

The Classic "Tin" Lid

Hand-forming a standing-seam metal roof

by Matt Holmstrom



Roof pans are laid from ridge to eave. The roof is created with seaming iron and hammer, 'turning' the edges of the pan into a standing seam.

With a few peculiar hand tools and a knowledge of some old-time techniques, an enterprising remodeler/restorer can produce one of the most attractive and longest-lasting residential roofs around—the standing-seam metal roof. While its clean lines and unmistakable hand-formed look are still admired by old house lovers, "tin roofing" has generally fallen into disuse, as roof after roof is replaced with composition shingles. This is unfortunate, because metal roofing is indispensable for solving some of the common problems of old-house roof work. For example, hand-worked metal roofing is essential when matching existing architecture with new additions. It's great for covering cornice returns, bay window roofs and other locations you don't want to roof again for many years. A standing-seam roof is perfect for roofs too flat for shingles, yet too steep for built-up roofing. Here in west-

ern Virginia a tin roof has been the roof of choice for many years.

A standing-seam metal roof is really quite simple. The idea is to fold sheets of metal together to create a weathertight skin, without penetrating the skin by fasteners. The metal is cut to length and bent into a "pan" having an angular, U-shaped profile. Unlike rows of shingles, pans run vertically from peak to eave. As each pan is laid on the roof deck, it is fastened with "nail cleats," cut and formed on site from the same metal as the pans. As the pans are laid edge to edge and fastened in place, the edges are double rolled, or "locked" together by hand to create a 1-in. high standing seam (for a description of tin-roof tools, see the sidebar on the next page). No sealants other than solder are used, except at flashings, where we sometimes use silicone caulking.

Choosing materials—A handworked standing-seam roof can be fabricated from either sheets or rolls of galvanized steel, terne (steel coated with a lead-tin alloy), copper or terne-coated stainless steel. For workability, terne and copper are best; galvanized steel is stiffer and more difficult to solder, and terne-coated stainless is stiffer yet (for a comparison of the properties of the different roofing metals, see *FHB* #24, pp. 42-46). Copper and terne-coated stainless are the premium materials in terms of longevity—and cost. Terne (the vernacular term is "tin") is long lasting if painted every few years. Galvanized steel can be left bare for a few years, but then it too must be painted. Whichever metal you select, use only compatible materials for nails and flashing.

My choice for a roof, at least in this area, is the terne roof, because terne is readily available,

very workable and easily painted (compared to galvanized roofing, anyway). It comes in coating weights of 20 lb. and 40 lb. (the weights refer to the amount of terne coating per 100 sq. ft. of metal). Twenty-pound terne is a flashing weight; forty-pound should be used for the roofing itself. The metal also comes in two thicknesses: 30-ga. steel for general use, and 28-ga. steel for heavier use. It's made by Follansbee Steel Corp. (State St., Follansbee, W. Va. 26037).

Terne comes in 50-ft. long rolls that are either 20 in. wide or 24 in. wide. The 20-in. width is best for residential roofing because it makes for a stiffer pan that is less likely to rattle in high winds. If you want to work with the wider stock, though, use 28-ga. steel for your pans to increase stiffness. All of the material comes with a brownish factory-applied shop coating, which keeps the metal from rusting while in storage.

Underlayment requirements—Terne roofing should be applied over a skip-sheathed roof deck. Condensation frequently occurs on the underside of a metal roof, and solid sheathing traps this moisture against the metal, causing it to rust from the backside. When decking a new roof, I use #3 1x6 or 1x8 pine boards, spaced about 1½ in. apart over rafters 16 in. o. c. I use the edge of a 2x block to gauge the space between courses. If you don't have enough support under the metal, it will be too weak to walk on and too bouncy to attach cleats to.

Make sure the attic is adequately vented to help control condensation and prevent moisture damage. Soffit and gable vents are best because commercial ridge vents and power fans don't mix very well with seamed metal roofing (they are usually designed for face nailing in place).

