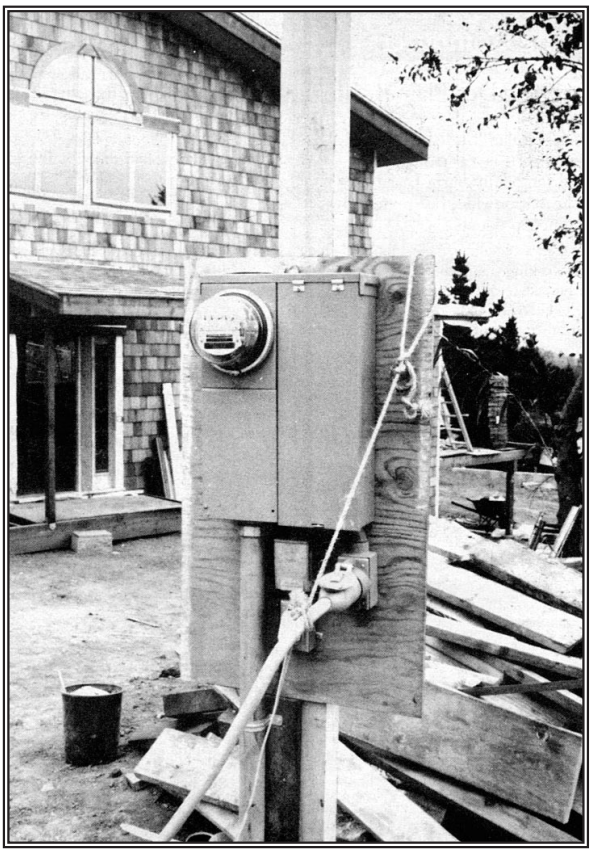
# GETTING POWER TO THE SITE



*Although job-site power poles are temporary, they take a lot of weather and abuse. The one at left, which taps into underground service, still requires rain-tight boxes and connections, and ground fault interrupter protection.*

## Whether you build, rent, or borrow it, plan your temporary electrical service with safety and convenience in mind

Even in this day of battery-powered tools, you need power on site to build a house, if only to plug in your charger. There are four ways of getting electricity: buy it, make it, borrow it, or steal it.

Stealing it is frowned upon by local utility companies and district attorneys, and shouldn't be considered as an option. Borrowing it is an excellent idea (see Borrowing Power, page 22), but it requires a cooperative neighbor within 100 yards – not always the situation. This leaves making it or buying it.

If you build in rural areas where utility poles are out by the highway, you're probably used to generating your own power. But for most of us building in cities or subdivisions, the best option is to use a temporary power pole and buy our electricity from the utility company.

A temporary power pole is nothing more than a metered, service drop that includes a conduit mast, a meter base, a disconnect switch, GFCI breakers, power outlets, and a ground. You can rent one or have your electrician make one up for you. Either way, it pays to use a pole that's set up right so that it delivers the power you need safely and reliably in all kinds of conditions. Construction sites are dangerous enough without adding the risk of frying somebody because of a jerry-rigged power source.

### Rental Option

Renting is an economical alternative if you only use temporary power occasionally. In my area, a 100-amp pole with one 220-volt and two 115-volt outlets runs about $50 a month, with a three month minimum and a $45 set-up fee.

In a typical installation, the rental company will bore a hole on your site with a power auger mounted on the back of their truck (they charge extra if they hit rock), tip the pole into place, fill and tamp the soil, brace it, and drive the ground stake. The only thing that remains for you to do is to have it inspected by the local building department, and ask the utility company to set the meter and make the connection.

However, if your local utility doesn't rent temporary poles, you may have to make a few calls before you find some place that does. Most tool rental yards in my area don't offer them. Strangely enough, the two companies that do are listed in the Yellow Pages under portable toilets (and one is an overhead door installer).

This brings up an interesting rental alternative: a combination toilet and

by Steve Lancaster

temporary service. Here this runs about $120 a month including weekly pumping, but it kills two birds with one stone if you need a toilet on site. Another combination I have seen — both rented and homemade – is a job shack that includes a mast, service panel, etc. (see Figure 1).

