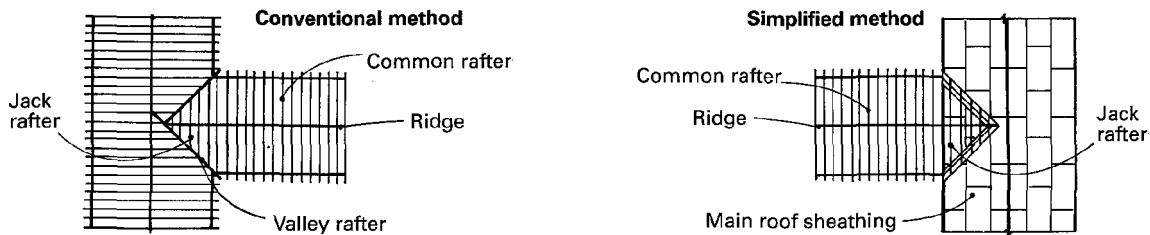


No valley rafters. When framing two roofs that intersect, the common method is to use valley rafters (drawing below left). A faster method (drawing below right) is to sheath the main roof first, then frame the smaller roof on top of it (photo above).



Simplified Valley Framing

Build one roof on top of the other and skip the valley rafters

by Larry Haun

The foreman on one of my first framing jobs asked me if I knew how to build a California roof. I had to admit I didn't. Instead of firing me on the spot, the foreman gave me until the next morning to learn. I pored over my carpentry books at home that night, and I found what I was looking for under "blind valley." That after-hours discovery nearly 40 years ago helped me keep my job, and the framing technique I learned is just as useful to me today.

When framing two gable roofs that meet at right angles, and when one of the roofs has a lower ridge than the other, the common approach is to use a supporting valley rafter that extends

from the wall plate to the main roof ridge, and a shorter nonsupporting valley rafter that intersects it (see *FHB* #76, pp. 46-50). But jack rafters must then be cut to fill the triangular space between the ridge and the valleys on the main roof (Cleft drawing, above). And a second set of jack rafters is needed for the smaller roof. All of that takes time.

The blind valley, or California roof as it's called out here, often is a less-complicated way of handling the same situation (right drawing, above). The technique certainly makes sense when framing an addition because the new roof can be framed directly on the old roof. It also works well

in new construction when the room under the main roof has a cathedral ceiling. Although this is most often used when a smaller roof intersects a main roof, the same technique can be used when the ridge heights of the two intersecting roofs are the same.

I was stumped by this framing problem as a green carpenter back in the 1950s, but the technique is not difficult. The main roof is framed, and the roof sheathing is applied. Then the common rafters of the smaller, intersecting roof are erected, and the ridge is carried over to the main roof. Finally, the valley jack rafters of the smaller roof are cut and installed, linking

the ridge of the smaller roof with the deck of the main roof. The photos in this article show this technique being used to frame a new roof on an existing roof covered with a membrane.

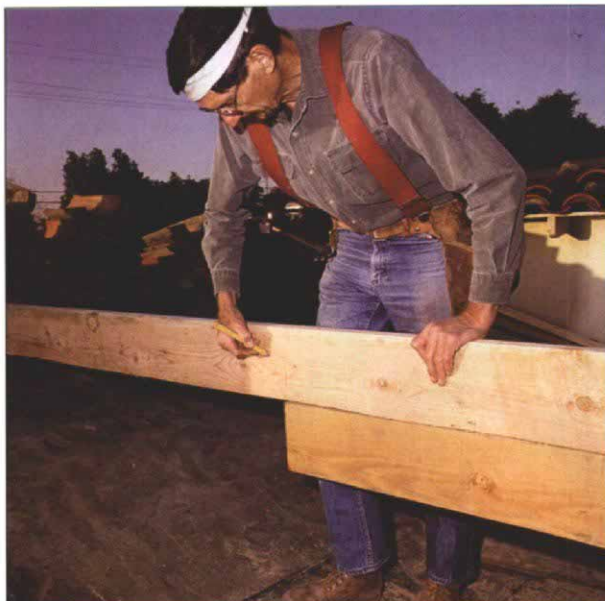
Some building codes require full sheathing under the secondary roof to maintain the main roof's shear strength. Full sheathing is certainly what you would use when building an addition onto an existing roof. At minimum, the main roof must have sheathing where the secondary roof ridge and jack rafters land. You may need to leave a hole in the sheathing on the main roof to allow passage for people or ductwork

Extending the ridge—Once the main roof has been built and the sheathing applied, the common rafters of the secondary roof are raised. The inboard end of the ridge extends to the main roof if the stock is long enough. If not, the ridge needs to be extended. To find where the ridge should meet the main roof, sight along the length of the ridge and mark the point where the top of the ridge falls on the main roof. A measurement from the mark on the main roof deck to where the secondary ridge ends gives you the length of the ridge extension (top photo, right).

