



# Build a Houseful of Doors

...without coming unhinged

BY JOHN LIVELY

Even before we moved into a Tudor cottage from the 1920s, I knew the doors had to go. Their faceted glass knobs, single flat panels and the dozen coats of gloppy paint definitely did not go with the house. And the doors were ugly to boot.

Soon after we moved in, I was sitting at the drafting table when despair settled in. Building one or two doors was no big deal, but making 16 doors was going to be a prison term of doing the same toilsome tasks over and over.

It was a sad Saturday morning when I told my wife I was going down to the building-supply store to check out the doors. It was even sadder still, when all I found were a lot of raised-panel doors in the Colonial style, a smaller selection of Mediterranean style and hundreds of hollow-core doors whose most exciting feature was a seamless skin of rotary-cut veneer.

By noon, I was back at the drawing board designing much simpler doors with biscuit joints instead of mortise and tenon. My plan was to figure out a strategy that would allow me to make and hang a single door in a weekend or two.

I also wanted to come up with a method of building a door to fit exactly into an existing opening, thus avoiding the tedious

and messy task of lugging all my tools out of the basement and into the living space of the house.

## Simple elements, major effect

For the sake of straightforward construction, I had to keep the number of elements in each door to a bare minimum—four frame members and one panel. To add interest to the design of the frames, I decided to run stopped chamfers on their inside edges. And on one door, I cut a double-

my house. But by fiddling with the details, you can adapt this basic approach to design doors that will work with your house.

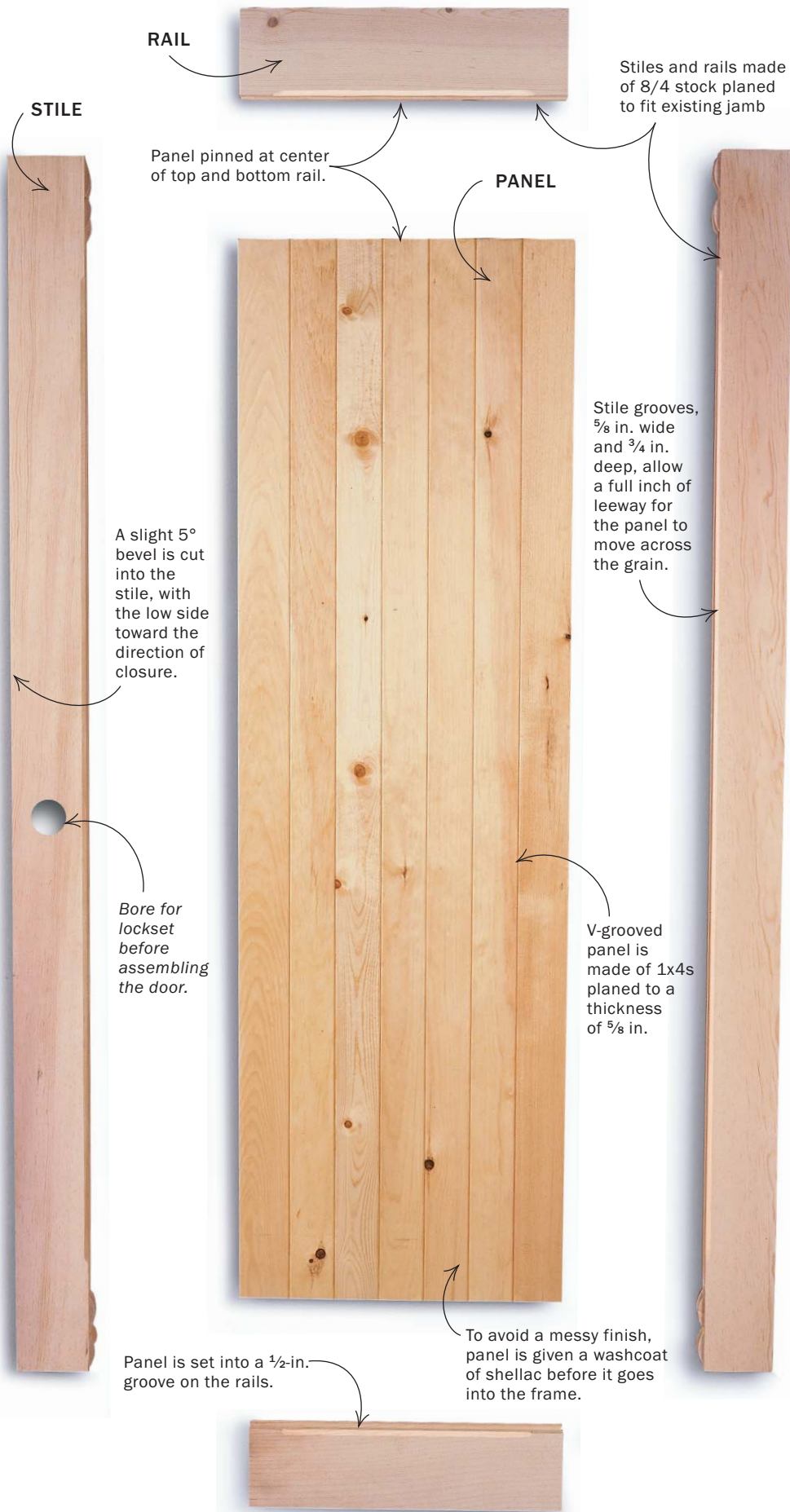
A door's vertical frame members (stiles) ought to be at least 4½ in. wide, but I prefer them a little wider. The typical back set for a knob location is either 2¾ in. or 2¾ in., which means to keep knobs centered, stiles should be either 4¾ in. or 5½ in. Also, after boring two big holes in your latch stile, there's not a lot of beef left if you're using narrow stock.