As another guard against trapping moisture under the roof, use red rosin paper instead of roofing felt beneath the roofing (photo below). This moisture-permeable material acts as a slip

sheet to help the roof pans expand and contract freely. Be careful not to step on rosin paper, though—it makes a good slip sheet for roofers, too. I get around this, particularly on steep slopes, by running the rosin paper from ridge to eave one course at a time as I run the pans. This makes it easy to work over, and the exposed skip sheathing offers plenty of toehold.

Estimating and getting started—If I'm using 20-in. wide terne rolls for a roof, my pans work out to be 17 in. wide (20 in. — 1¼ in. for one edge bend and 1½ in. for the other). Theoretically, a 50-ft. roll should cover almost 75 sq. ft. of roof area, but I allow about 12% for waste and for cutting cleats and flashings, which gives me about 66 sq. ft. of coverage for each roll. For edge cleats you'll need to cut 6-in. wide strips of metal from the long dimension of sheets of 24-ga. galvanized steel. This will give you 48 lineal feet of cleat from every 3-ft. by 8-ft. sheet of steel (it's also available in 4x8 sheets).

On old work I start by ripping off the old tin, but if I'm concerned about having too much open roof at one time, I'll remove the old stuff in sections, replacing it as I go. It's important to inspect the existing deck—there's no telling what you might find under an old roof—and repair any rot or damage in the rafters and sheathing. Set all nails in both new and old decking because a protruding nailhead can rub its way through expanding and contracting tin. Use a disc sander to smooth any other high spots.

Once the deck has been prepared, the edge cleats are the first metal to go on the roof, forming the first line of defense against wind damage. Cleats run along the entire perimeter of the roof, and will later be bent over the edge of the roof to form a drip edge (see E and G in the drawing on p. 64). When I nail up the cleats (every 8 in. with roofing nails or hot-dipped galvanized ring-shank nails), they should extend be-

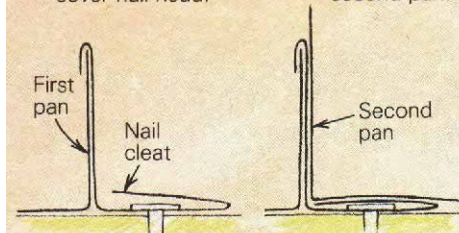
A few peculiar tools

As with most other crafts, having the proper tools on hand is half the battle. Unfortunately, most hand tinning tools won't be available at your local hardware or building-supply store, and clerks probably won't even know that such tools exist. Sheet-metal supply houses might have them, but at a handsome price. If tin roofs were once popular in your area, it stands to reason that tinning tools were too, and some real bargains may turn up at auctions. The cheapest route may be to

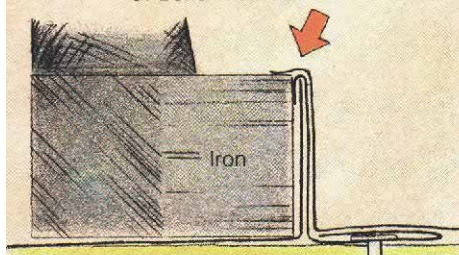
Turning a standing seam

The two outside edges of the seaming iron are of different heights, and alternately provide the anvil against which the hammer delivers blow after blow to roll the seams over. To use the iron, hold its taller side against the first pan. Flatten the second pan against the top of the iron with a mallet (step 3, below), then rotate the iron to the other side of the seam and pound the edge tightly over the edge of the first pan (4). This process is then repeated with the short edge of the iron to double roll the seam. The finished seam is a 1-in. high, double-rolled (or locked) standing seam (5).

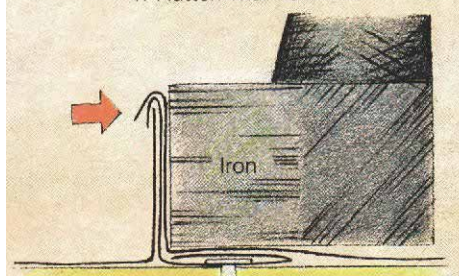
1. Attach cleat and cover nail head.
2. Position second pan.



