

Raised-Panel Wainscot

Traditional results with table saw and router

by T. F. Smolen

Installing a traditional raised-panel wainscot is a good way to transform a nondescript room into a more formal space. It's also a handsome alternative to replastering old walls that have been damaged over the years by feet, furniture and children. A wood wainscot is more durable than plaster or gypboard, and it relieves the unbroken plane of the wall with the delicate array of shadow lines created by moldings and flat surfaces, as shown in the photo at the top of the facing page.

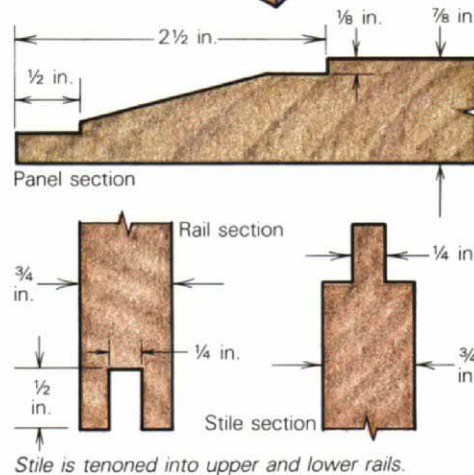
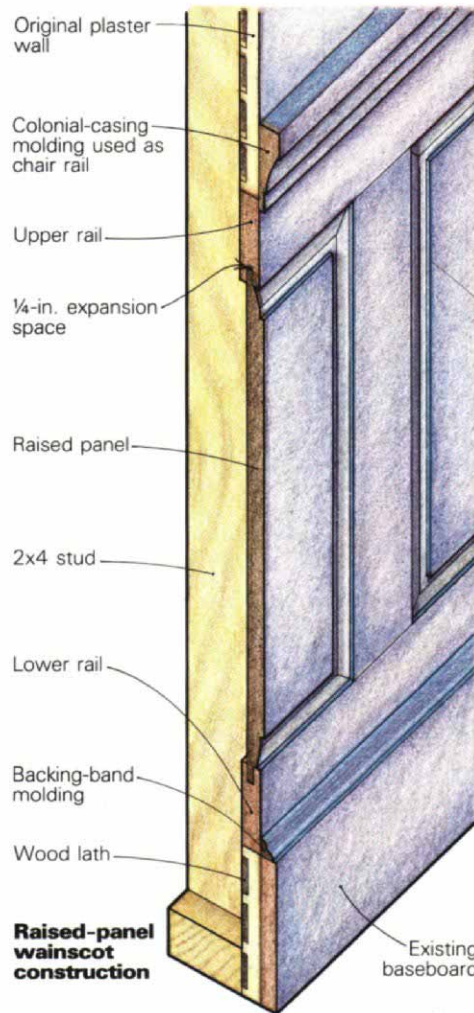
The term "wainscot" is often loosely applied to various paneling treatments that cover the lower part of a wall. The raised-panel wainscot shown here is a traditional style based on frame-and-panel construction. The frames consist of vertical members, called stiles, and horizontal members, called rails. They support panels whose beveled borders and raised fields give this particular style its name. Each panel rests in its frame with its grain running vertically. Panel width is limited by the width of your stock, unless you edge-join two or more boards together.

Beneath the bottom rail of the frame, a baseboard extends to the floor. At the top of the wainscot, a molding called a chair rail covers the joint between the top rail and the upper section of the wall.

The moldings that I used in making this wainscot can be bought at most lumberyards, and it's possible to make the raised panels and their frames with a table saw. I used a slot cutter and router table to groove the inner edges of my stiles and rails, but you could handle these as well on a table saw with a $\frac{1}{4}$ -in. dado blade.

Panel design—The wainscot that I installed in the dining room of my late Victorian home is traditional in design. I wanted its top to be about 41 in. from the floor. This finished height would include an existing 7-in. baseboard that could be left in place, and a 4-in. wide chair-rail molding that would overlap the top rail of the raised-panel frame. With the stiles and rails 4 in. wide, the panels would show 22½ in. of height. Their actual height would be 23½ in., since ½ in. of the panel edges would be let into the grooved frame all around (drawing, above right).

