INSTALLING
Crown Molding

by Gary Katz

Careful measurements, accurate angles, and some preassembly make installing crown molding as easy as running baseboard

I've heard it said that cutting crown molding is a test of a finish carpenter's skill. Phooey. Cutting crown molding can be just as easy as cutting baseboard, a lot more fun, and you don't have to wear out your knees. In this article I'll show you the techniques I use to maintain productivity and precision while installing crown molding. The first step is always careful layout and measurement.

Layout and Measurement

If crown isn't installed in a straight line, the molding will wiggle and wobble between the ceiling and walls, and tight margins between the crown and tall door and window casings will be hideously unequal. So I always snap lines before applying the molding.

To determine where the bottom edge of the crown will sit on the wall, place a piece of the molding in a framing square, just as it will sit on the wall — with

Figure 1. With the top of the square as the ceiling, the rise of the crown molding is measured to the bottom of the crown.

the bottom edge of the molding on one leg of the square and the top edge against the other leg. To help visualize the position of the molding on the wall, hold the square in the air and pretend that the top leg is the ceiling. Rock the crown until both "feet" lie flat against the square, then check the measurement at the bottom of the crown (see Figure 1). That measurement is called the rise — the distance from the bottom of the crown to the ceiling.

If I'm trimming only one room, I measure the rise of the molding, mark the bottom edge of the crown at each corner in the room, then snap chalk lines across all the walls. (If the walls have already been painted, I use a dry line and pencil in small marks every 6 or 8 feet along each wall.) Whenever I'm installing crown in more than one room, especially on large jobs, I transfer the rise measurement to several small blocks of scrap material. Each carpenter working on the job can then carry the same gauge block so that all the crown will be installed at the same elevation (Figure 2).

To avoid unnecessary steps up a ladder, I measure the length of each piece while I'm snapping lines on the walls. The measurements are always taken right along the chalk line — not at the ceiling. I write those measurements, in large numbers, just above the line on each wall.

To minimize trips to the saw, I make a cut list for each room. When measuring pieces over 8 to 10 feet long, I add $1/16$ to $1/8$ inch and spring them into place so that corner joints are tight. For pieces under 8 to 10 feet long, I measure precisely to within $1/32$ inch.

I use typical carpenter notations to identify the cuts: Inside corners are noted with a "V"; outside corners are marked "OC"; and self-returns are "SR." So for a piece that's 64 inches long, with an inside corner on the left and an outside corner on the right, I write on the cut list: "V 64 OC." If the angle is 90 degrees, I don't make a notation; but for other angles — like a $22\,1/2$ — I make a note next to the type of cut (see "Finding the Right Angles," page 5, for more about this).

Figure 2. A gauge block the size of the rise simplifies layout.

Figure 3. Install a stop along the length of your saw base to stabilize crown molding when cutting in position.

Cutting in Position

Crown molding can be cut "in position" or "on the flat." Each method has a specific use, and clever carpenters should become proficient at both. For each method, I've developed simple routines and techniques that increase efficiency and accuracy.

The most efficient way to cut crown molding is in position — with the molding standing upside down and leaning against the miter-saw fence. Cutting in position means that the material is always in the same position on the fence and never has to be

flipped end for end; the bevel of the saw is never changed from 90 degrees; and aligning the blade so that it enters the material exactly on the measurement mark is just as easy as cutting baseboard.

Everyone in the trade refers to this method as the mysterious "upside-down-and-backwards" position. No further examination of the enigma seems ever to be required. But carpenters might better imagine that the crown molding isn't really upside down and backwards — the saw is. The base of the saw is the ceiling.

Whenever I cut crown in position, I always start by placing a short piece of the molding on my saw (upside down). I trace a pencil line across the crown along the fence and along the base, then set a straight piece of scrap material, about 3 or 4 feet long, at the bottom line and fasten it with screws to my extension wings, where it acts as a stop (Figure 3, previous page). With the stop attached, the molding is held securely in position, the bevel is cut exactly the same way every time, and long lengths of material are easy to handle.