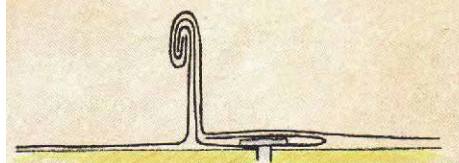
3. Bend with hammer.



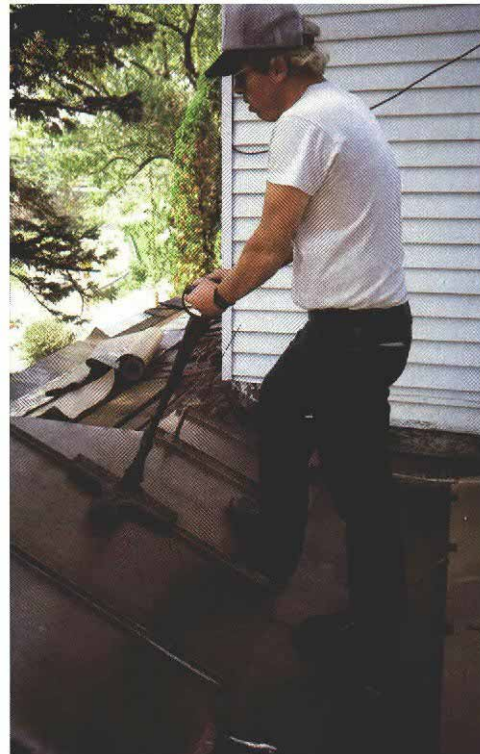
4. Flatten with hammer.



5. Repeat steps 3 and 4 with lower edge of the iron. Final joint should look like this.



After the galvanized edge cleats were nailed to the perimeter of the roof, the pans for hidden gutters were bent up and laid in place, and the edge was crimped to the edge cleat. The bent-up portions of this pan will later be flat-seamed into adjacent pans. Red rosin paper over spaced sheathing underlays the roofing because it protects the underside of the metal from condensation.



Tools of the metal-roofing trade. Holmstrom uses tongs (left) to bend the edges of pans before forming a seam. Here, he will flat-seam roof pans into the pan that forms the hidden gutter. Note that the standing seams have been flattened near the work, this allows the pans to be bent without distortion; next, Holmstrom "turns" the seam with a seaming iron (above center) and hammer. The metal is folded in upon itself twice and pounded flat. This seam will later be soldered to increase its water resistance. A similar process is followed along the ridge, only instead of being pounded flat, the joint is left as a standing seam. Standing seams are generally formed with hammer and seaming iron, but a pair of foot seamers (Shown right) speeds the work. It's an antique tool, but thoroughly effective—the jaws of the seamers can bend and crimp the metal with foot pressure applied to the pedal.

make the tools yourself—given the simple design and function of many tinning tools, this isn't as outrageous as it sounds. A friend of mine, for example, made a set of tongs for only \$8; in contrast, a new set costs about \$140 from a sheet-metal supplier.

The most basic tinning tool set consists of a set of tongs, a seaming iron and a hammer. Tongs (photo above left) are used to bend the sheet metal into roof pans. The jaws of the tongs have threaded holes in them for a pair of stop screws that determine the depth of the bend—you set the location of the screws depending on the depth of bend you want to make. Tongs will be among the most expensive hand tools in your basic tinning set, but you will use them a lot.

Valley tongs are similar to standard tongs, but are deep throated so the jaws can reach the center of a pan to make a bend. I don't have a pair of these because I've found something faster and easier: a portable sheet-metal brake like the ones used by aluminum-siding crews. With my 10½-ft. long brake, I can bend valley pans, flashings, nail cleats and shorter roof pans. Brakes are fairly expensive new (\$400 to \$900), but they are readily available used.

The seaming iron (middle photo, above) functions as sort of a mini-anvil, and has two machined steel edges and a metal handle. One edge is 1¼ in. high and is used for turning the first edge of a seam; the other edge is 1 in. high for rolling the seam a second time to lock it. To use the seaming iron, you simply set it along the seams between pans and hammer the metal against alternate sides to create the standing seam (drawing, facing page). You

can expect to pay about \$40 for a new seaming iron.

