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Installing Drywall

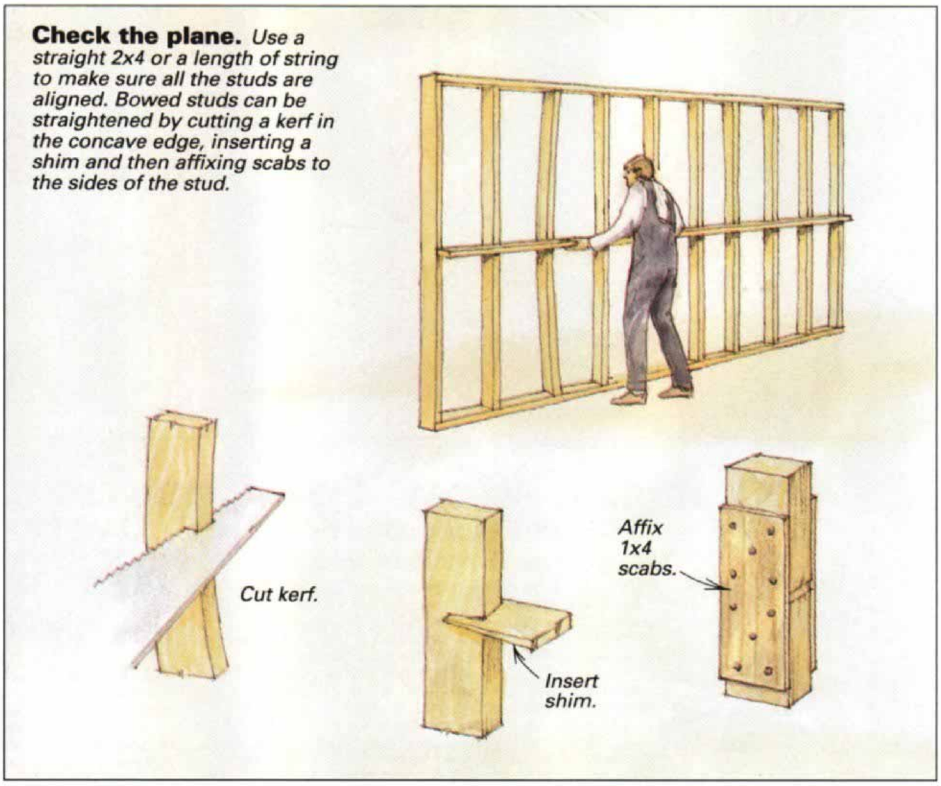
How to keep the sheets flat and the seams to a minimum

by Charles Wardell

For many builders, installing drywall ranks second in popularity only to paying liability premiums. It's dirty, heavy, even backbreaking work. And unless you do it all the time, getting tight joints and a smooth finish can seem like a Herculean effort.

Maybe that's why it's so easy to find bad drywall jobs. The stuff causes enough frustration that quality can fall victim to just getting the job done. A first-rate job is one that nobody notices, while a botched job is a memorable job.

Installing drywall is a two-phase process: first the sheets are hung, then they're taped and finished. In the June/July issue of *Fine Homebuilding,* I'll discuss taping and finishing, but in this article I'll concentrate on hanging drywall. No matter what type of drywall you choose (see sidebar p. 43), properly hung sheets are faster, easier and more pleasant to tape.



Check the plane. *Use a straight 2x4 or a length of string to make sure all the studs are aligned. Bowed studs can be straightened by cutting a kerf in the concave edge, inserting a shim and then affixing scabs to the sides of the stud.*

Readying the framing—The quality of a wall's finish depends a lot on what's under it. Wood-framed walls are supposed to lie in a continuous plane, but not all of them do. I check them with a straight 2x4 or with a string pulled across the face of the studs. If I find a warped stud, I either replace it or straighten it with a kerf and a couple of scabs tacked to the sides of the stud (drawing right).

The moisture content of the framing is important. Use surfaced, kiln-dried lumber. If you'll be drywalling soon after framing, get lumber that hasn't been stored outdoors. I learned the importance of this some years ago. We were renovating a hotel dining room with a 40-ft. long interior wall. Our supplier had brought us a load of waterlogged and frozen 2x4 studs, but under pressure from the owners, we framed the wall anyway. Over the next few days we hung and taped the drywall. Then we went home for the weekend. By Monday, after several days of thawing and drying, enough of the once-frozen studs had bowed at the center to buckle the entire wall. A gaping crack now ran the length of the wall. The whole thing had to be torn down and reframed with dry wood.