Visualizing the correct direction of a cut is also easier if we imagine that the fence is the wall and the base of the saw is the ceiling. For inside corners, the long point of the miter and the bevel is always on the wall or fence (just like with baseboard); for outside corners, the short point of the miter and the bevel is always on the wall or fence (just like with baseboard) (Figure 4). That rule *never* changes.

As with baseboard, if the piece has an inside corner (most have at least one), I cut that end first, then hook my tape on the long point and reach across the crown to measure the opposite end (Figure 5). If the piece has two inside corners, I prefer to cut the right-hand corner first — that way I pull my tape from my left side and the numbers are right side up. With the stop in place, the molding never moves while I'm measuring.

For pieces that have two outside corners, I cut one end and align the short point of the miter with the edge of the fence, then hook my tape *on the fence* and measure to the opposite end of the molding (Figure 6). For long lengths, I align the short point with the end of my extension wing, then hook my tape over the extension wing and measure to the opposite end of the molding.

Also as with baseboard, I first cut any end with a self-return, then hook my tape over the long point of the self-return and measure to the opposite end of the molding.

Figure 4. The long point of an inside corner is always against the wall or fence (left). The short point of an outside corner is always against the wall or fence (right).

Figure 5. Measure an inside corner by hooking the tape over the long point.

Figure 6. Measure an outside corner by aligning the short point with the edge of the saw fence and hooking the tape over the fence.

Cutting on the Flat

Crown molding with a rise of over $4\frac{3}{4}$ inches can't be cut in position on most miter saws. (The DeWalt 706 12-inch and the Hitachi 15-inch miter saws will cut crown in position with a rise up to 6 inches.) I prefer to cut in

Figure 7. To cut LH inside corners and RH outside corners, the bottom edge must be against the fence and nearly hidden from view, so cut those corners first (top left). Then flip the material, hook your tape on the long point, and make your measurement mark on the bottom edge of the molding (top right). That way you can control exactly where the blade meets the measurement mark (above).

position whenever possible, especially on jobs with any real volume, because cutting in position is much faster than cutting on the flat. But extremely large crown moldings are becoming more popular, and they must be cut on the flat with a sliding compound miter saw.

Most carpenters find that cutting on the flat isn't nearly as straightforward as cutting in position. I follow a few simple rules that make the job less confusing and more efficient.

Flip the material, not the saw. Though my Makita 12-inch saw (LS1211) bevels in both directions, I try not to change the bevel angle if I can help it. I find it's faster to flip the molding end for end — that is, unless I'm cutting in a small room or hallway. Then I have no choice and have to flip the bevel (more on that in a moment).

Keep the bottom edge measurement in sight. Crown molding measurements are almost always marked on the bottom edge and never on the top of the molding. That's one reason cutting crown in position is easier — the bottom edge of the molding is always up, so all measurement marks are clearly visible, and aligning the saw blade with the measurement mark is not difficult.

Cutting crown on the flat (with the bevel tilted only toward the left) isn't quite so simple because the bottom edge isn't always in view. But by thinking ahead, I'm always able to have the bottom edge of the molding away from the fence just when I need to, so that I can easily align the saw blade with the measurement mark.

Cut LH inside corners and RH outside corners first. To cut left-hand (LH) inside corners and right-hand (RH) outside corners, the bottom edge of the molding must be against the fence and nearly hidden from view. When the bottom edge is against the fence, accurately aligning the saw blade with the measurement mark is difficult and time consuming. So I cut those corners first, then flip the molding end for end and hook my tape on the long point of the miter-bevel to mark the opposite end. Cutting the RH corner is easy because the bottom of the molding is away from the fence, and I can quickly and accurately align the saw blade with the mark (Figure 7).

For pieces with LH inside corners and RH outside corners, pieces with two outside corners, and long lengths that I don't have enough room to spin in the air (Figure 8, next page), I flip the motor to the opposite bevel. There's simply no other way to cut these pieces with the bottom edge and the measurement mark away from the fence.

