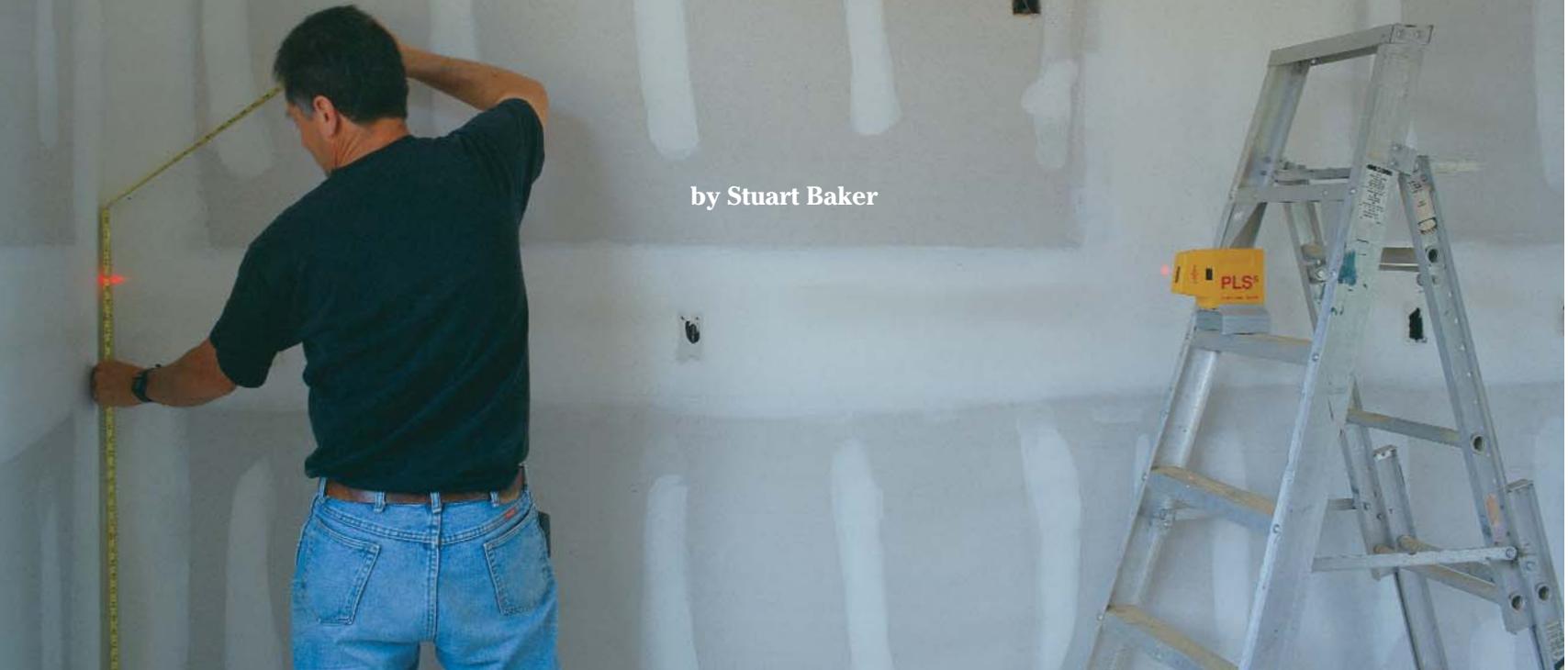


# Lasers on the Job Site

Are these electronic stringlines useful tools or high-priced gimmicks?

by Stuart Baker



**Some self-leveling lasers project more than one beam. Two of the five beams emitted by the PLS-5 from Pacific Laser Systems can be seen striking the wall. The two dots, one in the corner on the author's tape measure and one near the ladder, are on a level plane.**

Last year, our building and remodeling business got a contract to renovate an old barn that would become a historic small-boat museum. The barn was to be moved a short distance and set on a new foundation in Woods Hole, Massachusetts, the southern bay-front tip of the town of Falmouth.

