Heathkit of the Month:
by Bob Eckweiler, AF6C

Heathkit GD-1776
Programmable Home Heating Control.

Introduction:

Brrrr - as I write this it's morning and the sun is rising, however the outside temperature is 31°F. We are in the middle of an unusual cold spell for Southern California, but I am snug in the house with the heat going, (Though I might be dreading the next gas bill just a tad.) There is a Honeywell programming thermostat controlling the furnace that lets me forget about adjusting the heat as in the old days; and if I'm going to be away for the day or for a week, it is easy to change the program with a few button pushes.

Years back, I remember two daily functions I did in the winter; turn the heat down in the evening, and turn it back up in the morning. The latter was easy to remember on cold days; the former often led to getting up in the middle of the night because it was just too warm under the blankets. Turning the heat up in the morning was a losing proposition; I either had to get up a half-hour or so early, turn up the thermostat and then go back to bed until it was time to get up, or turn the heat up when I got up, and let the house reach a comfortable temperature just as it was time to leave for work.

All that ended in 1977 when I bought my first programmable thermostat; it was the Heathkit GD-1776. By today's standards it is not high-tech. Yet, it turned up the heat in the morning so it was up to temperature when I got up, and turned it back down at night. Additional up-down times could be added; so if no one was in the house while I was at work I could have it go down after I left for work and back up before I

Figure 1: Heathkit ad introducing the GD-1776
From Heathkit Catalog #815 - Spring 1977 (page 44)

got home. Besides the convenience, the Heathkit GD-1776 provided economic as well as energy savings.

Heathkit GD-1776 Programmable Home Heating Control: In today's world, one can say the GD-1776 was not "rocket science". Microprocessors were becoming popular - yet still expensive; and Heathkit took a different path. However Heathkit chose to implement their design, this device did its job, and did it well.

The GD-1776 was listed as "New" in the Spring 1977 factory catalog at a price of $37.95. In the fall 1980 catalog the price had risen to $39.95. How long after that before it was discontinued I was unable to determine. However, on that same 1980 catalog page, Heathkit was offering an assembled GDP-1369 by Robertshaw. This thermostat does everything the GD-1776 does, all built into the thermostat, plus battery backup and air conditioning control. It only cost $10 more than the GD-1776. (The original 1977 GD-1776 ad is shown in Figure 1.)

Figure 2: Heathkit GD-1776 Controller Unit

The GD-1776 has two parts, the thermostat that mounts on the wall in place of your original thermostat, and an AC powered timer and controller unit (shown in Figure 2) that mounts near the furnace. The thermostat is a White-Rodgers unit that came completely assembled, and the controller was the part you had to assemble. The existing thermostat wiring works perfectly for connecting the two units. only one pair of wires is needed.

The heart of the controller unit is a 24 hour, motor driven, electrical timer assembly manufactured by Intermatic. The timer wheel has 48 slots, each representing 1/2 hour increment. Metal tabs can be slid into the appropriate slots. Silver tabs are placed in the slot where you want the heat to set back (turn down) and brass tabs where you want the thermostat to work normally. The kit comes with two of each, but additional tab sets may be purchased.
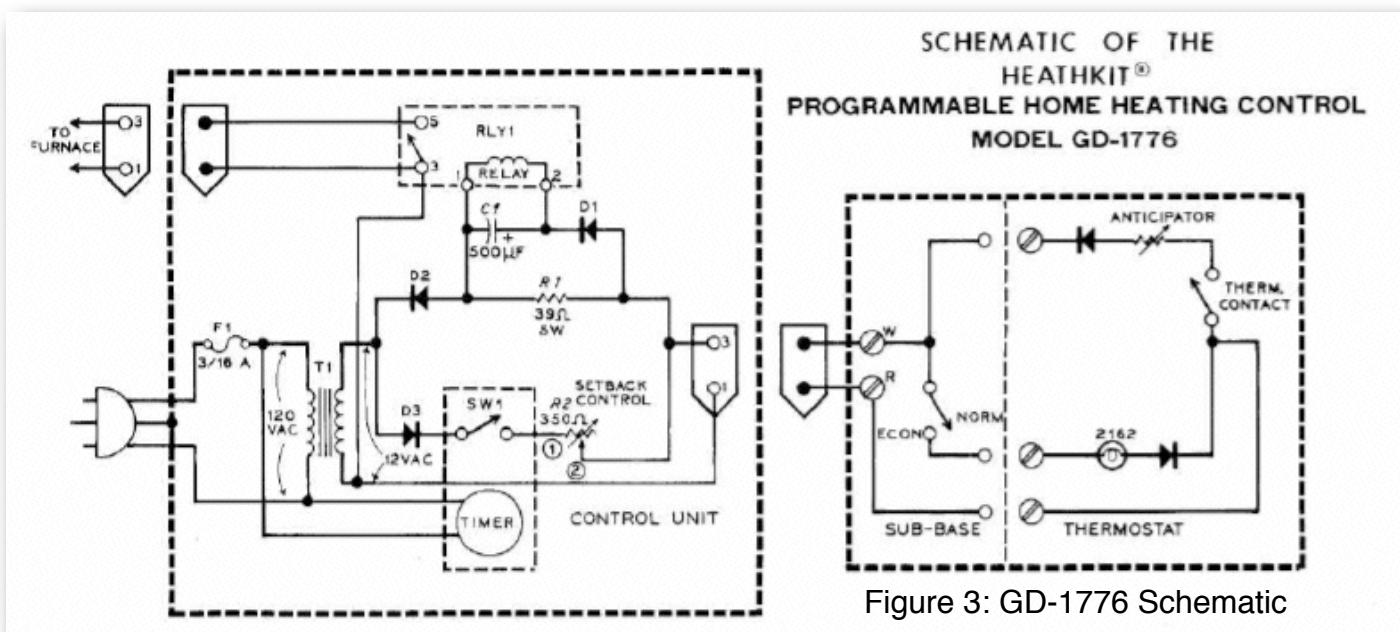
Figure 3: GD-1776 Schematic