Clearly, a double-bevel saw has several advantages over a single-bevel saw, because with a double-bevel saw long material rarely has to be flipped or moved. Cuts can be made quickly and accurately with the bottom edge of the molding always positioned away from the fence, and inside corners can

Figure 8. Some pieces are too long to spin around, necessitating flipping the bevel angle on the saw two ways instead.

always be cut first, which makes it easier to hook a tape measure. The only disadvantage is that the saw bevel must be flipped, which requires one more step and a little more time.

Finding the Right Angles

With crown molding, there are four important angles to consider: the corner angle (the angle where the walls meet), the spring angle (between the back face of the crown and the wall), the bevel angle (the angle to be cut, measured from the back face of the crown), and the miter angle (the angle to be cut, measured from the bottom edge of the crown).

In order to determine the bevel and miter angles, you first have to determine the spring angle (Figure 9, next page). Bevel and miter angle charts are available for cutting crown moldings with 45- and 38-degree spring angles (visit www.josephfusco.com for the best chart available). But not all patterns of crown molding are milled with a spring angle of 45 degrees or 38 degrees.

Even the best SCM saw in the world won't be of any help if you can't find the right bevel and miter angles. When I first started using these saws and ran into oddly angled corners or a crown pattern I couldn't cut using the standard settings marked on my saw, I always tried to cut the crown in position first, and then determine the right bevel and miter setting from the pieces I'd cut. These days I don't worry about such nonsense because I use a Bosch Angle Finder (BAF) and read the angle of *every* corner (even the 90-degree corners, because they're rarely 90 degrees) before cutting any crown (see "Using the Bosch Angle Finder" below).

Coping Inside Corners

Coping inside corners has long been the best method of joinery, and for wood crown molding that rule still

Using the Bosch Angle Finder

The Bosch Angle Finder ($100) is a must for cutting crown molding on the flat, and it's easy to use. When cutting crown on the flat, I read every corner, not just the 22 1/2-degree oddball corners. That way, every joint comes together perfectly tight the first time.

Start by spreading the arms on the BAF until the LED reads the exact spring angle of the crown molding you're installing (refer to Figure 9, next page), then press the black bevel/miter (BV/MT) button. The spring angle will be entered into memory — confirmed by the appearance of "SPR" in a black box at the lower left corner. (Unfortunately, the BAF doesn't have a permanent memory, so you must enter the spring angle of the crown for every corner. I'm hoping Bosch repairs that defect and adds a keypad so the spring angle can be entered more quickly and accurately.)

Next, place the BAF in the corner of the walls and open it until both arms are flat against each wall, then press the BV/MT button again. The abbreviation "CNR" will appear in the LED, confirming that the corner angle has been entered.

Press the BV/MT button a third time, and the miter angle will come up in the display, along with the abbreviation "MTR." Finally, press the BV/MT button one last time, and the bevel angle will be displayed, along with the abbreviation "BVL." It's that simple.

After entering the spring angle of the crown molding, measure the angle of the corner and press the BV/MT button again — "CNR" will appear in the display.

Figure 9. An inexpensive low-tech protractor is all you need to find the spring angle of crown molding. Hold the crown against a wall or flat surface, with the bottom edge down in the same position in which it will be installed at the ceiling. Then spread the protractor open between the wall and the back of the crown.