A major part of the job was installing two yellow-pine laminated roof arches to support the aging structure. The arches were delivered in two halves each, which were to be fitted and mitered on site. The discounted price for the arches was about \$4,000. Once ordered, they would be mine. Well, they had to fit.

In our discussions about how to find dimensions inside the crooked old barn, the notion of laser technology came up. We thought laser leveling tools might be helpful in laying out the arches, especially in the space under the ridge-line. In my effort to find out about the tools, I called *Fine Homebuilding*. As it happened, the magazine had not published an article on laser tools. With tongue in cheek, one of the editors asked if I was volunteering to write an article. To make a long story short, I took on the task.

Don McBride and Steve Bibbo, two carpenter/builder friends of mine, helped me to evaluate the lasers. After the barn job (which came out fine with the help of the lasers), we had to look for ways to use laser levels. In time, though, we found ourselves reaching for some of them quickly and shaking our heads at how the tools simplified and sped up certain tasks.

There are more laser tools made than we reviewed. We examined a representative sample of the equipment that is on the market now and that is likely to be used by residential builders (sidebar pp. 84-85). Several job sites served as our lab. We used the lasers for all kinds of tasks and checked them for accuracy against themselves, against each other and against conventional equipment such as plumb bobs and high-quality spirit and builder's levels.

**A laser is an amplified beam of light—***Laser* is an acronym for the phrase "light amplification by stimulated emission of radiation." In a nutshell, a laser is an amplified, focused beam of light emitted from a solid-state device called a diode. Laser beams can be bent and split by mir-

rors and prisms. Whether a beam is visible depends on the frequency of its light. Manufacturers have incorporated this fundamental technology in a wide variety of tools.

We looked at three basic categories of laser levels: stick, rotary and self-leveling. The simplest are the rail or stick type. Basically, these tools consist of a laser inserted into one end of an ordinary spirit level. They're commonly placed on a leveling base that is adjusted in much the same way as a transit or a builder's level. Once the leveling base is level, the laser beam can be rotated in any direction. Generally speaking, the tools in this category are the least expensive. The list price of the stick lasers we looked at ranged from \$290 to \$529.

In a self-leveling laser, the light source is suspended like a pendulum inside the tool. When the tool is placed on a reasonably flat surface, the light source is pulled down like a plumb bob by gravity and magnets. Consequently, the beam or beams of light projected from the tool are plumb or level.

Several of the tools now on the market project two or more beams at right angles to one another.

er, which can be useful in all types of construction. The PLS-5 from Pacific Laser Systems of California (photo facing page) makes the most of this feature by projecting beams simultaneously in five directions: up, down, left, right and straight ahead of the tool. We reviewed tools in the self-leveling category that ranged in price from \$499 to \$995.

The third general type, rotary lasers, send out a beam that sweeps around the tool in a full, or nearly full, circle. In this last category, there are two subgroups, tools with lasers that are visible to the eye and tools with lasers that can be detected only by a receiver or sensor, a hand-held instrument about the size of a calculator.

Visible-beam rotary lasers can be used both inside and outside. In bright sun, though, it can be difficult to see the red line of light created by the sweeping beam. Cabinet layout, chair-rail layout, suspended-ceiling layout—such tasks all are naturals for rotary lasers. In this category, we looked at laser levels that cost between \$699 and \$995.

**Lasers can be used to level floors or to plumb walls**—Small, self-leveling tools such as the Levelite by Levelite Technology (photo p. 85) can be useful in plumbing walls because they send out a vertical beam of light as well as a horizontal one.

To check a wall for plumb, you set the tool on the floor next to a stud. The beam coming from the top of the tool will be an inch or two away from the wall. Pull your tape out a few inches and put the blade in the path of the laser and the end of the tape against the stud. Let's say the laser dot strikes the tape at 1¼ in. Then move your tape up as high as you can on the same stud and take another reading. If the laser hits the tape on the same mark, the wall is plumb.