The width of the raised panels was determined by the distances between corners and the door, window and cabinet frames in the room. In each wainscoted section, I wanted



the panel size to be uniform, so I divided each section to allow equal spacings between stiles. The largest section has four panels, each of which is 12¾ in. wide; the smallest section has a single 18-in. wide panel.

I milled the panel stock from 4/4 roughsawn pine boards about 14 in. wide. The wood, originally intended for flooring, was air dried. I had one side planed down to a thickness of ¾ in., which allowed for a full ½ in. of relief on the raised panel and a sturdy ¼-in. thick tongue around the panel perimeter. Tight knots were acceptable, because I planned to paint the finished wainscot.

Raising panels—I set up a cutting schedule that included all panels for the wainscot, crosscutting the planks to 23½-in. lengths, then ripping them to finished width (the distance between inside edges of the stiles plus a ½-in. tongue allowance on each side). Then I made a template of the panel profile, which I set against the sawblade or dado head when setting up for a cut in order to produce the proper bevel and depth.

Making a raised panel with a profile like the one shown in the drawing below left requires three cuts on each side—one to form the bevel, one to form the tongue on the panel's edge and one to form the shoulder on the edge of the field.

To cut the bevel, I used a carbide-tipped combination blade because it produces a smooth surface that needs little sanding. To set up the saw for the bevel cut, I first set the arbor angle and fence distance to match the bevel on the template. Then I clamped a guide board to the tabletop, parallel to the fence and ¾ in. away from it. This guide board aligned and steadied the on-edge workpiece as it was fed through the saw (photo facing page, center). Without it, you'd have a troublesome, hazardous time keeping the bevel straight and true. Even with the fence, the blade had to cut through just over 2½ in. of wood, so I held the stock securely and fed with slow, steady pressure. The next time I need a similar setup, I'll use a 4x4 as the auxiliary fence.

Because some boards cup slightly after they are surfaced, I found it best to make cross-grain bevel cuts soon after the boards had been cut to their finished sizes.

When the bevels had been cut on all four sides of the panel, I completed the panel pro-

file using 1-in. wide planer knives (flat across the top) mounted in a Sears moving head.

The second cut (photo bottom left) removes a triangular section of waste at the edge of the panel to create the $\frac{1}{4}$ -in. thick tongue that fits into grooves in the frame. To allow for expansion and contraction of both frames and panels, I trimmed $\frac{1}{8}$ in. from the top tongue of each panel and $\frac{3}{16}$ in. from each side tongue (wood expands more across the grain than along it). The inner edge of the frame would be grooved to a depth of $\frac{1}{2}$ in. to provide expansion space at the top and sides of each panel. Allowing for play in the fit of each panel in its frame is necessary if the wainscot is to survive years of fluctuating humidity. Too tight a fit, and the panels are likely to check or bow out of their frames.

The third cut produces a $\frac{5}{8}$ -in. wide land at the juncture of bevel and field, and a $\frac{1}{8}$ -in. high shoulder where the field begins, $2\frac{1}{2}$ in. from the panel edge. No auxiliary fence is required for this cut, but the main fence needs to be set up exactly right. Here again I use the template to get accurate settings for the fence and blade. The blade should just graze the wood surface.

As soon as the panels were cut, I refin-

In a traditional raised-panel wainscot, a solid wood panel sits in a grooved frame. A chair-rail molding covers the joint between the top rail and the plaster. Overlapping the bottom rail, a baseboard extends to the floor, as shown in the drawing on the facing page.