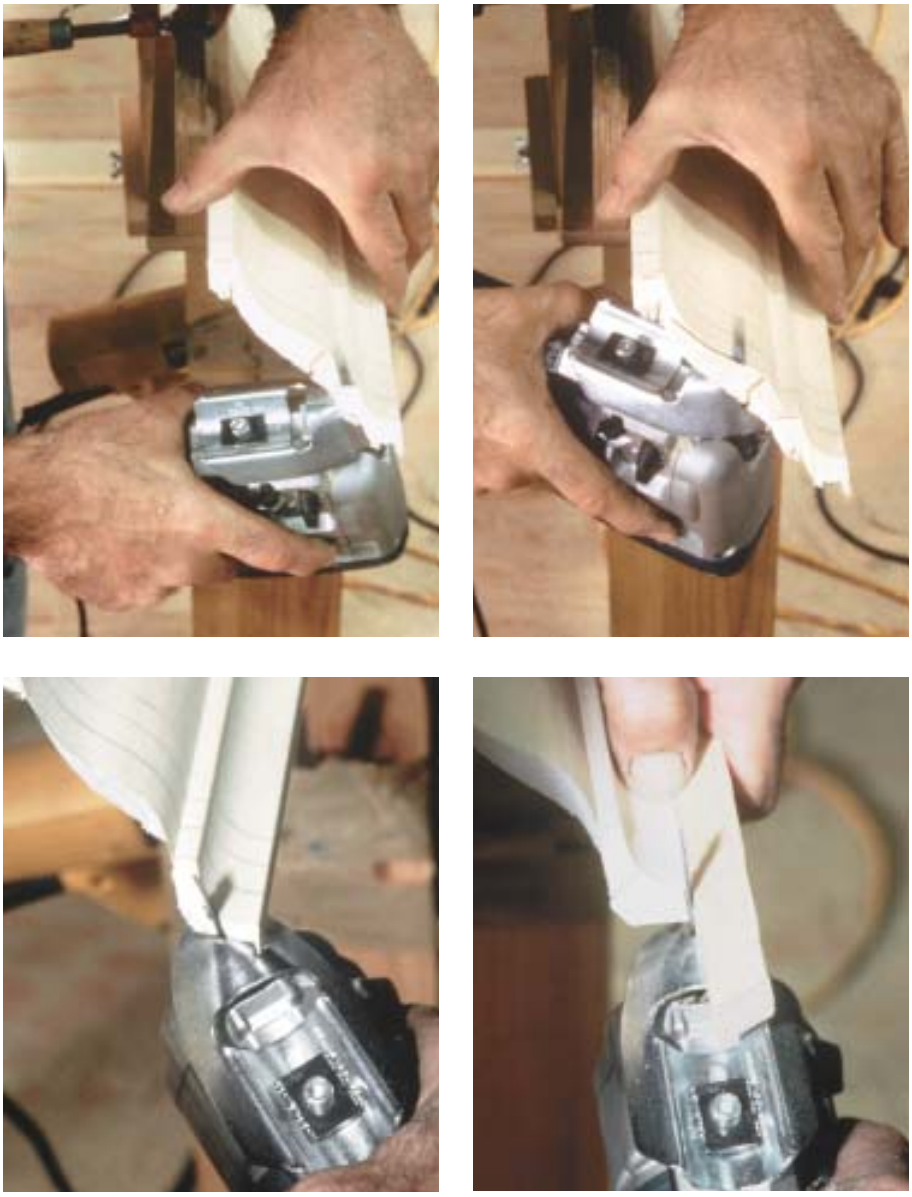

Figure 10. Begin coping with the Collins Coping Foot by cutting a series of relief cuts (top left). Cut down through the S-curve (top right). Cut back up toward the cove relief (above left). To finish the cut, use a small piece of stock to back up the fragile bottom edge, so that the sliver-thin miter overlap won't snap off (above right).

stands. For MDF and urethane moldings, however, coped joints are not always the best choice. MDF moldings don't cope well because when the material is compressed, the sharp coped edge folds back like thick skin. Urethane-molding manufacturers, on the other hand, insist that all joints be fastened with proprietary adhesive — which isn't possible with a coped joint.

I still do my coping the same way I originally learned, by cutting an inside-corner miter first. Occasionally, I use a coping saw, too. But for today's large hardwood moldings, I rely most often on a Collins Coping Foot (Collins Tool Company, 888/838-8988, www.collinstool.com).

