
TECHNOLOGY TO KEEP IN TOUCH

Contractors are finding
that cellular phones and
other high-tech commu-
nication tools can save
footsteps, time, and
money

by David Dobbs

A builder's best communication tools will always be a pencil, a blueprint, a desk telephone, and—for the site—a good set of lungs. However, increasing numbers of builders and tradespeople across the country are finding that their work flows more smoothly when they add some of the new high-tech communications products — whether it be a simple pager or a cellular phone—to their arsenal of tools.

But before you run out for the latest combination mobile phone/fax/copier/ portable computer/mobile data unit with clock-radio, pen set, and compass attached, read on. We've done some of your homework for you. Our main article takes a look at cellular phones, two-way radios, and pagers. In addition, "Coming Down the Pike," page after next, looks at mobile communication technologies now coming to the fore. And in "Life in the Fax Lane," last page, a builder tells how he makes the most of his facsimile machine.



Cellular Phones

Until recently, cellular phones (also called mobile phones) have been too expensive for most small builders. But improving technology and a larger customer base have brought cellular phone prices within reason. The units themselves now sell for as little as \$200, and monthly service and per-minute air-time charges are also dropping. As cellular gets more affordable, more builders are finding that when your dashboard is your desk, it pays to have a phone on it.

Cellular phones work by sending radio signals to a relay tower, which in turn either broadcasts the signal through the air or through conventional phone lines, depending on whether you're calling a cellular or a regular phone. The towers also relay calls from both types of phones to you.

An excellent tool

J. Ladd, a builder/remodeler in Burlington, Vt., uses a cellular phone to take care of phone business while driving between jobs and on errands. While enthusiastic about his phone, Ladd recognizes its limitations. For instance, when an ordinary phone is handy, he uses it, both to save money and because the connection is usually better. And he tends to avoid using his cellular in front of clients. "They see a cellular phone, they think maybe you're charging too much money," says Ladd.

Despite such reservations, Ladd, who paid about \$1,000 for the phone and spends about \$45 a month for tower access and air-time charges, feels the telephone is a good investment. "It lets me knock down small details at my convenience, and it reduces my desk-time. It's like my

slide-saw; it's an excellent tool. I can't imagine how I lived without it."

Selecting a Phone

Selecting a cellular phone means deciding how much portability and what sort of features you want.

Car, transportable, and portable. You'll find three types of cellular phones: car phones, transportable phones, and portable phones (see Figure 1).

A car phone works only in the auto in which it is installed. They are the least expensive cellars, starting as low as \$200, and their roof antennae give them the best range.

If you frequently switch vehicles or want to take the phone on site, you'll need a transportable (starting at around \$300) or portable model (starting at around \$400).

Transportable units are camera-bag sized. They provide a good combination of power (3 watts, the same as a car phone) and portability, though the cases get heavy after a while.

One-piece portable phones fit in a pocket or clip onto a belt. They have shorter warranties and are less powerful than other phones, because they are limited by the FCC to only 0.6 watts. And their batteries require daily recharging. Given these drawbacks, they make the best choice only when portability is crucial.

In selecting a phone, look first for name-brand quality. Ralph Lenz, an industry analyst for Technology Futures, an Austin, Texas, high-tech consulting firm, says, "As with other high-tech equipment, the more off-brand you go, the more likely you are to have trouble." Lenz recommends buying from one of the major electronic and car-audio manufacturers now making cellular phones.

Features. Cellular phones come with a dizzying array of features. We've listed only the most essential here. These features are found in most medium- and higher-priced phones.

- Speed (memory) dialing saves dangerous moments thumbing through your address book while you drive.

- Hands-free operation (a speaker-phone) is likewise essential if you use the phone while driving.
- A beeper that sounds off every minute helps keep calls short, saving air-time charges.
- A noise filter helps clear up poor transmissions.

Analog vs. digital. Like stereos and watches, cellular phones are headed down the digital road. This is because digital systems—which can carry several times as many transmissions as analog channels can—are needed to provide more access to airwaves that are already becoming overloaded in many areas. Another benefit will be improved transmission quality, more features, and, as the customer base grows, lower costs.