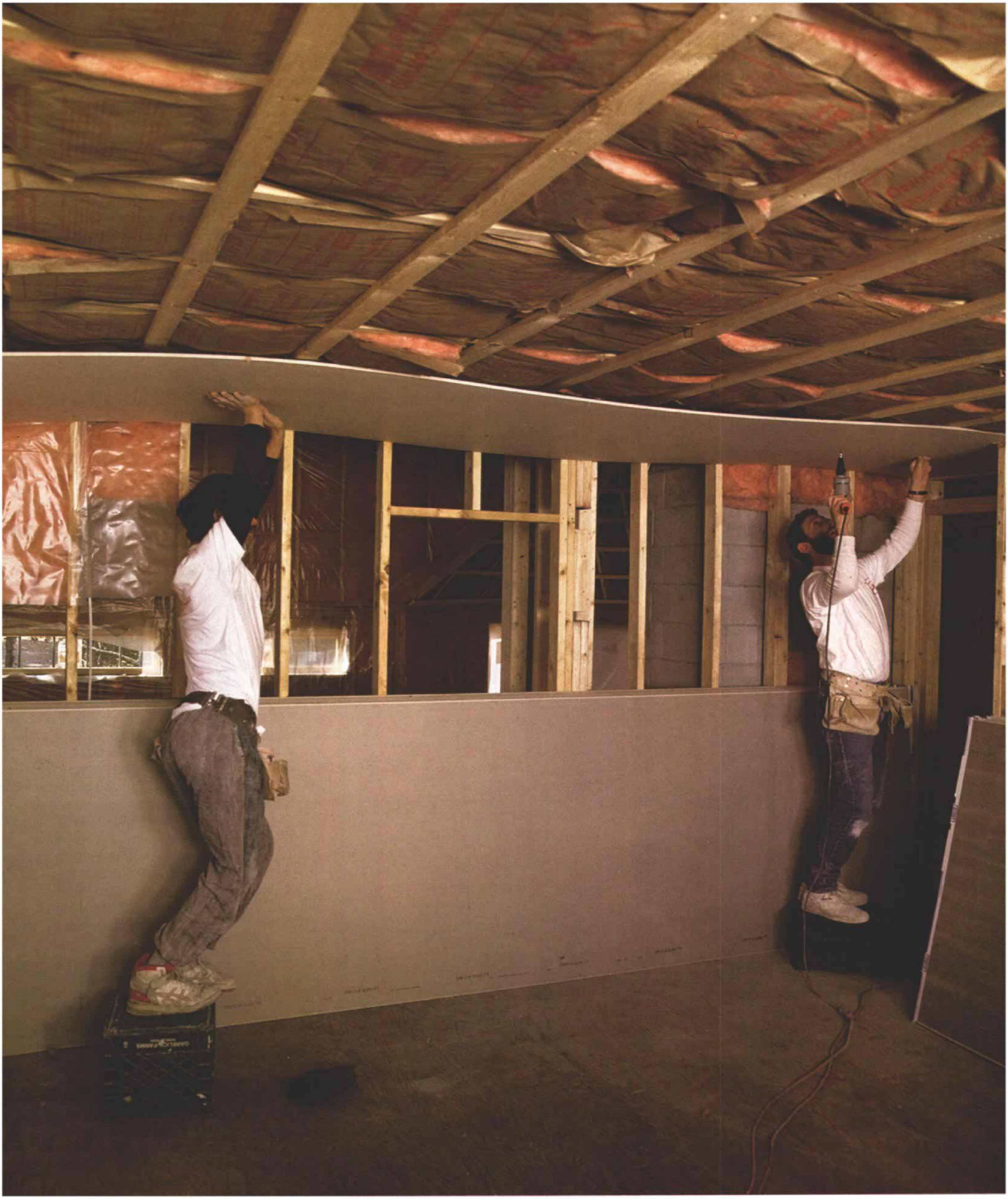
I use 1x3 strapping to fur out all ceilings (photo facing page), and I think it's worth the trouble. Shimming behind the strapping ensures a flat surface—even in an old house. The strapping also gives the electrician a place to run wires without having to drill holes in rafters or ceiling joists. And because the straps are placed 16 in. o. c., the joists can be placed 24 in. o. c. and then finished with ½-in. drywall without worrying about it sagging. The extra width of a 1x3 makes a larger target to hit with drywall screws, which is especially welcome when working on the ceiling.

Fasteners—Moisture is one reason that professionals fasten their sheets almost exclusively with screws. As wet framing lumber dries, it can shrink away from both the drywall and the nail shanks. This leaves a small space behind the drywall, so when someone leans on it, the nail head pops through the surface. Screws, on the other hand, are more likely to follow the framing as it shrinks, taking the wall surface with them. No space is created, so there's little danger of pops.

