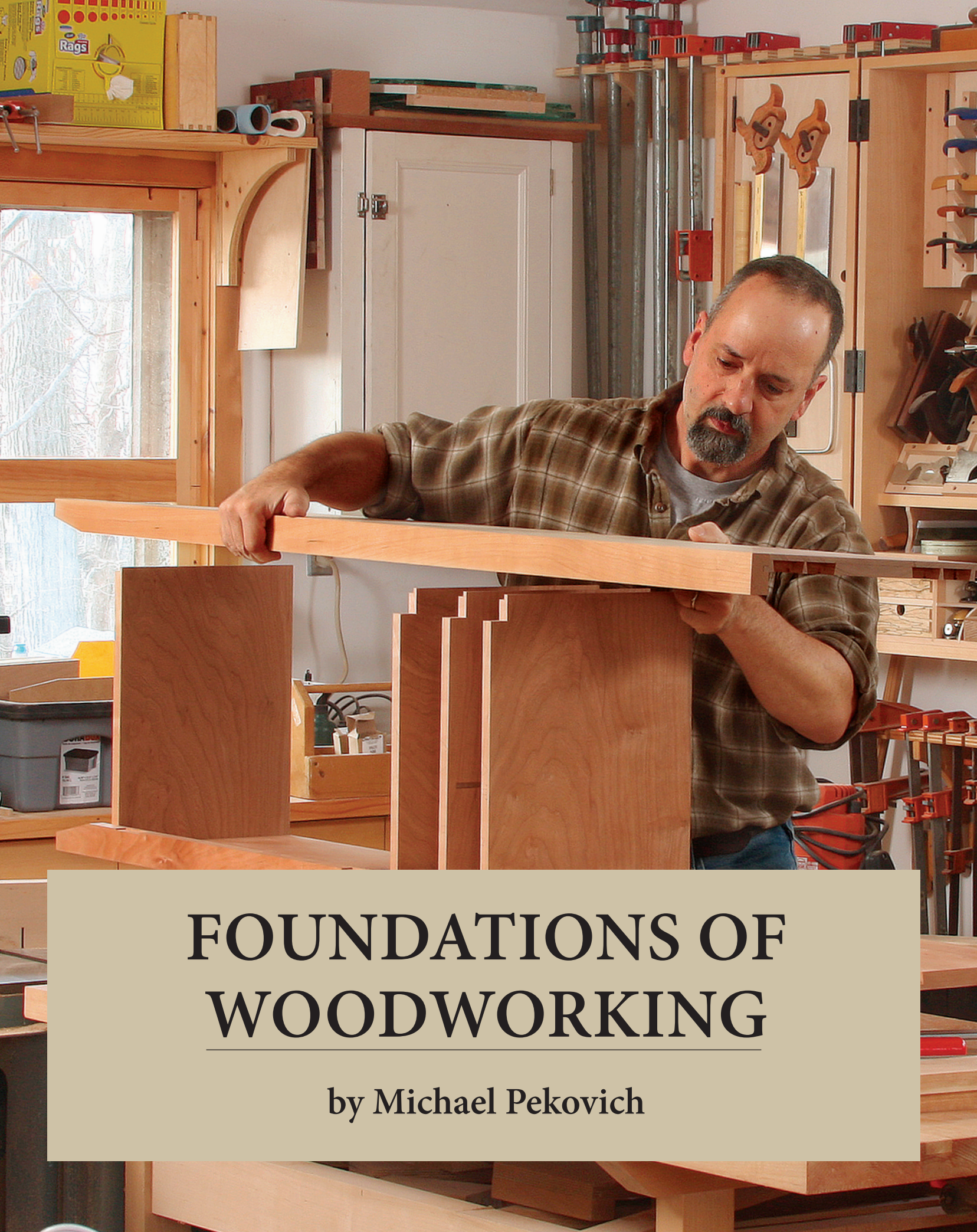


FOUNDATIONS OF WOODWORKING

by Michael Pekovich

INTRODUCTION

This e-book is a snippet from Michael Pekovich's new upcoming book ***Foundations of Woodworking***, which will be on sale on October 26, 2021. Preorder the book now, wherever books are sold.

Foundations of Woodworking gets to the very core of the **craft of woodworking**: laying out, cutting, and assembling joinery for furniture and other treasured wood objects. After an introductory chapter on the **basic woodworking strategies** that apply to anything you might build, Pekovich dives into a step-by-step, project-by-project description of **the essential wood joints**, from **rabbets and dadoes** through **dovetails** and **miters**. Master these joints—with a combination of **hand tools and power tools**—and the door is open to create just about any design you can think of.