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sprung Gothic arch into the top rail and carved a dogwood blossom. V-grooved 1x4s seemed the right remedy for making such large panels something more than unrelieved expanses of planed wood. After making the first couple of doors, I was surprised at the visual impact these simple details made.

The doors I made harmonize (to my eye anyway) with the Arts-and-Crafts style of

Traditionally, a door's horizontal frame members (rails) are of unequal widths, the bottom rail being considerably wider than the top one. This arrangement offers a maximum amount of wood to be involved in the usual mortise-and-tenon joinery. But with biscuit joinery and modern glues, you can size the rails to your liking. Because you're gluing long grain to cross grain, a 5½-in. rail will provide good strength with-



out enough cross-grain movement to break the joint loose. I get plenty of strength using double rows of biscuits in all four joints.

### Precise dimensioning is key to speed

The greatest aid to speed and efficiency is accuracy in milling. If your stock is milled up square and true, the rest of the work will go smoothly and quickly. But if you mess up on the first part, well, you'll be sorry. So to begin, check and recheck your jointer fence and sawblades for perfect squareness.

Unless you want to move the stops on your door jambs—they'll either be nailed or rabbeted into the jambs—it's best to make your doors the same thickness as the ones you're replacing.

Next edge-joint one edge, rip to width, then edge-joint the sawn edge. Crosscut the rails, but leave them a little long until



### Strong-enough biscuits save time

A double row of #20 biscuits, rather than a mortise and tenon, saves time and provides plenty of strength to hold a modest  $\frac{5}{8}$ -in. panel.

you determine the final length.

The last step is to plow the grooves in the frame for the panel. I cut grooves  $\frac{5}{8}$  in. wide and  $\frac{1}{2}$  in. deep across the length of the rails. In the stiles, I cut grooves  $\frac{3}{4}$  in. deep, giving the panel a full inch of leeway to move across the grain. Also, I stop the grooves so they don't run far into the joint area.

Before we go on, let's back up a minute. By making a door in your own shop, you

## Measuring without a rule



When it comes to fitting parts precisely in trim carpentry and cabinet work, a tape measure is about as useful as a baseball bat in a billiard game. A tape measure has all those spaces between the gradations, and in the real world, things seldom fall right on the mark. So you wind up rounding off to the nearest one-sixteenth.

Say you're measuring for a door. The jamb is almost  $29\frac{11}{16}$  in. wide, and you want clearances of  $\frac{1}{16}$  in. on the hinge side and  $\frac{3}{32}$  in. on the latch side. One stile is a smidge over  $4\frac{5}{8}$  in. wide, the other just shy of  $5\frac{1}{4}$  in. So to cut the rails to the correct length and make the entire door come out to the right width, you do some eighth-grade arithmetic, then measure and mark the cut. Right? No. Not if you want a precise fit every time. To get that kind of fit, you need a more reliable, more empirical reference. Lots of cabinetmakers and trim carpenters use a two-stick story pole, which, as the name suggests, tells the whole story.

## WORK OUT OF THE JAMB



**Mark once, cut once.** A nickel spacer on the top of the stile and two wedges on the floor hold the stile steady. A centerline is marked along-side the strike plate (above). Laying out the hinge locations with a striking knife (left) is easy work with the stile clamped to the hinges.

can dimension it precisely to the opening *before* you assemble it. This saves the tedious trial-hanging, unhinging and trimming that carpenters have to endure.

The best measuring method that I've found for this kind of work is described in the box above. So here I'll stick to explaining the standard clearances between door and jamb. Old-time carpenters called it nickel and dime, meaning a skinny  $\frac{1}{16}$  in. (dime) clearance at the top and a fat  $\frac{1}{16}$  in. (nickel) clearance on each side. My carpenter hero Tom Law takes exception to the traditional wisdom.

