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Harter

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(54) **SELF-PROGRAMMABLE THERMOSTAT**

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(52) **U.S. Cl.** ..... **236/1 C**; 236/44 C

(58) **Field of Classification Search** ..... 236/46 R, 236/46 C, 1 C, 44 C
See application file for complete search history.

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(57) **ABSTRACT**

A hybrid manual/programmable thermostat for a furnace or air conditioner offers the simplicity of a manual thermostat while providing the convenience and versatility of a programmable one. Initially, the hybrid thermostat appears to function as an ordinary manual thermostat; however, it privately observes and learns a user's manual temperature setting habits and eventually programs itself accordingly. If users begin changing their preferred temperature settings due to seasonal changes or other reasons, the thermostat continues learning and will adapt to those changes as well. For ease of use, the thermostat does not require an onscreen menu as a user interface. In some embodiments, the thermostat can effectively program itself for temperature settings that are set to occur at particular times daily or just on weekends, yet the user is not required to enter the time of day or the day of the week.

5 Claims, 3 Drawing Sheets

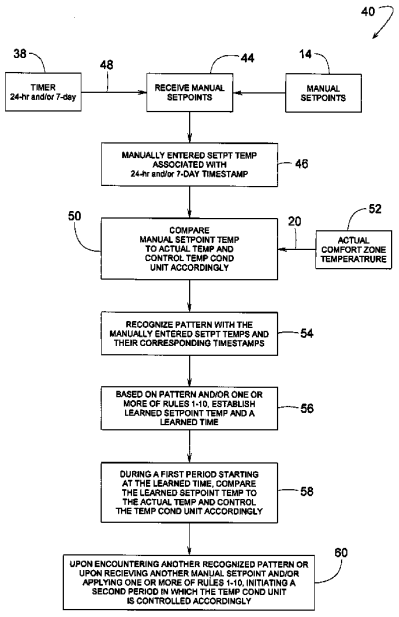


FIG. 1

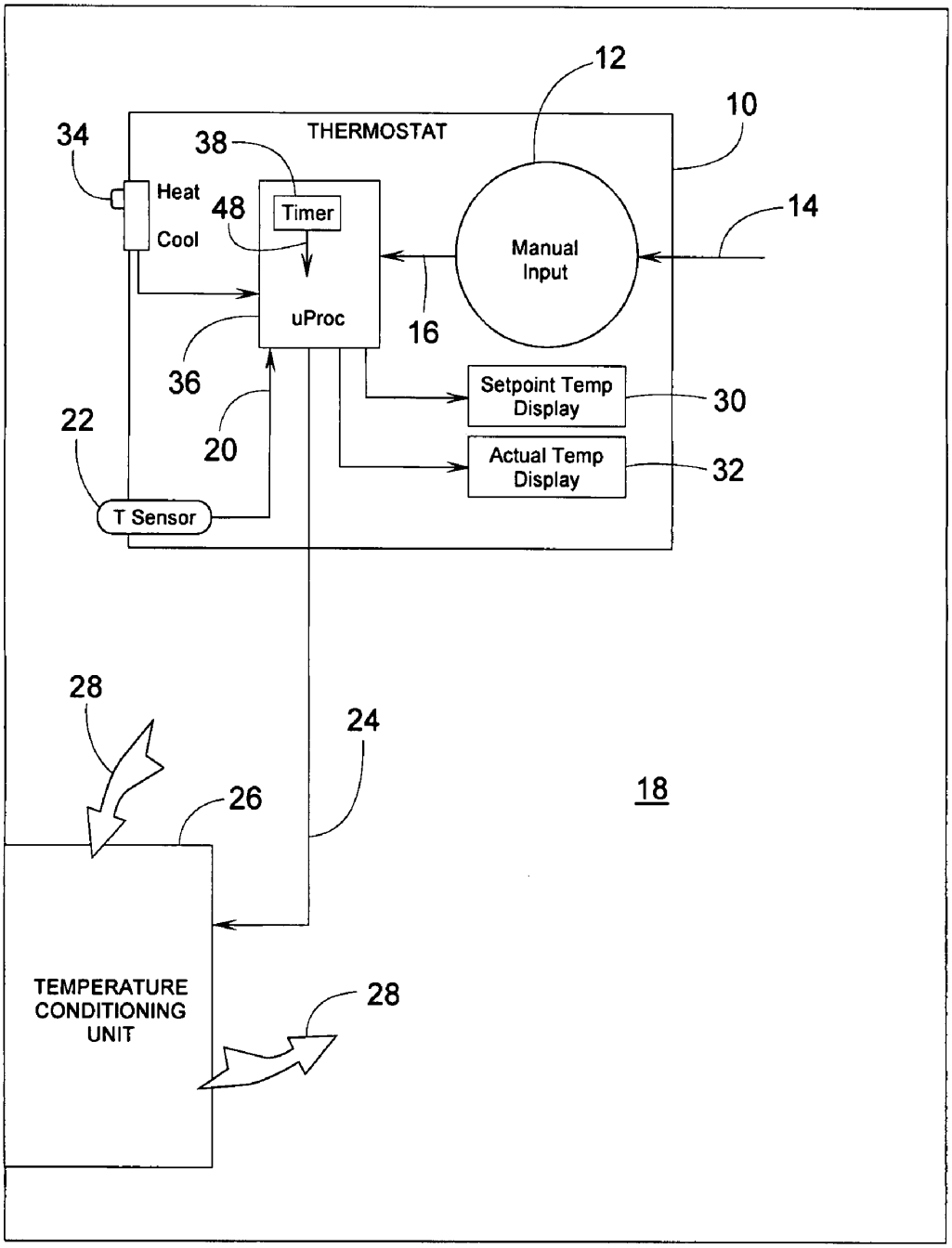


FIG. 2

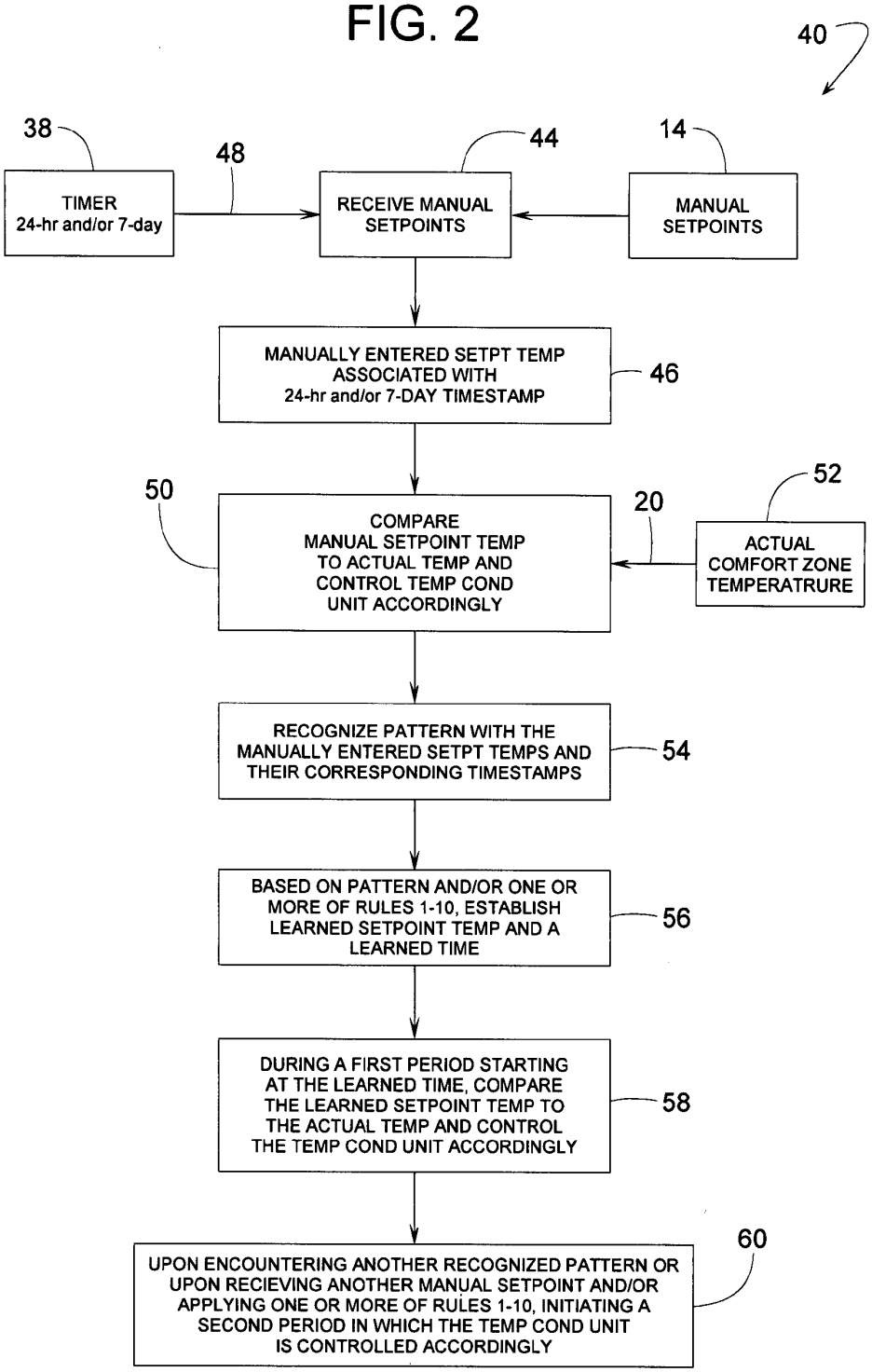
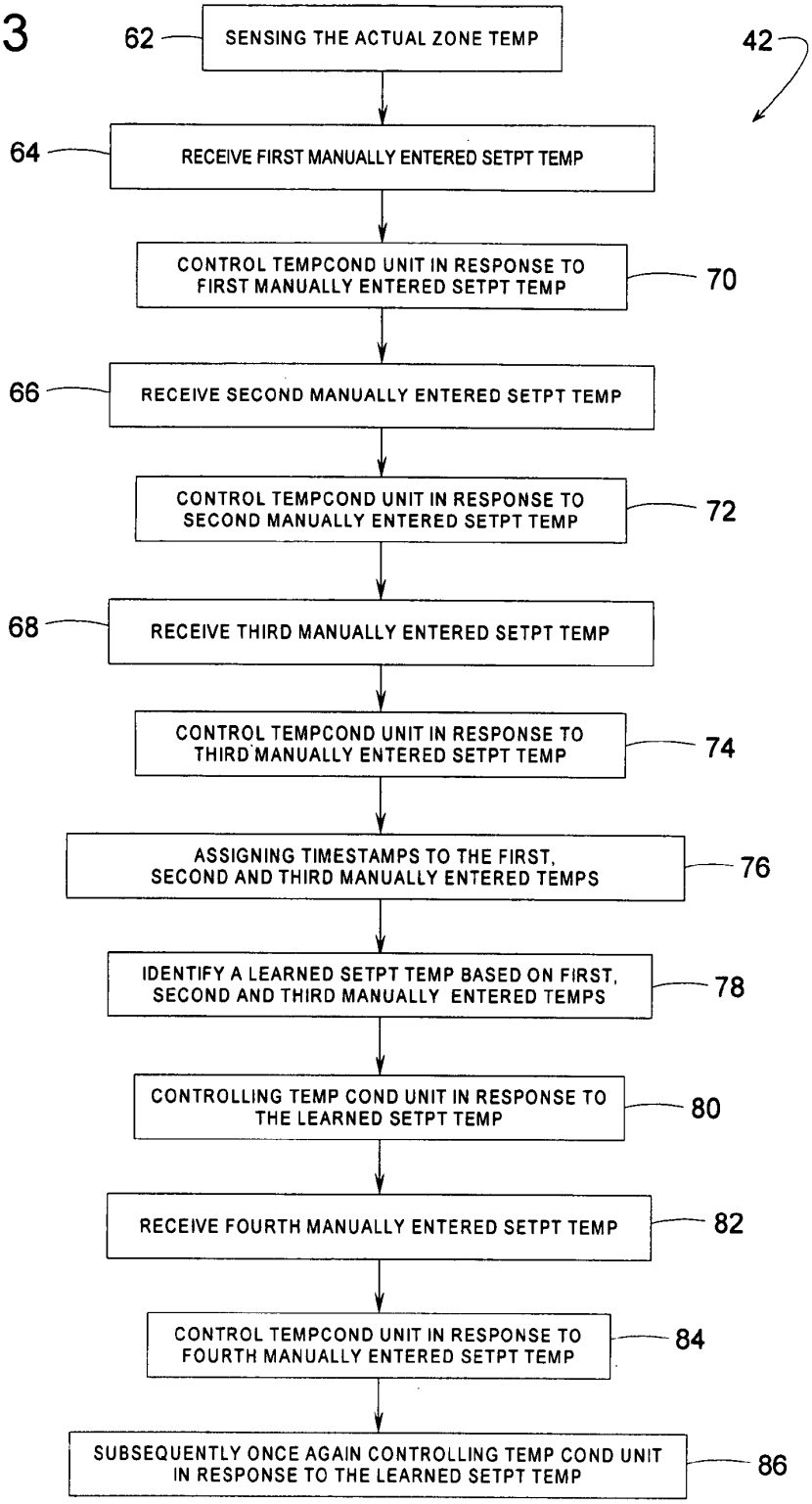


FIG. 3



SELF-PROGRAMMABLE THERMOSTAT

FIELD OF THE INVENTION

The subject invention generally pertains to a room or building thermostat and more specifically to a method of programming such a thermostat, wherein the thermostat can in effect program itself for various daily and/or weekly temperature setpoints upon learning temperature setting habits of a user and can do such self-programming without ever knowing the actual time of day or day of the week.

