

Breathing Fresh Air Into Bathroom Ventilation

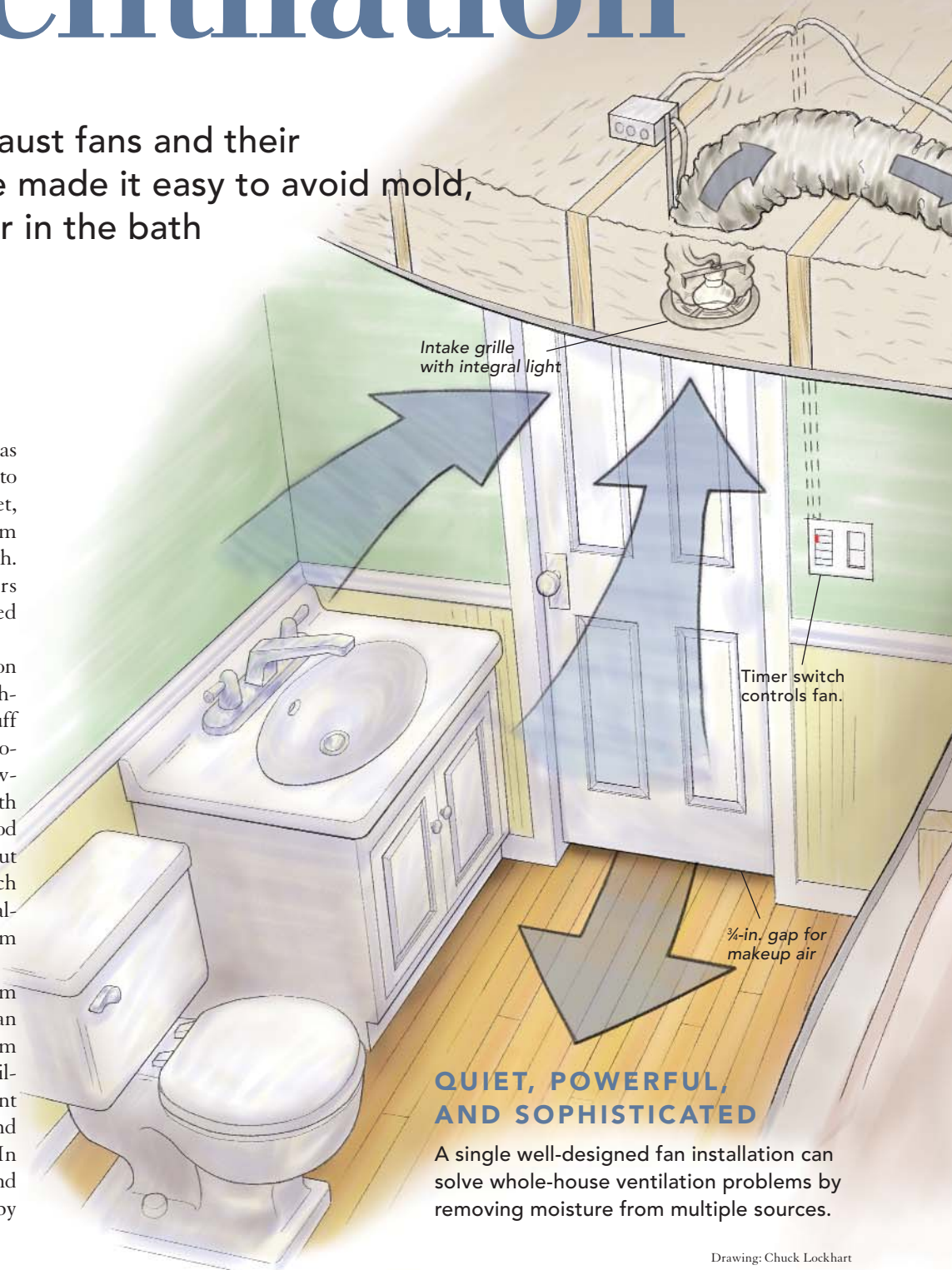
Powerful, quiet exhaust fans and their smart switches have made it easy to avoid mold, mildew, and stale air in the bath

BY SCOTT GIBSON

Bathroom fans have been around as long as their owners' reluctance to use them. Like a low-flying jet, early generations of bathroom fans were so loud they could rattle your teeth. So people left them turned off, mirrors steamed up, and bathroom walls glistened with condensation.