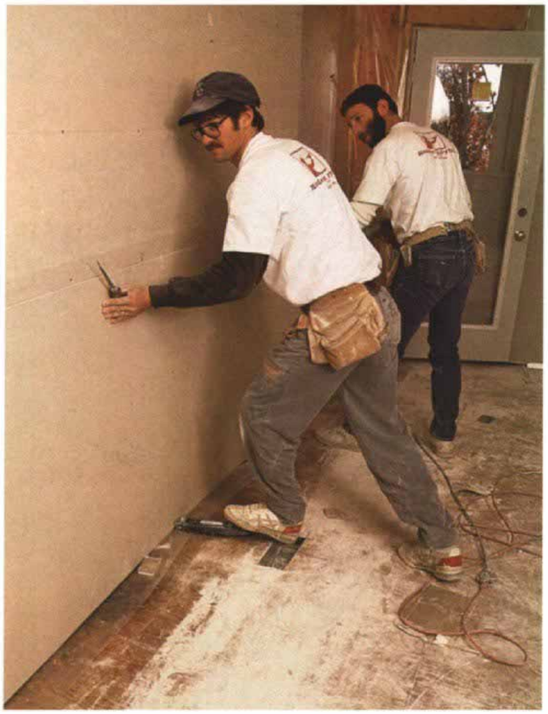
A second reason for using screws is that the core of a gypsum panel has almost no strength—it's all in the paper facing—and the facing is more likely to stay intact with screws. All fasteners must be set ⅛ in. or 1⁄16 in. below the face of the sheet, then finished with joint compound. With nails, this means driving the heads flush with the surface of the sheet, then hitting them once more with the hammer. The final blow creates a dimple in the paper surface that gets filled later. But denting the face of the drywall also weakens the bond between paper and gypsum. The paper may later become loose, forming a bump that has to be repaired.

But a drywall screw pulls the board snug to the framing without affecting the bond. The screw's head is formed in such a way that it sinks uniformly into the surface of the board, spinning the face paper under the screw head and leaving a clean dimple with no ragged edges. Type-W screws are for fastening drywall to wood framing or furring strips. Their diamond-shaped points

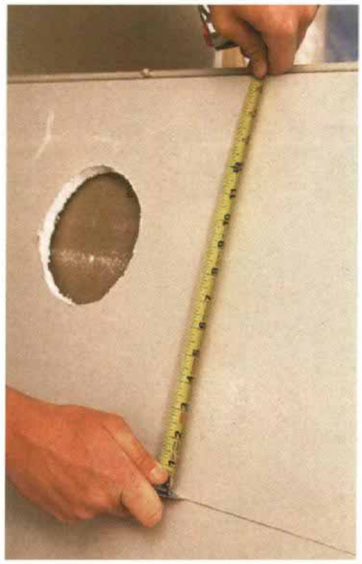
Drawings: Gary Williamson



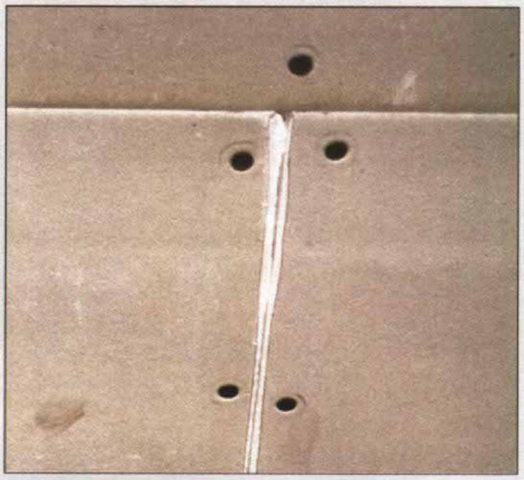
Ceilings first. The ceiling panels should be installed before the walls, and a flat substrate makes the drywaller's job a lot easier. One technique is to cover ceilings with 1x3 strapping. The straps can be shimmed to level out a warped or bowed joist, the gaps between them make handy chases for wiring runs, and the wide face of the 1x3 makes a big target for the screw gun. Here a 16-ft. sheet of drywall is muscled into place. Even though they're harder to maneuver, long sheets require fewer joints to tape. Note that sheets are hung perpendicular to the strapping.

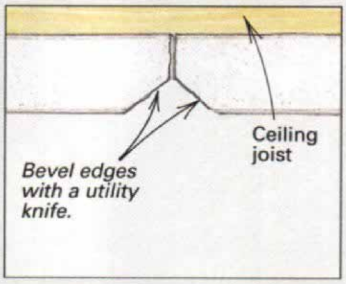


It sure beats a pry bar. **A panel lever slides easily under the bottom of the sheet and wedges it into place.**

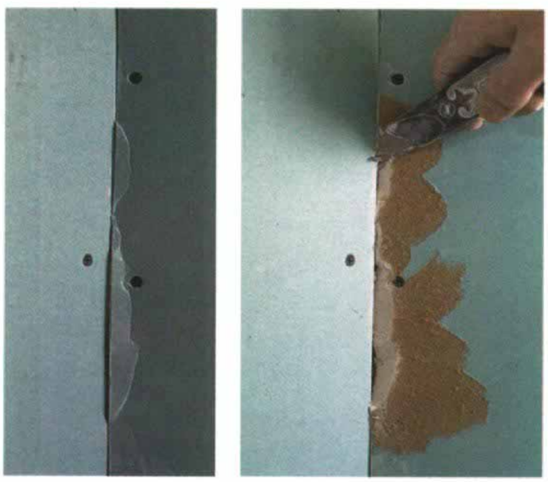


He's got a knife. **There's no need to mark a cutline for long strips of equal width. Instead, pinch the tape at the correct dimension with one hand along the panel's edge. Then pierce the paper skin with a utility knife held in the other hand and ride the tape along the edge of the panel to score its length.**