During the course of our testing, another carpenter friend, Jim Dexter, was working on a commercial project where he was installing tall, metal stud walls. He borrowed our Levelite self-leveling laser for a couple of days. He and his helper said they saved a great deal of time using the laser compared with using a plumb bob on a 16-ft. line.

To establish a plumb line from floor to ceiling with a tool such as the Levelite, put the tool on the layout line on the floor. (There are centering marks on the base and the sides of the tool.) The beam that comes from the top of the tool hits the ceiling at a point directly plumb from the layout line. A plumb bob can spin and sway and has to be steadied by a second worker. The pendulum in a self-leveling laser, by comparison, rights itself in a second or two.

One way to line, or check the straightness of, a newly framed wall with a laser is to shoot the beam along the wall so that it just glances the



**Laser beams can be bent by a mirror or prism.** The black attachment on the end of this Laser Tools Company MX laser splits the laser beam into two beams that are perpendicular to each other. This feature can be used to lay out 90° corners or to transfer a wall or railing line to deck framing below, as shown here.

edge of each stud. The portions of the wall that are leaning in will break the path of the laser, and the sections that are leaning out will be missed altogether.

**Rotary lasers establish a level plane**—Rotary levels are good for hanging cabinets or drop ceilings. First, the tool is set up on a tripod in the middle of the room or hung from a wall at the desired distance from the floor. Some manufacturers make brackets for their tools to attach rotary levels to walls either with screws or with magnets.

The tool's light source rotates and sends out a straight, level beam of light that quickly sweeps around the room. Wherever the sweeping beam strikes, it makes a dash of red light that can be marked with a pencil. Cabinets or ceiling grids can then be hung at the marked line on any wall in the room. This method can be more accurate than using a common spirit level. If you move around the room with a spirit level and draw a pencil line along its edge, a small error in the beginning can become an unacceptably big one by the end. The rotary lasers that project an



**The size and shape of the light projected vary from tool to tool.** The dot made by the MX "stick"-type laser, visible here on the exterior door casing, appears in a dashlike shape. When transferring vertical measurements, this shape can be slightly more precise than a round dot of the same size.

invisible beam can be used inside, but to our thinking, they lend themselves especially well to outside work. Our excavation and foundation crews have used invisible-beam lasers for years for leveling excavations and septic systems, laying out footings and setting foundation heights. We used rotary lasers outside to mark elevations on concrete forms, to mark deck ledger-board heights and to mark the tops of deck posts.

**Different types of tools produced the same readings**—We used the laser levels both in new construction and in remodeling for about six months. For the most part, we found the level of accuracy to be more than acceptable. On one job where we installed a deck on an existing house, we used the Nikon AL-15 invisible-beam laser (bottom photo) to mark a cutline in the siding. We checked this cutline against one made by the L360A rotary-beam laser from Laser Tools Company, a visible-beam rotary unit. The two tools agreed with each other within  $\frac{1}{16}$  in. along a 26-ft. wall. Allowing for differences in interpreting the dots of light the tools made, these two lasers might have agreed with each other perfectly.

On another occasion, Steve used the L360 to mark the height of some exterior posts. He tested the laser readings against his trusty, self-leveling Pentax builder's level, and the two tools agreed dead on.

The manufacturers' claims with respect to accuracy vary, but the deviation from level generally ranges from  $\frac{1}{8}$  in. to  $\frac{1}{4}$  in. over 40 ft. to 50 ft. When it comes to establishing plumb, the PLS-5 and the Plumb Pointer (the same tool as the Levelite but sold under a different name) both allow slightly larger deviations. In its specification sheet for the Plumb Pointer, Spectra-Physics claims the horizontal or level beam is accurate to within plus or minus  $\frac{1}{4}$  in. in 60 ft., and the vertical plumb beam to within plus or minus  $\frac{1}{4}$  in. in 40 ft.

