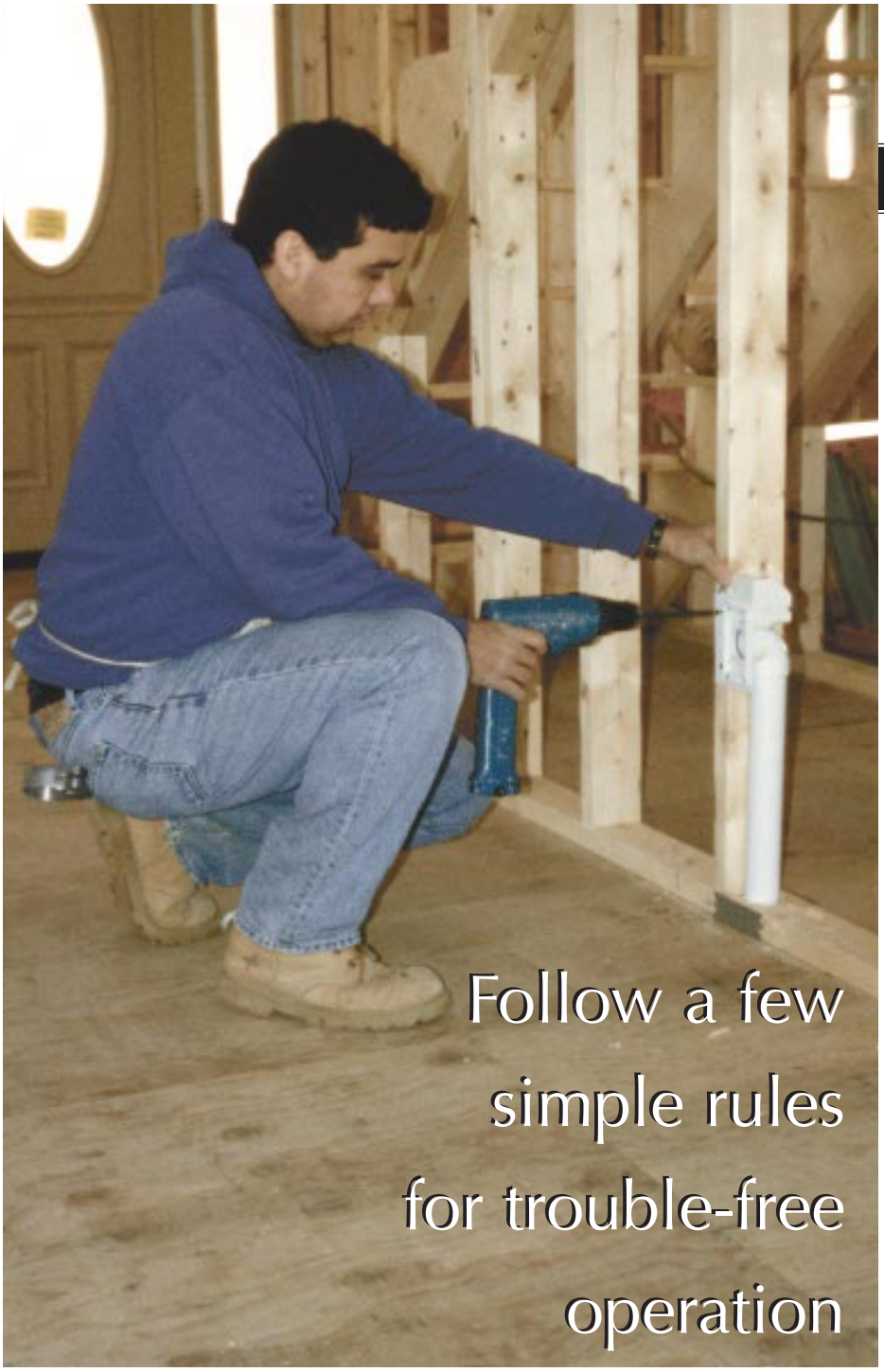
# INSTALLING Central Vac




by Bob and Ron Boffoli

We started our business, Cape Cod Vacuum Mart, back in the 1980s, selling portable vacuums and only the occasional central vacuum system. As convenient as they are, it has taken up until the last several years for central vacuums (CVs) to begin to catch on in this country. Currently, only about 200,000 CV units are installed annually in the United States (according to an industry spokesman, this represents a 2% to 3% market penetration). Meanwhile, north of the border, Canadian builders and homeowners made central vacuums a standard item back in the 1960s — according to Mark Bruneau of Industries Trovac, CV systems in Canada "are as common as toilets." In fact, in the mid-80s, we'd set up a booth at a home show and the most common reaction to our CV display was, "What's that?" Today, we have three trucks on the road installing nothing but central vacuums, which represents a full 50% of our current business. In spite of this brisk trade, the popularity of CVs remains regional, with installations mostly concentrated in the Northeast, the Northwest, California, the Southwest, and Florida.