The first "dual-mode" digital/analog phones hit the shelves earlier this year. It's expected that they, and then all-digital models, will gradually come to dominate the market as cellular networks around the country convert to digital.

This doesn't mean you should avoid buying an analog phone now, though. Systems aren't expected to go all-digital for five to seven years, and the lifetime of most phones is about three years—so you'll probably be replacing your analog phone before it becomes obsolete.

Choosing a Service

To use a cellular phone, you must subscribe to a cellular service. You can do this either through your cellular retailer or directly with the vendor. Cellular service typically costs from \$15 to \$45 a month, plus roughly 25¢ to 45¢ a minute per call; these costs are dropping yearly. (Long-distance charges are extra.) In return for your money, the vendor gives you a phone number and programs your phone so that it can transmit and receive calls via the vendor's towers.

By FCC decree, every cellular service area must have two vendors. Since the quality of both transmission clarity and customer service varies among vendors, you should comparison shop. Talk to customers of both services in your area to see what their experiences have been, particularly regarding sound quality and billing snafus (such as those 16-hour bills that occur because you forget to hit the end-transmission button). It may be worth renting a phone from each vendor for a few days to compare.

You should also see if either vendor offers automatic "roaming." Roaming lets you pass from your vendor's area into a neighboring area and still use your phone. While some vendors offer automatic roaming arrangements with their neighboring systems, other vendors leave it to you to make your own arrangements.

Two-Way Mobile Radios

Two-way mobile radios have been used for years to keep construction vehicles in touch with each other or with a base station. New technology has made these radios more private and "phone-like" than before. In fact, the more expensive models can even double as car phones.

Conventional vs. "Trunking"

Two-way mobile radios now fall into two groups: conventional models and "trunking" models. Because conventional models work on channels open to all area users, you sometimes have to search or wait for an unoccupied channel. In addition, your conversations aren't private. Such radios are relatively inexpensive, however, starting at about \$500. And since you pay only one

monthly tower charge whether you have two or ten radios in your fleet—and no per-minute charge—they don't cost much to use.

Trunked two-way radio systems offer greater privacy than conventional systems do by using discrete channels that you can monopolize for the length of your conversation. They also generally come with more features. Most trunking models, for instance, will scan through the channels automatically to find an open one. Quality trunking systems start at about \$800 a unit.

Combination Systems

A thousand dollars or more will buy a radio that works on both conventional and trunking frequencies. For a few hundred more, you can get a model with "telephone interconnect," the ability to act as a cellular phone. This will cost you additional monthly and per-minute charges similar to standard cellular phone charges.

Such a radio can be a good solution, however, if you need inter-vehicle communication for several vehicles, but a cellular phone for only one or two. You can outfit the one or two vehicles with units with telephone interconnect and put cheaper conventional systems in the others.

Shopping Around

To use two-way mobile radios over any area bigger than about a square mile, you need to subscribe to a tower service to relay your signal, much as with cellular phones. Shopping for two-ways is also similar to cellulars, according to Mark Levitt of Acticom of Waltham, Mass., New England's largest dealer of land mobile communications. Levitt says you should look for name-brand quality in the radio. In the service vendor, look for quality of transmission, adequate geographical coverage, and good customer service. Tower fees start at around \$25 per month and rise according to how much area you want service for.

Two-Way Personal Radios

In the light construction trades, two-way personal radios, or walkie-talkies, are most commonly used by plumbers, electricians, and others who work together on far ends of the same buildings. The walkie-talkie of choice among such workers is the voice-activated headset, which lets them converse while keeping their hands free to work.

Dan LaChance, a Burlington, Vt., electrical contractor, often uses the headsets when pulling new wire in existing buildings. "We'll use it to say things like 'Hold a minute' or 'It's pulling hard now, try a little more lubricant,'" says LaChance. "It's not terribly professional to be yelling that stuff around in an office building."

