Sentry is that it can project total daily or monthly usage and cost based on current instantaneous (past 20 seconds) usage. This feature acts like a "speedometer" to give a sense of how fast electricity is being used at the moment.

At a retail cost of $285, it is doubtful that many homeowners (except energy record-keeping junkies) will buy the Power Sentry. According to the manufacturer, its widest use to date has been by electric utilities for customer education, high bill complaints, and program monitoring of high-use customers.

Availability and price

The Power Sentry is available directly from Northwest Extension, Inc., 11232 120th Ave. NE, #105, Kirkland, WA 98033; (206) 828-9190, Fax: (206) 827-8229.♦

DESIGN AND CONSTRUCTION TIPS

Occupancy Sensors for Ventilation Control

If the primary purpose of residential ventilation is to provide fresh air for people (as opposed to diluting toxic air pollutants), then what about the idea of controlling ventilation systems by occupancy using occupancy sensors?

The concept of "demand-controlled ventilation" is not new. Broan makes a bathroom fan with an integral motion sensor (see ***EDU***, March 1992) and Aereco makes a fresh air inlet with an infrared occupancy sensor. But other than those two, none of the major ventilation equipment manufacturers sells occupancy sensing controllers for its systems.

Not a bad idea, but...

Manufacturers and researchers agree that the concept of ventilation control by occupancy sensors has merit, particularly for spot loads such as bathrooms, workshops, or kitchens, but that it is probably not a good idea for control of whole-house ventilation systems.

One reason for the objection is that in order to control a central ventilation system, the sensors would have to detect people in the entire house, which would require multiple sensors and considerable cost. Also, since some types of occupancy sensors (ultrasonic type) work by detecting movement in the room, they shut off the connected load if no movement is detected after a period of time. Thus they would turn off the ventilation when occupants were sleeping peacefully. (We were told of one amusing story in which occupancy sensors were used to control bathroom lights in an office building. When occupants were seated for extended periods, the room would mysteriously go dark until occupants figured out that waving their arms would bring the lights back on.)

For controlling bathroom or kitchen fans, however, or for controlling the high-speed boost on central ventilation systems, occupancy sensors may be a viable alternative to timers, humidistats, or manual switches.

Selecting the right occupancy sensor

An occupancy sensor is a type of switch that is triggered by sensing either heat or motion in the space. They are commonly used in commercial buildings to control lights and have recently been introduced into the residential market, also for controlling lights. Some, but not all, occupancy sensors are also capable of controlling exhaust fans and heat recovery ventilators.

All occupancy sensors have two basic components: a sensor, which detects the presence of people in the room, and a relay, which controls the connected load. With the more sophisticated systems, the two components are in separate housings. Those systems, commonly used in commercial buildings, are generally too expensive for use in homes. A more practical alternative for residential applications is an integrated unit that includes both the sensor and relay in a single housing that fits into a standard electrical box in place of a wall switch.

There are two general types of sensors: infrared and ultrasonic. Infrared sensors, sometimes referred to as "passive" sensors, detect radiant heat from people; ultrasonic sensors emit inaudible, high-frequency sound and detect changes in the sound echo as people enter the space. Infrared sensors are best suited to small enclosed spaces with regular shapes and without partitions. Ultrasonic sensors are best in rooms with partitions or dividers. Some hybrid systems have both infrared and ultrasonic detectors.

To control a ventilation system, an occupancy sensor must be rated for the maximum power draw of the blowers and must also be capable of handling "inductive" motor loads. Most residential exhaust fans and central ventilators have motors of ⅛ horsepower or less and have maximum power draw of less than 250 watts. A suitable occupancy sensor should therefore be rated for at least 250 watts.

Determining whether an occupancy sensor is capable of handling inductive motor loads is not always easy. Some manufacturers, like Lightolier, clearly specify blower operation in spec sheets, but others don't.

The following are three examples of occupancy sensors that can handle most typical residential ventilation systems.

Watt Stopper

Watt Stopper makes a full range of infrared, ultrasonic, and hybrid occupancy sensors. The Model WS-120 (Figure 1) is an integrated wall switch with infrared detector. It is capable of handling motor loads up to 800 watts. Trade price is about $50.

For more information, contact The Watt Stopper, 296 Brokaw Road, Santa Clara, CA 95050; (800) 879-8585.

Figure 1 — Watt Stopper wall-switch occupancy sensor

Lightolier

Lightolier's "Insight" brand occupancy sensors use a different control strategy from other systems. Called "vacancy" switches, they include a manual "on," but automatic off. The idea is that conventional occupancy sensors may turn on a fan or lights when they are not wanted (like when the dog wanders into the bathroom), so with Insight sensors the user must turn on the fan or lights by tapping the switch; the sensor

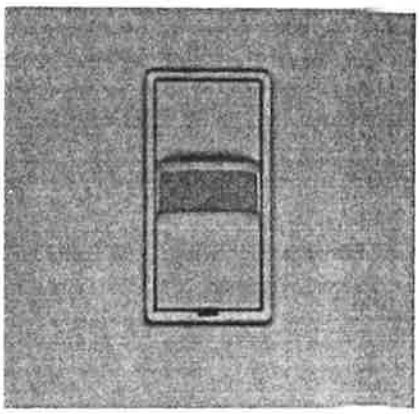

Figure 2 — Lightolier Insight "vacancy" sensor

then automatically turns them off after the room is vacated for a preset period of time.

The Insight Model IS2-600VA (Figure 2) uses an infrared sensor and is rated for up to 600 watts. Trade price is $48.

Lightolier specifically recommends Insight sensors for controlling exhaust fans. The spec sheet includes wiring diagrams for separate fan and light control in bathrooms (Figure 3).

For more information, contact Lightolier Controls, 100 Lighting Way, Secaucus, NJ 07096-1508; (800) 526-2731.

Tork

The Tork Model PS51A is an integrated wall switch with infrared detector that is rated for controlling motor loads up to ⅙ horsepower. = 150 W Trade price is about $80.

For more information, contact Tork, 1 Grove Street, Mt. Vernon, NY 10550; (914) 664-3542.♦

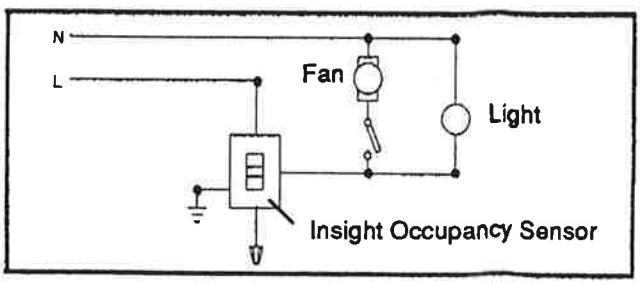

Figure 3 — Wiring diagram for controlling exhaust fan and ceiling light with Lightolier Insight occupancy sensor.