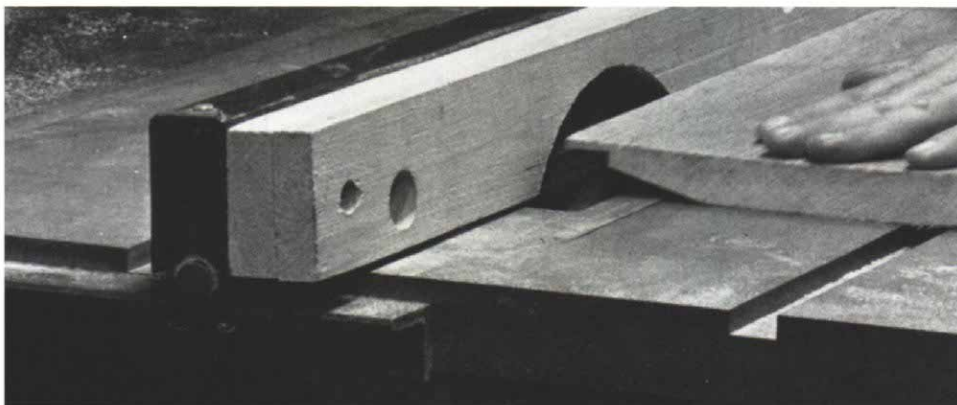
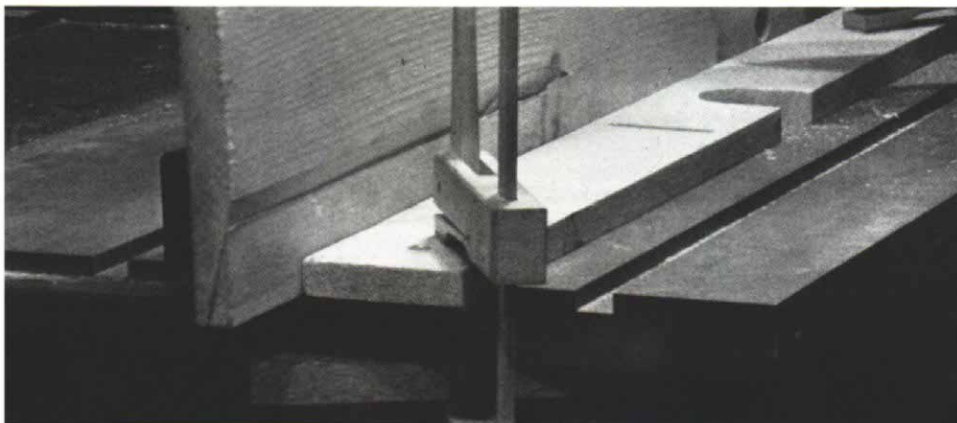


Table-saw setup. Top, a guide board, clamped parallel to the main fence, aligns the panel blank as the bevel is cut. Slow, firm feed and a carbide blade produce a smooth cut. For safety, let the blade stop spinning before the waste piece is removed. Above, a 1-in. wide planer blade cuts the tongue along the edge of the panel. At right, the author uses a tenon-cutting jig, attached to the saw's miter guide, to cut the tenons on a stile.

ished them to keep checking, cupping and wood movement to a minimum while I built the frames. I filled dings and small knots with plastic wood; then I sanded the exposed face with 80-grit paper and sealed knots with shellac to keep sap from bleeding through the finish coats of paint. Finally I gave each panel a coat of oil-base sealer compatible with the enamel finish I planned to use.

Stiles and rails—First I ripped 1x6 pine boards to 4-in. width. I cut all rails about 3 in. longer than their finished length so that after assembly I could scribe them for an exact fit to the walls on either side.

My design called for a ¼-in. wide by ½-in. deep mortise-and-tenon joint between stile and rail, so I grooved the inner edges of all the stiles and rails on my router table, using a ¼-in. slot cutter. Since the slot has to be cut down the exact center of the stock, I tested the setup on ¾-in. thick scrap before running stiles and rails through the machine.

To cut the tenons on the stiles, I used a thin-rim carbide blade on my table saw and a tenon-cutting jig on my miter gauge (photo previous page, bottom right). After a little touchup work with the chisel, I was ready to put frames and panels together.

Assembly and installation—I clamped the bottom rail of each panel section in the end vise of my workbench and fit each section together dry. Small pencil lines on panels and rails served as registration marks for centering each panel in its frame.

