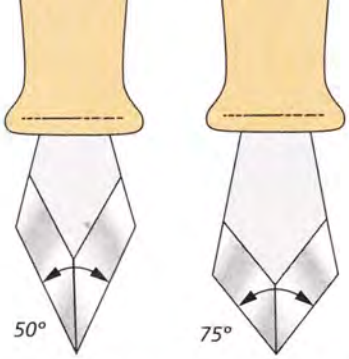
KNIFE TYPES. The margin photo shows a few different types of marking knives. While all of them have a flat back, the cutting edges of the knives are either single or double-beveled. That is, they have either one or two sharpened edges.

Keeping the flat face against a rule or square limits a single-bevel knife to cutting on only one side of the straightedge. For this reason, they are often paired, left and right, to give you some versatility.

Another option is the spear-point knife that is beveled on both sides of the tip. This knife can be used on either side simply by turning it over. I prefer this single-knife solution for its ease of use.

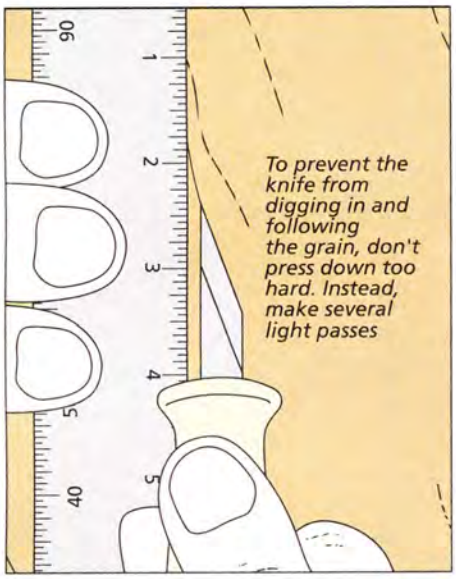
PREFERENCES. An important thing to consider when selecting a knife is how you grip and hold it. Do you prefer to hold it low to the surface or more upright? You can determine this by practicing with a pocket or carving knife.

Your preference will determine the choice of angle on the blade. It's common to find spear-point knives with angles ranging from 45° to 75°. If you like to hold the blade low, then the lower-angled knives will suit your style.



▲ The different angles available for double-bevel knives accommodate your habits and preferences for marking a workpiece.

▲ A groove scribed by a marking knife allows you to position the blade of a chisel for an extremely accurate paring cut.



No matter what your preference, however, you'll need to make sure the knife you choose can fit into tight spaces, like hand-cut dovetails. Some knives are made from thicker steel and simply won't fit between closely spaced tails.

STEEL. Like just about any cutting tool, you'll find marking knives made from different kinds of steel. Inexpensive Western knives are usually made from O-1 tool steel, but some high-end knife makers use other types, as well.

Japanese marking knives are available in high-carbon, white, or blue steel. These hard steels are forge welded to a softer steel, as is the custom for Japanese edge tools like plane irons and chisels.

The steel plays a big role in the cost of the knife. But in my view, expensive steel does not improve performance. And it's not likely you'll use up an entire blade in a lifetime of woodworking. Both O-1 and white steel are more than adequate for the task, easy to sharpen, and offer good value for the money

USING THE KNIFE. A marking knife is generally used with another tool, typically a square or a rule to scribe a straight line. The line doesn't need to be deep, just deep enough to score the surface. As I said earlier, you simply rest the flat face against the tool and pull the knife toward you. Keeping the blade sharp ensures you end up with a clean, crisp line. If it's dull, you'll wind up with tearout when cutting across the grain.

It's cutting with the grain that can be a problem. In this case, the tip has a tendency to follow the grain rather than the straightedge, especially if you're pressing down hard. Here it's best to make a few lighter passes to establish the line, then increase the pressure for a final mark.

