

**GB5  
HUMIDITY  
&  
TEMPERATURE  
CONTROLLER  
  
INSTRUCTION MANUAL**

**Digitry Company, Inc.**

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Dear Customer,

Welcome to the growing family of Digitry Controller users. Digitry is proud of its record of delivering "user friendly" Programmable Temperature Controllers for since 1980. The GB5 is in use for controlling processes around the world.

In the following pages, you will find complete information on using your GB5. As you will quickly learn, ease of operation and programming flexibility are trademarks of your Digitry Programmable Temperature Controller.

We appreciate hearing from owners of the GB5. Please contact us with any questions, suggestions, or application stories you would like to discuss. Our telephone number and email address are listed in Chapter 5 of this manual under "Sales and Service."

Many of the features and design elements of Digitry's controllers were suggested to us by our users. This is one of the reasons Digitry controllers continue to be the easiest to use and most intuitive temperature controllers available today.

Congratulations on your decision to increase efficiency and productivity in your workplace with Digitry's GB5 Programmable Humidity and Temperature Controller.

Sincerely,

Richard L. Tenney  
President



# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Overview of the GB5</b>	<b>3</b>
2.1	Capabilities . . . . .	3
2.2	Modes . . . . .	6
2.3	Status Indicator Lights . . . . .	6
2.4	Numerical Displays . . . . .	7
2.5	Keyboard . . . . .	8
<b>3</b>	<b>Programming</b>	<b>15</b>
3.1	Introduction . . . . .	15
3.2	Entering a Program . . . . .	16
3.3	Reviewing a Program . . . . .	16
3.4	Sample Programs . . . . .	17
3.5	Copying and Exchanging Programs . . . . .	22
3.6	Looping . . . . .	23
3.7	Delayed Start . . . . .	24
<b>4</b>	<b>Special Features of the GB5</b>	<b>25</b>
4.1	Automatic Hold . . . . .	25
4.2	Guaranteed Humidity and Temperature . . . . .	26
4.3	Error Messages . . . . .	26
4.4	Behavior During Power Failures . . . . .	27
4.5	Memory Failure . . . . .	27
<b>5</b>	<b>Reference</b>	<b>29</b>
5.1	GB5 Specifications . . . . .	29
5.2	Sales and Service . . . . .	30
5.3	Loaner Program . . . . .	30
5.4	Warranty Information . . . . .	30
<b>6</b>	<b>Glossary</b>	<b>33</b>



# List of Figures

2.1	GB5 Face . . . . .	5
2.2	Keyboard Functions . . . . .	9
3.1	Entering Sample Warming Profiles . . . . .	18
3.2	Starting Sample Warming Profiles . . . . .	19
3.3	Sample Warming Profiles . . . . .	19
3.4	Entering Sample Cooling Profiles . . . . .	20
3.5	Sample Cooling Profiles . . . . .	21





# Chapter 1

## Introduction

This manual introduces you to your GB5 Programmable Humidity and Temperature Controller. It details how to operate it. You do not need prior experience with controllers or computers. Just read and follow the simple instructions for programming your GB5.

This manual is divided into six chapters. It is best to read Chapters 1 through 4 in succession. Chapter 5, and the Glossary in Chapter 6 are handy reference sections to be used whenever needed.

Chapter 1 is this brief introduction.

Chapter 2 introduces you to the features and benefits of your GB5. The function of each operating mode, indicator light, LED display and keyboard button on the face of the GB5 is explained.

Chapter 3 teaches you how to program your GB5. The GB5 is easy to program once you are familiar with the layout of its controls, explained in Chapter 2. The chapter contains a sample profile that you may want to enter to become comfortable programming the unit. There are some pre-printed forms at the end of the manual to facilitate your working with profiles.

Chapter 4 explains the special features of the GB5, including how it behaves when power failures occur.



# Chapter 2

## Overview of the GB5

### 2.1 Capabilities

The GB5 used for controlling humidity and temperature is a modified version of the standard GB5, which has many capabilities and features that make it ideal for complex processes involving automatic temperature control, including glass, ceramics, metal-work, casting, etc. Its great versatility gives it a wide range of applications, and its ease of programming and simplicity of operation make it a favorite of users at all levels of technical proficiency.