## Putting a Pole Together

The utility company will typically supply the meter, service wire, and insulator, but everything below that is on you. Your electrician and utility company should get together on the details and any local requirements. Here are the main elements:

*The pole.* My utility allows both metal and wood poles; the latter can be round (Class 6 as designated by the American Wood Preservers Association) or square (a solid 6x6 timber). Although wood poles don't have to be pressure-treated or made of a decay-resistant species if in use for less than a year, this makes good sense if you're going to go to all the trouble of wiring it. Your utility should be able to help with names of suppliers of treated poles.

In my area, poles have to be at least 20 feet in length (with 4 feet in the ground), but they are more typically 25 feet (with at least 5 feet in the ground) in order to meet minimum clearances from the service drop to the center of the street (18 feet) or to the curb (16 feet). Pole placement is also mandated by my utility: no less than 10 feet and no more than 100 feet from a permanent pole.

The pole also has to be braced against the pull of the contractors either with a guy and ground anchor, or a long 2x4 that is bolted to the pole and to a 3-foot stake driven in the ground. In practice, however, bracing is often less elegant than this (see Figure 2).

*Service entrance conductors.* For a normal 240-volt system, you'll need three conductors. The service entrance conductor should be large enough and of a type to satisfy Section 310 of the National Electric Code. For example, you'll need #4-gauge copper or #2-gauge aluminum wire for a 100-amp service. I like copper. It not only conducts electricity better, but it has none of the corrosion problems that require you to treat the aluminum conductors with a de-oxidizing agent when making connections.

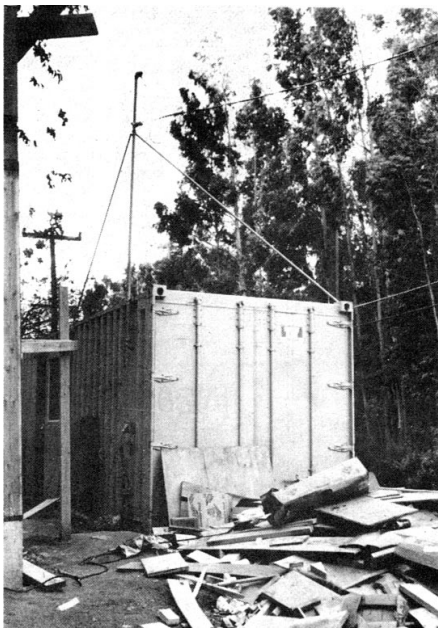


Figure 1. *Combining a job-shack or portable toilet with temporary power is common, particularly in rental units. Tying down the structure with steel foundation stakes or 2xs will keep it steady and, for smaller shacks, increase the chances it will be there in the morning.*

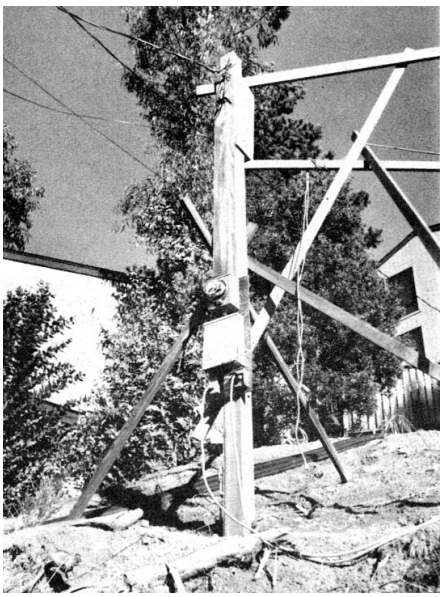


Figure 2. *This temporary pole makes up in bracing what it lacks in depth in rocky soil. In this case, the service drop is just a few feet away, making height minimums less important.*

