Stair-Building Tools

by Gary Katz with Daniel Parish and Jed Dixon

Specialized tools and templates make this tricky job go faster

I was a lot more courageous in my youth: I tore through empty subdivisions at breakneck speed on my minibike, raced through prickly pear cactuses on horseback, and even built my first stair — three stories high — using only a framing square, a circular saw, and an Audels carpenter's guide.

It's been more than 30 years since I cut those stringers, and until last summer I didn't build another stair. I've worked around them a lot, installing more than my share of skirtboards, landing balustrades, wainscoting, baseboard, and so forth. But it took a recent job and a new employee, Daniel Parish, to motivate me to learn how to install finished risers, treads, and balustrades. Along the way I relearned a lesson I've encountered throughout my career: Having the right tools reduces the learning curve.

Before starting work on the stairs, we collected and read several books on the subject, watched Jed Dixon install stairs and carve stair parts at *JLC* Live, and researched stair tools. Some of the tools we already owned, and a few of the jigs we made on the job. But we also ordered some promising specialty tools before starting work, and we were glad to have them.

SCRIBING AND CUTTING THE SKIRTBOARDS

The first step was to install the skirtboards on both sides of the stair.

A couple of levels. With the closed skirt tacked to the wall, we used a 32-inch Stabila level to trace level lines from the highest point of each rough tread **(1)**. We then traced a plumb vertical line from the nose of each rough tread. The 32-inch level is perfect for this task. The tool must sit all the way back on the tread so you catch the highest point, but it also must span beyond the nose of the tread below. A 24-inch level would work, but you'd have to trace pencil lines around your fingers. The extra length you get with the 32-inch tool makes the job easier.

On the open side of the stair, Daniel wanted to miter the risers into the skirtboard. We called Jed Dixon to ask him the best layout technique for marking these cuts. Jed recommended tracing the outside edge of the level. Fortunately, we had an assortment of levels handy; we found that the 16-inch level worked best for this job **(2)**. We could have just traced along the face of the riser to mark the short point of the miter, but the rough risers were nowhere near plumb, so the mitered risers would have looked terrible.

A pencil won't fit between the level and the riser, but Jed's advice — to mark the outside of the level for both the riser and the treads — worked great **(3)**. We then moved the skirt to a set of sawhorses and transferred the scribe lines to the opposite side of the level **(4)**.


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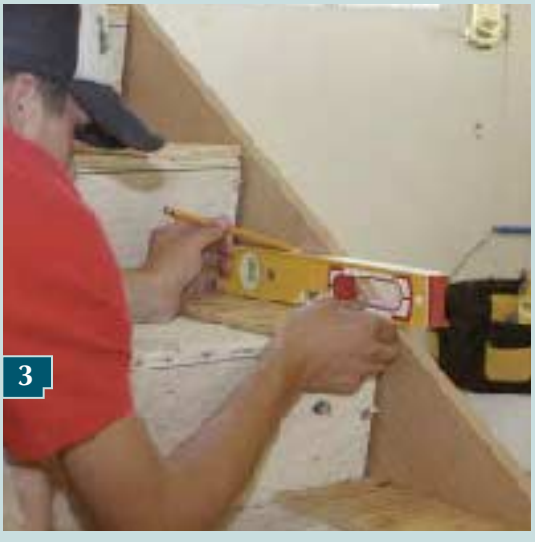
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A couple of saws. Making the cut where the tread meets the open skirt isn't crucial because the cut gets covered by the nosing and the scotia molding under the tread. We used a worm-drive Skilsaw and made these cuts freehand **(5)**.


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The cut for the riser is mitered at 45 degrees, however, so it's got to be perfect. Eyeballing that cut was out of the question. To ensure a perfect miter, we made a shooting stick from a length of 3/4-inch hardwood screwed to a piece of 1/4-inch plywood **(6)**. After the two pieces were screwed together, we ran the circular saw through the stick at a 45-degree bevel. Once this was done, it was easy to align the short point of the shooting stick with the pencil marks on the uncut skirt, clamp the stick down, and run the circular saw with the saw table snugly against the 3/4-inch fence.