- Simultaneous independent control of up to two acclimatization systems.
- User-programmable profiles.
- Up to fifteen setpoints per profile.
- Automatic ramping between setpoints.
- Maximum time of over three weeks per step, allowing over eleven months per profile.
- Automatic hold when humidity or temperature lags profile.
- Skip-step and keyboard hold functions, allowing manual control when needed.
- Looping back to beginning of program.
- Delayed start of program.
- Full 16-button keypad, allowing direct entry of times, relative humidity and temperatures without scrolling.

- Separate, large, bright LED displays for temperature and time.
- Retention of all profiles during power failures.
- Intelligent recovery from power failures and brown-outs.

The GB5 can be enhanced with several optional features.

- Remote temperature readouts, both standard and large size, permitting monitoring from various convenient sites.
- PC connectivity.
  - Graphing (chart recorder) of actual and programmed temperatures.
  - Data logging, giving a permanent record.
  - Remote monitoring for viewing progress of a profile at the PC, even over the Internet or using dial-up networking, for appropriately configured systems.
  - Entering profiles on the PC by typing at the keyboard, with a graph of the result.
  - Archiving profiles on the PC; keep an almost unlimited library of profiles for various kinds of work.
  - Copying profiles from the GB5 to the PC, for inspection, editing, and long-term storage.
  - Loading profiles from PC to the GB5; enter new profiles or use profiles previously stored on the PC.
  - Control of GB5 from PC; clear errors, stop, and even start an oven from the PC, even over the Internet or using dial-up networking, for appropriately configured systems.
  - Phone notification of events, such as errors and advancing from one step to the next.

The GB5 modified for humidity and temperature control two pairs of channels that work together. Channels 1 and 2 work together, with channel 1 associated with humidity and channel 2, temperature. Similarly, channels 3 and 4 work together, associated with humidity and temperature, respectively.

A diagram of the face of the GB5 is on the following page.

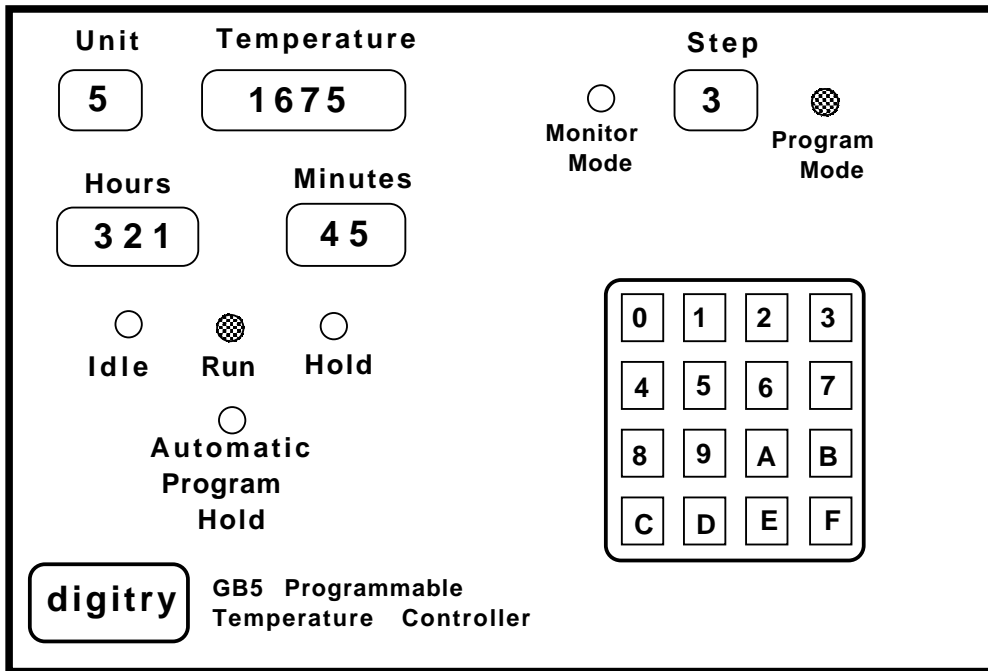


Figure 2.1: GB5 Face

## 2.2 Modes

There are two modes of operation for your GB5: MONITOR and PROGRAM. During standard operations, the GB5 usually is in the MONITOR MODE. When entering, changing or examining humidity or temperature profiles, the GB5 must be in PROGRAM MODE.