Beveling butt ends. **To prevent edges from breaking out—especially at butt ends—boards should fit easily without being forced. Tight fits or rough edges should be beveled with a drywall rasp or with the edge of the knife blade. Photo by Charles Wardell.**



Rip and patch. **If the paper and the gypsum core separate, such as this blister along a tapered edge, the paper should be torn away, and the panel excavated to solid material. The cavity will be covered with mesh tape and filled with quick-setting, nonshrink joint compound.**

Outside corners. **Metal corner bead protects the drywall at a vulnerable location and makes it easy to get a crisp, finished edge that runs straight from base to crown.**

ensure quick penetration (drawing below), and their aggressive threads provide tenacious holding power. Manufacturers recommend ⅝-in. minimum penetration into the substrate.

Type-S drywall screws have smaller threads. They're for affixing drywall panels to metal studs or channels. Their tips have a tiny slot or a hardened drill point that easily penetrates sheet metal with little pressure.

Type-G drywall screws are used for affixing drywall to gypsum backing boards. They have alternating high and low threads that hold well in a gypsum core.

Screws should be driven every 12 in. on ceilings and every 16 in. on walls. That's a lot of screws, so if you hang much drywall you'll want to get an electric screw gun. Because I don't do enough drywall work to justify buying an electric screw gun, I bought a Disston countersink tool, called the Dimpler, for my electric drill (Disston Co., 7345-G W. Friendly Ave., Greensboro, N. C. 27410; 919-852-9220). This magnetic bit holder has a built-in clutch. I'll admit that a screw gun does a better job, but at about $15 the countersink adapter sure beats messing around with a plain old Phillips bit in a drill.

Drywall adhesives—Some builders reduce fastener problems by laying a continuous bead of construction adhesive on each stud. Almost any good adhesive will do, but the label should say that it meets ASTM standard C557. The adhesive must bond the drywall directly to the framing. It can't be used over polyethylene vapor barriers or where faced insulation batts are stapled to the face of the studs.

A glue-screwed wall has greater racking strength and sound-deadening abilities than an ordinary one and uses about a quarter the number of screws. The United States Gypsum Company (USG), a major manufacturer of drywall, recommends that glued ceilings be screwed 16 in. o. c. at the ends and with three fasteners in each framing member—one at each edge and one in the middle. On walls USG says you can eliminate the center screw altogether (although I've never actually tried this).

Estimating and layout—As a remodeler, I've hung lots of drywall over the years, but my techniques weren't always the most efficient. To learn more about how a pro installs drywall, I spent a few days with Brian Henderson and his crew. Based in Oak Bluffs, Massachusetts, Henderson has been installing drywall for 15 years.

Henderson first considers the layout. The rule is to have as few seams as possible and to make seams occur between the tapered edges of the sheets. Where butt joints between the untapered ends of the sheets are unavoidable, he plans a layout that puts them in the least visible portions of the room. For example, they shouldn't occur over windows or near ceiling fixtures where the raking light will make them easier to see.

Henderson estimates wall by wall, figuring what he needs for each surface and ordering the

Cutting holes for outlets, switches and lights

Getting a close fit around electrical-outlet boxes is one of those things that just takes practice. Fortunately, there are a number of methods from which to choose.

A good method for the novice drywaller is to rub the face of the box with block chalk, raise the sheet into place and whack its face with an open hand. This leaves the box's profile on the sheet's backing paper. Simply plunge the tip of a drywall saw through the sheet, cut along the marks and then rehang the sheet. I'm told that you can get as good or better results with dishwashing detergent, hand lotion or lipstick (bright colors are probably your best bet).

If you'd rather not handle a sheet twice—no doubt the case on most ceilings—you can measure each box's coordinates and transfer them to the drywall. But I find that I make more mistakes with this method than with any other.

For recessed lights and other round holes, a circle cutter—a compass with a cutting wheel—makes accurate cuts of up to 16 in. in diameter if you can find center of the circle. You can save some money by making your own light-fixture template with the plastic lid from a 3-lb. coffee can. Because the lid's diameter matches that of most recessed light housings (check it out first), you can mark reference points on the wall or ceiling by driving a nail through the center of the lid, snapping it over the housing and measuring the distance from the nail to the walls. Mark the center on the workpiece and then reuse the lid to trace the lamp's outline.

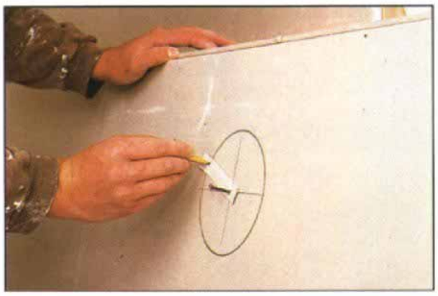
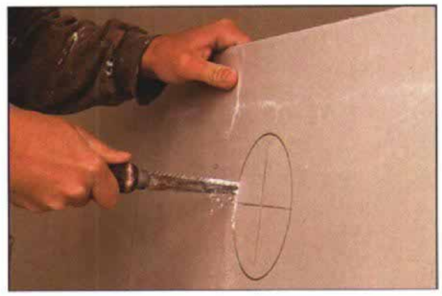
Another way to mark a circle on a sheet is to fashion a makeshift compass from a piece of the paper tape that binds pairs of sheets together at their ends (photos above).