Law calls for  $\frac{1}{16}$  in. on the hinge side,  $\frac{3}{32}$  in. on the latch side and  $\frac{1}{16}$  in. at the top. Bottom clearances typically call for  $\frac{1}{2}$  in. for vinyl floors,  $\frac{3}{4}$  in. for hardwoods and  $1\frac{1}{2}$  in. for carpet. Once you've measured the opening and have determined the dimensions of the door, you just may have one more problem.

**In heaven, square is square,** but on earth, door jambs in older houses seldom are. So check the head jamb for square. If it is square, fine. If it's not and if you're going to build and hang a bunch of doors, it's worth your time to make a big adjustable bevel from two pieces of scrap wood.

Check for squareness, or lack thereof, from the hinge side, and adjust your bevel to the angle made by the hinge-side jamb and the head jamb. If the head jamb is out of square, you can bet the threshold is too. While you're checking the angle of the threshold, here's a tip that can save re-trimming a door after it's hung: Adjust the bevel to the threshold-to-hinge-side angle.

To make one, take some  $\frac{1}{8}$ -in. rippings from the edge of a jointed 2x4, and saw the ends nice and square. When they make contact with the opposite side of the jamb, clamp them together, and mark a line across the one onto the other. Label it “opening width.” To figure the other door, all you do is measure from this mark the total clearance you want (in this case,  $\frac{5}{32}$  in.), and make another mark labeled “door width.” To determine the exact width of the rails, clamp the stiles together, butt a rail against them, tape the story sticks together at the door-width mark, and measure off the back side of the stiles onto the rail stock.

To get stile length, use a longer pair of sticks in the same way. No squinty-eyed reading of  $\frac{1}{32}$ -in. hash marks, no rounding off to the nearest gradation, no fraction conversions and middle-school math, no trimming to fit later.

A tape measure will get you in the ballpark. A story pole will sink your eightball every time, in one shot. —J.L.



Then holding the bevel tightly against the hinge-side jamb, swing the bevel out across the floor in the angle the door will swing. Any lumps or humps in the floor that will prevent the door from swinging fully open will show up immediately.

Once you’ve assembled the door to all the other specs, you can transfer the angles from the bevel gauge to the top and bottom of the door and trim to fit in the shop.

### Fit the hardware before assembly

Unlike carpenters, you don’t have to wrestle a whole door around to mortise for

hinges, bore for the lockset and mortise for the latch plate. You can fit all the hardware to the stiles before attaching the rest of the door to them. This makes the work easier, especially if you’re nursing a bad case of bench back.

**Bevel the edge of the door**—The narrow outside edge of the lock-side stile should be beveled to about  $5^\circ$ , with the low side of the bevel toward the direction of closure. Whether you’re doing this on your jointer or with a handplane, don’t wait until the door is assembled to do it. And don’t

worry about the bevel interfering with clamping during glue-up. The angle is too slight to throw things off.

**Install the lockset**—To locate the centers of the lockset bores, hold the lock-side stile against the head jamb using a nickel spacer on top and two wedges underneath. The centerline of the existing latch opening will be the centerline for both lockset bores (see the inset photo on the facing page).

Follow the template included in the lockset box to find the back-set axis for the face bore and the longitudinal center for the

## KEEP IT IN THE SHOP



**Adding detail to an unassembled frame.** Work moves quickly throughout the shop when you don’t have to haul a heavy door from one work area to the next. With the stile clamped securely in the bench, a series of chopping cuts and a smooth pass pares the waste away for a clean mortise that fits every time (above). To prevent tearout when boring for the lockset, drill the beveled edge first, then make two half-depth face bores (right).





**When everything is square.** Work blocks clamped to a sawhorse hold the door steady while it's dry-fit. Using a polyurethane glue allows plenty of time to make sure that everything is flush, square and aligned. Just remember to mist the biscuits with water to help the glue cure properly.

transverse bore. Bore diameters are fairly standard, regardless of brand—1 in. for the latch barrel (transverse bore) and 2½ in. for the knob barrel (face bore).

I use Forstner bits for all the doors. If you bore through the edge first, then run the face bore half-depth on each side, you won't risk the nasty tearout that comes when the 1-in. Forstner breaks through into the larger hole (see the bottom right photo on p. 73).

**Mount the hinges**—Laying out the hinge locations for an existing jamb is simple. Again, put a nickel on top of the stile, wedge it from the floor against the head jamb and clamp the stile to the hinges. Use a striking knife to mark the mortises directly off the hinge leaves.

Then back in the shop, with the stile in a

vice, you can cut the mortises in whatever fashion you prefer, knowing that you won't have to jigger the fit when you hang the door.

### The high craft of door hanging

In the traditional sense, door hanging is a mystery you don't have to worry about. That's because, if you've followed the method described here, you've already done it. You have actually incorporated hanging the door into the very process of making the door.

So after you have applied the finish, mounted the hinges and installed the lockset, all that's left is to slide the hinge pins home and shut the door. Click. □

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**A door that travels well.** The author uses the same door design for a clean look in the master bedroom.