## Why Install a Central Vacuum?

An important reason is health. One in three people in the U.S. has dust-related allergies. Even though portable vacuum makers may call attention to their HEPA (high-efficiency particle arrestor) filtration, the seal around the filter is often

**Figure 1.** Low-volt, 20-gauge wire makes a home run from each inlet valve to the power unit. Contact points in the hose base connect the circuit to an on-off switch in the wand.

ineffective, allowing microscopic dust to bypass the filter and recirculate in the room. Ordinary dust bags offer no resistance to these tiny particles; microbe-laden dust passes through a standard bag like a fly through a chainlink fence. By contrast, CVs have standardized superior built-in filtration, and many models can be exhausted directly to the outdoors. Even when vented to the outside, high-grade filtration ensures that exhausted dust won't collect on shrubbery or walkways.

The second reason is power: While the average portable vacuum has an airflow of 60 to 90 cubic feet per minute (cfm), one of our dual-motor CV units responds with 185 cfm. Because of the remote location of the power unit, the sound produced by a running CV (without a power head) is not much louder than a person forcefully exhaling. It's easy to talk over the sound of an operating central vac, and TV, music, and telephones remain clearly audible. Where remote installation isn't practical, many manufacturers offer super-quiet power units for installation within the living space.

Finally, a CV system eliminates the need to drag a clumsy machine around the house, banging up walls and furniture in the process. Portable vacs have to be lugged up and down stairs, sometimes descending on their own when tugged while cleaning. CV container capacity is generous, too; it usually requires emptying only once per year. As a final enticement to the homeowner, built-in systems typically retain their full value when a home sells — something that can't be said for a portable vacuum.

## Yesterday and Today

The typical system of the 1960s included PVC plastic tubing and a separate run of low-voltage wiring. To activate the motor, you inserted the metal-tipped vacuum hose into the wall valve, which closed the circuit between two contact points in the valve. The system shut off only after you removed the hose from the inlet. Although this was still more convenient than hauling a portable machine around, under-powered units, poor system configuration, and amateur installations all served to dampen the popular interest in central vacuums.

Today's equipment is vastly improved. In-wall tubing is dedicated 2-inch-diameter, vacuum-rated PVC, similar in appearance to schedule-20 pipe. The best tubing is made of virgin PVC; regrind content in lower grade PVC can have a rough interior finish that creates airflow friction. The standard wall valve is equipped with 20-gauge, low-voltage wiring to control the main power unit (Figure 1). However, rather than being activated by hose-insertion at the inlet, the low-volt wire continues inside the hose coils to a rocker-switch at the nozzle. This makes it

**Figure 2.** A thin-wall tubing cutter ensures clean, burr-free cuts for unimpeded airflow within the tubing.

more convenient to pause during vacuuming, to answer the phone for example. In carpeted rooms, the inlet will typically include a line-voltage circuit to operate a power nozzle attachment.

Even if the homeowner doesn't want to spring for the full system initially, it's still a good idea to install the tubing. It's an easy and inexpensive job, especially in new construction. The average cost of a rough-in — wall valves mounted, tubing stubbed to basement, garage, or utility room — is $80 to $120 per valve by region. A 2,000-sq.-ft. home usually requires a minimum of three valves.

***Tubing installation.*** We use a 2 1/4-inch-diameter spur bit to bore the necessary holes through the framing, walls, and floors. Tubing comes in 8-foot and 10-foot lengths but, unless the ceiling height is over 8 feet, we stick with the 8-foot tubing to reduce cut-off waste. We cut the tubing with a special thin-wall tubing cutter (Figure 2) to avoid leaving rough, burred ends that can snag vacuumed dust and hair. The tubing sections are joined with solvent-weld adhesive, just like plumbing lines.

Short 90-degree elbows are best reserved for use at the inlet connection, where there's usually not enough room for a sweep. All other offset jogs should be configured with a full-sweep 90 or two 45-degree ells to ease the radius and reduce airflow resistance (Figure 3).

For best results, wait to install the tubing until the electrician and plumber have completed their rough-ins. That allows you to match the height of the inlet valve to the outlet boxes in the room and avoid conflicts with plumbing and wiring runs (Figure 4).

**Figure 3.** Short 90-degree ells are used at the inlet valve only. Full-sweep 90s elsewhere ensure unrestricted airflow in the system tubing.

