Electrical Code Update

Only a few of the several hundred changes in the 1999 *National Electrical Code* will directly affect your remodeling and new construction work

by Sean Kenney

It's that time again: Every three years the *National Electrical Code* (*NEC*) undergoes major revision. The 1999 *NEC* includes several hundred changes that may have become the law in your jurisdiction. Many of these changes were editorial in nature, but some are important technical points. For the most part, you can leave it to your electrician to worry about the new rules, but in some cases these changes can directly affect your design, pricing, and how you go about your installations.

What's wrong with this picture? Even though it's around the corner, the service entrance cable is too low where it passes near the deck.

NM Cable Allowed Above Three Stories (336-4)

Non-metallic sheathed cable (the standard Romex found on all your job sites) is now allowed in all one-family and two-family dwellings of any height. It was previously restricted to buildings up to three stories. All buildings four stories or taller were required to be wired with another method, such as armored cable or conduit.

Although one- and two-family dwellings are usually not more than three stories, taller structures are not unheard of. This new rule should grant some relief for builders of those rare four-story houses.

The old rule also sometimes applies to basement or attic remodels. Some inspectors required the whole house to be rewired if an upstairs or downstairs addition pushed the house over the three-story limit.

All other buildings besides dwellings fall under the old rule: No NM cable if the building exceeds three stories in height.

Island Receptacles Clarified (210-52)

The *NEC* requires that at least one receptacle be installed on an island or peninsula. The question has always been, Where do you put it? The 1996 *NEC* was not very clear about this. Many inspectors required the receptacle to be mounted on top of the countertop using a tombstone-style receptacle, but most customers thought these were ugly.

Under the '99 *NEC*, a tombstone receptacle is no longer required. The code now clearly states that if no wall space or cabinet is available above the countertop within 18 inches, a receptacle can be mounted below the countertop within 12 inches — except where the countertop overhangs 6 inches or more (see Figure 1).

Bathroom Circuits Expanded (210-11)

A change in the '96 *NEC* required bathroom receptacles to be connected to a GFCI-protected 20-amp circuit that feeds *only* receptacles. The receptacles in all of the bathrooms in a house could be wired off one 20-amp circuit, but the circuit could not feed anything but bathroom receptacles. This meant that exhaust fans and lights installed in a shower (and which required GFCI protection to comply with their UL listing) could not be connected to the 20-amp GFCI receptacle circuit. Neither could jet tub motors or electric radiant heat.

Under the '99 *NEC*, this 20-amp branch circuit for bathroom receptacles can now feed fans, lighting, and other fixed equipment (Figure 2). However, two rules must be followed: The receptacle circuit cannot be used to feed any other rooms, and the total connected load of all of the fixed equipment *except lighting* cannot exceed 10 amps (210-23a).

Be careful when applying this new rule. Changes elsewhere in the code could seem to conflict. Make sure your inspector reads it this way.

Access Panel for Jet Tubs (680-72)

Although access to the electrical equipment for a hydromassage bathtub has always been required, a change in