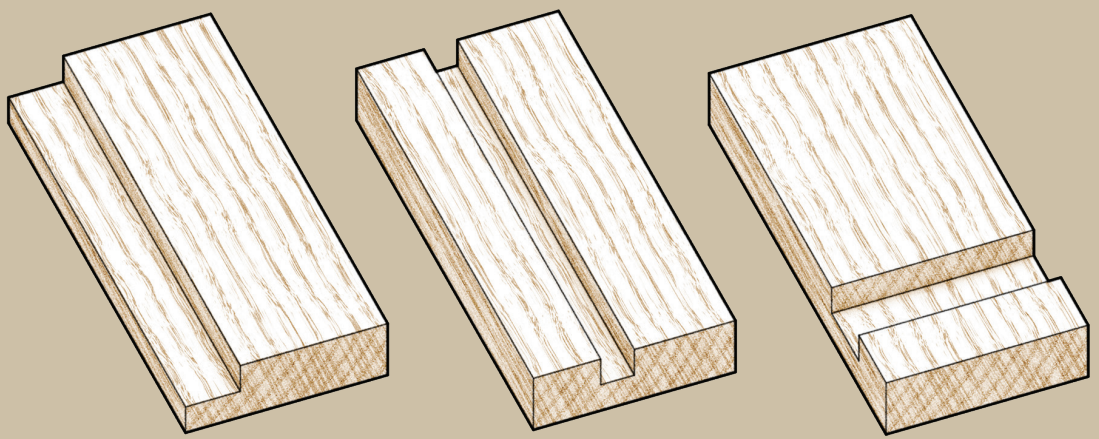
The book concludes with a selection of **inspiring projects**, including a wall cabinet, a chimney cupboard, an arched entry table, a desk divider, a dining chair, and many more.

Michael Pekovich's first book, ***The Why and How of Woodworking***, was the woodworking event of the year when it was published in 2018. ***Foundations of Woodworking*** is sure to pick up where ***Why & How*** left off, inspiring and instructing thousands of woodworkers worldwide.

RABBETS, DADOES, AND GROOVES

This is where the building begins. We've spent some time and care milling our lumber into flat and square boards, and with a rabbet or a groove, we begin to transform those boards into furniture parts. A good place to dive into joinery is with a trio of simple joints that are sure to be familiar to you. They say that familiarity breeds contempt, and the risk here is that it may prevent us from giving these joints our proper attention. If so, we'd be missing out on an important piece of the puzzle. Together they form the fundamental joinery that finds its way into just about everything we make. While rabbets, dadoes, and grooves are not difficult to execute, the method you use to make them may vary depending on the situation at hand. Because of that, a good portion of this chapter presents options for cutting each joint and attempts to offer guidance on which to pick for the particular challenge you are facing.

Just as important as knowing how to make the joints is knowing how to incorporate them into your work. While simple and sometimes limited on their own, they can combine to offer a powerful and versatile way to build. Learn how to cut these three joints and put them to use in your work, and you're off to a good start.

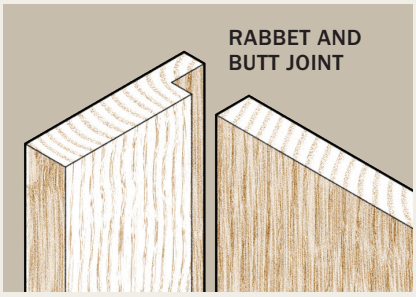


RABBET GROOVE DADO

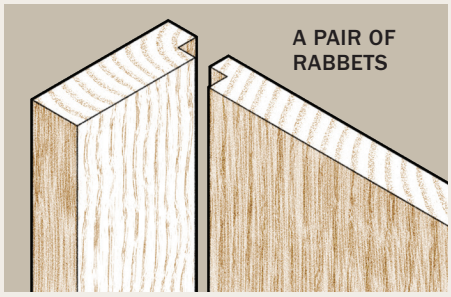
COMBINATIONS THAT WORK

Here is a small sampling of the many forms these joints can take. In deciding what to include, I started with the combinations that I put to use most often. They have gotten me out of a few jams over the years, and there isn't a single one that I'd want to do without.

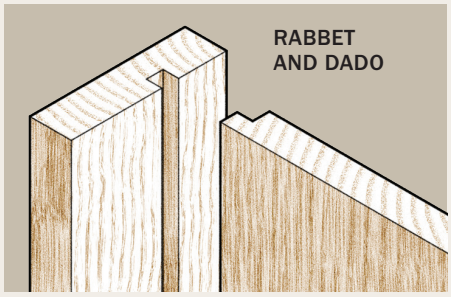
CORNER JOINTS



Provides a simple way to register parts while concealing the edge of one part.

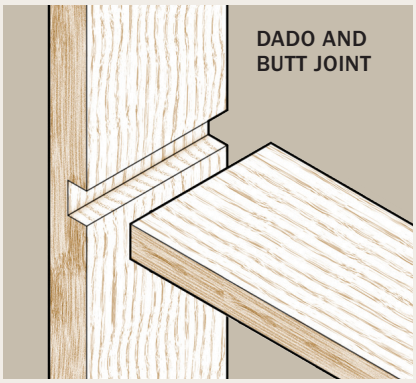


A second rabbet reduces the width of each rabbet and offers a second reference edge.