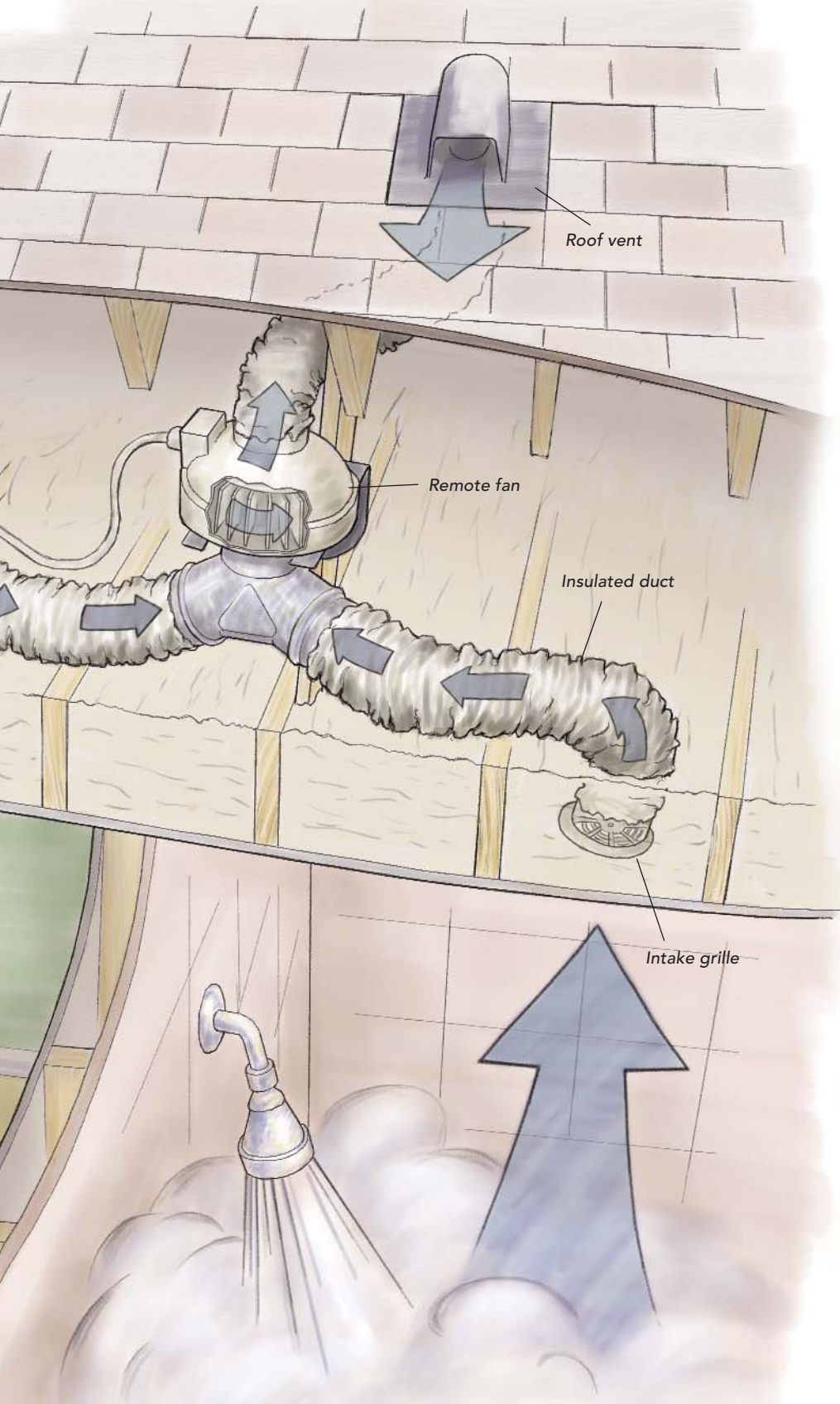
In an older house without much insulation and with a row of drafty windows, the bathroom typically would dry before the bad stuff started—but not in a new house. Contemporary houses are built to be tight, with low-infiltration windows and walls packed with insulation that stops drafts cold. That's good news for your heating and cooling bills, but it's bad for unventilated bathrooms, which now are prone to mold, poor indoor-air quality, and structural damage from long-term moisture exposure.