BOTTOM LINE. No matter what kind of work you do, there's a knife for you. Once you get used to using a marking knife, you're sure to keep one close at hand — right next to a sharp pencil. W

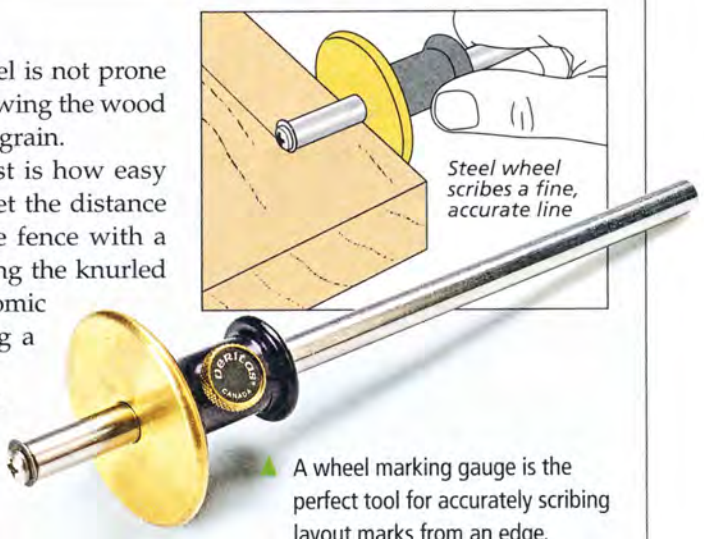
WHEEL MARKING GAUGE

Once you get used to using scribed lines instead of pencil marks, you'll also want to consider a wheel marking gauge for joinery work. With it, you can make dead-on layout marks for mortises, inlay channels, or any other lines that are measured from an edge.

Marking gauges have been in use for centuries, but using a hardened steel wheel instead of a metal pin or even a blade can be a big step forward. The advantage of the wheel is that it not only cuts a clean line, but it won't tear the grain like a pointed metal scriber when cutting across the grain. On top of that, a wheel is not prone to digging in and following the wood when cutting with the grain.

But what I like most is how easy it is to use. You can set the distance from the wheel to the fence with a rule and lock it in using the knurled knob. Then, the ergonomic design makes scribing a line a breeze.

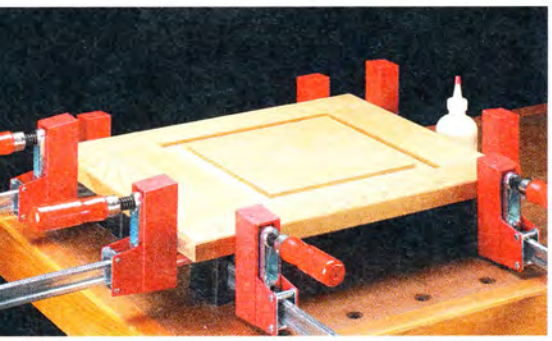
The basic model shown in the photo at right is available from *Lee Valley* (05N33.21).



▲ A wheel marking gauge is the perfect tool for accurately scribing layout marks from an edge.

mastering clamps & Assembly Strategies

Gluing up a project can be a little bit unnerving, especially if it's a big assembly. By the time you're ready to put it all together, you've cut, shaped, and sanded all the parts of the project to make them just right. But if the assembly doesn't go smoothly, the finished product might not live up to your high expectations. That's why learning about clamps and a few key techniques for clamping up an assembly is time well spent.



▲ Parallel jaw clamps are among the more expensive styles available. But they're tough to beat for square assemblies.

CLAMPS

For every assembly, there's a clamp that's right for the job. Whether it's a simple cabinet or a complex piece with curves and irregular surfaces, there's a way to assemble it and keep it together while the glue dries. Here are a few of my favorite clamps that see regular action in the shop.

▲ Bar clamps are popular both for their reasonable price and high performance. Here, a small bar clamp levels two workpieces during an assembly.

BAR CLAMPS. These clamps, sometimes referred to as "F-style" clamps, are the workhorses for most of us. They couldn't be easier to use — just slide the clamp head in place and twist the handle to put pressure on the workpiece. The advantage of these clamps is that they come in all sizes and the prices won't break the bank (photo above).