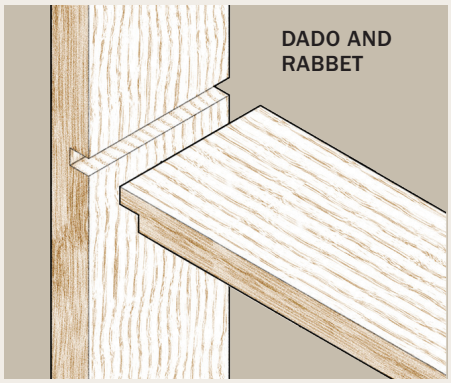


Adding a dado provides better registration and increases the glue surface.

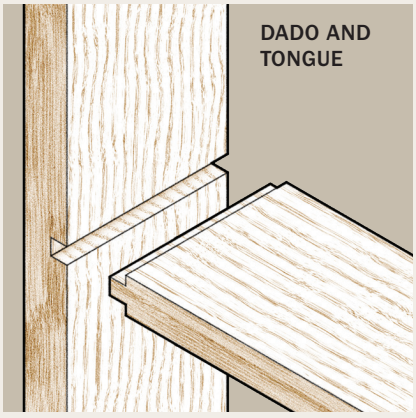
SHELF JOINTS



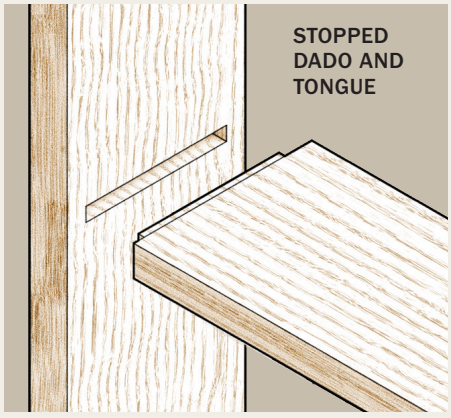
Requires precise shelf thickness and doesn't offer a lot of glue strength.



Shelf can be of any thickness, which makes it easier to fit.

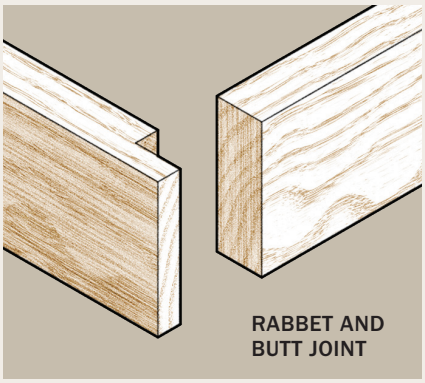


Allows both sides of the shelf to be surfaced without changing the fit.

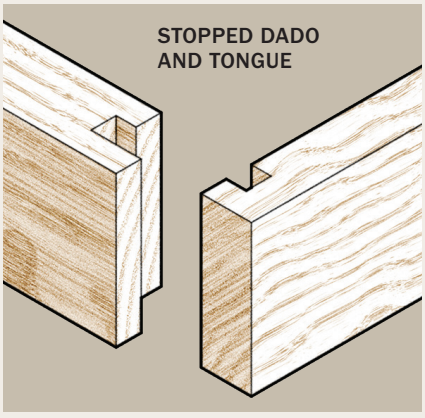


The dado and tongue are concealed on the edges of the case side.

CORNER JOINTS

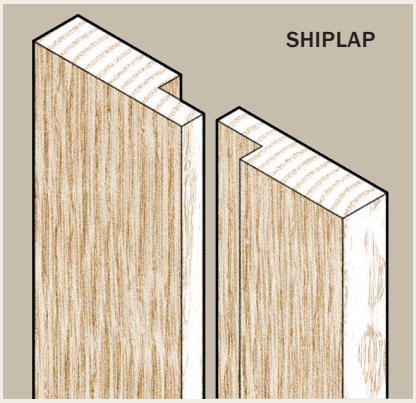


Offers better registration than a butt joint, but still creates a weak glue joint.

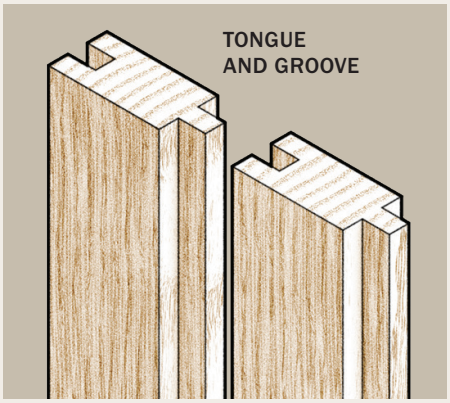


Provides increased glue surface and better registration; good for plywood parts.

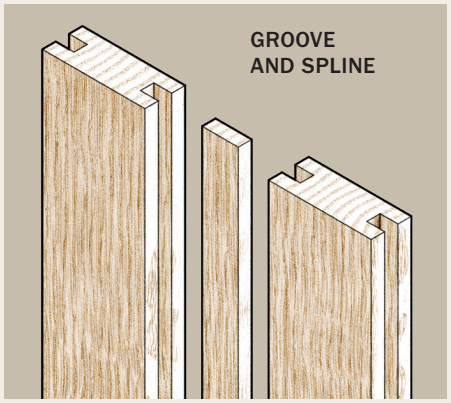
PANEL JOINTS



Mating rabbets allow for seasonal movement and conceal gaps.