Island Receptacles

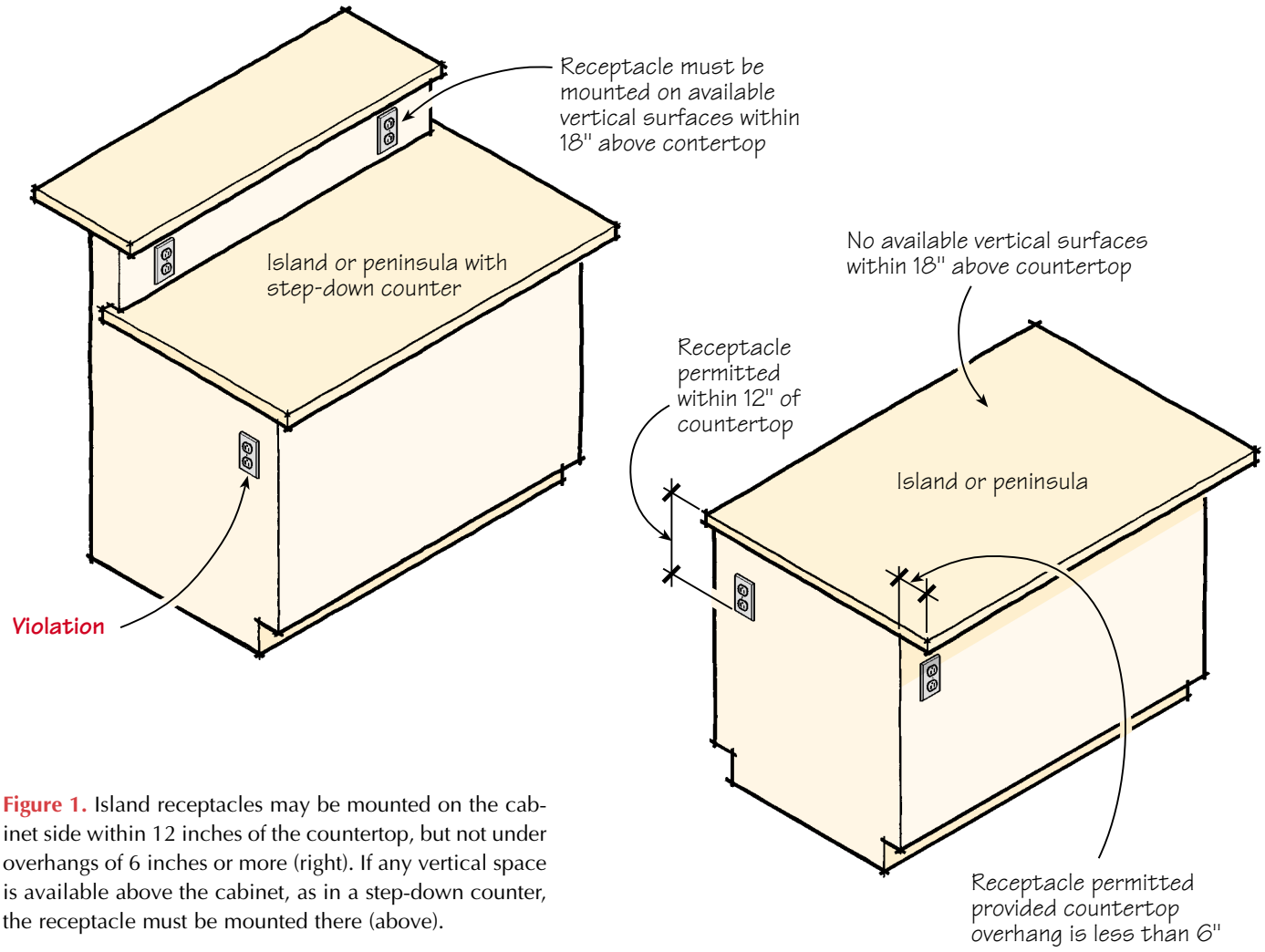

Figure 1. Island receptacles may be mounted on the cabinet side within 12 inches of the countertop, but not under overhangs of 6 inches or more (right). If any vertical space is available above the cabinet, as in a step-down counter, the receptacle must be mounted there (above).

the language spells this out clearly. Often homeowners balk at the thought of a removable access hatch in an elegant tile tub surround. With some planning, you can usually locate the panel inside a closet or in the ceiling of a closet on the floor below.

Exhaust Fans in Showers (410-4)

The '96 code made it illegal to hang fixtures such as track lights or paddle fans in a 3x8-foot zone above a bathtub. However, a poor choice of words inadvertently made it illegal to install an exhaust fan over the tub or shower, which is where most of my customers want it located. Luckily, most inspectors were not enforcing this rule. New wording clarifies the intent that an exhaust fan can be installed above a bathtub but a paddle fan or other suspended fixture cannot (Figure 3).

Paddle Fan Support (422-18)