The standard tinner's hammer is made entirely from hickory or ash. But it doesn't take long to wear down the face of a wood hammer, and if you don't keep it trimmed up to a 90° face, you'll have problems pounding tight seams without damaging the flat surfaces of your pans. For superior durability and control, I far prefer a Stanley Compo-Cast 2-lb. deadblow hammer (The Stanley Works, 193 Lake St., New Britain, Conn. 06050). It's a urethane hammer with steel shot in the head to reduce rebound, and will leave fewer hammer marks on your metal.

Good aviation snips—light-cut, left-cut, and offset—are indispensable because you'll have to cut a lot of metal. Don't bother with cheap snips or you'll be throwing them away out of frustration before the end of the job. I've found that Bergman makes a pretty good one (Bluebird snips, by Bergman Tool Mfg. Co., 1573 Niagara St., Buffalo, N. Y. 14213).

You'll need plenty of locking pliers—use the flat-faced kind made for working sheet metal (photo p. 61). Three or four are a start, but a dozen or two aren't too many for serious tin work. You'll need them for clamping pans together before and during seaming, for battening down sheet plastic and tarps to protect unfinished work and for all sorts of other uses. You can also use locking pliers for crimping and small bending tasks, but a pair of hand-seamers, available at sheet-metal or siding supply houses, works better. You can also get a hand-seamer (and a pretty good pair of snips, too) from Malco Products, Inc. (Annandale, Minn. 55302). Offset hand-

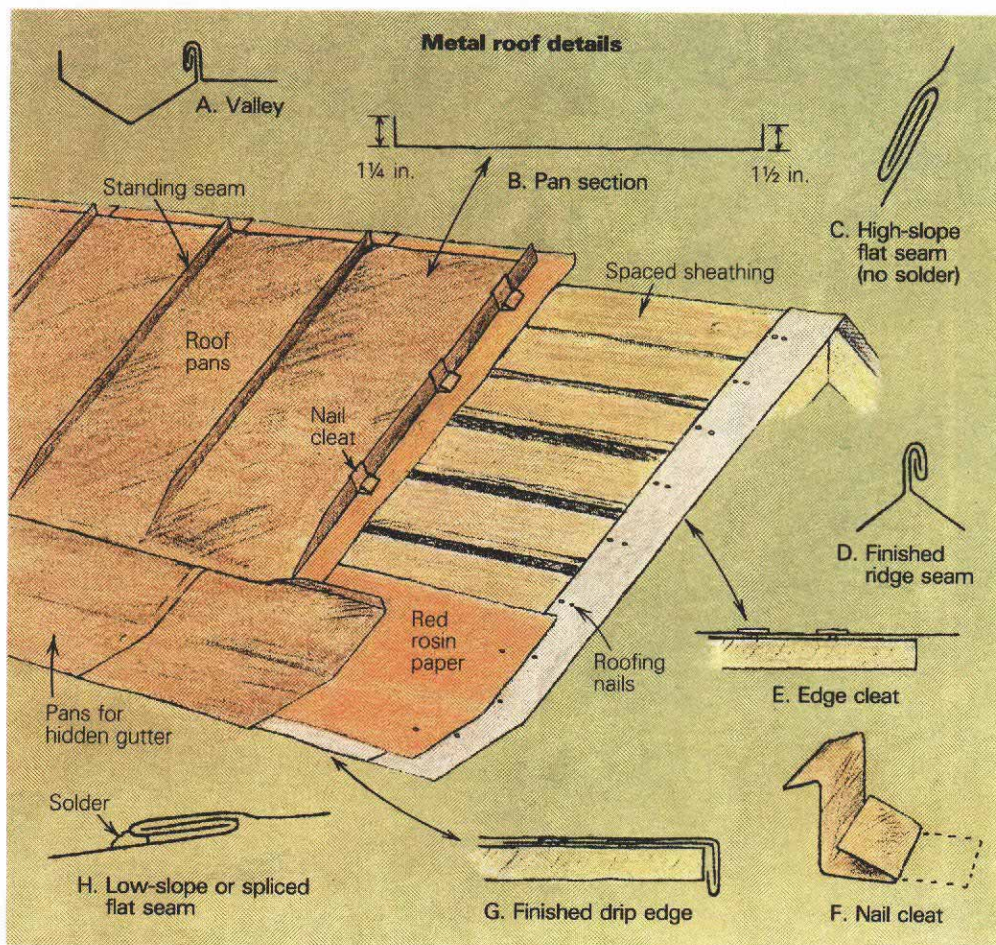
seamers are useful for working in those hard-to-get-at places.