BACKGROUND OF RELATED ART

Furnaces, air conditioners and other types of temperature conditioning units typically respond to a thermostat in controlling the air temperature of a room or other area of a building. Currently, thermostats can be classified as manual or programmable.

With manual thermostats, a user manually enters into the thermostat a desired temperature setpoint, and then thermostat controls the temperature conditioning unit to bring the actual room temperature to that setpoint. At various times throughout the day, the user might adjust the setpoint for comfort or to save energy. When operating in a heating mode, for instance, a user might lower the setpoint temperature at night and raise it again in the morning. Although manual thermostats are easy to understand and use, having to repeatedly adjust the setpoint manually can be a nuisance.

Programmable thermostats, on the other hand, can be programmed to automatically adjust the setpoint to predetermined temperatures at specified times. The specified times can initiate automatic setpoint adjustments that occur daily such as on Monday-Friday, or the adjustments might occur weekly on days such as every Saturday or Sunday. For a given day, programmable thermostats can also be programmed to make multiple setpoint adjustments throughout the day, such as at 8:00 AM and 11:00 PM on Saturday or at 6:00 AM and 10 PM on Monday through Friday. Such programming, however, can be confusing as it can involve several steps including: 1) synchronizing the thermostat's clock with the current time of day; 2) entering into the thermostat the current date or day of the week; and 3) entering various chosen days, times and setpoint temperatures. One or more of these steps may need to be repeated in the event of daylight savings time, electrical power interruption, change in user preferences, and various other reasons.

Consequently, there is a need for a thermostat that offers the simplicity of a manual thermostat while providing the convenience and versatility of a programmed thermostat.

SUMMARY OF THE INVENTION

An object of the invention is to provide an essentially self-programmable thermostat for people that do not enjoy programming conventional programmable thermostats.

An object of some embodiments of the invention is to provide a programmable thermostat that does not rely on having to know the time of day, thus a user does not have to enter that.

Another object of some embodiments is to provide a programmable thermostat with both daily and weekly occurring settings, yet the thermostat does not rely on having to know the day of the week, thus a user does not have to enter that.

Another object of some embodiments is to provide a programmable thermostat that does not rely on onscreen menus for programming.

Another object of some embodiments is to provide a thermostat that effectively programs itself as it is being used as a manual thermostat.

Another object of some embodiments is to provide a thermostat that automatically switches from a manual mode to a programmed mode when it recognizes an opportunity to do so.

Another object of some embodiments is to provide a thermostat that automatically switches from a programmed mode to a manual mode simply by manually entering a new desired setpoint temperature.

Another object of some embodiments is to observe and learn the temperature setting habits of a user and automatically program a thermostat accordingly.

Another object of some embodiments is to provide a self-programming thermostat that not only learns a user's temperature setting habits, but if those habits or temperature-setting preferences change over time, the thermostat continues learning and will adapt to the new habits and setpoints as well.

Another object of some embodiments is to minimize the number of inputs and actions from which a user can choose, thereby simplifying the use of a thermostat.

Another object of some embodiments is to provide a thermostat that can effectively self-program virtually an infinite number of setpoint temperatures and times, rather than be limited to a select few number of preprogrammed settings.

Another object of some embodiments is to provide a simple way of clearing programmed settings of a thermostat.

One or more of these and/or other objects of the invention are provided by a thermostat and method that learns the manual temperature setting habits of a user and programs itself accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic view of a thermostat controlling a temperature conditioning unit.

FIG. **2** shows an example of algorithm for a thermostat method.

FIG. **3** shows another example of algorithm for a thermostat method.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. **1-3** show a thermostat **10** and a method for automatically programming it. Initially, thermostat **10** might first appear and function as an ordinary manual thermostat. Thermostat **10**, for instance, includes a manual input **12** (e.g., dial, keyboard, pointer, slider, potentiometer, pushbutton, etc.) that enables a user to manually enter a manual setpoint **14** that defines a manually entered setpoint temperature **16**. The manually entered setpoint temperature **16** is the user's desired target temperature for a comfort zone **18**. Upon comparing the manually entered setpoint temperature **16** to the comfort zone's actual temperature **20** (provided by a temperature sensor **22**), thermostat **10** provides an output signal **24** that controls a temperature conditioning unit **26** (e.g., furnace, heater, air conditioner, heat pump, etc.) to heat or cool air **28** in comfort zone **18**, thereby urging the comfort zone's actual temperature **20** toward the manually entered setpoint temperature **16**.

A digital display **30** can be used for displaying the current setpoint temperature, and another display **32** can show the comfort zone's actual temperature. Displays **30** and **32** could be combined into a single display unit, wherein the combined

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