Suspended ceiling fans weighing up to 70 pounds can now be hung

Bathroom GFCI Circuits

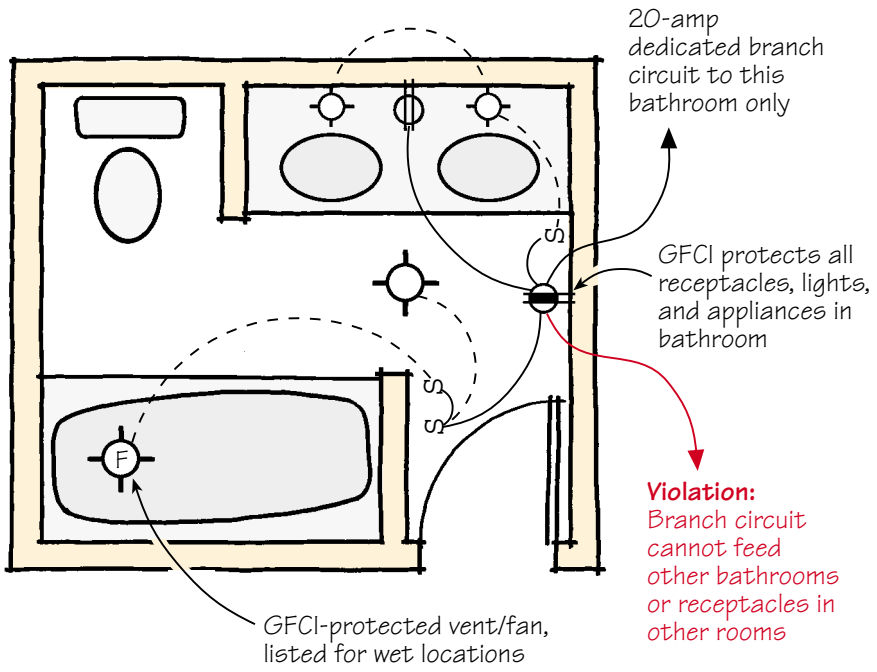

Figure 2. The GFCI receptacle circuits in bathrooms can now feed fans, lights, and other equipment — as long as the circuit serves only the one bathroom.

Bathroom Exhaust Fan Location

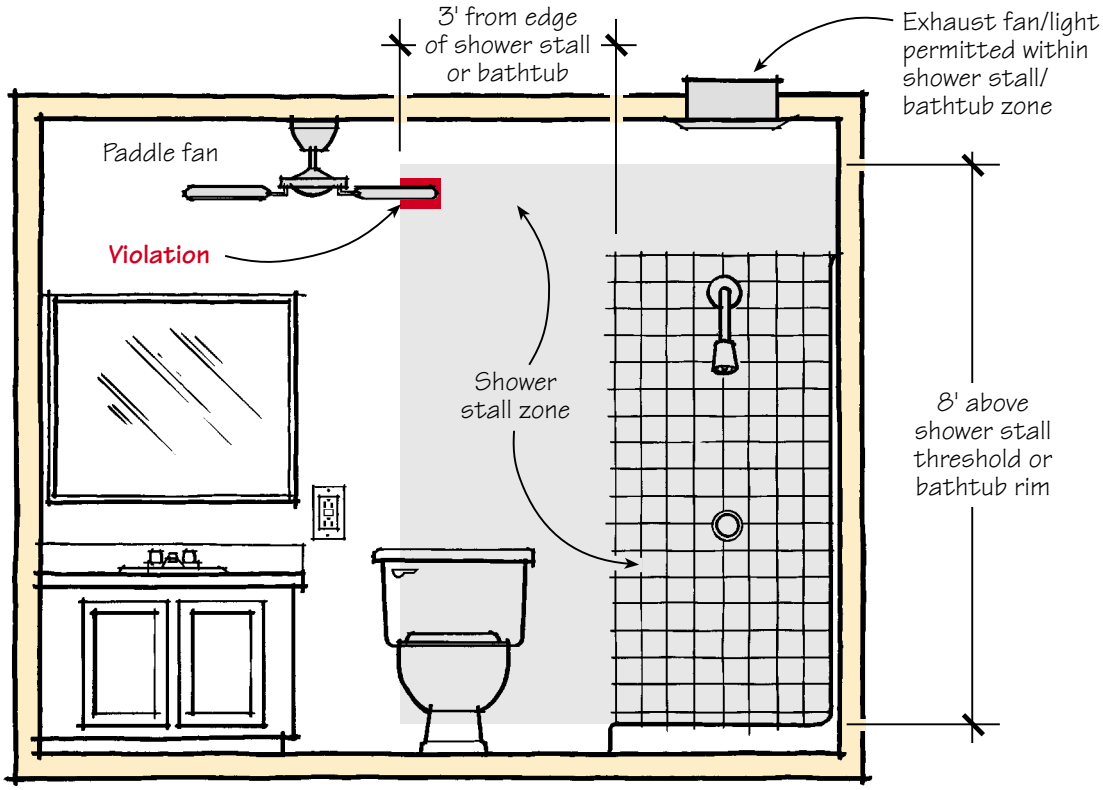

Figure 3. An exhaust fan can be installed in a 3x8-foot zone above a bathtub or shower, but a paddle fan cannot.

Figure 4. Beginning in 2002, AFCIs — arc fault circuit interrupters — will be required for bedroom receptacle circuits.

directly from an outlet box without any other independent support, as long as the box is listed for the purpose. Previously, fans that weighed more than 35 pounds required independent support.

Section 410-16 extends this to other types of fixtures such as chandeliers.