Using a coping foot. A jig saw, equipped with a Collins Coping Foot, makes quick work out of both softwood *and* hardwood crown molding. The best person to demonstrate the technique is the inventor of the foot, Dave Collins.

Dave starts coping by making a series of relief cuts along each step in the profile. He also cuts a relief at the deepest point in the S curve. Next, he slices down the S curve and uses the angle of the coping foot to simultaneously push and leverage the jig saw blade perfectly along the line of the profile. Turning the saw around, he then eases the blade up toward the top of the crown and terminates the cut neatly into a relief cut. The bottom of the crown is cut last, first by cutting up through the cove, then by cutting parallel with the grain, leaving a final sliver of wood to form the appearance of a miter (Figure 10).

Installing Crown

Before lifting crown into position, I mark the stud layout on the wall, just beneath the snap line. I mark the joist layout in the ceiling, too, just outside the footprint of the molding. If the joists aren't running perpendicular to the wall, I cross-nail the molding to the ceiling: Every 18 inches I drive two nails about 2 inches apart, angling the nails toward each other at 45 degrees.

If the joists are running perpendicular to the molding, I try to hit every one. Occasionally, I use a stud finder, though I tend to rely more on a simple magnet (Tot-Lok Key, available from Woodworker's Supply, 800/645-9292, www.woodworker.com) (Figure 11).

Don't nail the corners. I usually begin installation with the first piece I measured, especially if I've coped any joints. But I also try to install exceptionally small pieces first, just like baseboard, so that longer pieces can be sprung into position.

With a typical two-person crew, molding must be applied to the wall one piece at a time; fastening ends and corner joints must often wait until the next piece is installed. To position the first piece on the wall properly, I carry two short scraps, cut with inside and outside angles. The scraps help ensure that the corners will line up once the final piece is applied (Figure 12). But until that piece is installed, I never nail near the ends or corners — I always fasten the molding only near the center of the wall. Once two adjoining pieces are applied, I work the corner until it's perfectly aligned and tightly closed.

Tap up or down. Working a corner joint together sometimes requires a little patience. Walls and ceilings are never perfectly straight. Miter saws may cut moldings at perfect angles, but a slight bow in a wall or a belly in a ceiling will throw a curve into a corner. I carry a block of soft wood so that I never have to hammer directly on the crown. First I tap the bottom edges of both pieces until they're aligned (Figure 13). If the top of the corner is open, I tap the top of both pieces toward the wall. As they slide down the wall, the top corner will usually close up. If the bottom of the corner is open, I tap the bottom of the pieces toward the ceiling.

Shim bad walls and ceilings. Wall and ceiling corners are notoriously bad in modern homes. I often have to shim the molding slightly to close up a joint. For that purpose, I cut shims from scraps of MDF (Figure 14, next page). These shims need be only 3 or 4 inches long, and 1/4 inch thick at the heel. Once installed, they snap off easily just flush or even behind the face of the molding. I try to keep the molding as straight as possible. On paint-grade jobs, the shims and the gaps flanking the shims can be covered with caulk; on stain-grade jobs, the walls often must be floated

Figure 11. A magnetic Tot-Lok Key on the ceiling identifies the position of a joist.

Figure 12. Use a piece of scrap (right), cut with inside-to-inside corners, to ensure proper positioning of the first piece of a corner joint.

Figure 13. Use a softwood block to drive the corner together, tapping the top of both pieces toward the wall to close a gap at the top of the miter, or tapping up on the bottom edge of the molding to close a gap at the bottom of the miter.

Figure 14. MDF shims are often necessary to close up a joint.

by the drywall crew after the crown is installed.

Preassembling Crown Molding

If all walls and ceilings were framed perfectly straight and flat, installing crown molding would be a lot easier — compound mitered joints would pop together just right every time. But the fact is, finish carpenters must perform perfect joinery in an imperfect world. Preassembling crown molding is one way to cope with imperfect walls and ceilings, speed production, and improve the quality of mitered corners.