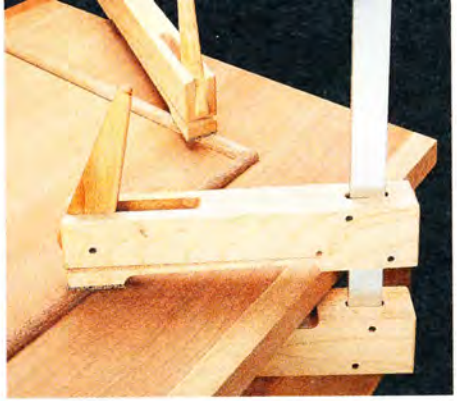
PIPE CLAMPS. Pipe clamps, like those in the main photo, are not terribly expensive, especially if you provide the black pipe. For the money, these clamps are the way to go when you're working on

large, heavy assemblies like tabletops or benchtops. Pipe clamps can channel a lot of clamping power to an assembly.

PARALLEL JAW CLAMPS. Parallel jaw clamps are more expensive than most other types of clamps. Nevertheless, they're my favorite for assembling cabinets, edge-glued panels, and anything else that needs to be kept flat and square. True to their name, the greatest feature of these clamps is the fact that the two tall jaws remain parallel even when tightened. The photo at the bottom left of the facing page shows how two pairs of clamps can be stacked.

CAM CLAMPS. Another traditional clamp, the cam clamp uses a lever to put pressure where you need it, but without a great deal of force. They're handy for precision work like luthiery and small assembly jobs. The left photo above shows them holding molding in place.

ONE-HAND CLAMPS. "Squeeze-style" clamps are great for all kinds of tasks, and the one-hand grip is convenient. Don't be fooled by all the plastic in these clamps. They provide plenty of clamping power for most projects. These clamps save the day when you're juggling project parts and trying to hold one in position (top right photo).



▲ Cam clamps are lightweight and easy to use. Their padded jaws allow you to use them on fine, detailed work.

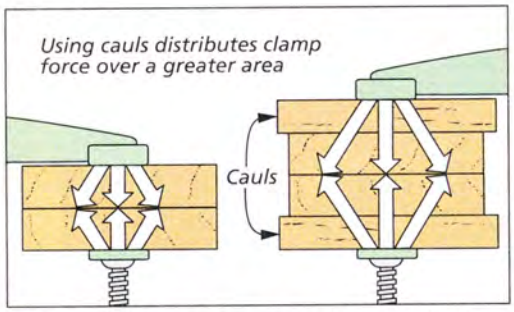
▲ One-hand clamps excel at light work and for those times when you need an extra hand to hold something in place.

BAND CLAMPS. Band clamps come in a few different styles, but they all consist of a nylon strap (the band) and a tightening mechanism (the clamp), either in the handle or a ratcheting lever. The photo at right shows a typical use — assembling a box. They're also the perfect way to clamp round or multi-sided projects.

▲ When it comes to boxes, multi-sided, or round assemblies, a band clamp provides simple, effective holding power.

CLAMPING ACCESSORIES

In addition to the clamps, there are a few items I wouldn't be without for most glueups. They make assembling projects easier or allow your clamps to work more efficiently.



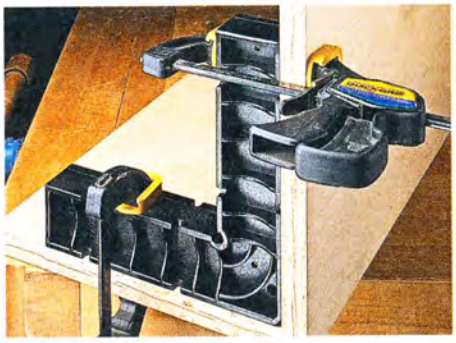
◀ Whether clamping up a joint (left photo) or two workpieces, cauls distribute the clamping pressure evenly and ensure a good bond.