The good news is that the latest bathroom exhaust fans are so quiet that you barely can hear them. Homeowners can choose from self-contained models that mount in the ceiling or wall, or from remote units that mount some distance away from the bathroom and can draw air from more than one inlet. In addition to features such as built-in lights and heaters, exhaust fans can be controlled by



QUIET, POWERFUL, AND SOPHISTICATED

A single well-designed fan installation can solve whole-house ventilation problems by removing moisture from multiple sources.



circuitry that cycles the blower on and off in response to humidity levels in the room.

Choosing the right fan comes down to two considerations: how much noise the fan makes and how much air it moves.

Start by choosing the right fan size

For bathrooms up to 100 sq. ft. with an 8-ft. ceiling, an exhaust fan should move 1 cubic foot of air per minute (cfm) for each square foot of floor area. A 70-sq.-ft. bathroom, for example, requires a fan rated for no less than 70 cfm—enough to change the air in the room eight times an hour.

In bathrooms larger than 100 sq. ft., the rule of thumb is based on the number and type of fixtures the fan will serve. Enclosed water closets, showers, and bathtubs each require 50 cfm of fan capacity, while a jetted tub needs 100 cfm. Separate exhaust outlets over each of the fixtures or a single exhaust point that handles the entire bathroom can provide ventilation. Exhaust intakes should be away from air-supply ducts, and bathroom doors should have a $\frac{1}{8}$ -in. gap at the bottom so that makeup air can enter the room.

Fan-capacity recommendations assume the fan will move the amount of air that it's rated for, but that's not always the case. Manufacturers arrive at cfm ratings by testing fans against 0.1 in. of static pressure. This rating assumes a nearly ideal installation: a short, straight run of rigid duct and a cap that doesn't restrict airflow. If your installation will require a duct run longer than 12 ft., more than one elbow, or flexible duct, you should check the manufacturer's recommendations and increase the fan size accordingly.

Surface-mounted fans serve a single exhaust outlet

Ceiling-mounted fans are designed to draw air through a single port and exhaust it through a cap in the roof or wall. Installation is relatively simple because the fan and grille are one unit. Capacities typically start at 50 cfm (the minimum required by code in a bathroom without an operable window) and range

Installation guidelines

- With a remote fan, use soft, flexible duct for the first 5 ft. to reduce fan noise.
- Insulate ducts in unconditioned spaces to reduce condensation.
- For ceiling-mounted fans, choose galvanized steel or PVC duct, which have less airflow resistance than flexible vinyl or aluminum.
- Install a UL-listed fan in a shower stall or over a tub, and put it on a circuit protected by a ground-fault circuit interrupter.
- Ceiling inlets are more effective than wall inlets at gathering heat and moisture.
- Always duct exhaust air outside through a cap, never into an attic or a basement.

NEW FANS ARE EFFICIENT



Ceiling fans don't need big plastic grilles. Broan-Nutone's combination recessed light/fan mounts in the ceiling for easy installation. Available trim designs blend in with traditional lighting (inset photo).



In-line fans such as the bullet-shaped Fantech mount directly in the duct and offer installation options. They are capable of venting several areas.



American Aldes multiport fans have a separate port for each duct run. This model has two 50-cfm ports and a larger port capable of 100 cfm.

A roar or a whisper?

Noise levels for ceiling and wall-mounted fans are described in *sones*. Unlike the more familiar decibel scale, the sone scale is linear: A 2-sone fan makes twice as much noise as a 1-sone fan.

The Home Ventilating Institute (847-526-2010; www.hvi.org), an industry trade group, conducts standardized tests for bathroom fans. Older fans or inexpensive models can reach 4 sones. Yet one of the new Broan-Nutone models and several Panasonic models are rated at less than 0.3 sones.