**Figure 4.** To avoid conflicts, central vac tubing is best installed after the electrician and the plumber have completed their rough-ins. Inlet valves can also then be mounted to match electrical box heights.

## Retrofit Installations

Approximately 20% of our installations are retrofits. Although new construction is currently driving the business, we expect this trend to shift as the public becomes more aware of the feasibility of retrofitting a central vacuum system into an existing home. Retrofit costs may be the same as in a new home, or higher, depending on the level of difficulty. A retrofit in a single-story ranch over a crawlspace or full foundation, for example, is usually quite simple. A wall inlet valve can be easily modified to rotate into the wall cutout and clamp to the drywall, much like an electrical old- work box. Even two-story homes, homes on slabs, and homes with elaborate floor plans normally pose surprisingly few difficulties. When faced with a slab or finished basement, we often run tubing from the power unit up into the attic, and back down to the inlet locations. Stacked closets also

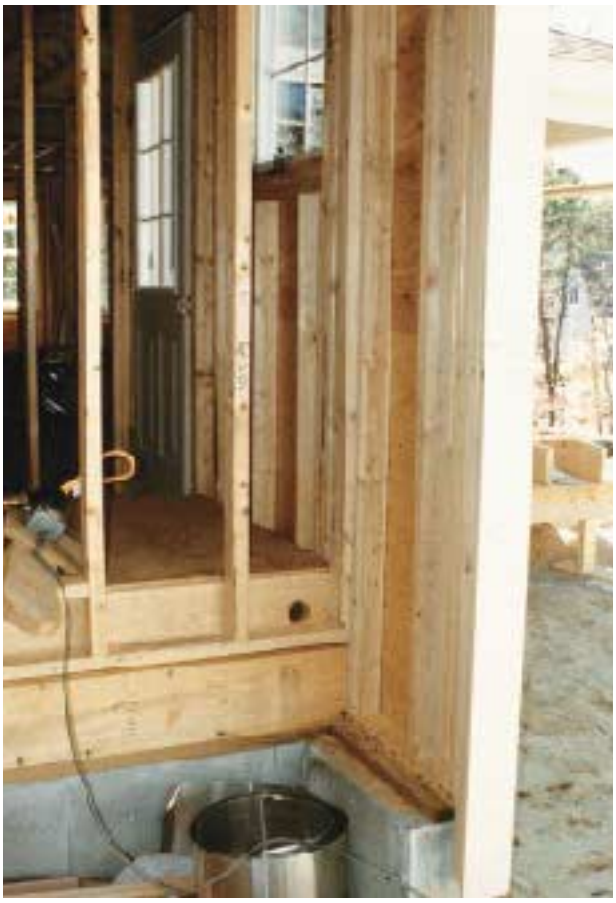


**Figure 5.** An inlet valve located close to the garage's overhead door eliminates the need to pull the car in for cleaning.

may provide a convenient floor-to-floor tubing chase.

Valve location isn't limited to the lower wall; other possible locations include a low ceiling (as in a finished basement), cabinet sides and toe kicks, stair risers, or right in the floor, protected by a metal inlet cover.

If a retrofit situation requires elaborate tubing runs and long verticals, which increase flow-resistance and lifting requirements, we'll specify a stronger dual-motor unit to compensate. These cost from $50 to $200 more than a single-motor unit, but ensure that the system is sufficiently powered.

## Inlet Valve Layout

Careful valve location is an essential part of a successful system. A 30-foot length of hose is standard, although many manufacturers also offer a 35-foot hose. An easy way to ensure complete coverage with your inlet layout is to start at the far corners of the floor plan and work toward the center, using a 30-foot length of string to simulate the hose's reach.

A central hall is often a good location for an inlet because the hose can extend outward in all directions. If you install an inlet in a large bedroom or a family room, try to locate it near a door opening where it's unlikely to be blocked by furniture placed against the wall. Consider the swing of the door as well, so that it won't interfere with the cleaning pattern. Most users find that it's easier to vacuum upward from the bottom of a flight of stairs, rather than dragging the hose down the stairs from above. Also, locating the inlet higher on the wall, at the typical wall-switch height is better for older users or those with limited mobility.

***Garages.*** Vacuums come in handy in the garage, too. The best location for the inlet is close to the overhead door, so that the homeowner won't have to pull their car, boat, or motorhome inside to clean it (Figure 5). It's a good idea to locate a remote garage inlet valve at wall-switch height so that it won't be blocked by storage items. Many power units have a built-in utility valve which can serve as the garage hose inlet.