You may not need a soldering iron for small roofjobs, but you probably will on the large ones. Commercial roofers sometimes use irons heated in charcoal braziers, but this seems primitive to me. I prefer electrically heated irons with at least 175 watts of power and a wide-bit tip—a standard soldering gun or spidering iron won't do the trick. You may find these high-wattage soldering tools at a sheet-metal or stained-glass supply outlet.

You might want to invest in a set of foot seamers—they're nice to have but not essential (photo above right). Foot seamers use both leverage and foot power to turn a seam and flatten it at the same time, and they'll eliminate hours of hammer and seaming-iron work on an average roof. They're delightful to look at and simple to use, but very hard to find. A friend of mine found an old set at an auction and paid \$25 for it, but I've been quoted prices as high as \$900 for a set in good working order.

I've found power shears indispensable, though only because I do a lot of metal roof work. Shears cut the heavier metal needed for edge cleats and without them, you'll need to have a sheet-metal shop rip your edge cleats. My Kelt K-200 (Kelt Tool Co., 5055 Madison Rd., Cincinnati, Ohio 45227) excels at cutting into old tin roofing—ripping off an old roof seam by seam can be brutally slow.

Finally, I keep some ladder hooks handy for any steeply pitched roof. These steel brackets attach to the top of any standard aluminum ladder and transform it into a very safe and lightweight roof ladder. —M.H.



yond the edge of the roof by about 1 1/4 in. at the rake boards and about 2 in. at the eaves. The joints need only to be butted, not lapped.

Forming pans and nail cleats—On a simple gable roof, the pan length is determined by measuring the distance from the bottom of the eave edge cleat to the ridge, and adding 2 in. (1 in. for the ridge seam and 3/4 in. to overhang and crimp to the edge cleat). I usually measure this length (adding a 6-in. allowance for error) while the old roof is still on, and bend up the pans beforehand. Then I can just trim the excess once the pans are up. But on a hip roof this isn't possible. Instead, snap a chalkline eave to ridge every 17 1/4 in. across the decking (this approximates the pan width), and run into the hip. Measure up to the "highest" point of each pan to find the rough dimension for cutting it.

Roll out the metal on a firm, flat surface and cut it to the rough pan length with snips or shears. With the tongs set at 1 1/4 in., grasp one edge of the metal in the jaws and bend it up about 45°. Continue along the entire length of the strip, then go over the edge again to get the entire bend up to a full 90° (if you're using a sheet-metal brake, you can do this in one operation). Reset the stop screw on the tongs to 1 1/2 in. and repeat the process on the opposite edge (B in the drawing above). You'll probably find it helpful to put some weight in the center of the pan to keep it from sliding around as you bend it. The first pan to go up on a gabled roof is at the gable end, and it isn't bent in the U-shape that characterizes those to follow. Instead, one side is bent down 1/2 in. to lock onto

the edge cleat, while the other side gets bent up 1 1/4 in. for seaming to the subsequent pan.

To make the nail cleats, bend strips of roofing metal (F), then use the hand snips to cut 2-in. wide nail cleats from the strips. The sheet-metal brake works best here, but hand seamers or even locking pliers can be used. An average-sized roof may take a thousand or more cleats, so a tinner can always pass some time on a rainy day by filling up the cleat bucket.