You can use your framing square to mark the angle on the end of the ridge extension that will make the ridge snug on the main roof. The angle will be the same as for the seat cut on the common rafters. But I usually scribe the angle in place (middle photo, right). I set one end of the ridge-extension stock on top of the secondary ridge, and the other end on the main roof at the point where the ridge will end up—the ridge extension should be sitting level at this point. Then I use a scrap of 2x ridge stock to scribe the angle of the main roof onto the ridge extension. Once the ridge extension has been measured and cut, nail it in place on top of the main roof sheathing, making sure it is level and straight. At the other end, toenail the extension to the end of the ridge already in place (bottom photo, right).

Marking valley locations—Now you can mark the location of the valleys on the main roof sheathing. You will need to snap a chalkline from the end of the extended ridge where it meets the main roof to a point near the eaves where the two roof planes come together (top photo, p. 60). To find the lower mark for the valley chalkline, extend the plane of the secondary roof into the main roof—with a Stringline or a piece of 2x stock—and find a spot where the two intersect. Snap the chalkline from the ridge, through the spot that you've marked.

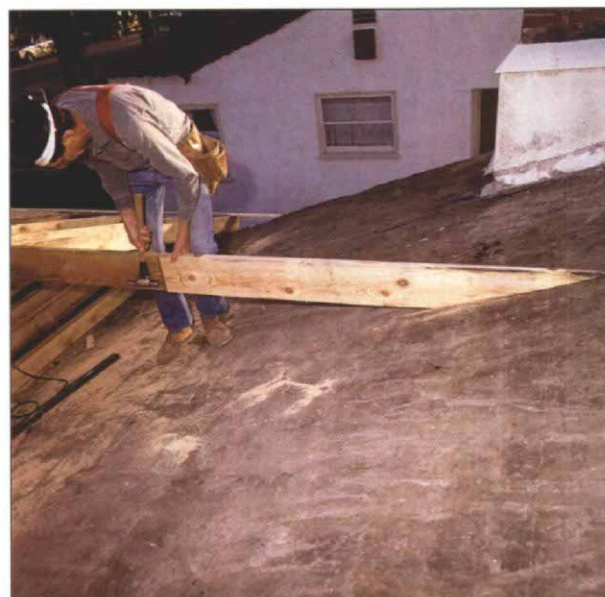
You must add support along this line as a base for the tail ends of the valley jack rafters—the short rafters that extend from the valley to the ridge of the secondary roof. Make this base by nailing two 1x6s side by side, or by using strips of plywood 12 in. to 16 in. wide, next to the valley chalkline. Don't nail them on the line. Instead, hold the boards back from the line so that the top edge of the jack rafters will be in the same plane as the line (middle photo, p. 60). The steeper the pitch, the closer to the line the boards will be. To find the exact distance between the chalkline and the 1x6, stretch a line from the



Mark the ridge length. To find the correct length for the ridge extension, measure from the end of the existing ridge to the point you have marked on the main roof deck. Or lay the main roof deck on top of the existing ridge, run the extension all the way to the main roof and then mark the extension where it should be cut.



Scribing the ridge. To mark the correct angle on the ridge extension where it meets the main roof, you can use a scrap of wood and the main roof deck. Set the extension on top of the secondary ridge already in place, make sure it is level and then use a 2x scrap to scribe the angle on the extension.



Nailing it up. Once the ridge extension has the correct angle on one end and has been cut to length, toenail it to the end of the ridge already in place and to the existing roof deck.

Snapping the line. After the ridge extension is in place, snap a chalkline to mark the location of the valley. The upper point is where the ridge extension meets the main roof. The lower point is found by extending the plane of the secondary roof into the main roof. In this example the wall of the addition is higher than the wall it intersects on the existing structure.



Installing support material. The doubled 1x6 supports in the valley are set back from the chalkline. The steeper the roof, the smaller the distance between the support and the line.



Marking the jack rafters.

The valley jack rafters are marked in pairs, one for each side of the ridge. The angled marks indicate the direction of the bevel (side cut). Set your saw to the correct bevel and make sure the blade is angled in the same direction as the slash mark on the edge of the stock.

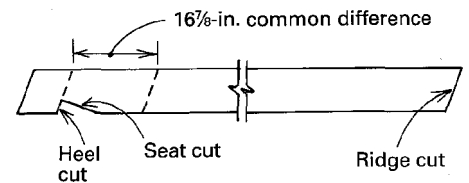


ridge of the secondary roof to the chalkline in the valley and push your 1x6 up to the string.

This support material can just be marked in place on the roof and cut roughly to length. Total accuracy isn't required. Nail the support boards in place with 8d nails through the sheathing and into the common rafters of the main roof.

Cutting the jack rafters—The ridge extension can now be filled in with jack rafters. They are laid out in pairs, one jack for each side of the ridge. The first pair of jacks will be shorter than the common rafters, and each successive pair will be shorter as they move along the secondary ridge and up the main roof. The amount that each jack is shortened depends on both the pitch of the main roof and the on-center spacing of the rafters. But each succeeding jack rafter on a roof will be shortened by the same amount, called the common difference. There are several ways to determine this common difference. An easy way is to use a book of rafter tables. Turn to the chart showing the pitch for the main roof (in our example 4-in-12) and find the on-center spacing for the rafters (in this case 16 in. o. c.). Or you can use the table stamped on the blade of your roofing square. The common difference for a 4-in-12 roof is 16 $\frac{1}{8}$ in. So as you move up the valley cutting the jacks, each pair would be 16 $\frac{1}{8}$ in. shorter than the pair before.

