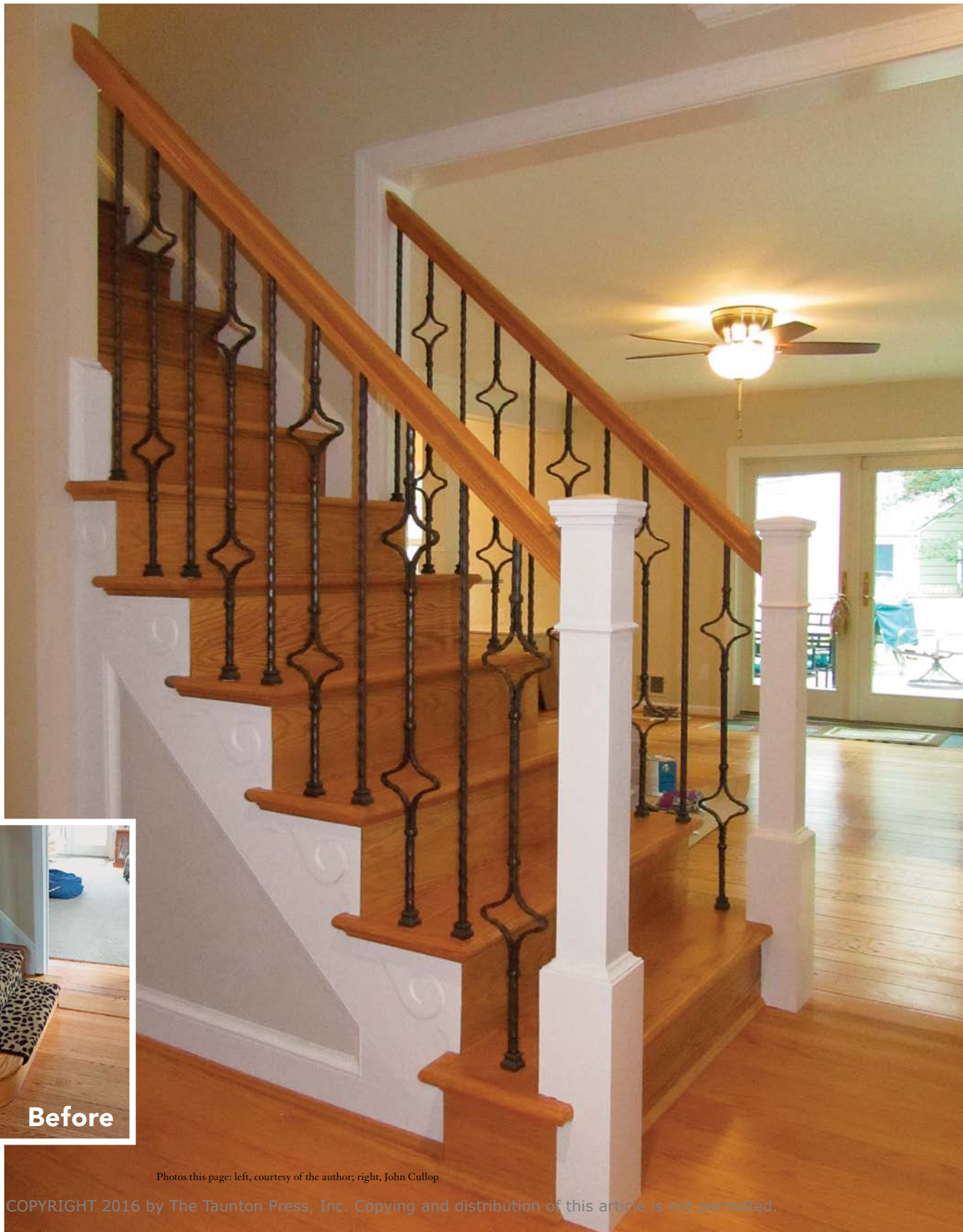
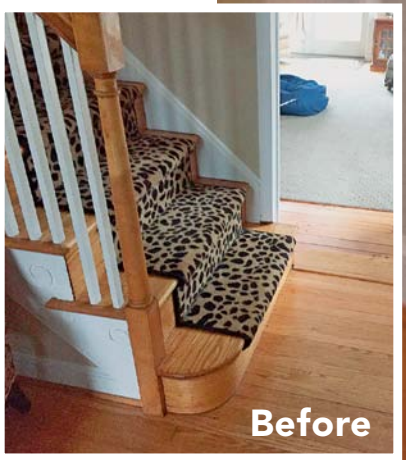
Remodeling

BY MICHAEL PATTERSON



Widening an opening has consequences. *Removing the wall on the right of these stairs meant rebuilding them so that both sides were open, with returned treads and skirtboards that joined the risers in mitered joints.*



Photos this page: left, courtesy of the author; right, John Cullop

a Stair

Rebuilding these stairs in place preserved a finished ceiling below but added other challenges

I recently remodeled a kitchen, which included opening it to an adjacent family room to improve traffic flow and sightlines. The views and traffic had been blocked by a stairway with a full wall on one side. The architect for this remodel, Amy Stacy, called for the wall to be removed and the lower half of the staircase to receive new balustrades, returned treads, mitered risers, and decorative skirtboards.

