Home temperature timer — Thermostatic give-and-take

In most private homes, winter temperature levels are maintained in an erratic way. At many periods during day or night, more economical use could be made of the heating system while still providing adequate comfort levels. A new device invented by the Division of Physics' Heat and Thermometry Section holds just such promise for the energy-conscious consumer.

Imagine a computer installed in each home . . . in its memory a fuel-saving program set to regulate internal temperatures automatically over the course of a day, cooler at bedtime and warmer during evening hours according to the occupant's needs.

Useful but impossible?

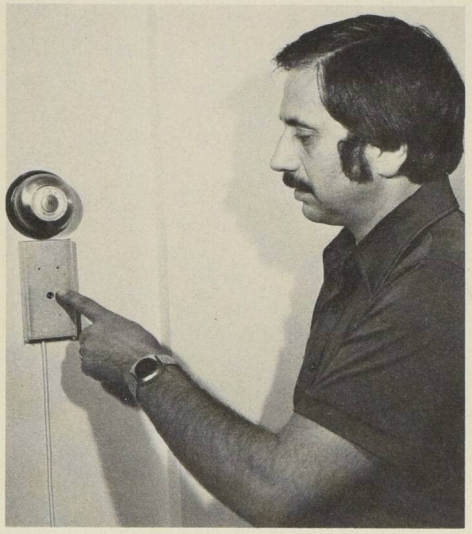
Enter Chris Kirby and Jerry Kathnelson with the next best thing. The two NRC physicists recently devised a compact solid state device that performs the same temperature control task as the imaginary computer. Their thermostat timer, no larger than a pocket calculator, is wall-mounted under a conventional thermostat, then programmed by the homeowner to raise and lower room temperature levels at predetermined times during a 24-hour cycle.

"The fact is, some clocks and time switches now available on the market do a similar job," explains Kathnelson, "but most of these are on/off electromechanical devices subject to wear, and with fairly crude time settings. We feel our unit offers greater accuracy and reliability by virtue of its solid state design. Also, it requires no electrical or mechanical connection to the thermostat or heating control system. Installation involves nothing more than mounting and plugging into a wall outlet."

The unit's secret? Deceptively simple. In giving a "cool down" command to a thermostat, the timer device generates a small amount of heat. In effect, the home thermostat is deceived by this local rise in temperature, and reacts as if the entire room had been heated to the same level. Accordingly, it signals the furnace to work less frequently.

"Programming the device is no more difficult than setting a digital wristwatch," adds Kathnelson.

In fact, it takes only the touch of a finger. Commands are given to the unit by simply activating a touch-sensitive switch at the appropriate time of day. Once a 24-hour cycle of instruction has been registered, it becomes locked in the timer's electronic memory. The daily sequence of thermostat deception then continues until the program is altered.



Mansell Acres, NRC/CNRC

Kathnelson displays the solid state timer. No larger than a pocket calculator, it is wall-mounted near a household thermostat then custom-programmed with a "turn up/turn down" daily temperature cycle. Once set, the program is unaffected even by power failures of up to two hours duration.

Kathnelson montre le programmateur à semiconducteurs, guère plus grand qu'un calculateur de poche, qui est appliqué au mur près du thermostat domestique; il peut être programmé à volonté de façon à augmenter ou à réduire la température au cours d'un cycle de 24 heures. Une fois enregistré, le programme est inaltérable et subsiste même lors de pannes d'électricité d'une durée de deux heures.

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Kirby indicates carbon resistors in the timer device which generate the small amount of heat used to deceive a room thermostat. The unit itself consumes very little power and is equally suitable for central air-conditioned homes in summer.

Kirby indique que les résistances au carbone du programmateur produisent une petite quantité de chaleur qui trompe le thermostat. Ce dispositif consomme lui-même très peu d'énergie et peut être également utilisé dans les systèmes de climatisation centrale.

An added feature is the possible breadth of temperature variation. Users may select temperature increments ranging from 2°F to 10°F (most room thermostats are still calibrated in °F.) The unit then performs its temperature-varying cycle in multiples of one or two of the chosen increment.

For example, a typical daily program based on a constant thermostat setting of 70°F and an increment of 5°F might look like this:

7 a.m. — Temperature raised from 60°F to 65°F (up by one increment)
5 p.m. — Raised to 70°F (up by one increment)
11 p.m. — Lowered to 60°F (down by two increments)

Since each degree of night setback saves roughly one per cent over an eight-hour period, this regimen should reduce annual fuel consumption by at least 10 per cent. To the homeowner, that spells "money".

For one timer model (projected cost $30) the programming itself must be performed in real time; that is, a user must register commands at the very hour of the day they are meant to be carried out in future cycles. A newer model currently in the design stage has a liquid crystal clock display and can be pre-programmed at any time. Both models feature an override capability which may be used to eliminate a command temporarily from a daily cycle.

"Interestingly enough," recalls Kirby, "the idea for the thermostat timer came to us about 10 years ago. Since then it's really been a case of solid state technology, miniaturization and so forth catching up with the idea and making it workable. Today, it's the kind of device that could easily be computer-assembled and tested during mass production."

The NRC physicists have filed patent applications for both the thermostat timer design and the unique touch-sensitive switch used in programming it. At present, licensing of the new invention is being handled by Canadian Patents and Development Limited (CPDL), a Crown Corporation founded by NRC, which in the future will be reporting to the Minister of Industry, Trade and Commerce. □

Wally Cherwinski