Note that you may have to switch to fire-code-rated tubing and an approved inlet cover where it passes through an attached garage wall. When finishing up the system installation, we recommend a separate $50 to $100 garage kit that includes a dedicated hose and some standard head attachments. It's better than dragging the indoor hose and attachments through the dirt and grease of the garage environment.

## Clogs

We're frequently asked what happens if something like a sock gets caught in the tubing inside the wall. The answer is that this is highly unlikely: The hose and fittings are all $1^1/_4$ inches in diameter, while the in-wall tubing is 2-inch diameter. Any clogging that does occur is likely to be in the hose or at the valve inlet. A clog that can't be cleared manually can usually be blown out by reversing the suction. If necessary, most power units can be lifted right off the wall and used like a portable vacuum to suck out a clog.

***Avoidable trap.*** One possible cause of

clogging inside the wall is a tubing configuration that allows a "gravity drop." As dust and dirt pass through an overhead horizontal tubing run, some of the heavier debris may drop out of the stream into an improperly installed inlet below. If that inlet remains unused long enough and enough debris collects, the inlet can become blocked.

The solution is never to wye the vertical pipe from an intermediate inlet directly into the underside of an overhead run. Instead, the wye fitting should connect to the side or top of the overhead run, then sweep down to the inlet takeoff below (Figure 6). Although even a gravity drop blockage is easily cleared, you'll never encounter this problem in a properly configured tubing installation.

## Power Units

Surprisingly, nearly all vacuum system manufacturers go to the same motor maker, Ametek Lamb of Ohio, for their power unit. Even Miele, a popular, high-quality German portable vacuum maker, imports Ametek motors for use in some of its machines. Typical residential-use motors are rated for 800 to 1,200 service hours. The published motor service ratings are conservative, and repairs to central vacuums seldom involve more than replacement of the motor's carbon contact armature brushes. Fifty hours of runtime per year is considered to be standard to high usage in the average home, which means you can usually count on an average 20- to 30-year service life from a CV unit.

## System Sizing

Homes with up to 5,000 square feet of living space and simple tubing runs are adequately served by a smaller, single-motor unit that draws between 13 and 16 amps. Bigger homes call for a twin-motor system on a dedicated 240-volt, 30-amp circuit. Homes in the thinner atmosphere above the 8,000-foot altitude level may also call for upgraded suction capacity.

When exhausting a system to the exterior, avoid long tubing runs that might cause back-pressuring and overheating