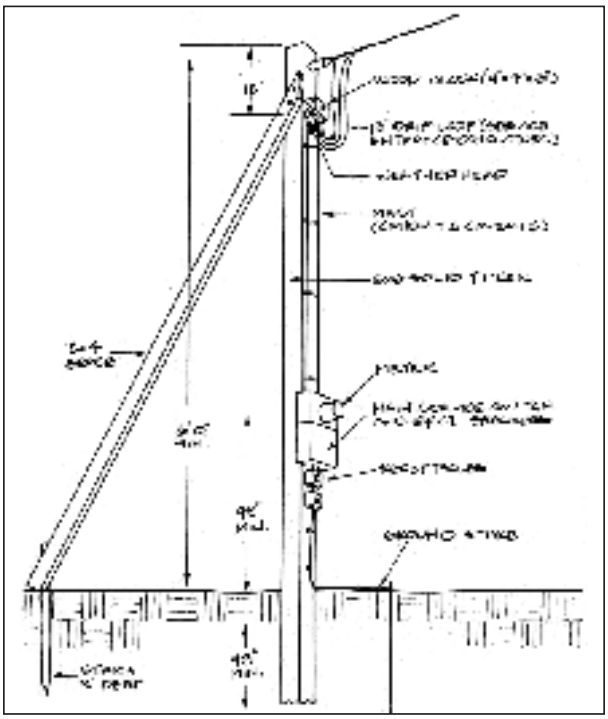


Figure 3. *Temporary power pole specs are often enforced by the utility that supplies the power. The required double mast protection – conduit and wood covering – seems like overkill until the first time a backhoe slams into the pole.*

*Mast.* The service entrance conductor is protected from construction site wear and tear by the service mast (see Figure 3). This is a metal or plastic conduit mounted to the pole. The mast should be further protected by another covering made of wood, fiber conduit, or PVC. This redundancy pays for itself the first time a backhoe boom strikes the mast.

The mast should be mounted to the pole with 2-hole pipe straps at each end, and every 3 feet in between. The covering should be attached in the same way. Place the weatherhead at the top of the mast, giving the service an 18-inch drip loop. A 4x4x6-inch wooden block is required immediately above the weatherhead. Rain-tight fittings should be used with all conduit connections.

*Meter box.* The meter box is mounted at the bottom of the mast, putting the meter at least 4 feet off the ground; eye level is idea. The meter box should be exterior rated, and the main service should accommodate a padlock.

I use a combination unit that contains the meter mount, a main service switch, and space for several circuit breakers, but you can build it out of component parts if you choose. When it comes to breakers, I like GFCIs (ground-fault circuit interruptors) for the protection they afford everyone on the crew.

*Receptacles.* The outlets are mounted below the service box. These also should be mounted in waterproof boxes with wiring protected by conduit. You'll need at least two 115-volt outlets and one 220-volt receptacle in either universal or twist-lock versions.

*Grounded.* The entire system needs to be grounded with an 8-foot stake driven into the ground at the base of the pole. The stake should be attached to the meter box with at least a #6-gauge ground wire.

## Codes and Permits

Where I work, an electrical permit from the local building department is required before you can set a temporary power pole. Besides requiring you to fill out an application and pay a fee, most building departments (or electrical departments in some localities) also want to inspect the finished temporary service before approving it and issuing a "permit to connect."

Once this process is complete, the building department will notify the local utility company. When they get the word, you can make arrangements to have the power connected. This involves another fee, and still another inspection. Then, and only then, will a field crew come out and perhaps agree to run a line out to your pole.

Utility companies often make a utility service manual available to its customers. Its purpose is to lay out exactly what they require before they will hook you up. It is up to you to make them happy. (In my area, it's the utility company – not the building department – that really nails you on the details with temporary power poles). The manual contains specs and drawings needed to engineer the temporary power system.

Both local building departments and utility companies use the National Electric Code (NEC) in setting their guidelines. The particular section of the NEC that applies to temporary power poles is Article 305, "Temporary Wiring."

## Getting Power Around the Site

Once you've gotten power to the job site, practical distribution is the next step. Extension cords are the obvious answer, but they're not always handled as well as they should be.

First, they should be rated for outdoor use (this is designated by the letters W-A at the end of the cord designation) and checked frequently for breaks in the insulation and broken grounding prongs.

Second, unless your pole is within a

# "Borrowing Power"

by John Flanders

It's a fact of life these days for urban builders that the vacant lot they're building on is bordered by existing houses, not other lots. And except for the odd wood hunter picking through hour scrap pile for 2x4 offcuts, the neighbors are likely to frown upon you for filling their lives with the hubbub of construction. Worse, they may see you as a villain for blocking someone's view or covering that last bit of open space. So the sooner you can meet and establish good relations with your neighbors the better.

This meeting can also be an opportunity for you to get power for your job site without having to mess around with power poles or generators. It takes a little courage and the gift of gab to make the approach, but the deal is a sound one for both parties: You pay their electric bill for the duration of the job in exchange for the use of their service drop.

