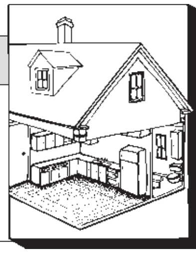


Smarter Bath Vents and Heaters

by Paul B. Turpin

Whether or not you're looking forward to the day when you build electronic houses that anticipate your clients' every whim, there are several uncomplicated devices — thermostats and sensors — that can be used today to make a house "smarter." Wiring these controls into standard 110-volt circuits offers greater comfort, convenience, and even energy savings in rooms such as the bath, which are full of systems that are used sporadically.

Two sets of controls I use mainly in master bathrooms are not expensive, nor are they difficult to install. However, both involve wiring and that carries serious liability, particularly in wet areas like the bathroom. If you aren't licensed or qualified to do the electrical, hire someone who is and make sure everything meets code. (If you're interested, I can recommend *Practical Electrical Wiring* by Richter & Schwan from McGraw-Hill as a good guide to residential wiring.)

Heating Controls

Built-in electric space heaters are often used in bathrooms — even those with central heat — to raise the temperature of the room quickly during a shower or bath. The heater I use most often for this is *Dayton's Low Silhouette Kickspace Electric Heater* from the Grainger catalogue (708/913-7422); it fits nicely in either a cabinet kick space or a soffit. These heaters offer an optional built-in thermostat, but I can provide more flexibility with slightly different controls.

When this electric heater is the only source of heat in the bathroom, I use two, 24-volt thermostats. The first maintains the room at normal temperature. White-Rodgers makes a moderately priced, fully programmable, low-voltage thermostat (#1F60-22) that is carried by most electrical supply houses and hvac suppliers.

The second thermostat is an inexpensive one (White-Rodgers #IC20-2) that remains set at the high temperature needed during baths and showers. This thermostat can be wired so that it's activated by a spring-wound timer. It allows customers to "twist and forget" when they want the bathroom extra warm for awhile, so they don't have to reset or reprogram a thermostat. Figure 1 shows how to wire these devices so the high-temperature thermostat overrides the maintenance thermostat when activated.

In order to make use of these low-voltage thermostats, you have to use an electric heat relay. I use a White-Rodgers #24AO1G-3 to control noninductive heating loads up to 6,000 watts. At the panel, I use a GFCI breaker as a safety measure in case of flooding.

A note on selecting heaters: I always use the highest BtuH (Btus per hour) output available, so that the room will warm up quickly when necessary. For example, the Dayton heater, like most, is rated at 3.412 BtuH output per 1 watt of input. It has a range from 500 to 2,000 watts. I typically use the 2,000 watt configuration on a 15-amp, 240-volt, GFCI-protected circuit; this gives me a very respectable 6,824 BtuH output.

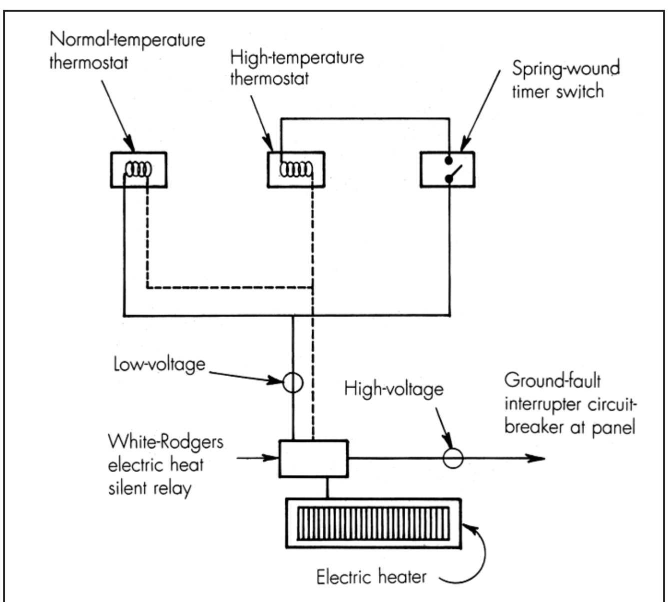


Figure 1. *Schematic diagram of dual-thermostat, short-term, high-output electric heat control.* *This schematic shows the basic wiring scheme for a short term, high output baseboard heater that can be controlled by the homeowner with a spring-wound timer switch at bath or shower time.*

Timing Ventilation

Ventilating a bathroom for both odor and moisture is a must, even if there are operable windows and a climate that allows them to be opened frequently. In my experience, moisture control is even more important than odor elimination. As a result, I like to put my ventilating fan's intake over the shower area or tub whenever possible. However these fans do need to have a wet-location rating.

I control the fan with a spring-wound timer so it can be used when it's needed and comfortable. In most cases, this is after the client has left the room since even the quietest ventilating fan adds unwanted noise.

Even windowless rooms that require a fan wired into the light switch can benefit from a fan that will continue its timed run after the occupants have left the bathroom. This can be accomplished with a single fan by running an additional switch leg to a timer switch. In this situation, I don't recommend having the fan intake over the shower; it creates too much of a draft on the person showering.