CAULS. It's important to channel the force of your clamps effectively. In other words, you want the clamping pressure distributed over the entire length of the joint whenever possible. The far left photo shows how a pair of cauls can help. Since clamping pressure radiates out at a 45° angle from the jaw, the caul distributes the force by backing the clamp away from the edge of the project (left drawing).

GLUE SPREADERS. You'll also need a way to spread the glue on your joints. I've used everything from my fingertips to acid brushes (lower left photo) and purpose-made spreaders. All of them work well. The goal is to spread a thin coat of adhesive on the surface of the joint.

CLAMPING SQUARES. Keeping a cabinet square during assembly is critical. If you make a mistake, the doors won't fit properly and you'll have to spend a lot of time trimming them to match the opening. Fortunately, you can eliminate the worry with a couple of plastic clamping squares (near left photo). They also give you a welcome assist by holding two adjacent pieces together while you complete the assembly.

▲ Applying an even coat of glue is easy with a small brush. Store it in a bottle of water and you can use it again later.



▲ Clamping squares take the guesswork out of cabinet assemblies. Just clamp them to the workpieces and you're off.

TECHNIQUES

Having a selection of clamps and other accessories is a good start toward assembling a project. But using them properly and having a strategy for how to proceed during the assembly is what produces the best results. However, there are still a few more things to keep in mind. For starters, keeping a project square is a big concern, as is pulling the joinery together for a gap-free fit. This is when proper techniques play a role.

SQUARE PROJECT/FLAT SURFACE. Before you begin assembling a project, you need to have a good place to put it all together and clamp it up. If you assemble a project on a surface with depressions or ridges, you'll find it difficult to keep the project square during the glueup. But if your benchtop or worktable isn't perfectly flat, there are workarounds.

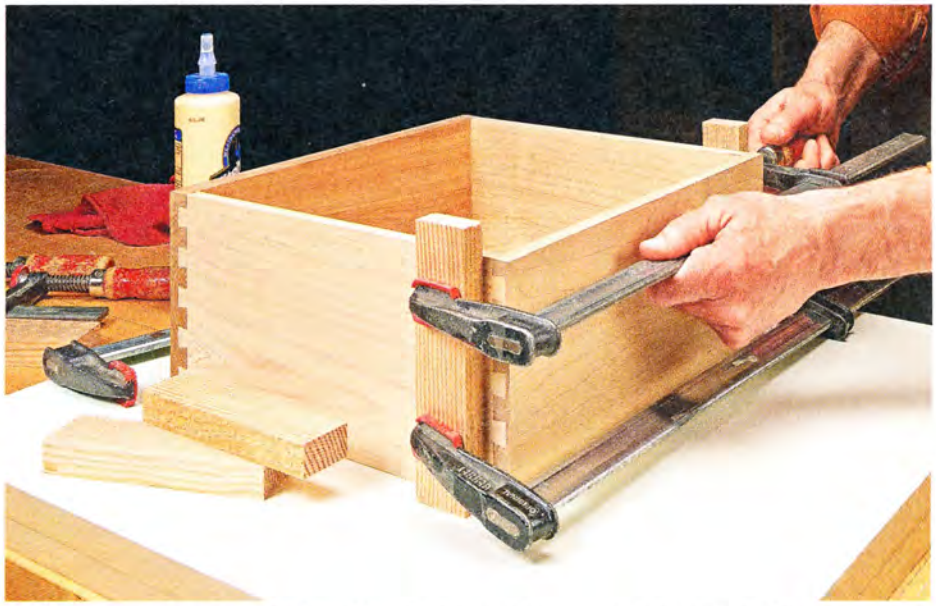
I keep a few pieces of melamine-coated MDF in the shop for just this purpose. They stay flat, especially when you double them up. And the melamine makes for an easy cleanup since glue won't stick to it. The photo above gives you the idea of how it works.