## 2.3 Status Indicator Lights

There are two groups of indicator lights on the face of the GB5. The MODE lights are directly above the keyboard on either side of the STEP display. The four status indicator lights are to the left of the keyboard, directly beneath the TIME display.

**MONITOR MODE:** When the green MONITOR light is on, the GB5 is ready to display the relative humidity and temperature and either the time remaining for the current step. Your channels are constantly monitored by the GB5, even when the MONITOR light is not lit.

**PROGRAM MODE:** When the red PROGRAM light is on, the GB5 is ready to enter, examine, or change humidity and temperature profiles. Note that any programs that have already been started will continue to execute; working with one program has no effect on the others.

Button B on the keyboard is used to switch modes. See section 2.5, page 8, for details.

**IDLE:** The red IDLE light indicates that the control power to a selected channel is off and the channel timer is not running. Therefore, that channel is ready to begin STEP #1 of your program. Once the program has completed its cycle, the GB5 automatically returns the channel to IDLE. Resetting the channel using Button F (as described in section 2.5, page 8) also forces the GB5 into IDLE.

**RUN:** The green RUN light indicates that your channel has been activated. This means that the channel is following your program.

**HOLD:** The yellow HOLD light indicates that your program has reached an indefinite, programmed hold or that Button D has been pushed (also placing the channel in an indefinite hold). In either case, the channel timer stops running and the channel maintains the preset temperature.

**AUTO-HOLD:** The yellow AUTO-HOLD light indicates that a channel has gotten too far from its programmed value, as explained in section 4.1. This light also comes

during the last minute of any step until the programmed humidity and temperature are achieved. As long as this light is on, the timers for both the paired channels are stopped.

Note: If AUTO-HOLD comes on during a profile, the actual time to run the profile will exceed the time entered into the program.

## 2.4 Numerical Displays

There are four numerical LED displays on the face of the GB5: one digit each for the UNIT and the STEP, four digits for the HUMIDITY or TEMPERATURE, and five digits for the TIME. Under most circumstances, each indicates information either about a profile being entered or about a channel being controlled. At other times, error messages may appear in the TIME and TEMPERATURE displays. These are described in other sections of this manual.

**UNIT:** This display indicates the channel that currently is being monitored or programmed.

**HUMIDITY or TEMPERATURE:** This display indicates either relative humidity or temperature. In MONITOR MODE, this is the reading from your relative humidity or temperature sensor; in PROGRAM MODE, it is the final humidity or temperature of a given step. In MONITOR MODE, the relative humidity is shown in the left half of this display, and the temperature is shown in the right half. In PROGRAM MODE, both numbers are right-justified.

In MONITOR MODE, if no inputs are connected to the corresponding channel, a humidity channel will be blank and a temperature channel will display 32° Fahrenheit.

**TIME:** This display shows the time for the current step. The time indicated when the GB5 is in PROGRAM MODE denotes the length the step. When programming, the “HHH HH” will be displayed to indicate a programmed hold, i.e., a soak of indefinite length, and “LLL LL” will be displayed to indicate a loop back to the beginning of the program.

Even more esoteric is the LL-LL and the LS-LS for copying and exchanging programs, which are described in Section 3.5, page 22.

In MONITOR MODE, the display shows the remaining time of the current step, and diminishes as the step proceeds. The timer is running whenever the green

RUN light is on unless the HOLD or AUTO-HOLD light is on.<sup>1</sup> The timer stops when your channel is IDLE. When the timer is stopped, the displayed time does not change. However, since a programmed hold has no time associated with it, the display shows “HHH HH”.