Walls are much easier. Where two sheets meet over a switch box, you can cut each one in place. Before installing the bottom sheet, use a T-square placed on the subfloor to mark the box's location and height (drawing right) on the floor. Then hang your sheet, measure back up to the box and use a utility knife or a drywall saw to cut it in place.

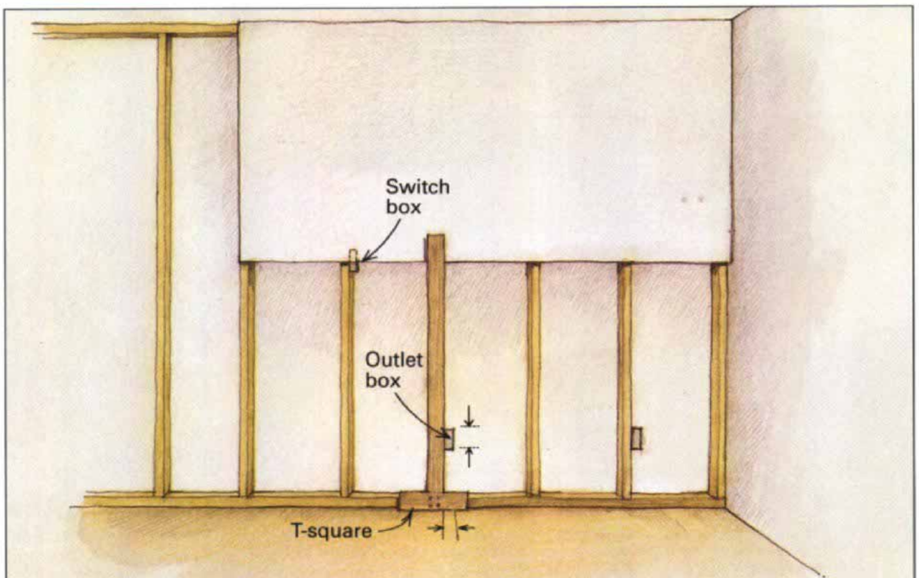
Some pros cut outlets with a drywall cutout tool, which is a small router with a special bit. It uses a high-speed ⅛-in. drill bit with sharpened spirals that are designed to throw dust into the hole rather than back at the installer (though it still throws off quite a bit of dust). The bit chucks into a small sleeve that, in turn, fits into the router's collet. The sleeve lets you adjust the bit's depth.

To rout an outlet box, first measure from the center of the box to the nearest wall or floor and make a mark. After hanging the sheet, plunge the router bit in and bring it over to the inside edge of the box. Then jump over to the outside edge and rout around it, using the box as a template. Figure on burning up three or four bits in a two-bedroom house. If you're confident of your ability to make accurate cuts, you can use the same technique with a drywall saw (bottom photos, this page). If you're really confident, you can eyeball the center of each box and plunge a saw through the sheet once it's on the wall.

One place where you can't rout or saw sheets in place is on homes with continuous poly vapor barriers that are sealed to the outlet boxes. Cutting around the box would destroy the barrier at that point, creating uncomfortable drafts and possible moisture problems. —*C. W.*

Twirl and cut. You can mark circular cutouts with a compass made from a screw and a piece of the paper used to bind pairs of of drywall sheets at their ends. Plunge a drywall saw through the face paper to make your cut.



Cutting boxes in place. *Switch boxes can be cut out in place without measuring. To locate outlets, mark their coordinates on the subfloor, then measure up after the sheet is in place.*


Saw and slice. Another way to cut holes for outlets is to first hang the drywall right over the boxes. Then use a drywall saw to cut around the interior of the box. Remove the waste and enlarge the opening with a utility knife.

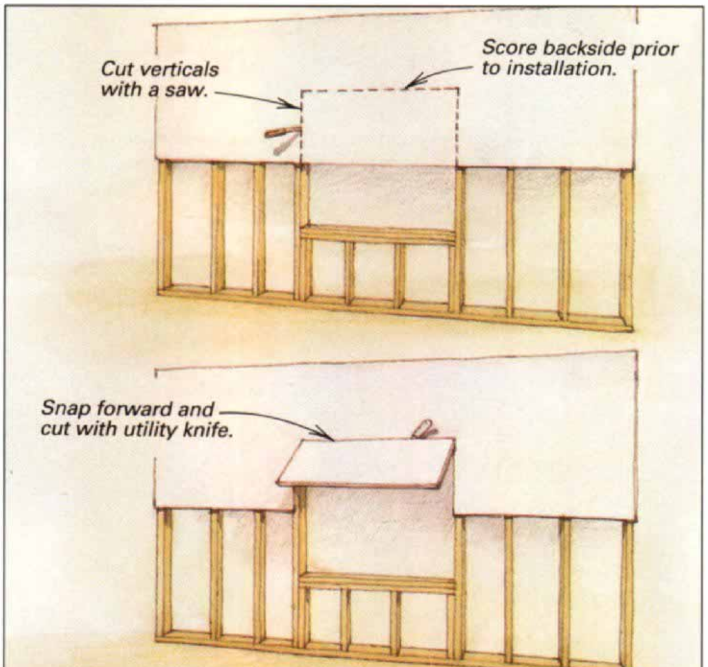
longest sheets possible. Like most experienced estimators, Henderson can walk into a room and quickly see what's needed. For the occasional drywaller like me, it helps to bring a sketch pad. Laying out the walls and the ceilings on paper helps me see where the joints will fall and often suggests better patterns.