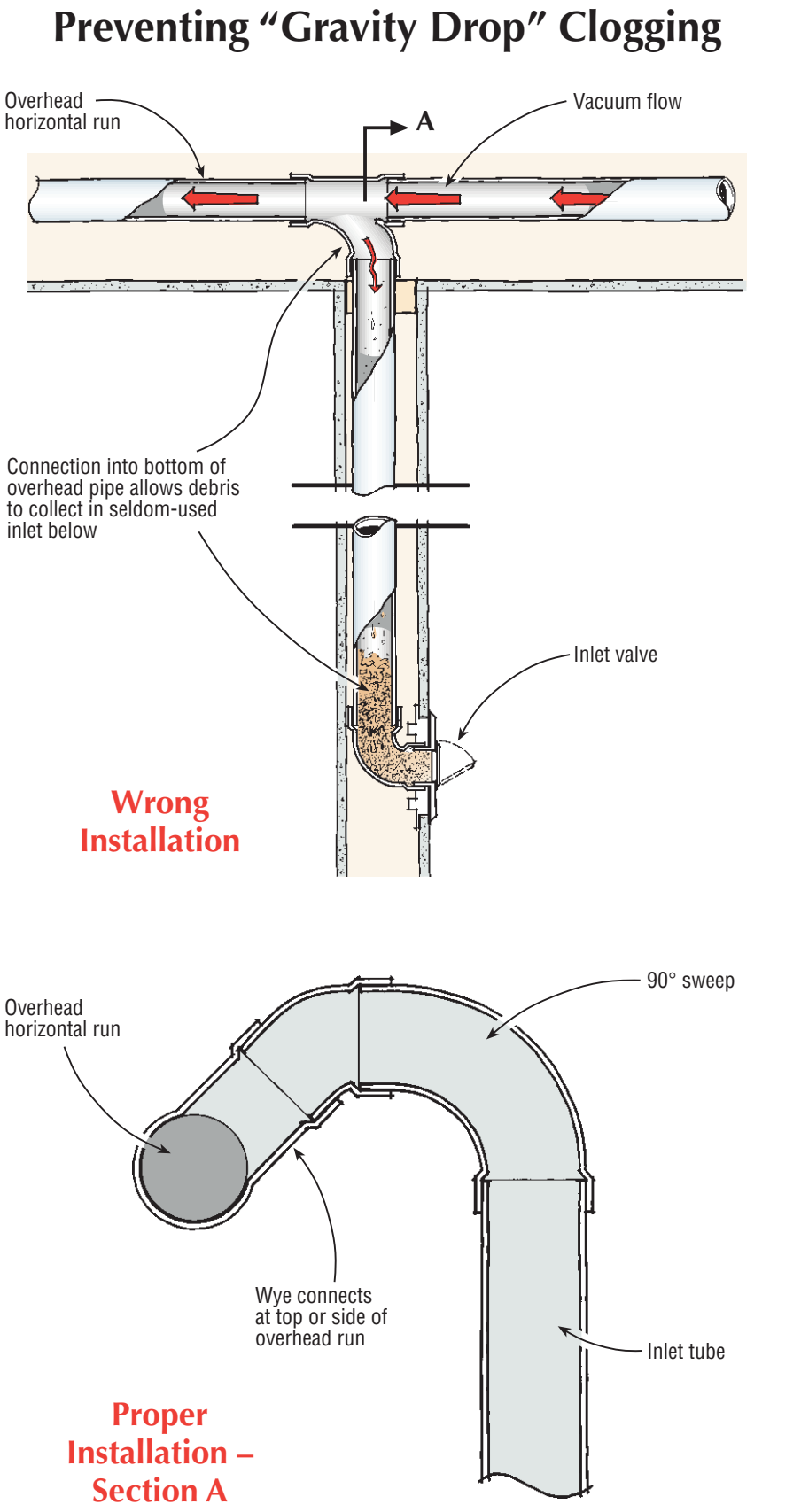



**Figure 6.** Heavier dirt particles can drop out of the air stream and eventually clog an improperly installed and little-used inlet tube. Wyes should take off only from the side or top of overhead runs to avoid this problem.

**Figure 7.** A toe-operated Vac Pan valve, installed in the cabinet toe kick, makes kitchen sweep-ups a breeze.

of the power unit. The maximum total exhaust run should be no more than 30 feet.

## Options and Attachments

A 110-volt power nozzle with rotating beater brushes grooms and cleans medium- and deep-pile carpet much better than an ordinary floor head. Air-driven "turbo heads" are also available, but we don't recommend them for heavily carpeted homes. Air flow is diverted to drive the impellers, thereby diminishing suction strength. Very sandy traffic areas and commercial floors are also poor candidates for a turbo head, because all the dirt is drawn through the 5/8-inch-diameter impeller housing, which wears out the blades. Turbo heads are most suitable for cleaning low-nap carpeting and rugs in homes without hairy pets.

M.D. Manufacturing's Stealth power head has a sensor that monitors the drive belt tension so that any undue resistance, such as an entangled rug fringe, causes the motor to cut out, preventing belt breakage. Although a replacement belt only costs a few bucks, when a customer has just spent $1,500 or more on a new, high-tech vacuum system, they expect no aggravation. At $500, a Stealth head costs $100 more than a regular power head, but eliminates these maintenance problems. Regardless of the brand, no beater brush is immune from occasional loading of fibers and hairs, so periodic cleaning is necessary.

A toe-operable VacPan in the kitchen is a great option in kitchens and mud-rooms. (Figure 7). The valve can be inconspicuously installed in the cabinet toe-kick for quick sweep-ups. An extra 30-foot, crush-proof, dual-voltage hose costs about $200. This is a good option for a two-story home.

***Bob and Ron Boffoli*** *have owned and operated Cape Cod Vacuum Mart in Orleans, Mass., since the early 1980s.*

## North American Central Vacuum Manufacturers

**Beam Industries**
800/369-2326
www.beamvac.com

**Broan-NuTone**
800/445-6057
www.broan.com.

**CentralVac Intl.**
800/666-3133
www.centralvac.com.

**Electrolux**
214/378-4000
www.electroluxusa.com

**The Eureka Co.**
800/282-2886
www.eureka.com

**Hoover**
330/499-9200
www.hoover.com

**Industries Trovac**
800/361-9553
www.cyclovac.com.

**M.D. Manufacturing**
800/525-2055
www.builtinvacuum.com

**M&S Systems**
800/366-6874
www.mssystems.com

**Nilfisk-Advance America**
800/645-3475
www.pa.nilfisk-advance.com

**Patton Building Products**
**Marley Engineered Products**
800/334-4126
www.marleymeh.com

**Vacs America**
800/266-1526
www.vacs@vacsamerica.com

**Vacuflo—H-P Products**
800/822-8356
www.hpproducts.net

### For More Information

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