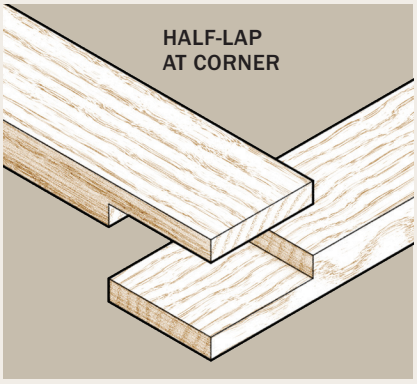


Better registration than a shiplap but more effort to cut.

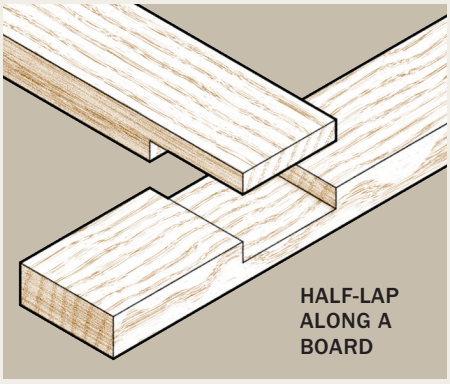


Spline replaces tongue, making the joint easier to construct.

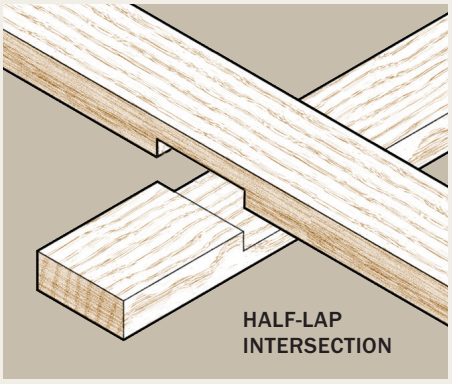
FLAT JOINTS



Provides some registration; broad glue surface makes it a strong joint.

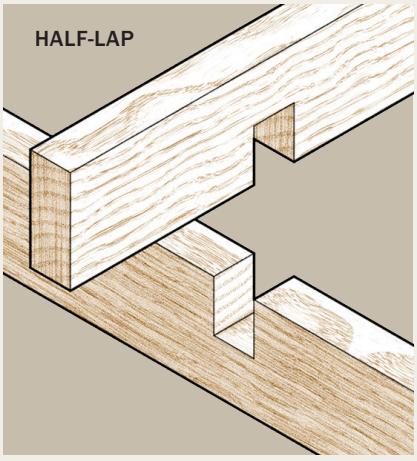


Cross-member must be sized to fit dado; strong glue joint.

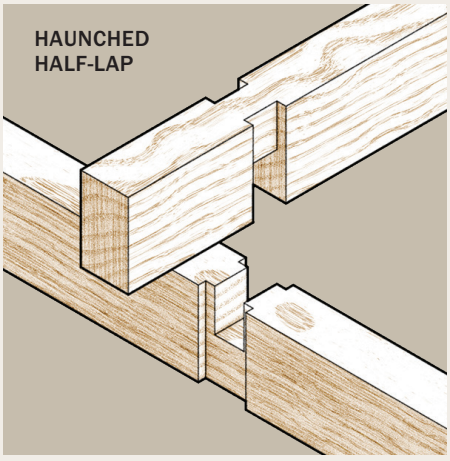


Requires careful fitting of both parts; strong glue joint.

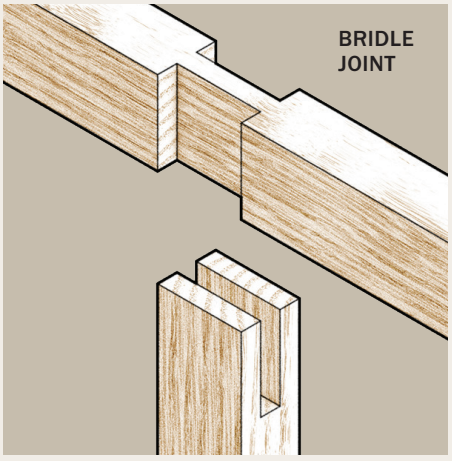
VERTICAL JOINTS



Can create weak short grain if near the end of a board.



Stronger than half-lap and eliminates short-grain issues.



Better registration and double the glue surfaces of a half-lap.

CHIMNEY CUPBOARD: A SMART USE OF SIMPLE JOINERY

While rabbets and dadoes may be simpler to execute than dovetails or mortise-and-tenon joinery, I want to stress that they still constitute a versatile and powerful combination when it comes to building furniture. This is not a "dumbed-down" way of building or a compromise for the sake of ease of construction. The classic Shaker chimney cupboard is a great example of how you can make sturdy, elegant furniture using simple joinery. Most of the case joints on this project are rabbets and dadoes. The subtop rails are connected with half-blind dovetails, but I've substituted a rabbeted dado joint for those on occasion. (You can also replace the dovetails on the drawers with pinned rabbets.)