DRY FIT. The last preparation is to do a dry assembly. This is where you put the parts together without glue (photo below). It gives you a chance to go through the assembly process and will reveal any tricky spots or problems.

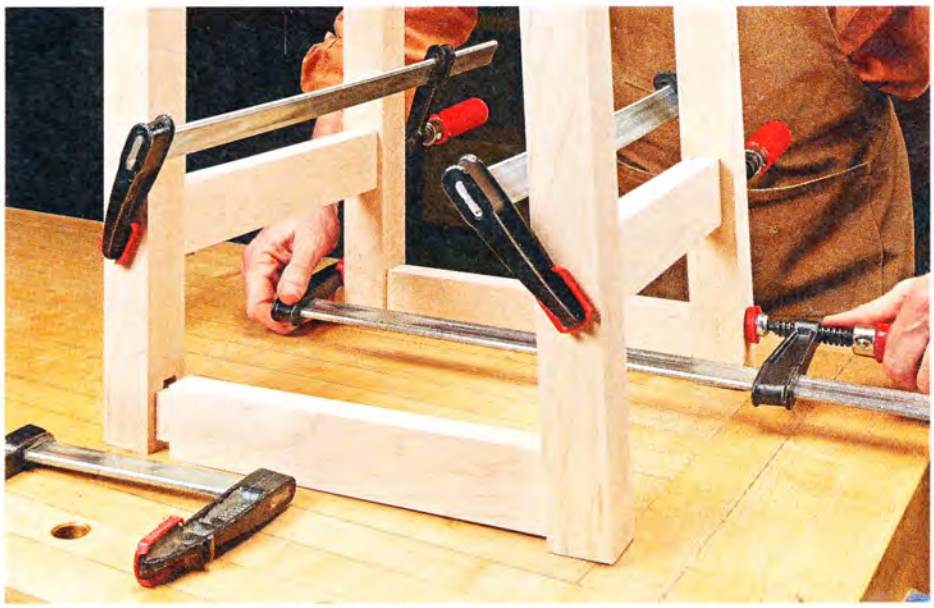
I start by clearing the worksurface, benchtop, or assembly table. You don't want to deal with clutter or any other distractions during an assembly. Anything that isn't vital to the process needs to be moved out of the way.

At this point, I look for any subassemblies that I can glue up first. A good example of a subassembly is the two ends of a table base. By attaching the legs and rails for each end, you make the final assembly just a matter of adding the stretchers. Most projects have some parts that can be assembled in advance. Once you get in the habit of using this technique, you can eliminate the mad rush of putting everything together at once.

I also use this time to give each joint a thorough examination to make sure they close tightly and look good. If your joints won't close up without clamping pressure, however, this is the time to stop and fix the problem instead of using the clamps to pull the pieces together. If you don't take care of it, the joint will remain under stress and be subject to failure at some later date.



▲ Melamine makes a solid, flat surface that even glue squeezeout won't stick to. By stacking up a couple of pieces, you can compensate for an uneven benchtop or worksurface. This flat surface ensures that the parts of your assembly will also remain flat during the glueup.



▲ A dry assembly of the project can help you identify problem areas in the joinery or the assembly process. During the dry assembly you can also plan the order of operations for the final glueup. After a dry run, you can proceed with confidence to the final assembly.

APPLYING THE GLUE

By now you should be feeling ready for the assembly. You've worked out the process and fixed any problems with the project and the joinery. But there are still a few things to consider. The first is which glue to use.

You'll need to use a glue that matches your timetable. Some glues, like conventional PVA adhesive, have a short open time. That's fine if you can get the project assembled in a few minutes. But if you have a large assembly that needs to go together all at one time, look for a slower-setting glue like liquid hide glue (upper right photo, opposite page).

Once you've settled the question of which glue to use, the next step is to prepare your gluing accessories, like a spreader for the glue. Whether you prefer to put the glue on one or both surfaces is up to you, but either way works fine, as long as you end up with an even

layer across the entire joint. The proper amount of glue is what's important. Too little and the joint is glue-starved. Too much and you'll end up with a sticky mess on your assembly table.