To mark the first pair of jack rafters, use a du-



plicate of a common rafter from the secondary roof and lay it on edge next to two pieces of rafter stock that are approximately 1 ft. shorter. Then add two more pieces of rafter stock about a foot shorter than the first pair. Keep adding successively shorter pairs of rafter stock until they shrink to nothing and keep the ends flush at the ridge end. Measure up from the heel cut of the common rafter exactly 16 $\frac{1}{8}$ in. and scribe a mark on the edge of the longest pair. Measure 16 $\frac{1}{8}$ in. from that mark and lay out the next pair and so on until all are laid out.

Each pair of jack rafters will have a plumb cut at the ridge (just like the common rafter) and a level seat cut with a bevel (side cut) on the opposite end to fit the pitch of the main roof. The side cut at the lower end tips either to the right or to the left, depending on which side of the ridge the jack is to be nailed. To indicate this for cutting purposes, make angled slash marks, one to the right and one to the left, on each pair of jacks (bottom photo, left). These marks will help you lay out and cut the correct side cut later.

So far, I have assumed that the last common rafter on the secondary roof falls exactly in the corner. In that case the first jack rafter would be a full 16 $\frac{1}{8}$ in. shorter. If the last common does not fall exactly in the corner, the difference would not be as great, and you'll have to measure to

find the length of the first jack. Lay out 16 in. along the ridge and the valley from the last common rafter. Measure from the ridge to the point on the valley chalkline to get the length of the first pair of jack rafters. After that, each pair will be $16\frac{7}{8}$ in. shorter than the previous pair.

Making a template—To mark the seat and the ridge cuts on the jack rafters, make a pattern or template (top photo, right). On one end of a short piece of 1x material that's about the same width as the rafter stock, scribe a ridge cut by holding the tongue of the framing square on 4 in. and the blade on 12 in., and mark along the tongue. The level seat cut is drawn on the other end of the scrap by marking along the blade. After cutting along these two lines, nail a 1x2 fence on the top edge to make it easy to keep the template even with the top edge of the stock.

Now, with the template, mark the ridge cuts on all the jack rafters. For the seat cuts, place the template on the jack stock so that the point of the seat cut lines up with the intersection of the length and slash marks you made earlier—this is the long point on the bottom of the jack rafter. Each jack rafter of a pair will get a line for the seat cut—but on opposite sides.

When you're ready to make the seat cuts at the ends of the rafters, your rafter tables will also provide the correct bevel for the side cut. Set your saw to this angle (for a 4-in-12 roof, the bevel is $18\frac{1}{2}^\circ$) and cut along the lines you made with the template. As you cut, make sure the sawblade is angled in the same direction as the slash mark you made on the edge of each jack rafter.

This sounds more difficult than it really is, and it will be obvious when you start doing it. One jack is cut to the left, one to the right. When you're done, you will have pairs of jack rafters that are cut to the same length, but the bevels of the seat cuts will be in opposite directions.

Once the jack rafters are cut, lay out the ridge at the correct spacing (in this example 16 in. o. c.) and nail the jack rafters into place. Use two 16d nails, just like you would for a common rafter. Nail the seat cut to the 1x6 base. Secure these jacks to the base by toenailing them through the sides (middle photo, right) so that no nails will be in the way if you have to cut sheathing.

Finishing touches—If two intersecting roofs have different eave heights—as is the case on the addition I framed for this article—you may need to fit a scrap of plywood or rafter material behind the common rafter where the two roofs meet (bottom photo, right). On a roof with open eaves (i. e., no soffit), this prevents birds from nesting in this corner, and it doesn't leave an unreachable section of roof for the shingler.

If the roofs intersect at the same plate height, you will need to cut a fake valley rafter tail out in the overhang, so the sheathing for both roofs is supported where it intersects. □

Larry Haun lives in Los Angeles, Calif., and was a longtime teacher in apprenticeship programs. His book, The Very Efficient Carpenter, was published by The Taunton Press in 1992. Photos by Larry Hammess.



A template will help. To mark rafters accurately, make a template from a piece of 1x material that's the same width as the rafter. Make a ridge cut on one end and a level seat cut on the other. A 1x2 nailed on the top edge of the template acts as a fence to aid alignment.



Installing the jack rafters. Once the valley jack rafters have been measured and cut, they are installed along the ridge just as if they were commons. Toenail them into the 1x6 supports.



When eave heights are unequal. When the intersecting walls are at different heights, a scrap piece of rafter stock or plywood nailed to the backside of the last common on the smaller roof will prevent birds from nesting in the eaves and will simplify the shingling process.