For many tasks, this kind of accuracy is more than workable. For example, as far as we're concerned, a 50-ft. foundation that varies in level no more than  $\frac{1}{4}$  in. is really quite good.

When we installed a new girt in an existing house to level a large living room, the Levelite and Plumb Pointer both gave us great results. Measuring the distance between the oak floor and the laser beams coming from both tools, we found them to read within  $\frac{1}{8}$  in. of each other over 50 ft.

**Self-leveling tools have limits**—In testing the tools, we found a couple of points on the downside. Three of the units we tried are self-leveling, but they stop functioning if the laser is not within a certain degree of level. The Levelite

and Plumb Pointer need to be within  $4^\circ$  of level to self-level, and the PLS-5 needs to be within  $8^\circ$ . The Nikon AL-15 levels itself as long as its bull's-eye leveling bubble is within the circle.

In the case of the tools that required manual leveling, the leveling process was sometimes a frustrating procedure. The bubbles in all of the lasers we tested were much slower acting than those typically found in spirit levels. It might seem that the slower the movement, the more accurate the bubble, but we found in practice that some of the bubbles seemed almost mad-deningly slow, and it was hard to know when they had really stopped moving.

In almost all cases, making a pencil mark from the laser mark took a little interpretation. The pool of red light that appears on any object in the beam's path varies from tool to tool. Some tools create a clearly defined dot. Others make something that looks more like a slash (bottom photo, p. 83). Once you've become familiar with the tool, it becomes easier to find the center of the dot. With a little care, the margin of error can be limited to within  $\frac{1}{16}$  in.

Laser levels aren't all that different from spirit levels in this regard. Human interpretation and error are brought into play whether you're reading one type of leveling tool or the other.

When it comes to reading a dot, brighter is not necessarily better. Brighter beams are easier to see at longer distances. At closer ranges, though, a bright beam creates a mark with so much light that it can be difficult to locate the center.

**Weighing cost and immediate need**—After testing these tools, I would like to own a laser or two. In my view, lasers are not the best tools for every leveling job. Spirit levels still are better for jobs involving smaller dimensions, such as setting windows or medicine cabinets. But for jobs that involve longer distances, such as setting mudsills or long lines of cabinets, laser tools come out on top.

If cost were not a factor, I would go a step up from the stick lasers. The PLS-5 is at the top of my wish list, with second place a draw between the L360 visible-beam rotary laser with a beam sensor and either the Levelite or Plumb Pointer.

The technology has improved since the tools first were introduced, possibly as a result of the strong competition between manufacturers. At least two of the manufacturers told us they planned to bring out upgraded products. If you're in the market for a laser, call the manufacturers to inquire about their latest developments. How many days til Christmas? □

*Stuart Baker and his wife, Astrid, operate the Creative Contractors Corporation in Falmouth, Massachusetts. Photos by Reese Hamilton, except where noted.*

## Stick levels

Laser Tools Co. Inc.: L100 MX



We had trouble keeping the short-bodied MX laser reading level. We tried calibrating the bubble with little success. Finally, we taped the laser to a very accurate 4-ft. spirit level. This combination produced great results. This tool is solidly made and has a strong beam, which appears on the work surface as a fairly distinct, tight, bright slash. List price: \$399; (800) 598-5973.

## Rotary levels

Laser Tools Co. Inc.: L360A



We had some difficulty with the leveling vials on the first tool we tested but had better luck with a second that we tried. We found this to be a trusted tool once we got used to it. On the job, we referred to the L360 as the "boat anchor," a reference to its mass and solid construction.

The laser can be adjusted to project in one of three ways: in a continuous circle, within a limited angle or in a fixed dot. An optional sensor that makes the beam easier to read outdoors is available. List price: \$699; (800) 598-5973.

Nikon Inc.: AL-15 Electronic Level



The Nikon is built so that its beam projects in an uninterrupted, 360° sweep. Although it performed well, we found the tool's construction to be disappointing; it seemed almost delicate.