Running a roof—Set the first pan over the rake edge cleat, with the upper end at least 1 1/4 in. past the ridge and the lower end overhanging the eave cleat by about 3/4 in. Reach over with the hand seamers and firmly crimp the pan to the cleat down its entire length. This will later be bent downward to form a drip edge. Cut a length of rosin paper and tuck it under the pan, overlapping some of the edge cleat with the paper. Slip nail cleats over the outboard edge of the pan about every 12 in., crimp them tightly to the pan, then nail the flanges to the roof deck with a pair of 1-in. long roofing nails. Bend the back edge of the cleat back over the nail heads to protect the underside of pans and discourage nails from pulling out. At the bottom of the pan, don't bother with nail cleats—nailing through the 24-ga. edge cleats can be brutal, and the final bottom crimp will secure the pan here anyway.

On the second pan, and all subsequent pans until you reach the opposite end of the roof, you'll get lots of practice in hammer work. Each pan is placed next to the previous one, with its 1 1/2-in. edge alongside the neighboring 1 1/4-in. edge, and with the same overhang at ridge and

eave. I clamp them together with locking pliers in several places, and then fasten nail cleats.

Use the seaming iron and hammer to turn the seam once along the entire length of each pan (photo p. 61). To cover the open roof as fast as possible, I double-roll the seam in only a couple of places to lock it in place. When I've laid all the pans on one side of the roof, I'll come back to put the second turn on all seams. After every two pans, I put down another length of rosin paper, lapping it only slightly over the previous length; a few roofing nails hold it in place.

"Losing" a seam is frustrating. While seaming, the top fold in the 1 1/2-in. edge can get flattened without the top of the 1 1/4-in. edge inside it. This usually results from sloppy bending techniques (like an undersized 1 1/4-in. edge or a very uneven roof deck), but will occasionally happen even to the best roofer. If it happens to you, just pry up the flattened metal with a hammer claw or screwdriver, then carefully reseat it.

If the roof deck is out of square, the ends of the pans will "sawtooth" as you work your way across the roof. To minimize this, I carefully align the pans with the roof edges when I start a side, but after that I don't pay much attention to it. Later on, when the bottom edge of the pan is crimped around the edge cleat, the edge of the roof will look quite straight. The important thing is to make sure you have at least 1 1/4 in. of metal for the ridge seam. The ridge will be a compound seam, which is difficult anyway—one that's too short is that much tougher. If the roof deck is severely out of square, cut the pans longer to compensate and just trim the excess down to 1 1/4 in. once the pan is in place. At the end of the roof, another edge pan locks over the edge cleat. Running pans for a hip roof works pretty much the same way, though each hip pan must be trimmed to the angle of the hip.

Ridge details—Once all the seams on one side of the roof have been double-rolled, I flatten about 6 in. of the seam at the top and bottom of each pan by just beating it down with the hammer, in preparation for the compound seams to come. On hip roofs, flatten the seams in a downslope direction to prevent flowing water from pocketing under them.

Once the pan seams have been flattened, I can begin to form the ridge seam. With the tongs, I grasp the extra 1 1/4 in. of pan that extends past the ridge and bend it backwards, so that it's in the same plane as the opposing side of the roof. Then, after running all the pans on the other side of the roof, this lip is stood up with the tongs and double rolled with the opposing side (D). The second roll on one of these compound seams is quite stiff, especially where pan seams come together, so I'm careful to lay out the second side of the roof so as not to allow pan seams to coincide with those on the previous side. On a roof framed with an irregular hip, some seams will coincide no matter what you do, and you'll really have to work to turn them down.

Splicing pans—What's the longest pan you can comfortably work? I've seen and even installed pans up to 24 ft. long, but at this length,

expansion can be a problem and handling can be a nightmare. Generally, I consider anything over 14 ft. to be too unwieldy to handle and go with a two-piece pan.