Pull-Chain Switches (210-70)

Light fixtures with pull-chain switches are now permitted to be installed in storage areas such as attics, cellars, and utility rooms. The pull chain is required to be near the entrance. In the past, a wall switch was required for these locations.

Upgraded Service (230-79)

A 100-amp service is now the smallest service that can be installed for a single family home. In the past a small house could have a 60-amp service.

Entrance Lighting

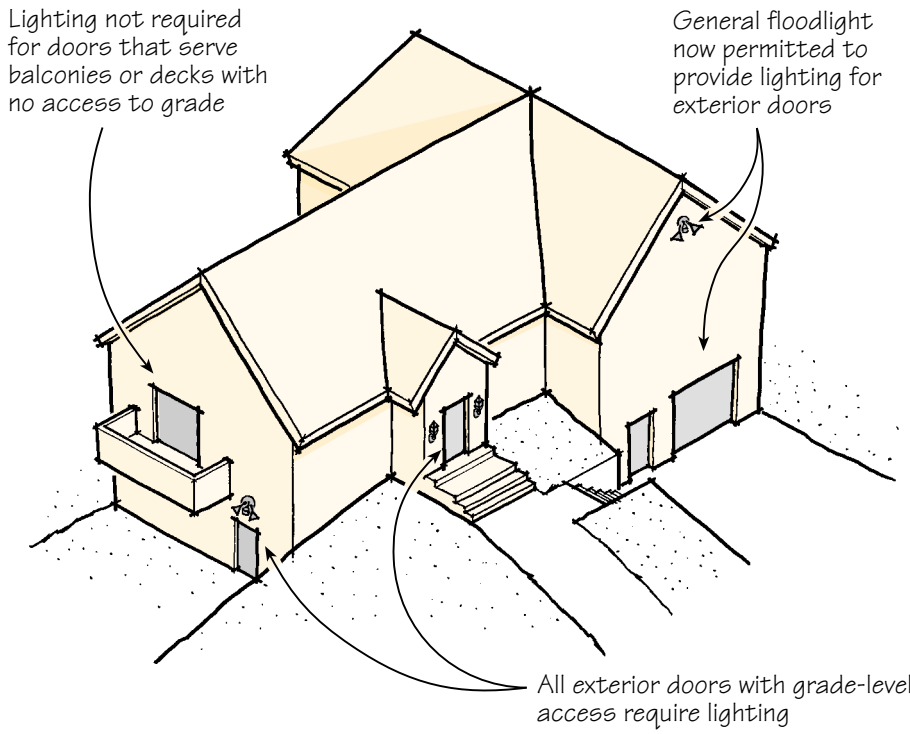

Figure 5. Instead of a light next to every entrance door, a general floodlight can now provide illumination for exterior entrances. Lighting is no longer required for exterior entrances with no grade-level access.

Sizing Service Conductors for Multifamily Dwellings (230-90)

Under past codes, sizing service conductors for multifamily dwellings was confusing. Changes in '99 make it clear that the service conductors do not have to be sized based on the total number of the individual disconnects, but rather on the total demand load.

Bonding Gas Pipes (250-104)

Though it has long been required, the bonding of all aboveground gas pipes to the service equipment is now clearly spelled out. Even so, this may continue to be one of the least enforced rules in the book. Some inspectors tell me they still will not enforce this controversial law even though it is now clearly required.

Many electricians and inspectors feel that bonding the gas pipe will create a hazard. I disagree. The gas pipe is already grounded by contact with the earth or by contact with grounded electrical equipment. The problem is that neither of these connections guarantees a good ground.

A poor ground is much more dangerous than a good ground because, in a ground fault situation, extreme heat can build up without tripping the circuit breaker. Bonding the gas pipe to the service equipment creates a very good ground path back to the electrical equipment, which will trip the circuit breaker if a ground fault occurs before any heat can build up in the gas pipe.

Some questions come up about what type of clamp to use. The clamps must be listed for connection to steel pipe and copper or aluminum wire.

Central Vac Rules (422-15)

A separate circuit is no longer required for a central vacuum system as long as the circuit complies with 210-23(a), mentioned above under "Bathroom Circuits," which says that the rating of the fixed equipment — the central vac, in this case — cannot exceed 50% of the circuit rating. So, on a 15-amp circuit with other receptacles, the central vac could be rated 7.5 amps, or 10 amps in a 20-amp circuit. Also, the central vac

must not exceed 80% of the rated load of a dedicated circuit (12 amps on a 15-amp individual branch circuit, 16 amps on a 20-amp).

Mobile Home Service (550-23)

The service to a manufactured home (mobile home) is permitted to be mounted directly on the manufactured home only if the home is secured to a permanent foundation.