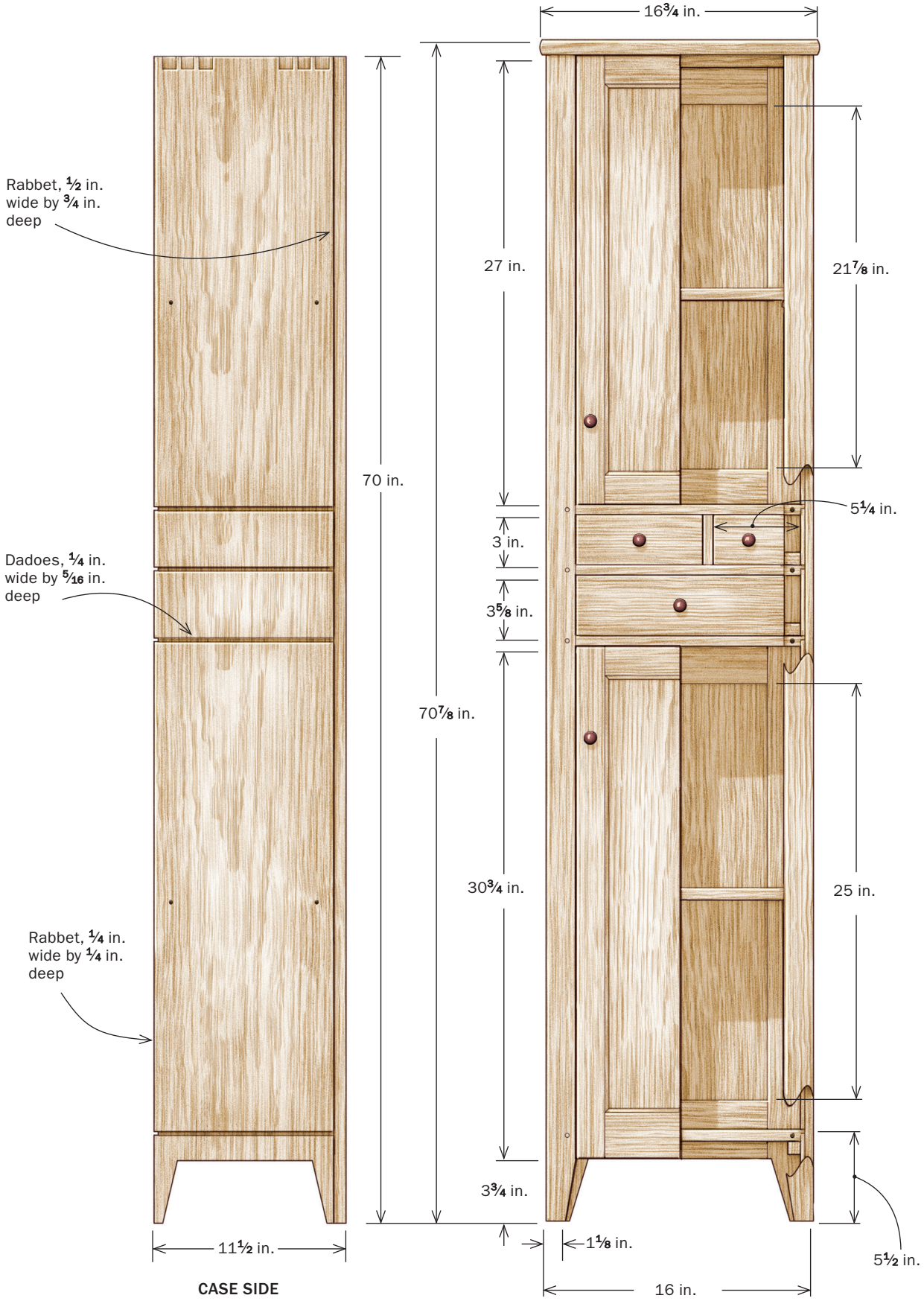
We face the same challenge here as on the previous wall cabinet, in that a dado joint offers no mechanical means to hold parts together like a dovetail does. It also provides no long-grain glue surfaces, which results in a weak glue joint. It sounds like a non-starter, but with a smart building strategy we can provide the strength to the case joinery that the dado alone lacks. As on the wall cabinet, we're adding vertical stiles to create a partial face frame to tie the shelves into the sides. Because this is a larger floor-standing piece and will encounter more racking stresses, we're fortifying the glue joint with some mechanical help. On this piece, the sides connect to the face-frame stiles with a tongue-and-groove joint. In addition, the stiles are secured to the shelves with pins. A frame-and-panel back ties the shelves to the sides at the rear of the case.