In assembling the wainscot, only the stile tenons get coated with glue. The panels are seated firmly in the frame, but not glued. This way, they can respond to changes in humidity and temperature without binding or bowing their frames. I used a small brush to spread glue on the tenons, and then assembled the frames and panels, snugging stile-to-rail joints together with pipe clamps until the glue set.

I wanted to nail the wainscot directly to the studs rather than installing it over the existing plaster, which was sound but presented quite an irregular surface. Leaving the original baseboard intact, I snapped a level line about ¼ in. above the installed level of the top rail and ripped out the plaster and lath. I scribed the plaster along this line with a utility knife, then ripped it off by hand. I cut the lath with a chisel and pried it off the studs with a hammer and small prybar.

Next, I nailed up the paneled sections, which I had purposely built slightly wider than the spaces they would occupy so they could be scribe-fitted to the walls. This left a slight gap between baseboard and bottom rail and between plaster and top rail. I used a 4-in. wide Colonial-casing molding at chair-rail height to cover the joint between the rough plaster and the top rail of the wainscot, and a 1½-in. wide backing-band molding at the baseboard and bottom-rail junction. □

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Modified wainscot: a raised panel with birch-veneer plywood and beveled molding

by Michael Volechenisky

A small ad in the local paper got me interested in building a raised-panel wainscot. It offered for sale "paneled wainscoting from a 150-year-old home" (wainscot is actually the correct term here). This would be just the thing for the dining room in my equally old house, which I was in the middle of redoing. But the age of the wainscot was unfortunately confirmed by its condition, and in any case there wasn't enough of it to go around my 15-ft. by 15-ft. dining room. So I decided to build my own from scratch, enlisting the advice of Luther Martin, a retired builder and woodworker who was sympathetic to the idea of recreating an old look with new materials.

Panel design—I planned to construct a frame-and-panel wainscot along traditional lines, bordering it with a baseboard along the floor line and a chair-rail molding along the top. But Martin didn't want to use solid wood panels because he'd seen long stretches of wood-paneled wainscot push walls out of plumb as a result of normal wood expansion. Cracking and cupping are other risks of solid wood panels. So I made my raised panels from ¾-in. thick lumber-core plywood with birch face veneers, and with slightly modified beveled molding. The molding, which is 2 in. wide, forms the beveled border of the panel, and the lumber-core plywood is the field. A tight tongue-and-groove glue joint between border and field and two coats of white enamel hide the fact that these panels weren't raised in the traditional fashion.

This alternative design has several advantages. First of all, the lumber-core plywood field is far more stable than its solid wood counterpart. Expansion and shrinkage are negligible, as are cracking and checking. And the birch face veneer is better than solid pine or fir if you're planning to paint—as I was—because it contains no knots or resin pockets, which could bleed through the finish.

Third, you can give the panel's bevel a fancier treatment than is possible with conventional techniques, since the border isn't an integral part of the field. The molding I used, for example, has a quirk bead at the inner edge of the bevel—an embellishment that suggests far more intricate work than was actually involved.

Michael Volechenisky lives in Sayre, Pa., and Pompano Beach, Fla. Photo by the author.

Making moldings—From top to bottom, my wainscot contains a chair-rail molding scribed to fit the plastered wall; two smaller moldings (a cove and a beaded stop) that fit over the frame and raised panels; and a baseboard scribe-fitted to the floor, with its top edge covered by a modified scotia molding (drawing, facing page). I made these moldings with my spindle shaper, but could have bought similar ones at the lumber store.

I milled the beveled molding for the panels that make up the wainscot on an old Hebert molder-planer. The Hebert, which is no longer made, is similar to the Williams & Hussey planer (Williams & Hussey Machine Co., Dept. 16, Milford, N. H. 03055), and both machines are shop-size versions of the larger, more powerful planer-molder machines used by lumber mills.

My machine has only one cutterhead, which is mounted horizontally above the table and holds a pair of knives. It is driven by a 1-hp motor, and is powerful enough to complete a molding in a single pass, providing you use knot-free wood that's not too dense. But to be on the safe side, I usually make my first cut to within ⅛ in. of the finished dimension and then run the stock through a second time to get a smooth surface that requires very little sanding.