In order to cut the miters on both right-hand and left-hand skirtboards, you need two types of circular saws. Our Skilsaw worm drive bevels to the left, and we used a Makita sidewinder saw for the right bevel.


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Starting step. The 16-inch level was also perfect for leveling the bullnose step before making the careful scribe to the skirt **(7)**. And it was just long enough to plumb the newel **(8)**.

Once all the treads, risers, and newel posts were installed, we started piecing together the handrail. For all of this work, we used an assortment of tools and templates — and, believe me, stair building requires a lot of them.

The over-the-post fittings we used on this stair were from the Conect-A-Kit system from L.J. Smith (L.J. Smith Stair Systems, 740/269-2221, www.ljsmith.net). If you're a beginner at building balustrades, like we were, these fittings make stair building easy because the tops pop off on all the level fittings, and the bottoms pop off on the easings **(9)**. With the top off, you use a standard socket set to drive the connecting lag screws **(10)**.

We also had a lot of standard railing connections to make. To lay out the railbolt holes, we followed the advice in L.J. Smith's catalog and made templates for everything. A plastic template made it easy to locate the center of each 1-inch hole in the bottom of the railing and rail drops **(11)**. For the 3/8-inch holes in the ends of the railing sections, we cut a thin slice of railing and drilled a 1/8-inch hole at the centerline and used that as a template **(12)**. We used a 1-inch Forstner bit and a 3/8-inch paddle bit to bore the holes **(13, 14)**.


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RAIL CONNECTION TOOLS

L.J. Smith's Bore Buster Plus kit ($500) comes with a variety of tools that make balustrade installation easy for any experienced trim carpenter, even if your experience doesn't include stair work. To assemble the rail, we used the Rail Bolt Installer **(15)**. This handy little wrench has a 1/2-inch socket on one end for tightening the hex-head lag screws that are the primary fastener for the L.J. Smith system. A nut welded to the center of the wrench works great for tightening 5/16-inch rail bolts, which are the industry standard for rail assembly and are also used on several connections in the L.J. Smith system. The wrench is also gauged for locating pilot holes on handrails and rail drops, so rail-bolt connections are easy to align — a fact I didn't realize until later, after I'd made my templates!

We actually discovered another wrench for tightening rail bolts that we liked even better **(16)**. Universal Building Systems' ingenious device, the Rail Bolt Wrench ($8, 800/200-6770, www.stairfasteners.com) is made from heavier steel, and has a magnetic stud on the handle designed to hold the nut while you thread it on the bolt. A common rubber band wraps around both the nut and a pin in the center of the handle **(17)**. By simply pulling on the rubber band, you can spin the nut onto the bolt **(18)**. I had a tough enough time just seeing inside that 1-inch hole. I couldn't imagine threading on a nut without that wrench.

MAKING A PITCH BLOCK

In addition to the special pop-top fittings, we also used a few standard easings on this staircase. To make the necessary cuts on the easings, we turned to the tried-and-true pitch block, on Jed Dixon's advice. A pitch block is a deceptively simple device, and easy to make: One leg equals the height of the tread (the rise), and the other leg equals the width of the tread (the run). The resulting angle — the rake — allows you to find the tangent points where the railing parts meet.

First, we positioned the pitch block with the rake against the railing (that's the angle of the stair, which is also the angle at which the railing runs up the stairs), and marked the tangent point on the bottom of the railing (an easing in photo **19**). Then we turned the pitch block around and traced the angle of the rake across the railing profile **(20)**.

We used a shortened pitch block at the miter saw to help secure the railing at the correct angle. A couple of Quick-Grip clamps and a spacer cut to fit between the bottom of the railing and the miter-saw fence made the operation a lot more precise **(21)**. Jed warned us to first dry-fit all the pieces and then, to make a perfect fit before final assembly, shave a little off the railing, not the easing. It's a lot easier to cut a piece of straight railing than a curved easing. As it turned out, almost all the pieces fit perfectly the first time — no doubt the result of good advice, patience, and clamps and jigs.