The L. S. Starrett Co.:  
Starrett Exact



We used the Starrett and other stick levels, such as the Red Line Laser by Pinpoint Laser Systems, to set some kitchen cabinets and to check floor levels. We found the Starrett and Red Line did not read level right out of the box. After some calibration, however, they all performed well and agreed with each other within  $\frac{1}{16}$  in.

The Starrett laser has a tight beam that is fairly easy to read and mark. We thought it was nicely made but pricey. List price, 20-in. model: \$414.95; (800) 541-8887.

Macklanburg-Duncan:  
Smart Dot Builder's Laser



This tool is nicely made. It comes as a kit that includes, among other things, a leveling base and an attachment that allows the beam to be bent at a 90° angle and swept in a plane perpendicular to the level. The Smart Dot projects a bull's-eye pattern. List price: \$529; (800) 665-2737.

Pinpoint Laser Systems Inc.:  
Red Line Level



The Red Line Level had our favorite dot. What from a distance looked like a tiny red cotton ball actually contained a centered and very readable bull's-eye pattern.

We found this tool to be a small, rugged unit with some useful optional equipment. One accessory splits the beam into two separate beams 90° apart. Leveling bases can hold the unit in either horizontal or vertical position. List price: \$290, leveling base: \$70; (508) 462-8056.

## Self-leveling

The hand-held sensor required to read the beam provides both LED and audible signals to indicate when the sensor is precisely in line with the beam. The plastic holder that can be used to attach the sensor to a surveyor's rod does not hold the sensor in place firmly.

Nonetheless, the unit performed accurately and had the best carrying case of any laser we tested. The working distance of this laser, more than 200 ft., was the greatest of those tested. List price: \$995; (516) 547-4200.

Levelite  
Technology Inc.:  
Levelite SLX



Spectra-Physics  
Laserplane Inc.:  
Plumb Pointer



The Levelite SLX and the Plumb Pointer both are made by Levelite Technology Inc., and aside from the markings on their housings, they're the same tool. The self-leveling lasers project two beams simultaneously, one vertically and one horizontally. We found these tools to be among the best tools for checking walls for plumb and beams for level. We used them interchangeably to level a sagging floor in an existing house, to level the mudsill and 60-ft. main girt at a new house, to determine the outline of a new metal chimney, to check level in a new cellar before pouring the slab, and so on. These little guys got a workout. They are compact, handy, easy to use and reasonably priced. Levelite Technology Inc.: Levelite SLX list price: \$499; (800) 453-8354. Spectra-Physics Laserplane Inc.: Plumb Pointer list price: \$499; (800) 538-7800.

Pacific Laser Systems: PLS-5



We received the PLS-5 from Pacific Laser Systems late in the game and got to use it less, but it impressed us and did useful work. It projects five beams at the same time: plumb up and down and level straight out and to both sides. The two side beams project at 90° to the primary front beam, so you can use it, for example, to square partition walls to each other. We found the PLS-5 to be the most accurate laser of those we tried for establishing plumb marks. The tool's forward beam was the brightest one we tested.

We used this laser to determine grade inside a new cellar and to check walls for plumb, among many other things. It's a unique, well-thought-out machine that was designed by a tradesman. List price: \$995; (800) 601-4500.

Laser Reference Inc.: Proshot L2



The Proshot has a support rod built into its structure that limits its sweep to slightly less than 360°. We used the rugged Proshot L2 to mark concrete forms for an oddly shaped deck, with fine and quick results.

The Proshot has two horizontal leveling bubbles compared with the Nikon's combination of a single bull's-eye bubble and a self-leveling mechanism. The Proshot's electronic sensor and its holder have a tighter tolerance than the Nikon's, giving a little more precise reading. Costing several hundred dollars less than the Nikon, the Proshot seems the better deal. List price: \$599; (800) 238-0685.