Molder-planer manufacturers sell a variety of molding cutters to fit their machines, but I've often made my own from precision-ground tool steel (it comes in many sizes and thicknesses, and can be bought wherever metalworking tools are sold). After drilling two holes in each tool-steel blank so they can be bolted to the cutterhead, I transfer my molding outline to the blank and start removing metal. I hacksaw as much as I can, grind the shape to a 30° bevel and hand-file corners and coves where my bench grinder can't reach. After getting both cutters as nearly identical as I can, I mount them in the Hebert and run a trial piece of wood through. This tells me which cutter is doing most of the work by the flecks of wood that adhere to its cutting edges. More filing follows; then I hone the blades and install them. Since most of my molding runs are for 500 ft. or less, it doesn't seem necessary to harden my cutters.

All the moldings, stiles and rails for my wainscot were cut from basswood stock I'd been saving. Basswood works easily, and I've found that you can usually smooth it by hand with a cabinet scraper, with little or no

sanding. It also takes a fine coat of paint, because it's knot-free and resin-free.

No matter what type of wood you use on a molder, you'll get better results if you make sure that each board you run through the machine has its grain oriented correctly relative to the cutterhead. To prevent small chips and tears in the molding, feed your boards so that their grain slants down toward the exit side of the machine.

I constructed the panels first. Each completed panel actually consists of five pieces—the birch-veneered lumber-core field and four bordering molding sections. As shown in the drawing, the tongue along the inner edge of the molding is designed to fit in a 1/4-in. wide groove cut in the edges of each panel. I grooved the panel edges on my table saw, using dado blades. At the corners of the panel, adjacent molding sections are mitered. Once all the parts for a panel were cut and test-fitted, I glued them up.

After the panels were finished, I built their frames. Top and bottom rails for each 15-ft. side of the room were cut from 16-ft. long basswood boards. Using a hollow-chisel mortiser chucked in my drill press, I cut mortises in the rails to receive stile tenons. Then I grooved the inner edges of the frame on the table saw to receive the 1/4-in. by 3/4-in. tongue around each panel.

I test-fit the frame-and-panel sections for each side of the room, then glued and clamped them together. Before installing each section, I gave the back of the frames and panels two finish coats—the same number that the front of the wainscot would receive. Thus both sides of the wood can respond equally to temperature and humidity. Perhaps this wasn't necessary, but there hasn't been a single paint crack in the wainscot after eight years on the wall.

Though I could have installed the wainscot directly over the dining room's old plaster walls, they were in such bad shape that I stripped the room down to its studs and nailed up rock lath. Then new plaster was applied down to a temporary ground I nailed just below the height of the chair-rail molding that would top off the wainscot.

The frame-and-panel assembly was the first part of the wainscot to get nailed up. I made sure each wall section was level and used 8d finishing nails, positioning them close to the rail edges so they would be hidden by the covering layer of molding.

Once the four frame-and-panel sections were up, I added moldings to the rails. The baseboard and the scotia-style molding covering its top edge were mitered at the corners, as were the chair rail and its two adjacent moldings. A light sanding, followed by a primer coat and two coats of semi-gloss Kemglow enamel, finished the job. □

The gluing setup used to construct the panel consists of four bar clamps and a Formica-faced base slightly shorter and wider than the panel. At panel corners, the molding joint is a glued miter.

Wainscot construction

Section view

- Chair-rail molding
- Cove molding
- Filler strip
- Beaded stop molding
- 2 in. wide upper rail
- Modified casing molding forms border of raised panel
- Glued T&G joint
- 3/4 in. thick lumber-core plywood with birch face veneer
- 1/8-in. by 1/8-in. reveal creates shadow line around field of raised panel
- Raised panel is let into 1/4 in. by 1/4-in. groove in stile and rail frame
- 3-in. wide lower rail
- Baseboard scribe fitted to floor
- Rock lath
- Plaster

Chair rail and baseboard were made more ornate by adding adjacent moldings. The panel consists of a lumber core plywood field and a beaded molding border.