For most jobs, LaChance uses \$40 units that run on 9-volt batteries and have a range of about 1/4 mile. But he says the range and sound quality are sometimes unreliable for these small units. When he needs more power, he rents more expensive headset units for \$5 a day. On noisy sites, where the racket would constantly activate the voice-activated microphones, he rents lapel- or belt-mounted units that must be thumbed to transmit.

According to Acticom's Mark Levitt, you pretty much get what you pay for in walkie-talkies. He says high-quality headset, hand-held, and lapel units start at around \$200. The most powerful and sophisticated units can link into channels used by mobile two-way radios,



Figure 1. Cellular phones come in three types: portable units (above) are good if you always need the phone at your side. Transportable units (below, at left) and car units (below, at right) are more powerful and durable.

Coming Down the Pike



Motorola's mobile data unit lets field personnel access and input information from a central computer via the two-way radio.

In the world of consumer electronics, technology changes fast: today's cutting edge is tomorrow's everyday tool. Car phones turned heads a few years ago, but now you don't think twice about seeing them, and even small builders are finding them cost-efficient tools.

So what are the communication tools you won't be able to live without tomorrow?

The two that carry the most promise are fax machines for cars and mobile data units.

Fax on wheels. Once both car phones and fax machines were common, it was only a matter of time before the two started getting together. The first car faxes came out in 1988, and as of this writing, both Mitsubishi and Nissei were making fax machines specifically for cars. The machines, which are smaller (only 1 or 2 inches tall) than ordinary faxes, draw power from the car's cigarette lighter and send their signals over cellular phone networks.

Rhonda Wickham, editor of *Cellular Business* magazine, says the print and transmission quality of these fax transmissions equals that of all but the most expensive office fax machines. The machines use special paper designed to withstand the heat of closed cars left in the sun, and the machines, says Wickham, are probably built to be a bit sturdier than your typical office fax.

Wickham has sent faxes from her car on several occasions and "had no problems," she says. According to Wickham, the only real potential problem with fax transmissions is the possibility of transmission errors occurring at the moment a car moves from one cellular area to another. The solution, says Wickham, is to either not fax while you're on the move, or make sure you buy a fax machine with an error-correction feature.

For a builder, a portable fax can hold all the advantages that an office fax does, as well as quick, on-site turnaround of plan revisions, change orders, revised subcontractor and client contracts, supply orders, and other urgent correspondence. And

while car faxes now start at around \$1,000, they should, like cellular phones, drop quickly in price as technology improves and sales and competition increase. In ten years they're likely to be as common as car phones are now.

Mobile data. Mobile data units, which are already available, are essentially computer terminals in cars; they communicate via FM radio waves with central computer terminals elsewhere. These units range from simple, hand-held keyboard units not much bigger than a calculator to full-bore PCs with screens that mount under the dash. Mobile data units are what enable overnight courier companies to keep track of packages and police to pull up a driver's record on screen.

In construction, the promise of mobile data is to give field personnel constant and quick access and input to computerized information back at the office. A person in the field could get pricing or scheduling information, for instance, as well as send information about progress and expenses at the site. This can save paperwork and speed billing.

Julia Massey, a Motorola marketing representative, says a typical construction use would be to track time and material charges at a job. For instance, an electrician just finishing up a wiring job could enter the number of hours he spent and the type and amount of materials he used on the job. That information would enter the company's central computer and be immediately available for billing. "The bill could go out before the electrician gets to the next job," says Massey.

At this point, such units cost thousands of dollars and, more significantly, require that you have your accounting, job tracking, or billing processes computerized. Nevertheless, mobile data units are already being used by large commercial contractors such as cement and electrical contractors. As the technology gets cheaper and more small contractors computerize their billing and paperwork, they may become a common sight on light-construction sites as well.—D.D.

allowing them to communicate via repeater towers with mobile units (see Figure 2).

Pagers

Pagers, which used to simply beep, now come in several varieties. Numeric pagers display the phone number you need to call; alphanumeric pagers dis-

play names and numbers or short messages; voice-message pagers broadcast short verbal messages from the pager service or caller; silent pagers just vibrate against your waist; combination pagers do any or all of these things; and—believe it or not—wristwatch pagers can both tell the time and make sure you never miss a call (see Figure 3).