Roof pans that must be spliced are cross-seamed together. A $\frac{3}{4}$ -in. "bend up" is put on the upper edge of the lower pan, and a $\frac{3}{4}$ -in. "bend down" is put on the lower edge of the upper pan (C in the drawing on the facing page). These bends are across the flat bottoms of the pans only—the edges are left alone to overlap each other. The upper pan edges must sit inside those of the lower pan, and sometimes I have to bend the upper pan $\frac{1}{16}$ in. narrower for this to work out. Once they're lodged together, the bends are flattened with a hammer and the pan can be nail-cleated and edge-rolled just as one-piece pans are.

A cross seam shouldn't fall over a gap in the skip sheathing, otherwise it can't be flattened without distortion. Cross seams in adjacent pans should be staggered. The face of the cross seam should be soldered, though this may not be necessary for steep roofs (I usually solder cross seams when the roof pitch is less than 8-in-12). On slopes of less than 6-in-12, a special cross seam is used that features a soldered cleat and a 4-in. minimum overlap.

You're probably wondering about the roofs you've seen with innumerable cross seams. The time it took to solder every seam was considerable, I'm sure, but the reason for this was more the availability of materials than the patience of the roofer. Metal used to come in short sheets because it was hand-dipped to get the terne coating, not continuously coated, as it is now.

Running valleys and compound seams—

Valleys are installed as separate pans before any adjoining roof pans go on. Each one starts as a 20-in. wide or 24-in. wide sheet of 40-lb., 30-ga. metal (use 28-ga. on low slopes). The metal is first bent lengthwise down the middle to the approximate angle of the valley, then each edge is further bent inward $1\frac{1}{4}$ in. at a 90° angle (A in the drawing). I make the first bend either with the deep-throated valley tongs or on the sheet-metal brake, and the second two with regular tongs or the brake. The pan is then laid into the valley atop red rosin paper, and temporarily fastened to the perimeter edge cleat with locking pliers. The lower edge of each valley should be trimmed to overhang the edge cleats by $\frac{3}{4}$ in. Nail-cleat each side of the valley on about 12-in. centers, then flatten the sides inward. Pans coming into the valley are trimmed to a length $\frac{1}{4}$ in. past the edge of these flattened bends, then they're cleated and seamed to each other. When completed, the standing seams are flattened over the valley. Then with tongs or a hand seamer (on a steep valley the tongs may not fit), the flattened valley edge and the pan edges are stood up and double rolled toward the valley. Usually the doubled valley seam is flattened, and on a lower slope it's also soldered. Splices in valley pans should be soldered.

The trickiest spots on a roof are where compound seams meet, as where a hip runs into a ridge or two valleys meet at a ridge. Usually the downslope seam is completed and flattened out

where it is to become part of the upper compound seam, and the upper seam is completed afterward. An exception is at the eave edge cleat. Hip or valley seams coming down to the edge of the roof are completed and flattened at the eaves. The entire roof edge is bent around the edge cleat and crimped with hand seamers, or with hammer and seaming iron. (Use locking pliers to clamp the bottom of the pan as you work along it.) Then the whole edge is bent down. On the rakes, I bend the overhang flush with the fascia board. On eaves, I angle the edge away from the fascia some, for good drainage into a gutter. Since folds are made through both roof metal and edge cleat, you have to be forceful with the hand seamers and the hammer.

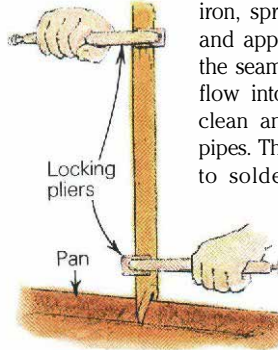
Changing slopes—Standing-seam metal roofing works well on a roof with a slope change. But if you try to bend a roof pan across the flat of the pan, the bent edges will fold up on themselves and the bottom of the pan will crease. The trick is to devise a tool that controls this folding—I use part of a broom handle for the job (drawing at right).

To use the tool, place the slot over the standing bend of a pan where the slope should change, and turn it until the pan flexes toward the desired angle. Repeat this on the other side of the pan. Since angled pans aren't able to expand freely, it's a good idea to splice them on the upper slope.