GD-1776 Circuit:

The schematic is shown in figure 3. The concept is simple. Inside the thermostat is a small #2162 14V, 100 ma wire leaded lamp. For normal operation this lamp is off; but during setback periods the bulb is partly lit, producing heat and causing the thermostat to measure a temperature warmer than ambient. The amount of temperature setback is adjustable by a potentiometer control on the controller unit. The adjustment allows setbacks from 1° to more than 15° F by adjusting the brightness, and hence the heat given off by the lamp.

A transformer with a 12 volt secondary provides power for the lamp as well as the controller relay. When this relay is closed the furnace is on. The wire pair between the thermostat and controller performs two functions. One of the leads is the common lead, but isolated from ground. The second lead completes two circuits depending on the AC polarity. The AC voltage from the transformer secondary is steered by two diodes: D2 and D3.

When the thermostat contacts are closed D2 sends voltage through those contacts and through D1 to operate the relay, turning on the furnace. C1 smoothes the pulsating DC, preventing the relay from chattering. D1 isolates the relay and capacitor from the thermostat's anticipator circuit. R1 provides the proper load for anticipator.

When the timer motor contacts are closed, requesting the temperature be set back, D3 sends voltage through those contacts to the lamp in the thermostat causing it to turn on. In the controller, in series with the lamp is the **SETBACK** control which adjusts the current to the lamp. On the thermostat is an **ECON-NORM** switch which opens the lamp circuit in NORMal position preventing any setback.

The anticipator circuit, common on most thermostats, causes the thermostat to turn off a bit early since it often takes a while for the heat in the room to reach the thermostat. It operates in a similar way as the setback system; a small heater in the thermostat comes on along with the furnace. It is adjustable and the White-Rodgers instruction sheet describing the adjustment is provided with the kit. The factory anticipator setting worked well for my situation.

Conclusion:

The GD-1776 was simple to install; a pleasant surprise was that the new thermostat mounted in the same holes as the old one. The control unit was mounted on the wall in the furnace compartment next to the furnace. AC power for the controller was provided by the same wall outlet, located inside the furnace compartment, that supplies power for the furnace blower. The existing thermostat cable was used and rerouted to the GD-1776 controller assembly; a short two-wire extension cable, included with the kit, ran to the furnace thermostat connector. Molex three-pin connectors (one pin is not used) provide connections to the controller unit.

The thermostat worked as advertised. It took a few tries to adjust the setback to the desired amount. The setback was adjusted for about 10 degrees at night and I don't remember the heat coming on in the middle of the night except on those rare and very cold nights. Saving energy and money, while enjoying added comfort is a nice feeling!

The GD-1776 thermostat was installed in the fall of 1977. It worked flawlessly, giving good service up to the day it was replaced in the early 90s for the more highly programmable microprocessor based Honeywell *Magic-Stat*.

73, from AF6C

Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.
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