The dadoes that connect the shelves to the sides also get an upgrade. Where the wall cabinet employed dadoes the full width of the shelves, on this project the shelves are rabbeted to fit narrower dadoes. It's a little more work, but adding a rabbet to the process actually solves some challenges and makes for more accurate work. The idea is to cut a dado narrower than the stock and then rabbet the end of the stock to create a tongue that fits into the dado. A big advantage of this approach is that it saves you from having to mill your stock to an exact thickness to match a dado. The other benefit has to do with ending up with square work. On a full-width dado, the stock bottoms out in the joint, so any inconsistency in the depth of the dado (which is not all that uncommon) will affect the dimensions of the case. When you rabbet the stock that fits into the

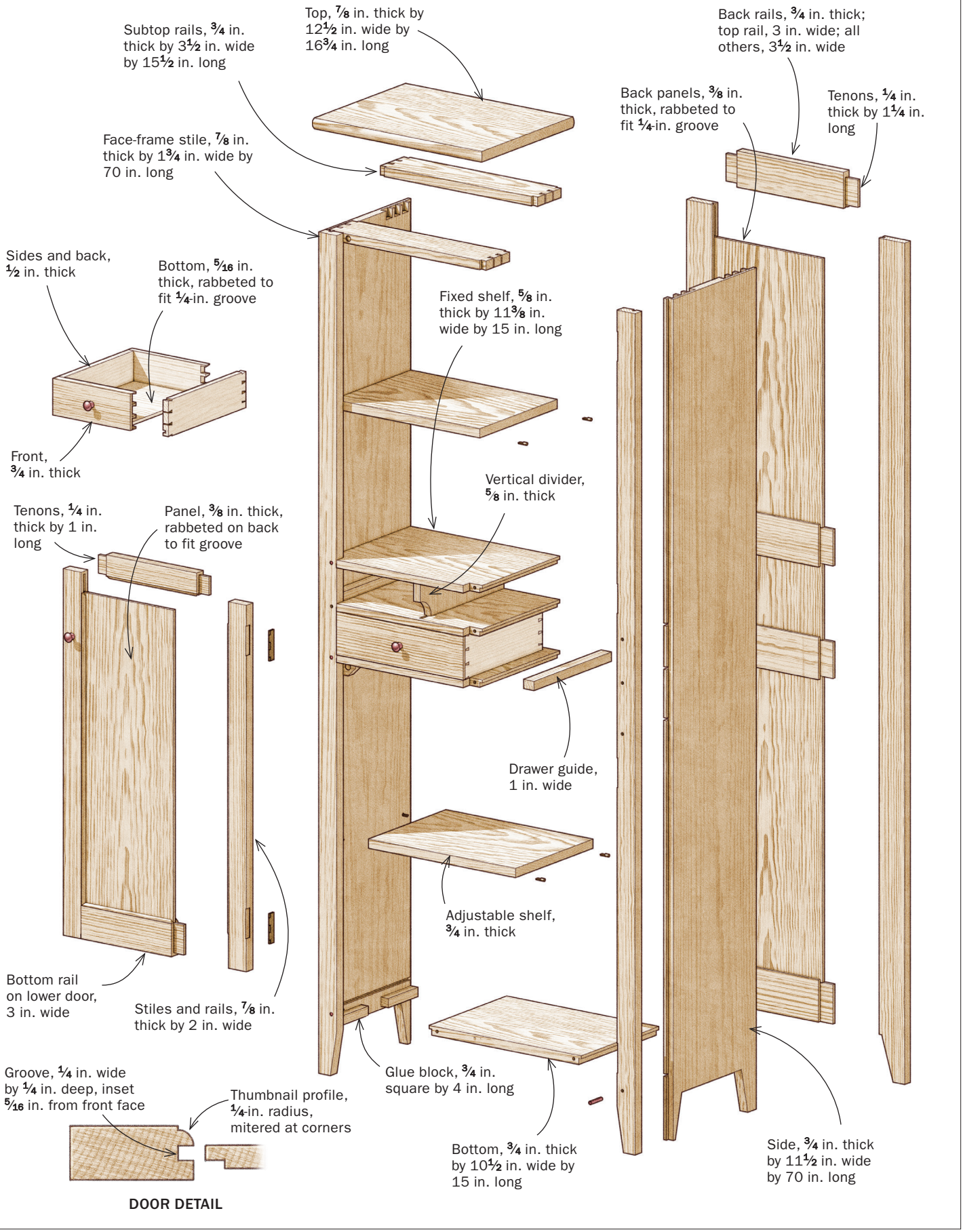
dado, the shoulder of the joint becomes the determining factor in how it comes together. So the aim is to cut the dado a little deeper than you need in order to ensure that the rabbeted part doesn't bottom out before the shoulder seats. This is a lot easier than trying to nail an exact dimension.

Understanding how something as simple as adding a rabbet to a joint can lead to more accurate work is important to your woodworking journey. This one step does away with worrying about exact thicknesses and exact depths, and makes your life easier at the same time. As you become more experienced, the craft will become easier and more enjoyable, not just because your skills will improve but because your approach and strategy will improve as well. The more effectively you can navigate through a project, the more you can build accuracy into your work without adding effort.

It's also a good illustration that sound construction doesn't rely solely on the strength of the joinery you choose, but in the application of those joints. While we often think of design in terms of how a piece looks, determining how something will go together and whether it will stand the test of time is an equally important part of the design process.