Let's rock—The drywall trade isn't tool-intensive. Henderson, for example, does just about everything with a tape measure, a chalkline, a 4-ft. T-square, a utility knife, a keyhole (or drywall) saw, a screw gun and a panel lever to wedge sheets into place (top left photo, p. 40). Other useful tools are a drywall hammer (if you're using nails), a drywall rasp and a couple of T-braces. A drywall hammer has a rounded head with a waffle pattern. It's supposed to leave a dimple in the sheet without tearing the paper. It also has a hatchet end that can serve as a jacking wedge. A Sureform plane can be handy for carving the edges of a drywall sheet. You can make a similar tool by wrapping a piece of expanded metal lath around a 2x4 offcut. I make my T-braces from 2x4s that are a couple inches longer than the ceiling height. They have 4 ft. 2x4 crossbars reinforced with 1x diagonals. Wedged under a drywall sheet, T-braces prop up ceiling panels while the panels are screwed to the framing.

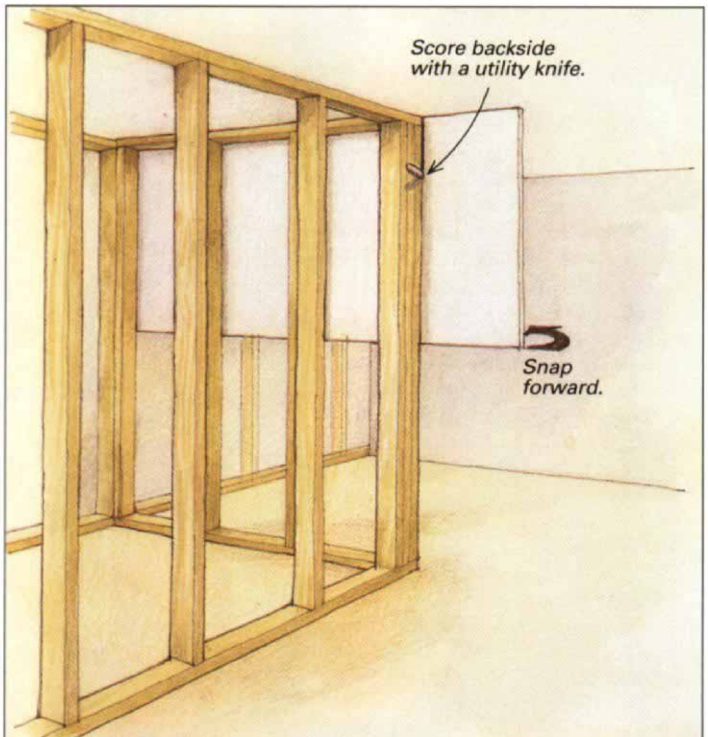
Drywall panels are cut by scoring and snapping. With a sharp utility knife, a clean cut is made through the paper face, slightly penetrating the gypsum core (top right photo, p. 40). The joint is then snapped back to break the core, and the knife is used to cut the backing paper at the crease. Some installers score the face, snap the sheet back, then sever it by snapping it forward. This takes practice and works only if the humidity is low and the sheets are crisp. I try to keep two knives loaded with sharp blades, and I change blades often. To keep them from clogging, I spray the blades with graphite lock-spray.

Sheets should fit without being forced into position: tapered edges next to tapered edges, butt ends next to butt ends. Rough-edged cuts should be smoothed with a utility knife.

Starting at the top—The edges of the ceiling drywall should be supported at the wall intersection by the gypsum board affixed to the studs. And the best way to make that happen is to hang