Because only the lower half of the stairway needed to be altered and no work was being done on the second floor or in the finished basement stairwell below, I decided it would be far less disruptive to rebuild the lower half of the stair in place rather than to remove the entire staircase and install a new unit.

Fortunately, houses from this era (mid-1940s) typically have site-built staircases rather than the shop-built units common in modern construction, so there were rough stringers I could reuse. A modern stair, even if it were open on one side, would have a housed stringer (where the treads and risers fit in mortises cut in the stringer and are secured with glue and wedges) on the other side and no stringer in the middle, making it difficult to rebuild the stair without tearing into the finished stairwell below.

Code was another issue. Because no work was being done to the upper half of the stairs, the building department didn't require that section to be brought up to code. However, the parts I touched did have to meet code, and the riser heights on the lower section varied by more than code allows. That had to be fixed. Another potential problem was that the existing stringers were cut from 2x10s rather than 2x12s as code calls for, but because the stringers were each supported by a wall below, their 2x10 construction wasn't an issue. The final touches to the stairs themselves were installing manufactured decorative scrolled brackets on the skirts and adding trim below the treads.

Michael Patterson is a remodeling contractor in Gaithersburg, Md. Photos by Andy Engel, except where noted.

FIX THE OLD STRINGER

To check the consistency of the riser height, a laser level was used to find the elevation of each tread. The variations exceeded the 3/8 in. allowed by the IRC, so they needed to be corrected. To find the right riser height, the elevation difference between the finished floor and the first remaining tread was divided by six, the number of risers on the lower stair. A story pole was marked with the correct elevations of the tread cuts and used to gauge which treads would need shimming and which would need to be lowered to make the riser heights identical.

Demolish carefully. *To preserve the underlying stringers as much as possible, as well as to protect the basement-stairway ceiling below, the old treads and risers on this stair were removed individually.*

Scabs repair major damage. *Larger damage done in demolition was repaired by gluing and screwing 2x scabs to the stringers. A story pole and a laser were used to establish tread elevations.*

Trim and shim to fit. *After using the story pole to establish the elevation, a jigsaw was used to lower tread cuts that were too high. Low ones were shimmed up with scraps glued in place.*

MAKE THE TREADS AND RISERS

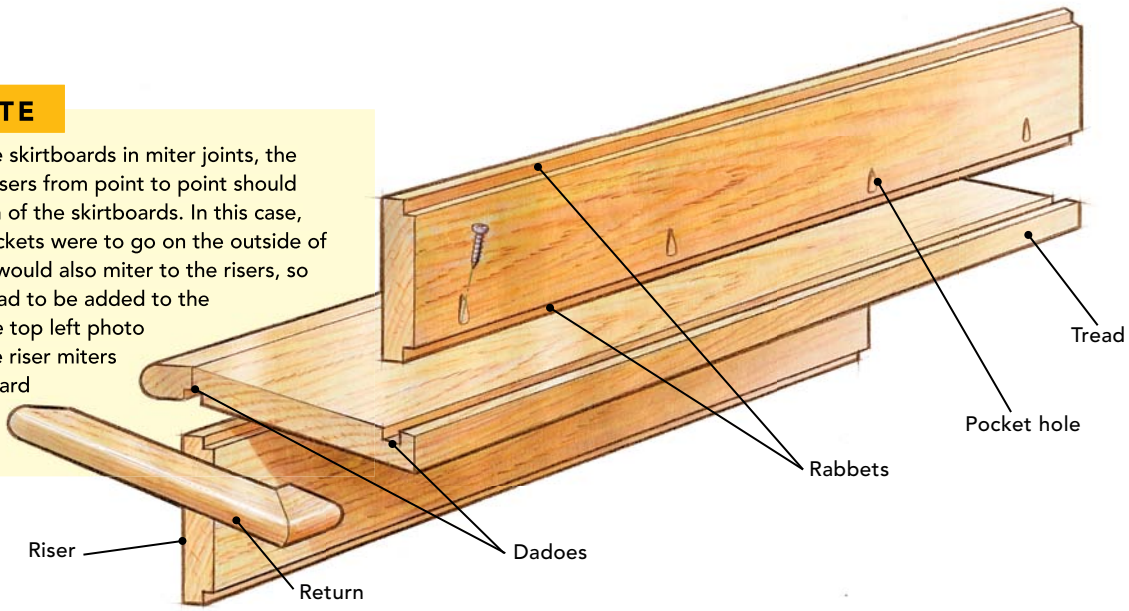
The biggest challenge with an open stair is making the stopped miters on the tread ends where they meet the returns. Getting the crosscut and the miter to meet in a tight, straight joint is easier to get wrong than to get right. The solution was to rip the nosings off the treads, make the miters and crosscuts, then glue the pieces back together. Each piece of nosing went back on the same tread in its original orientation, so the joints were imperceptible after sanding. The next challenge was to keep the tread and riser joints straight and consistent. Any bow in the riser stock would show in the final product. The means to that end was to rout interlocking dadoes and rabbets in the treads and risers.