## Kilowatts and Dollars

A little arithmetic shows how you come out ahead in this deal. In my area, a rented power pole itself with installation and removal, costs around $200 for a four-month project. Add to this the power company's hookup fee of $250 and minimal monthly charges of $15 and you'll find yourself spending $125 a month just to get the juice to the job.

The actual cost of the power you consume will be vastly less. Saws – power tools in general – tend to run a small percentage of the time. As an example, if each member of a four-man crew operates a 12-amph tool five percent of the time, and shares a 10-amp, 220-volt compressor that operates on the same duty cycle, they will consume a grand total of 64 kilowatts if they're working eight hours a day, 20 days a month. That's less than $100 at my utility's rates.

However, before you knock on the neighbors' door, you might discretely make sure that their service is up to the task. A 60-amp, 220-volt main switch is enough if you're not doing any heavy welding. If they have a three-wire service (which you can see at the weatherhead), or an underground service of fairly recent vintage (that you can get to without trampling over hill and dale), then you're on your way.

Of course, you need to exercise some caution. If you're going to offer to pay a neighbor's entire electric bill for some months, make sure they don't heat their house electrically, or have a hot tub squirreled away in the backyard. Air conditioning is another load to look for. But a glance at the panel ought to clue you in – most circuits for major power consumers are properly labeled. And if you suspect that their bill is astronomical, offer to pay a portion of it.

## Temporary Hookup

Once you've made a deal to use the neighbor's service, your electrician can figure the least obtrusive way to tap into the panel and install a 30- or 50-amp four-wire outlet in a weatherproof box where you can get at it. Have him bear in mind that you'll be removing the hookup when the project is finished, so holes in finished surfaces aren't part of the program. But don't overlook the obvious. Plenty of houses have unused stove or dryer circuits just waiting to be put to good use.

On your end, you'll want a convenient way to break your subfeed into circuits. A Tempower outlet box from Harvey Hubbell, Inc. (P.O. Box 3999, Bridgeport, CT 06605; 203/333-1181) which contains a number of 110-volt ground-fault-protected outlets along with a 220-volt outlet for heavier draws is the premium solution. All you need to add is an extension cord – usually #6 or #8-gauge four-wire cable, type S or SO – with ends to match your receptacle.

As an alternative, you can build up a portable panel from off-the-shelf components which does more or less the same thing (see illustration). Start with a rain-tight panel that has space for at least eight breakers. Mount it to a piece of plywood with enough extra space for several weatherproof outlet boxes. Bring your heavy-gauge extension cord into the panel through the appropriately sized hub at its top, being sure to use a waterproof cord connector.

From then on, you or your electrician will proceed as if it were a regular panel, wiring up ground-fault protected outlets to suit your needs. If you don't use twist-lock outlets, you can forego ground-fault circuit breakers, which are comparatively expensive, and use GFI outlets instead. These have dropped in price dramatically in the last few years – down to less than $10 apiece in my area. And oddly enough, I've seen less "nuisance tripping" with the outlets than with the comparable breakers.

With this kind of set-up, you can unplug the panelboard and store it with the rest of your tools when you pick up at the end of the day. When the house is complete, the panel goes home with you to be used on another project. Then the only thing that remains is to pay the neighbor for that last power bill – something you should do promptly. Neglecting this could leave your clients with a snarling neighbor before they even have a chance to throw a housewarming party.

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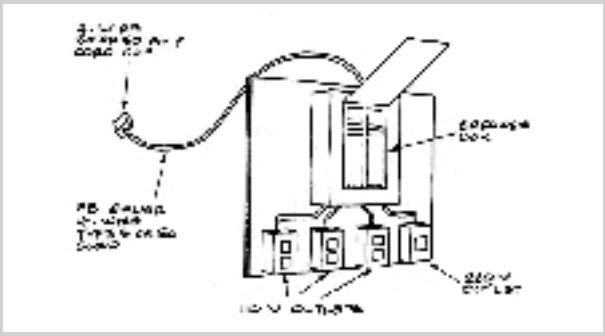

*At the end of the day, this plywood-mounted breaker box and its receptacles just unplug from a 220-volt outlet at the neighbor's service panel and go in the truck.*

few feet of the house, cords have to be sized to handle the voltage drop that comes from running current a long distance. This loss in power is due to the resistance that all wire offers electricity as it travels along. In order to minimize voltage drop over a long distance, you have to decrease the resistance by using heavier gauge wire.