A standing-seam roof becomes a risky proposition at pitches less than about 1½-in-12. Although I have read recommendations limiting standing-seam work to minimum slopes of 3-in-12, this seems too conservative to me. I once tore off a 1-in-12 standing-seam roof on a small porch that was underlaid with 1910 and 1911 newspapers. Naturally, I replaced it with standing seam, figuring that 71 years of leak-free service proved a point. But it's a judgment call and on a large roof, or one with other roofs draining onto it, you should use a flat seam throughout.

A flat-seam application is essentially a standing seam turned once, flattened, and soldered (H). The pans are bent with a 1¼-in. edge and a 1-in. edge, so only the low side of the seaming iron is needed to roll them. All low slopes are done in a flat locked seam that is soldered, but flatwork can be tricky because one popped solder seam means a bad leak. Whenever possible, I try to increase the roof pitch instead.

Soldering—Soldering can be difficult and very time-consuming, so first summon up all your patience, and then select the right flux. Flux is a material that helps metals fuse, and also prevents surface oxidation. I use a liquid flux called Stay Clean (J. W. Harris Co., 10930 Deerfield Rd., Cincinnati, Ohio 45242) for galvanized steel. Crystalline rosin flux is used for copper, new terne, and terne-coated stainless. I've had a tough time finding this material lately, but you might be able to get it from a sheet-metal supplier. Solder won't flow on weathered terne or



terne that has been stripped of paint (as in repair work), so I use a liquid flux called Rubyfluid Soldering Flux (The Ruby Chemical Co., 68-79 McDowell St., Columbus, Ohio 43215). In a pinch, the lead-tin coating on new terne will solder without any flux.

I use only 50/50 solid-core bar solder, never an acid or rosin-core solder. Wire solder can be used, but bar solder is more efficient for tinwork. Though 1-lb. bars are the most common, I prefer ¼-lb. bars because they seem to get just the right amount of solder on the seam without gumming up the tip of the soldering iron. An average roof might take about 2 lb. of solder.

Good soldering technique comes from common sense and practice. Heat the soldering iron, sprinkle or brush some flux on the seam, and apply the tip of the iron and the solder to the seam. If the seam is hot enough, solder will flow into it, though the process isn't quite as clean and easy as it is when sweating copper pipes. The flatter the seam is, the easier it will be to solder. Cross seams on steep slopes are tough because the solder wants to flow downhill rather than along the seam. To minimize this, use a dam of scrap metal to keep the solder from running down the pans.

Flashing—Flashing a metal roof is simpler than flashing a shingle roof because step flashing is eliminated. If a roof ends along a sidewall, for example, the edge of the last pan is simply bent 2 in. or so up the sidewall as a base flashing. To accommodate expansion, this lip isn't fastened to the sidewall in any way. Counterflashing, made from the same materials as the roof, is then slipped under the siding and lapped over the base flashing. You'll have to remove or pry up some siding in order to nail the counterflashing in place.

Where a roof slopes away from a wall, such as on a shed addition, there are two flashing options. One way is to cut the edges of the pan about 2 in. from the end, flatten them and then bend this "flap" to conform to the wall surface. The problem with this method is that it's hard to get solder into the small hole at the back edge of each standing seam. The second choice is to use a separate flashing pan. Stop the roof pans about 12 in. short of the wall, and seam them together. Put a 1¼-in. bend-up at the top edge, then bend a flashing pan to lock into it.

Chimneys and curbs are flashed by turning the pan up as base flashing, but tabs must be soldered in at corners to make the base continuous. Stepped counterflashing where a roof meets a chimney can be replaced with a single L-shaped piece of metal, tucked into an angled kerf cut in the masonry. Seal the kerf, and any nailheads through the counterflashing, with paintable silicone caulk.

For flashing vent stacks, I like to use prefabricated pipe collars with a neoprene gasket and a galvanized steel base. Bends should be made in the base so that it can be flat-seamed and soldered right into the roof pans. □

Matt Holmstrom is a remodeling contractor in Bedford County, Va.