Figure 2. Two-way radios come in everything from conventional models (top) to more sophisticated models that provide private radio conversation and can double as car phones (above).



Figure 3. This top-of-line pager—or personal message receiver—can pass any combination of tone, voice, or alphanumeric messages, including continuous "scrolled" messages that roll up the screen. It can store up to eight messages, and with an optional printer, it can even print out a message up to 1,950 characters long. If you don't want an annoying beep, it can alert you to a call by vibrating.

Life in the Fax Lane

by Sanford Wilk



Hitachi's high-end fax machine does everything but brew coffee.

Imagine this: You're to meet a client and start a remodeling job at 7:45 a.m., but you also need to check price and availability that day for the lumber and materials that you'll need on site in less than 48 hours.

The standard approach would be to go to the job, meet the client, get your crew started, and then return to the office to spend most of the day on the phone with various suppliers. Before it's over, you'll be able to repeat your materials list blindfolded, and the phone's handset will feel more familiar than the worn handle of your old Estwing.

There's an alternative to this nightmare: it's called a fax machine. I never realized how much time, money, and frustration a fax could save until I owned one—a Hitachi 38M. Now when I find myself in the situation described above, I spend my day on the job instead of on the phone. The evening before, I write just *one* copy of my required materials list, set the fax machine to transmit that list to my favorite suppliers overnight, and go to bed.

By the time I wake, my list has

reached all my suppliers. When I return at day's end, I find their written price quotes waiting for me. After picking the best prices for available stock, I simply fax my orders in. It's like having office personnel without having to take anyone to lunch on Secretary's Day.

Save in long-distance charges.

A good fax machine saves more than time. It can also cut your long distance charges. The Hitachi, for instance, like other top-end machines, allows me to delay a transmit time until after long-distance rates have gone down. When I started placing my orders to out-of-state suppliers by fax after 11 p.m. instead of phoning them in by voice during the day, my monthly phone charges plummeted.

High-end features. At \$2,395, the Hitachi costs a lot more than some fax machines (you can find them for as little as \$500 now). However, top-end machines like the Hitachi usually come with features not generally found on less expensive machines.

The Hitachi, for instance, can transmit drawings, photos, and blueprints up to 11½ inches wide

by 24 inches long without having to reduce the document before sending. Lower-end machines can't do this, and very few machines with even higher price tags can send (or receive) a drawing with the clarity of the 38M. The Hitachi even knows when a machine you're sending a fax to can't print as wide as the 38M can, and automatically reduces the drawing so that the receiving machine can handle the transmission.

Another feature senses when you run out of paper, so the machine stores the incoming fax document in its memory until you add another roll.

Endless uses. Besides sending and receiving materials orders, shop drawings, blueprints, and change orders, I also use my fax to send paperwork to my accountant, transmit contracts to my attorney for approval, and relay messages to my subcontractors. The uses are endless. Best of all, it saves both money and time—and there aren't many tools that can do that. ■

Sanford Wilk is a builder and architect in Springfield, Mass.

Pagers are one of the cheaper communications technologies, but you can still squeeze a lot out of them. Electrician Dan LaChance, for instance, regularly uses his crew's 10-second voice-message pagers to give them crucial messages, such as to pick up that extra roll of wire or dozen switchboxes at the supplier.

One New Hampshire builder with a car phone uses an alphanumeric-display pager to let him know he has a call to return—saving the 45¢ it would take to

receive a cellular call that gives him the same information. And, of course, pagers of any sort can tell a builder who isn't near a phone to get to one.

Paging services work in two ways; some use both. You can have an answering service automatically take your calls whenever your phone is busy or goes unanswered, then page you every time you get a call. You can also have a phone number assigned to your pager that anyone—your office personnel or whomever else you wish to give the number

to—can call to activate the pager, making it beep or pass a voice message. (Obviously you should think twice before giving that number out.)

You generally rent, rather than buy, pagers. Paging service costs range from around \$20 per month for a tone-only model to around \$40 or more for the fancier models. ■

David Dobbs is an associate editor with The Journal of Light Construction.