You can tell you have it right when you add clamping pressure and an even line of glue beads up out of the joint line. The top photo at left shows what you're shooting for. I don't try to remove the glue squeezeout while it's wet. Doing so usually results in spreading it around more and pushing it into the grain of the wood. It's usually better to wait until after the clamps are off.

▲ Beads of glue on the joint line as you tighten the clamps are a good sign that you've applied the right amount of glue.

▲ A scraper is the ideal tool for cleaning up hardened glue. By using both hands, you can remove the toughest residue.

AFTER ASSEMBLY

After an hour or so you can remove the clamps and start inspecting the project. Of course, there will always be glue to clean up. But on top of that, now is the time to inspect your work.

CLEAN UP SQUEEZEOUT. After removing the clamps, the squeezeout will have skinned over but still not fully hardened. Now you can easily remove it with a chisel and it won't leave much residue. The trick here is to use a chisel with the bevel down, flat on the workpiece. Once you get the feel for it, you can peel off the rubbery residue in no time at all. The key is to lock in the angle of the chisel with your arms and keep moving. The box below has another way of dealing with squeezeout.

The nice thing about waiting until this point to remove the excess glue is that very little of it will have worked its way into the grain to spoil a stain or finish. If there is any residue, you can touch up the surface with a little light sanding.

Sometimes, you might want a project to stay in the clamps longer and the glue will completely harden. In this case, I turn to a scraper to remove the beads.

▲ Liquid hide glue and PVA glue are good choices for most projects. Hide glue gives you a bit more time for the assembly.

The lower photo at left shows a type of scraper that works well for removing dried glue. The carbide blade of the scraper makes short work of the residue, but beware of tearing up the wood fiber.

FINAL INSPECTION. During all of this post-assembly cleanup, I take a hard look at the entire project. Now is the time to fix scratches or other marks you may have made during the process.

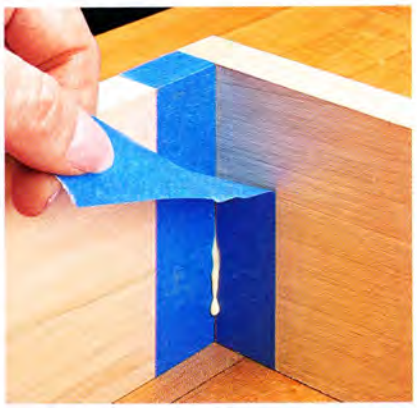
If you apply these methods for assembly to your next few projects, before you know it they'll be second nature. With the right clamps and a little patience, you can put together even the largest projects. And that will open up new doors for your creativity. W

DEALING WITH SQUEEZEOUT

Cleaning up excess glue can be a real headache, especially if the glue is in a hard-to-reach area, like the inside of a box. For these assemblies, you might want to mask the mating components at the joint line, as shown in the photos at right.

Using blue painter's tape, carefully apply the tape right at the edge of the joint. Be sure not to allow the tape to interfere with the joint closing. Once you've completed the assembly, let it sit for a few minutes and then pull off the tape. The excess glue will come off with it.

▲ Align the tape with the edge of a joint, but not inside the joint line. Press the tape in place firmly so it adheres well.



▲ After the glue has had a few minutes to set up, remove the tape slowly by peeling it away from the edge.

looking inside

Final Details

◀ *Linen Press.* Frame and panel doors and simple cove moldings adorn this traditional-looking project. Inside, you'll find plenty of space for storing a wide range of items. We'll walk you through each step of the building process, starting on page 30.

▼ *Knife Block.* This curved knife block provides an attractive home for your kitchen knives. The secret to creating the arc is laminated construction. Turn to page 16 to learn how it's built.

◀ *Hall Bench.* Graceful curves and smooth lines give this bench an understated elegance. Below the seat, a pair of drawers provide a place for stowing gloves, hats, or scarves. Complete, step-by-step plans begin on page 20.