Rip the nosings off. *Index marks made before cutting help to align the pieces for glue-up. Square-cut the treads to length, and miter the nosings.*

Put the treads back together. *Biscuits align the top of the nosing and tread. Pocket screws from below draw the nosing and tread together, clamping them as the glue sets, Stagger the two so that the screws bite into the oak, not the biscuits.*

BUILDER'S NOTE

When the risers join the skirtboards in miter joints, the length of the mitered risers from point to point should equal the outside width of the skirtboards. In this case, though, decorative brackets were to go on the outside of the skirtboards. These would also miter to the risers, so the bracket thickness had to be added to the length of the risers. The top left photo on p. 43 shows how the riser miters extend past the skirtboard before the brackets are applied.



Machine the treads and risers. *Rabbets in the risers slot into dadoes in the treads. This ensures tight joints and corrects any bows in the risers when they fit into the tread dadoes.*

Drill pocket holes in the riser backs. *Screws driven through these holes pull the risers tight to the treads, ensuring strong glue joints.*

The first step is unique. *Preassembling the first tread and riser allows blocking for the newels to be attached with hidden screws.*

Drawing: Dan Thornton

STRING THE TREADS AND RISERS TOGETHER

With all of the parts made and the stringer defects corrected, it was time to put the stair back together. All the treads were dry-fitted, and their edges were aligned with a long level. Maintaining that alignment was a key to the job. Stair treads need to be placed consistently or they become a trip hazard. To that end, they were glued and nailed down, with the others left in place for reference. The treads and risers were installed from the bottom up, allowing access to the back of each riser so it could be pocket-screwed to the tread below. With the first tread and riser, how the newels would attach had to be considered. In addition to adding blocking, that meant mortising the flooring for the newel.

BUILDER'S NOTE

Every stair differs in terms of its construction and the design of its newel posts. Here, the bottom tread is wider than the others to accommodate the plinth of a box newel. Additional blocking was installed to make a strong connection.

Use two glues. *Where the treads meet the stringers, use construction adhesive for its gap-filling ability. With their better wood-to-wood fit, the tread-riser joints can be secured with carpenter's wood glue.*

Screws are best. *Wherever the holes will be hidden, fasten the treads and risers with screws. Here, pocket screws are being driven through the back of a riser into the tread below.*

Hand nails beat gun nails. *Driving 8d finish nails by hand through the treads into the tops of the risers pulls the joints tighter than using pneumatically driven nails. Drill pilot holes a slightly smaller diameter than the nails.*

TEMPLATE THE SKIRTS

After the treads and risers were installed, the next operation was fitting the skirts. This is fussy, as the skirts need to miter into the risers precisely. There are enough variances in any site-built stair so that making templates to lay out the skirts, rather than laying them out with a framing square as if they were stringers, makes sense. The main part of the template consisted of a 1x4 that was cut to fit under the steps like the skirtboard would. The upper end of the 1x4 was cut to fit precisely, but the lower end wasn't critical because the bottom riser was to wrap around and cover the skirtboard. Previously attached triangles were glued to the 1x4 with fast-setting 2P-10 (fastcap.com) adhesive. This has two components: a viscous glue goes on one side and an activator is sprayed on the other. Bring the two together, and the adhesive sets in seconds.

Triangles mimic the skirt's notches. *Mitered where they meet the riser, the triangles are fitted tightly to the riser and the tread and then temporarily screwed to the stringer.*

Fasten a 1x4 on the line of the skirtboard. *The 1x4 mimics the bottom of the skirtboard. Plywood scraps glued between the 1x4 and the triangles lock them together so that the template can be unscrewed from the stair as one piece.*

Mark the tread cuts directly. *Place the template on a piece of 1x12, and transfer the tread outlines directly from it.*

Transfer the riser cuts indirectly. *With a scrap of 1x and a pencil, mark the tops and bottoms of the mitered riser cuts on the skirt. When the template is removed, use a straightedge to connect the dots and draw the cutline.*

Cut the skirts with a circular saw. *Mitering the skirts requires one circular saw that bevels left to miter the right skirt, and another that bevels right to miter the left skirt.*

FINISH UP

The final steps prior to sanding and finishing were to attach the tread returns, the tread brackets, and the molding below the treads, which in this case was a small ogee instead of the more common cove or scotia. Because the tread returns run cross-grain to the treads, some provision had to be made to allow for the treads to expand and contract seasonally without opening up the miter joint. Attaching the returns with a combination of glue and trim nails did the trick.

Fasten the skirtboards. *The riser miters extend past the skirts to accommodate the decorative brackets.*

Use glue and nails. *Glue each tread return at the miter, and join it to the back of the tread with 15-ga. trim nails. The glue holds the miter tight, and the nails allow the tread to expand and contract.*

Attach the brackets. *After mitering the brackets, mark them to length in place, then cut them and nail them on.*

Tread molding is the final touch. *Wrapping around the brackets and ending with a glued-on return, this prefinished molding is attached with 18-ga. brads.*