Noise levels, however, increase with fan capacity. For example, Panasonic's 60-cfm WhisperCeiling model is rated at less than 0.3 sones, while its 290-cfm model has nearly five times the flow but also produces 2 sones of sound.

Sone ratings don't apply to remote-mounted fans because there are too many installation variables at work.



New-generation fans operate with less noise than the refrigerator in your kitchen, a noise threshold described as 1 sone.

The Watson by Tamarack Technologies is mounted in a gable-end stud bay. A discrete exhaust vent slides through the siding to mate with the fan.



upward to about 400 cfm. Prices begin at about \$100 for quiet, Energy Star-rated models from manufacturers like Broan-Nutone and Panasonic. Pricier models have built-in lights and infrared or electrical-resistance heaters.

Because warm, moisture-laden air collects at the ceiling, these fans expel it quickly. One disadvantage, though, is that ceiling fans can't pick up exhaust air from more than one point. Bathrooms with separate water closets need

an additional unit, and in large bathrooms, a high-capacity fan has to draw exhaust air relatively long distances. Bigger fans mean more noise and a larger grille in the ceiling.

To mask the appearance of ceiling fans, Broan-Nutone recently developed a recessed light/fan combination with trims designed to match those of conventional recessed lights.

Wall-mounted fans are another option. Although they can be easier to install than a

SWITCHES MAKE THEM SMARTER

ceiling unit when remodeling, through-the-wall units typically generate more noise than ceiling units and also admit more noise from the outside. Moreover, drawing air from the wall instead of the ceiling is not as efficient. As a result, manufacturers generally don't suggest them as a first choice.

Remote fans can handle multiple pickup points

In large bathrooms or ones with separate water closets, remote fans have one big advantage: They can pull air from several grilles in different parts of the room, or even from adjacent bathrooms. And fan motors can be as far as 50 ft. from the grille, reducing noise.

There are several types. Cylindrical in-line fans, such as those made by Fantech and Continental, are mounted in the duct. In a bathroom with two or more pickup points, connections are made in the duct before it reaches the fan housing. Rectangular multi-port models, such as those from American Aldes, have a separate port for each length of duct. Other types of remote fans, including those made by Tamarack Technologies, are installed against an outside wall.

Intake grilles on remote-fan systems are much smaller than ceiling-mounted fixtures, and versions with integral lights are available. Grilles can be installed in the shower or over the sink to collect moisture close to its source. Serving more than one pickup point with a single fan, however, means that all pickup points are either on or off. If a single remote fan is used for back-to-back bathrooms, for example, both will be ventilated even when only one is being used.

The right switch improves fan performance

Bathroom fans often are less effective than they could be because they are turned off too soon. The fan is switched off right after a shower, but most of the moisture is still in the room, clinging to the ceiling and shower walls and trapped in damp towels. Expelling moisture actually may take 20 to 30 minutes.

A variety of switches allows fans to run longer, or to cycle on and off automatically as they are needed.



Programmable switches like Tamarack's Airetrak can be used to ventilate a whole house.



Leviton's timer switch shuts off automatically after a specified amount of time has elapsed.



When the relative humidity reaches a preset level, this Tamarack Humitrak activates the fan.

The simplest type is an electronic or mechanical timer programmed to keep the fan running for a set amount of time. Leviton's version lets you select the running time with the push of a button. A variation is Energy Federation's delay-off switch, which keeps the fan on after the switch is turned off. An adjustment screw behind the cover plate allows users to set the extended run time.

Automatic controls, such as Tamarack's Airetrak, are more sophisticated, allowing a fan to be programmed to cycle on and off throughout the day. These controls are especially useful when the bathroom fan (typically a large remote fan) is used for whole-house ventilation to provide the 0.35 air changes

per hour recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers. A boost feature on some models temporarily increases fan speed when the shower or bath is used.

Humidity-sensing switches turn on a fan whenever relative humidity reaches a preset level. An override switch allows the fan to be turned on regardless of humidity.

Finally, motion detectors can be used to power up a fan as soon as anyone enters the room, then turn it off after they leave. □

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Sources

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Leviton
800-824-3005
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Sensors ensure that each port in this unit operates at its rated cfm.

Panasonic
866-292-7292
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Tamarack Technologies
800-222-5932
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