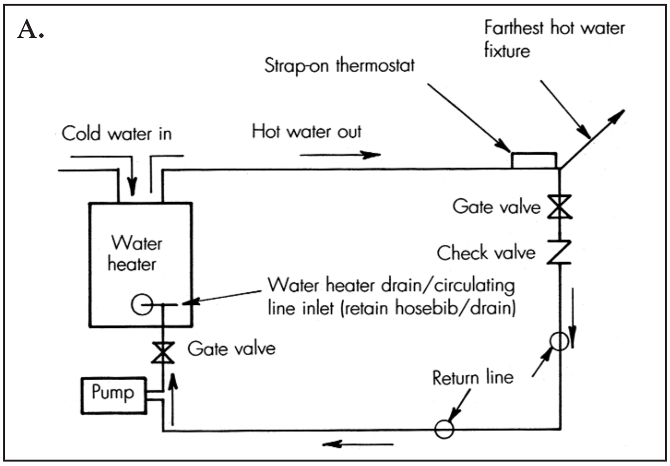
What I would really like to see is a switch arrangement that would produce this sequence: First, clients enter the bathroom and switch on the light and the fan comes on as well. Then, they twist the timer on. The fan shuts off, but the light remains on so they can shower without the draft of the fan. Finally, they leave the bathroom and switch off the light. The fan comes on and runs to the end of the timer cycle.

Code officials might fuss about doing it this way since it violates the letter — but certainly not the intent — of the law. But I think it could help customers to use the ventilation, instead of hating it so much they disconnect it. However, I haven't figured out how to put this sequence together. Any thoughts from electricians out there?

Hot Water Recirculating System

Anyone who's ever laid out plumbing knows to keep hot water runs as short as possible; the closer fixtures are to the water heater the better. This saves both energy and water. Unfortunately, this isn't always possible. Sometimes added bathrooms are far from the rest of the house, or the water heater needs to be moved to make room for other alterations.

If you're facing a situation where there is a long lag time in hot water delivery, a recirculating system can solve the problem. This system requires running a return line back to the water heater from the most distant hot water fixture, and installing a small, stainless-steel pump to feed the recirculated water back into the



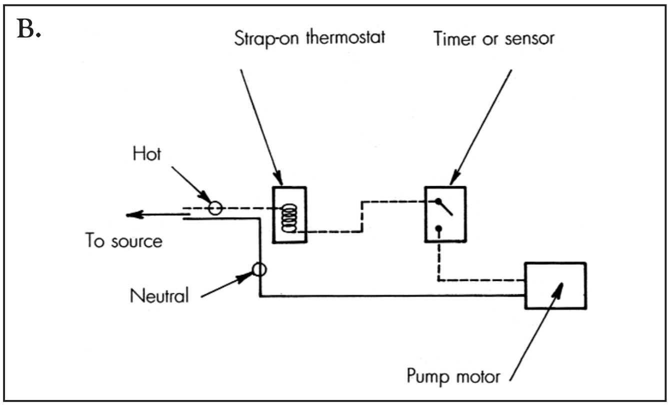


Figure 2. Piping schematic for hot water recirculating system. *The plumbing schematic (A) shows how to set up a recirculating "loop" with a small pump so that fixtures a long distance from the water heater deliver hot water on demand.* ***Wiring schematic for hot water recirculating system.*** *The wiring diagram (B) demonstrates how an inexpensive, strap-on thermostat and a timer or motion sensor can be used to control the system efficiently.*

water heater through the drain outlet near the bottom of the tank (see Figure 2A).

You have to pay attention to the overall hot water distribution layout; all fixtures should be on the loop. A separate branch line to one fixture only would "starve" other fixtures. The recirculating loop should, of course, be insulated as heavily as possible to reduce heat loss during cycling.

To connect the pump — I use a Grundfos #UP 15-42SF — you have to remove the hosebib/drain cock on the water heater and put in a tee. The pump outflow attaches to one side of the tee, and the drain cock goes back in the other.

The next step is to control the flow. Obviously, it would be a waste of energy, not to mention shortening the life of the pump, for it to run continuously. And the point of the system is to improve hot water delivery to the fixture *on demand*.

The way to do this is to have two switching devices wired in series (see Figure 2B). The first is a strap-on thermostat control — I use a White-Rodgers #1127-2 — that you fasten onto the hot water pipe at the farthest point of the loop. This thermostat functions as a low-limit control; it should switch the pump on when the pipe temperature falls below the limit set on the thermostat.

The second switching device responds to anticipated demand, and is wired to the thermostat in series so that both of them need to be "on" in order for the pump to run. There are two basic kinds of switches that can be used here: timers and sensors.

A programmable timer is set to the periods of day — early morning, dinner hour, late evening — when the demand for hot water is most likely. Motion or infrared sensors (two sources I know of are BRK Electronics, 708/851-7330; or Hubbell Industries, 203/333-1181) can be used to activate the system by installing them in the bathroom or in the hallway leading to it.

The sensor has the advantage of actually responding to the movements of the homeowner, rather than just predicting them. When residents are moving around the area, the hot water's available; when they're not around, the system remains inactive.

Sensor switches can also replace normal light switches; these are useful in utility rooms, large walk-in closets, garages, and other rooms without outside light sources. ■

Paul Turpin is a Los Angeles-based remodeling contractor who specializes in kitchen & bath design and remodeling.