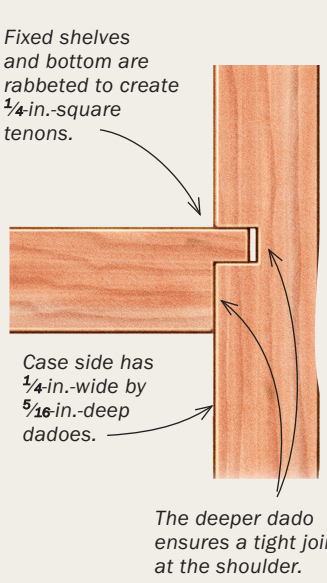

16¾ in.
Rabbet, ½ in. wide by ¾ in. deep
Dadoes, ¼ in. wide by 5/16 in. deep
Rabbet, ¼ in. wide by ¼ in. deep
70 in.
27 in.
3 in.
3⅝ in.
70⅞ in.
30¾ in.
3¾ in.
21⅞ in.
5¼ in.
25 in.
5½ in.
11½ in.
1⅛ in.
16 in.

CASE SIDE


Top, 7/8 in. thick by 12 1/2 in. wide by 16 3/4 in. long
Subtop rails, 3/4 in. thick by 3 1/2 in. wide by 15 1/2 in. long
Face-frame stile, 7/8 in. thick by 1 3/4 in. wide by 70 in. long
Back rails, 3/4 in. thick; top rail, 3 in. wide; all others, 3 1/2 in. wide
Back panels, 3/8 in. thick, rabbeted to fit 1/4-in. groove
Tenons, 1/4 in. thick by 1 1/4 in. long
Sides and back, 1/2 in. thick
Bottom, 5/16 in. thick, rabbeted to fit 1/4-in. groove
Front, 3/4 in. thick
Fixed shelf, 5/8 in. thick by 11 3/8 in. wide by 15 in. long
Vertical divider, 5/8 in. thick
Tenons, 1/4 in. thick by 1 in. long
Panel, 3/8 in. thick, rabbeted on back to fit groove
Drawer guide, 1 in. wide
Adjustable shelf, 3/4 in. thick
Bottom rail on lower door, 3 in. wide
Stiles and rails, 7/8 in. thick by 2 in. wide
Glue block, 3/4 in. square by 4 in. long
Groove, 1/4 in. wide by 1/4 in. deep, inset 5/16 in. from front face
Thumbnail profile, 1/4-in. radius, mitered at corners
Bottom, 3/4 in. thick by 10 1/2 in. wide by 15 in. long
Side, 3/4 in. thick by 11 1/2 in. wide by 70 in. long

DOOR DETAIL

RABBETS AND DADOES JOIN THE CASE

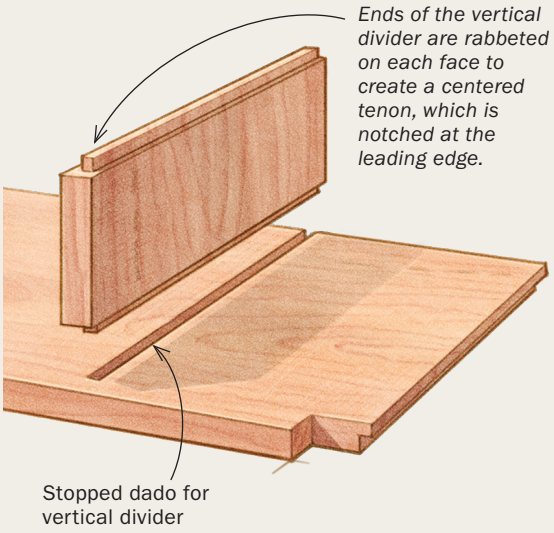



1


2

Combining a rabbet with a dado on the case joints has big benefits. First, rabbeting a part to fit a dado is much easier than milling a part to a precise thickness to fit a full-width dado. Second, the rabbet creates a shoulder on the shelf that registers against the inside face of the case side. This makes for much more accurate glue-ups because it doesn't rely on the bottom of the dado being perfectly even (which is difficult to pull off on a wide case side). And because the joint registers off the shoulder, you can cut the dado a little deep, which allows room for excess glue to gather and prevents squeeze-out. The face frame and back panel hide any gap at the bottom of the joint.