Inside and outside corners. For most short runs of crown molding — especially coffered ceilings, around bookshelves, mantelpieces, and even in vestibules — I prefer to preassemble as much of the crown as possible. Of course, preassembled pieces must be measured perfectly, or labor and material will be lost to runs that fail the fit test. So I measure all pieces carefully: I measure short pieces with outside corners exactly; for short pieces with inside corners, I often subtract $^1/_{32}$ inch; for long pieces, I add a little, maybe $^1/_{16}$ inch in 8 feet. I miter all corners and fasten them with glue and nails. The finished assembly must fit tightly but not too tightly (Figure 15).

Miter clamps. Miter clamps are essential hand tools. They ensure tight-fitting miters in casing, crown, and panel molding, and for preassembling crown molding, they are a must.

Figure 15. Preassembly guarantees tight-fitting miters, especially with difficult-to-cope dentil crown (above left). (See photo, page 53.) Temporarily secure the corners with miter clamps, then fasten with glue and brad nails (above right). Small hallway and bathroom rectangles should always be preassembled because they can be installed in just minutes (left).

I use two types of miter clamps. Ulmia clamps are available from several catalogs (Garrett Wade, 800/221-2942, www.garrettwade.com) (Figure 16). A lighter-duty set of spring clamps is also manufactured by the Collins Tool Company. The Ulmia clamps come in two sizes and are manufactured from heavy spring steel. These heavy-duty pinchers, with sharp chisel-cut points, grab ferociously and leave a like-size mark. There are times when I need these aggressive clamps, especially when I install large MDF crown moldings. But for most work, the lighter-duty and easier-to-use Collins clamps are more suitable. And because they have sharp needle points, those clamps leave only small marks.

I use the miter clamps to squeeze the glued-up corners closed, then I secure the miters with brad nails. I allow the glue to dry a little before installing the assembled section of crown. At first all this special care may seem to take longer, but installation is amazingly quick and joinery is precise. These miter clamps are indispensable for making three-piece bullnose corners (see "Rounding a Corner," next page).

Preassembling Splices

Whenever possible, I prefer to preassemble splices in crown molding, whether the material is stain grade or paint grade. I make up all splices before beginning the installation, which allows time for the glue to dry before cutting each piece for length. Of course, preassembling splices in runs longer than 30 feet sometimes requires more than a three-person crew, but I find that scaring up a few additional hands for a long lift is always worth it — these splices are nearly invisible.

I used to use the thickest backing that I could behind a spliced joint because it's easier to secure 3/4-inch backing to the molding with brads or staples than it is to fasten 1/4-inch backing. But these days I fasten the backing with a polyurethane hot-glue gun, so the size of the backing is limited only by the size of the crown. Of course, the backing can't be so thick that it interferes with the crown seating properly against the wall and the ceiling. On smaller crown profiles, there's often enough room only for thin plywood.

I start by attaching the backing to the back of the crown — always the piece cut with the inside miter — using a HiPurformer hot-glue gun (www.titebond.com; Woodworker's Supply, $100) and staples for extra security (Figure 17). Next, I turn the crown over, so I can see the joint, then apply hot glue to the joint and the backing before pressing the two pieces together (Figure 18). You can also use carpenter's glue on the joint and hot glue only on the backing. Thirty-second hot glue doesn't take long to set. Then I turn the splice over again, and, for safety's sake, I fill it full of staples.

Cutting Acute Angles

I've spent hours trying to get the right-sized block stuck in the right spot between the back of the crown and the fence on my saw, just so I could cut an angle sharper than my miter saw would permit. But cutting acute angles doesn't have to be a nightmare. With the right jig, these sharply pointed miters can be measured and cut as easily as any standard corner.

I prefer to cut crown in position, rather than lying flat, as I've said, and these angles are no exception. So I've made two accessory fences that clamp to the extension wings on my sliding

Figure 16. For preassembling crown, casing, and panel moldings, miter clamps are the secret. Ulmia clamps are on the left, Collins clamps on the right.