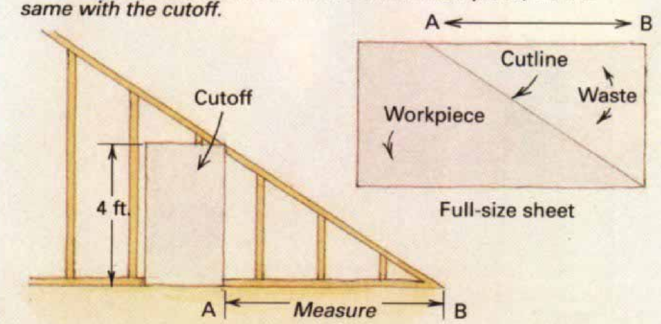


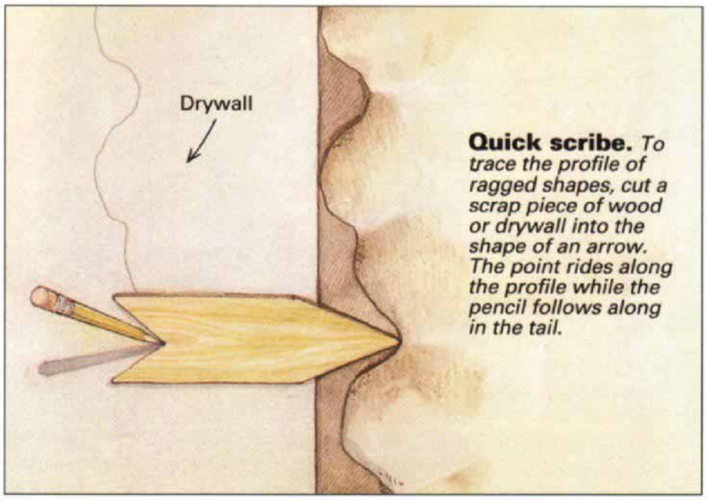
Inside cuts. *Windows and doors are drywalled by placing a sheet over them, then cutting out the opening. On a three-sided cut around a window, mark the horizontal leg of the cut on the back of the sheet, then score it with a knife. After the sheet is hung, cut the other two legs with a saw. Then snap the scrap piece forward and cut the crease with a knife.*



Outside corners. *Run sheets long at outside corners, score backside with a utility knife using framing as a guide, snap forward and finish the cut from the front.*

Figuring angles. *Angles like the one shown can be measured with a drywall cutoff and a tape measure. The distance from the cutoff to the corner (AB) equals the length of the horizontal leg of the triangular piece of waste. The width of the cutoff must equal the width of the sheet. So if you'll be trimming the bevel off the bottom of the finish piece, do the same with the cutoff.*





Quick scribe. *To trace the profile of ragged shapes, cut a scrap piece of wood or drywall into the shape of an arrow. The point rides along the profile while the pencil follows along in the tail.*

the ceilings first, then butt the wall panels tight to the ceiling.

Once upon a time you could visit almost any drywall job and see people walking around on stilts. That's getting rare. Most insurance policies don't cover workers who are injured while on stilts. Henderson, for example, hangs high ceilings from staging platforms, and low ones while standing on plastic milk cartons (photo p. 39). He and his crew work two to a sheet, raising and fastening according to a well-honed rhythm.

That's fine for pros, but a 4x12, ½-in. sheet weighs nearly 100 lb. Those of us who are less vigorous (and not working by the square foot) prefer to use three people—two to hoist and one to fasten—or to rely on other lifting aids. I used to hold sheets in place with my head, but just as I no longer use my teeth as a utility knife, I've realized that my body wasn't meant to be a post. Drywall hoists are available that will lift a sheet to the ceiling and hold it there while you fasten it. You can even make your own (see *FHB* #50, pp. 50-51). But for most jobs, nothing beats a pair of helpers—preferably big ones with strong backs.

If butt joints are unavoidable, they can at least be kept away from the center of the ceiling. And because continuous butt seams tend to crack, they should be staggered. If you want perfection, or if you want to compensate for average taping skills, try back blocking. Install nail blocks between the joists and a length of strapping across the blocks, parallel to the framing. The strapping here should end up about ⅛ in. above the plane of the strapping on the rest of the ceiling. Hang your sheets so that the ends fall on the recessed strapping between joists. When the butt ends are nailed, they should be recessed about ⅛ in.

Most pros don't back block. It takes too long, and their taping skills are good enough that they don't need to. To make taping easier, though, Henderson doesn't leave factory edges on batt joints. The paper can curl back and lift the tape. Instead, he trims all butt ends at a 45° angle (middle photo and drawing, p. 40), then he drives a screw every 4 in. to 6 in. Any paper that does separate from the panel is torn off and taped later (bottom left photos, p. 40).

And now the walls—Before hanging the walls, the locations of all studs are marked on the floor and the ceiling. In most cases the top panel goes on first to ensure a tight wall/ceiling joint. Gaps larger than ⅜ in. will suck in the tape.

Henderson fastens the top of these panels first. Otherwise the top edge might break as it's pushed into place. The bottom panel is then cut to fit below the top. He cuts his bottom sheets ½ in. narrow to leave room for a panel lever. If you don't have a panel lever, a flat pry bar will work, though not as well.

Outside corners are run long, then cut in place after nailing (top right drawing, facing page). It's faster than measuring, and if the framing isn't square or plumb, there won't be any big gaps beneath the corner bead.

Windows and doors are drywalled by installing a sheet over them and then cutting out the openings afterward. Window and door headers are perfect spots for butt joints. But make sure the seams don't line up with the jamb, as this could prevent the window casings from lying flat, and a crack will inevitably open over the jamb.