Some tradesmen use #14-guage or even #16-gauge extension cords because they're cheaper, light, and flexible. But over longer distances, higher amperage tools just aren't going to get the voltage their motors were designed to run on. For any trade that works off a power pole, a #12-gauge wire cord is a better choice and will take you up to 100 feet. This may sound cautious, but the charts that come with most power tools are even more conservative in their requirements (see Table). They are based on limiting line voltage drop to 5 volts at 150% of the tool's rated amperes for 115-volt service.

For distances over 100 feet, consider a spider box (see Figure 4). It plugs into a 240-volt outlet on the pole and extends the pole's capability right down to the center of the job. It's basically a giant box with 240-volt and 115-volt outlets from which you can run all sorts of extension cords (the image this creates gave the spider box its name). This is a very versatile system because it can be moved from place to place, or even floor to floor, during the construction of a building, and shortens the run of 115-volt cords. It also helps prevent the incredible tangle of cords, "pigtails," and "Y"s that hang off a pole when a lot of trades are on the job at the same time.

Spider boxes aren't cheap — $200 to $700 depending on the number of outlets, whether they include GFCI breakers, twist-lock outlets, etc. – but they make a lot of sense. Not all electrical supply houses stock them, but they are widely manufactured for commercial construction and can be easily ordered. ■

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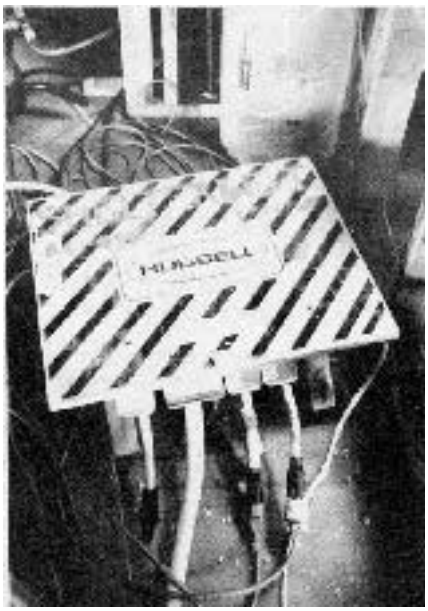


Figure 4. *A fixture on large commercial jobs, 220-volt spider boxes bring 100-volt and 220-volt receptacles right to the center of the job. This allows shorter runs of smaller-gauge drop cords, and keeps connections at the power pole to a minimum.*

**Recommended Extension Cord Wire Gauge Sizes for use with portable electric tools**

| | | Length of Cord | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 115V: | 25ft. | 50ft. | 100ft. | 150ft. | 200ft. | 250ft. | 300ft. | 400ft. | 500ft. |
| | 230V: | 50ft. | 100ft. | 200ft. | 300ft. | 400ft. | 500ft. | 600ft. | 800ft. | 1000ft. |
| Tool Amp Rating | 0-2 | 18 | 18 | 18 | 16 | 16 | 14 | 14 | 12 | 12 |
| | 2-3 | 18 | 18 | 16 | 14 | 14 | 12 | 12 | 10 | 10 |
| | 3-4 | 18 | 18 | 16 | 14 | 12 | 12 | 10 | 10 | 8 |
| | 4-5 | 18 | 18 | 14 | 12 | 12 | 10 | 10 | 8 | 8 |
| | 5-6 | 18 | 16 | 14 | 12 | 10 | 10 | 8 | 8 | 6 |
| | 6-8 | 18 | 16 | 12 | 10 | 10 | 8 | 6 | 6 | 6 |
| | 8-10 | 18 | 14 | 12 | 10 | 8 | 8 | 6 | 6 | 4 |
| | 10-12 | 16 | 14 | 10 | 8 | 8 | 6 | 6 | 4 | 4 |
| | 12-14 | 16 | 12 | 10 | 8 | 6 | 6 | 6 | 4 | 2 |
| | 14-16 | 16 | 12 | 10 | 8 | 6 | 6 | 4 | 4 | 2 |
| | 16-18 | 14 | 12 | 8 | 8 | 6 | 4 | 4 | 2 | 2 |
| | 18-20 | 14 | 12 | 8 | 6 | 6 | 4 | 4 | 2 | 2 |

Porter-Cable Corp.