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LOCATING BALUSTERS

We laid out the balusters two per tread, and transferred those marks to the bottom of the handrail using L.J. Smith's Telescoping Baluster Marking Tool **(22, 23, next page)**. This is a cool tool ($140). You first set the depth-adjusting screw at the bottom to match the desired depth of the hole for the baluster — how far the baluster will penetrate into the bottom of the rail. Next — if you aren't using the company's Bore Buster drilling jig — you adjust the center-


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ing gauge for half the thickness of the rail, which automatically positions the layout marks in the center of the handrail. (If you're using the Bore Buster, you should make marks on the outside edge of the handrail, which you then transfer with a square and pencil to the side of the rail — whichever side is easiest to view with the Bore Buster mounted on the railing.)

Now you adjust the length of the telescoping pole so that it fits snugly between the tread and the railing. Two spirit levels, located at the top of the pole, help plumb the tool in both directions; however, only one is really necessary — the one parallel with the railing. Once the tool is plumb, you simply pull down the spring-loaded plunger and release it, and the point on the plunger leaves a perfect mark on the bottom of the railing.

The tool also accurately measures the length of each baluster, including the depth of the mortise.

BALUSTER JIG

The L.J. Smith Bore Buster speeds up the process of drilling the baluster holes on the underside of the handrail **(24)**. It clamps to most railing profiles and can be set at any angle from 0 to 60 degrees. The bit fits into a spring-loaded bushing and swings on an adjustable scale.

You start by clamping the jig firmly to the handrail. A spirit vial on the angle scale makes it easy to adjust the angle of the drill bit to ensure that all holes are perfectly centered and plumb. Once the Bore Buster is adjusted properly, you slide the jig to each mark, then bore all the holes in the railing. L.J. Smith includes three cutting bits in its Bore Buster kit: 5/8 inch, 3/4 inch, and 1 inch, for different-size balusters **(25)**. (If you're smart, you'll pop the railing off and drill it while it's clamped upside down to the treads, instead of drilling upside down, the way we did!)

DRILLING GUIDE

L.J. Smith has really thought of everything with the Bore Buster kit. The combination of Smith's tapping drill bit, self-centering baluster-boring guide, double-threaded bolts, and bolt drivers makes for a fast installation and a seriously strong balustrade. The tapping bit (Dowel-Fast Tap) is used to drill and tap each baluster location on the treads **(26)**. After cutting the balusters to length, we drilled a matching hole in the center of each piece using the Centaur (a self-centering drill guide) **(27)**, then threaded in Smith's dowel screws using the Dowel-Runner, a socketlike driver that accepts a threaded bolt **(28)**. After removing the handrail from the newel posts, we threaded each baluster into the holes on the treads, then carefully reinstalled the handrail over the balusters and bolted the rail into the newel posts.


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FINISHING TOUCHES

Even though railing and fittings are made to match, minor carving and sanding is still necessary for flush joinery. We used Collins Tool Company's Bunny Plane set **(29)** ($149, 888/838-8988, www.collinstool.com) to initially shave and carve the stair fittings. The set comes with two tools: one for flat areas and one for concave profiles **(30)**. These planes aren't just for detailing handrails, though. They're also great for fitting crown splices, detailing trim, and tackling countless other finish carpentry chores.

To sand out and finish all the stair-part joinery, we used a conforming sanding block from Klingspor ($30, 800/228-0000, www.woodworkingshop.com). It works in much the same way as those scribe-transfer tools you see in woodworking catalogs. Ultra-thin plates on the bottom of the sanding block conform to any profile and are locked in place with a turnkey. The sandpaper is attached with a hook-and-loop system. We found that the tool works best if you lock in the profile, attach the sandpaper to one side, loosely press the block and paper onto the profile, and then attach the paper to the other side **(31)**.

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