On a three-sided cut around a window, the inside leg of the cut is scored on the back of the sheet before it's hung. Once the sheet is up, the other two legs are cut with a saw. The cutoff is then snapped forward and finished off with a knife (top left drawing, facing page).

On angled walls, like the gable end of an attic with kneewalls, Henderson hangs the bottom sheet first because it's likely to have a square end for at least part of its width. Of course some angles start right at the floor. In these cases Henderson uses a full-width cutoff to measure his angle (bottom left drawing, facing page). Whatever the wall configuration, the edge that meets the floor should be full thickness if possible. If you put a tapered edge next to the floor, small baseboards will lean in when nailed against it. If a tapered edge at the bottom becomes unavoidable, fill it with joint compound.

When fitting drywall around ragged shapes like stone fireplaces, you'll need to do some scribing. Henderson scribes with a scrap piece of drywall or wood cut into the shape of an arrow (bottom right drawing, facing page). The point rides the outline of the surface while the pencil nestles in the tail. To cut irregular shapes and curves, use a coping saw, a keyhole saw or a jigsaw.

A few ways to mark and cut holes for electrical boxes are included in the sidebar on p. 41.

Installing corner bead—The final step in the installation process is the corner bead. There are lots of drywall beads on the market (see *FHB* #63, p. 52), but most jobs get standard metal corner bead (bottom right photo, p. 40). The corner should project slightly above the surface of the wall so that the flanges of the comer bead end up covered with joint compound. Henderson uses sheet-metal shears to snip the bead. For wall corners, he cuts the bead about ½ in. short for fit, and he pushes the metal tight to the ceiling. The gap at the bottom is covered by the baseboard.

This is one place where drywall nails are acceptable—in fact they're preferred over screws because they're easier to install and because nails usually don't pop on corners. Start halfway up the wall and drive a pair of nails opposite one another. Then work out from this point with opposing nails. Drive a nail every 10 in., making sure that the flanges of the bead lie flat against the wall. You can't hide bulges with taping compound, so add as many extra nails as you need to make the flanges lie flat. At the bottom of the corner, Henderson adds extra nails to keep the bead in place in the event of errant bumps from furniture or shoes. The length of the nails will depend on the thickness of the drywall. They should penetrate the framing ⅜ in. to ½ in. □

Charles Wardell lives in Lexington, Mass. Photos by Charles Miller except where noted. *A great source of information on materials and methods for drywall, plaster and cement board construction is the 500-page* Gypsum Construction Handbook *from USC (125 S. Franklin St., P. O. Box 806278, Chicago, Ill. 60680-4124); $16.95.*

Types of drywall

A sheet of drywall consists of a gypsum core—hydrous calcium sulphate—sandwiched between two layers of chemically treated paper. Drywall comes in lengths ranging from 8 ft. to 16 ft. Its long edges are tapered to permit taping and finishing with water-based joint compound. Its ends, known as butts, are left full thickness.

***Standard* drywall covers most walls. It comes in four thicknesses: ⅝ in. is the board to get for a top-notch finish. It's stiffer, burns slower and deadens sound better than the other thicknesses. Walls framed with studs on 24-in. centers should be covered with ⅝-in. drywall; ½ in. is the most common single-layer sheet It should be used on walls with studs no farther apart than 16 in. o. c.; ⅜-in. drywall is used in remodels over old walls; ¼-in. drywall is easily bent, so it's great for covering curved surfaces with short radii. It's installed in two layers.**

***Fire-code* panels have a gypsum core that's laced with chemical additives and glass fibers. Most building codes specify fire-code panels for garage and furnace-room ceilings. Type X, the most common for homes, is ⅝ in. thick and has a one-hour fire rating. Commercial types have higher ratings.**

***Moisture-resistant* (MR) drywall is the stuff with the green paper, which has nothing to do with moisture—it distinguishes MR from regular drywall. It is used in high-humidity areas such as bathrooms, laundries, utility rooms—even returns around condensation-prone windows and skylights.**

MR gets its moisture resistance from the asphalt emulsions in its core. These make it denser and heavier than regular drywall. Unfortunately, they also make it more limp, especially when damp. That means it has a greater tendency to sag than regular drywall and should not be used on a ceiling unless the framing is 12 in. o. c.

MR board resists moisture, not water. It fans apart when soaked, so manufacturers caution against using it over vapor barriers. MR is marketed as a base for ceramic tile. I don't consider this wise: Moisture that gets behind the drywall in a poorly insulated tub or shower surround could easily condense. I've seen wall tile peel away from trails under these circumstances. Most tilesetters I know won't use MR as a tile backer. They use cement backer board instead.

***Foil-backed* sheets have a perm rating of .06 and act as a vapor barrier or retarder.**

***Interior ceiling* boards have multilayer cores. They're rigid enough to be hung from widely spaced framing without sagging.**

Drywall also comes in patterns. Pittcon Industries (6409 Rhode Island Ave., Riverdale, Md. 20737, 301-927-1000) makes wainscot drywall—a gypsum-board panel embossed to resemble raised-panel wainscoting. *—C. W.*