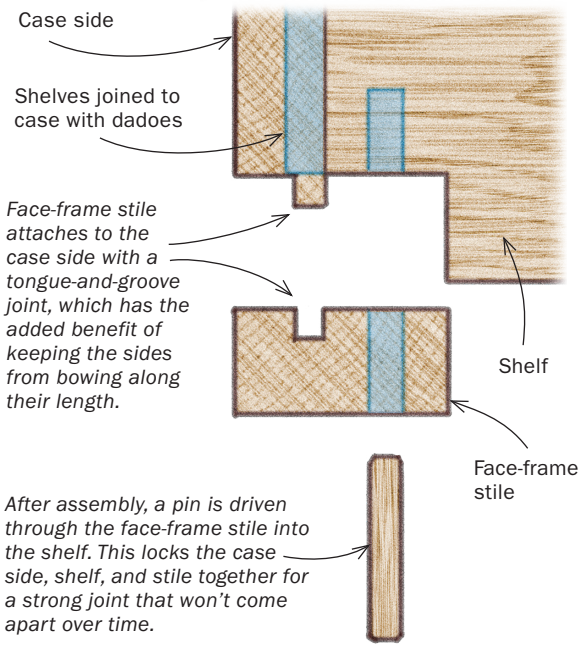
To cut the dadoes in the case sides for the shelves, dividers, and case bottom, I used a crosscut sled and a ¼-in.-wide dado blade on the tablesaw. The long sides create a bit of a challenge when dadoing. To cut the three dadoes



near the center for the shelf and drawer dividers, I clamped a long hook stop to the crosscut-sled fence (1 & 2). The dado for the case bottom is trickier because the long side can pivot during the cut. For that dado, I made a stop block with hold-down clamps and attached it to the sled (3). Clamping the piece in place kept it tight against both the fence and the sled base (4). The vertical drawer divider required a stopped dado in the top and center shelves. Clamping them together and routing both dadoes at once ensured that they would line up once assembled and result in a truly vertical divider (5). The ends of the shelves and case bottom were rabbeted to create a tab sized to fit the dadoes in the case sides (6). A featherboard clamped to the rip fence provided downward pressure to keep the part from lifting during the cut, resulting in tabs of consistent thickness. Aim for a snug fit and fine-tune it as necessary with a shoulder plane.

CASE ASSEMBLY GOES QUICKLY

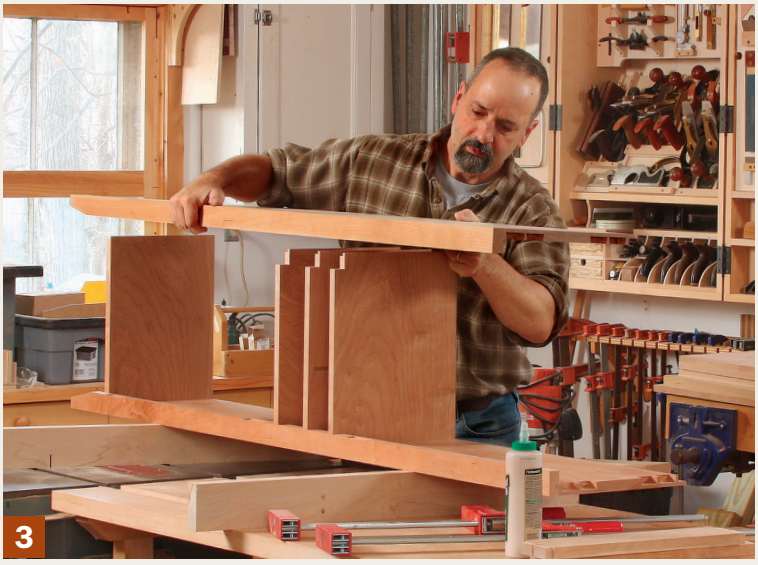
FACE FRAME STRENGTHENS THE CASE JOINERY



Normally the face frame is the last thing I add when building a case, but it was the first thing I tackled on this project. Use a narrow caul to direct clamp pressure over the joint and use a square to check that it sits flat (1). Gluing the frame first eased construction in a couple of ways. First, it allowed me to plane the edges flush to the case sides while the side assemblies were easy to deal with. It also made it easier to mark and notch the shelves to fit around the stiles.

The case bottom and the front subtop rail butt against the back of the face frame and act as door stops. The fixed shelf and dividers, on the other hand, end up flush with the front of the face frame, so you need to notch them to fit around it. With the stiles already glued to the case side, it's easy to scribe the notches (2). Cut the notches a little deep so the shelves end up protruding a bit from the front of the case. That will let you plane them perfectly flush later. Cut just outside the line with a handsaw or on the bandsaw, and pare the remaining waste with a chisel.

Continue the assembly by gluing up the sides, shelves, and bottom and top rails (3). Once all the clamps are on, add glue blocks under the bottom shelf. Apply a thin coat of glue on two faces and rub the block back and forth until it grabs. The vacuum will hold it in place without clamps. To allow for seasonal


3


4


5


6

movement, apply multiple short blocks along the joint rather than one long one. The drawer guides are glued in the same way, but because the guides are long, glue the front half only. Afterward, drill through the face frame at the shelf, divider, and bottom locations and pin the joints. This really locks the assembly and adds a little visual interest.

After the case has dried, flush up the shelf and dividers with the face frame (4). Then slide in the vertical divider (5) and plane it flush (6). This is much easier than trying to plane all of the parts flush at once. All that's left of the casework is to glue the top in place and add the frame-and-panel back (7). The back has two center rails aligned with the fixed shelf and lower divider, allowing you to screw the back to them as well as the sides, further strengthening the case joinery. The back plays an important role in keeping the case square and tying the horizontal members to the sides.


7