Swimming Pools

As usual there are many changes to the rules for wiring swimming pools. My advice is to consult with the electrical inspector when wiring a pool. The rules are often misinterpreted and many localities have their own rules for swimming pools.

Arc Fault Protection (210-12)

Probably the most important change in '99 won't take affect until 2002, when all 15-amp and 20-amp circuits feeding bedroom receptacles will be required to be protected against arc-faults using an AFCI, or arc fault circuit interrupter (Figure 4).

An arc fault can be caused by loose wiring connections or old, corroded contacts in a switch or appliance. An AFCI is designed to detect the difference between arcs caused by faulty equipment and the kind of arcs that occur, say, in the motor of a vacuum cleaner as a natural part of its operation.

Arc fault protection should cut down on the number of house fires. The technology involved is so new that the *NEC* has allowed a three-year delay on the rule to allow manufacturers to further develop it and work the bugs out.

Exterior Lighting (210-70)

The previous code required a wall-switched outside light "at" every exterior door. The new code says only that a switched light must provide illumination for entrances, which would allow a general floodlight to provide lighting for more than one door (Figure 5). In addition, only exterior entrances with grade-level access are required to have lighting. A door to a balcony, for instance, no longer needs a light, though many customers will undoubtedly request them.

Overhead Service Clearance

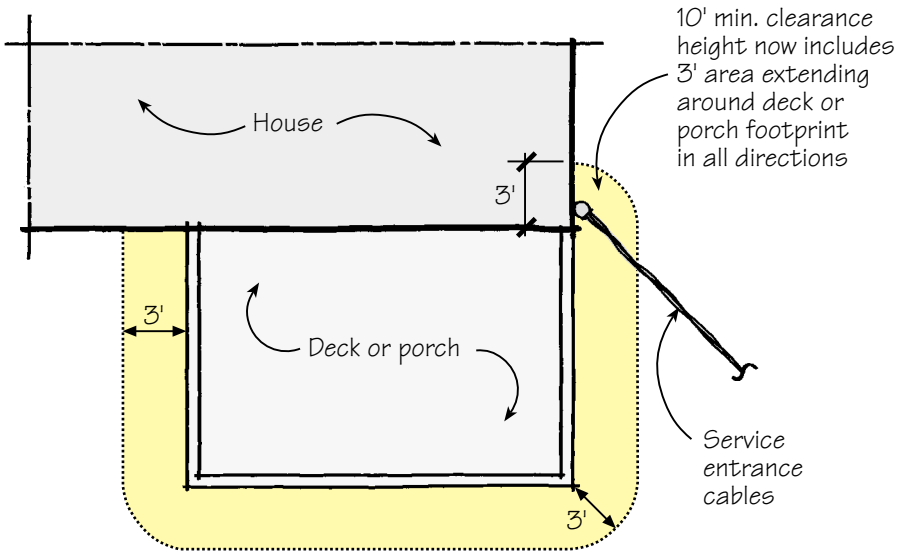

Figure 6. As before, overhead service entrance cables must be placed higher than 10 feet above a deck or porch. Now, however, this includes an area extending 3 feet out in any direction from the deck or porch.

Service Conductors Over Decks and Porches (230-9)

I have often seen decks that were built right under low overhead service conductors, where a person could reach up and touch the wires — an extremely dangerous condition (see photo, lead page). In the past, these conductors were required to be a minimum of 10 feet above the deck or porch. The '99 *NEC* takes this a step further by extending the 10-foot clearance to include an area 3 feet out from the porch or deck in every direction (Figure 6). The 3 feet should also be measured around a corner.

New Job-Site GFCI Rule (305-6)

As most builders know, all 15-amp, 20-amp, and 30-amp 125-volt job-site receptacles are required to be GFCI-protected. To save money, some builders make their own plug-in protectors using a GFCI receptacle from a hardware store. This is no longer possible.

New wording in the '99 *NEC* requires a plug-in GFCI protection device to be built with components that are *listed* for portable GFCI protection. Most GFCI receptacles the consumer can buy are not listed for portable use.

Workshop Receptacles (210-8)

Under the new code, all receptacles in a workshop in an unattached building on residential property are required to be GFCI-protected, even those in a finished office area.

Lights in Dropped Ceilings (336-18)

Previously, a Romex wire feeding a light installed in a dropped ceiling had to be supported within 12 inches of the fixture. Now, the Romex must be supported within 4½ feet of the fixture. Most other types of cable must have support within 6 feet.

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