Figure 17. Preassembling splices is faster and guarantees tight field joints. First, fasten the backing to the piece with the inside miter.

Figure 18. Polyurethane hot glue speeds up the task and guarantees flush-fitting, trouble-free splices. If you're a skeptic, apply yellow glue to the joint first.

compound miter saw. I built the fences 4 3/8 inches tall because that's the maximum depth of cut on my Makita 12-inch saw. Each accessory fence is at a 45-degree angle to the metal fence on my saw. I use plywood scraps for the accessory fence (Figure 19, next page).

When using this fence, *you must use clamps to secure the work piece!* Cutting sharp miters is easy with this fence, but it's also easy to cut your hand off, so don't be stupid. *Clamp the fence securely to the miter saw, and clamp the work piece securely to the fence.* Don't try to hold the material with your hand, because the cut won't be precise — and a miter saw, especially a sliding saw, will grab the wood and pull it right into the blade, along with your hand.

Finding the Miter Angle

Cutting a sharp miter is easy with an accessory fence, but figuring out the right miter angle can be a little confusing, no thanks to that guy (whoever he was) who designed the first miter scale on a chop saw.

Remember, when your miter saw is set at 0, it's actually making a 90-degree cut. So the only accurate mark on most chop saws is 45 degrees, and all those marks between 0 (90 degrees) and 45 are larger than 45, not smaller: The 22 1/2 mark is really 67 1/2 degrees. Mark the real angles on your saw with an indelible marker. Find the angle of the

Rounding a Corner

Cutting a three-piece corner takes a little more time than a caulked 90-degree corner, but I prefer the look because it adds drama to the molding and the corner. As with three-piece baseboard corners, I start by making a corner mockup, then use that to mark every outside corner in a room (right). Most often, the small center piece is 3/4 to 7/8 inch wide, from short point to short point, with both ends cut at 22 1/2-degree angles.

Three-piece bullnose corners should be preassembled whenever possible, so that small pieces don't have to be held and nailed in place. Miter clamps are the best tool to draw the joints tight (below left) and hold them that way while they're cross nailed. Once the corner has been assembled and the glue allowed to dry, installing the three-piece assembly is simple and painless (below right).

Before any measurements can be taken, bullnose corners must be laid out with a three-piece mockup.

Wherever possible, preassemble complete corners.

Preassembled corners are easy to install, and the joints are sure to be snug.

corner with a simple protractor; then split that angle and dial in your chop saw to the exact miter.

To set the saw at the correct miter angle using an accessory fence, I simply subtract the miter angle that I want to cut from the angle of the accessory fence (45 degrees), then swivel the saw that sum from the 0 mark. In other words, if I'm working on a 40-degree acute angle and I want 20-degree miters, I subtract 20 degrees from 45 degrees (the angle of the accessory fence). The result, 25 degrees, is the amount that I swivel the saw. Now those marks on the miter saw scale are actually helpful.

Cutting acute angles on the flat. Cutting on the flat is almost easier, because SCMs can bevel up to 45 degrees, and many can miter up to 60 degrees, well within the angles needed even for a sharp 45-degree corner (56-degree miter and 46.7-degree bevel for crown molding with a 38-degree spring line).

Unfortunately, the Bosch Angle Finder isn't (yet) programmed to determine bevel and miter angles for corners that are much tighter than 60 degrees, so for most octagons, the BAF is useful only for reading the angle of the corner. To get the miter and bevel angles for acute angles, refer to a good crown chart, one that goes below 60 degrees (most do not).

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Figure 19. The author used two scraps of 3/4-inch plywood about a foot long by 4 inches wide for the accessory fence, both cut with 45-degree miters on the ends (left). The fence is attached to a 3/8-inch plywood base, which hangs about 4 inches past the fence to provide a base for moldings (center). For safety and tight joinery, be sure to clamp the fence to the saw *and* the material to the fence before cutting (below).