**STEP:** In MONITOR MODE, the number displayed directly above the keyboard indicates the current step of the program you are executing. In PROGRAM MODE, this LED display indicates the step you are entering or reviewing. The steps are indicated by the numbers “1” through “9”, and then “A” for the tenth step, “B” for the eleventh step, and so forth, up to “F” for the fifteenth step (the maximum number that can be programmed for any one channel). A horizontal bar “- - - -” will appear in the TIME and HUMIDITY or TEMPERATURE displays if you try to enter more than 15 steps per channel or if you try to view a step after a Loop “LLL LL”.

## 2.5 Keyboard

The keyboard on the face of the GB5 consists of 16 buttons. There are 10 numerals, 0-9; and six special function buttons, A-F. The functions performed by the A-F buttons are printed above the keyboard. The chart in Figure 2.2 summarizes the functions performed in each operating mode.

**Button A—Channel:** Button A is used to select the channel that will appear in the display, i.e., the channel you will be monitoring or programming. Simply push Button A and then push the number of the channel (from 1-9) you wish to view. The channel number appears in the upper left hand corner of the GB5, below the word UNIT. Selecting a physical channel, 1-4, automatically invokes MONITOR MODE.

In addition to the four physical channels you can actually control, there are five channels that are not connected to any temperature reading inputs or control outputs. These channels, 5-9, are for storing programs that you may wish to use later. These “extra” programs may be either punched in directly, in the same way as with channels 1-4, or exchanged or copied from other channels, as will be explained shortly. Since channels 5-9 do not correspond to real channels, there is no monitor mode for them. They will always appear in the PROGRAM MODE.

Another, less frequent use of Button A is in copying and exchanging programs. For this use, you must be in PROGRAM MODE. Pushing Button A twice will call

---

<sup>1</sup>If either one of the paired channels experiences an AUTO-HOLD condition, both timers stop; but unless both channels experience AUTO-HOLD conditions, the AUTO-HOLD light will be on only for the channel that caused the AUTO-HOLD.



Button	Function	In PROGRAM MODE	In MONITOR MODE
<b>A</b>	<b>Channel</b> pushed once followed by digit 1–9	Selects channel for viewing or changing	Selects channel for viewing or changing
	pushed once followed by digit 0	Selects SCANNING FUNCTION	Selects SCANNING FUNCTION
	pushed once followed by ENTER	Backs up to previous step	
	pushed twice	Prompts for copying or exchanging programs	
<b>B</b>	<b>Mode</b>	Selects MONITOR MODE	Selects PROGRAM MODE
<b>C</b>	<b>Clear</b>	Clears entries so changes can be made	Clears errors
<b>D</b>	<b>Hold</b> pushed once	Programs a hold, or soak, at a specified temperature	Holds channel at current humidity or temperature
	pushed twice	Programs looping feature	
<b>E</b>	<b>Enter/Start</b>	Enters or reviews a program	Starts, restarts, or skips steps in a program selected by digit <sup>†</sup>
<b>F</b>	<b>Cancel</b> followed by digit <sup>†</sup>	Erases the entire program	Cancels a program and returns to IDLE

NOTE: All channels can be operating simultaneously regardless of which channel operations are being displayed or which channel is being programmed.

<sup>†</sup>This digit is required by the Confirmation Sequence; see section 2.5, page 12.

Figure 2.2: Keyboard Functions

up LS-LS or LL-LL, prompting you to specify a program number to exchange or copy, respectively. This is explained in section 3.5, page 22.

**Scan Function:** The GB5 has a special SCAN FUNCTION, where it monitors all four channels and displays each channel's time and temperature for a few seconds. This allows you to monitor all your channels without having to step through them manually. To select the SCAN FUNCTION, press Button A followed by Button 0. The SCAN FUNCTION automatically sets the GB5 to MONITOR MODE. To return to the normal control mode (and reactivate the keyboard), select any channel or program for display by pressing Button A followed by a digit. No buttons other than A are active while Scanning.

Note that whenever the GB5 resets, it automatically invokes the SCAN FUNCTION. In particular, if there has been a power outage, the GB5 will commence Scanning upon the return of power. Another event that will trigger the SCAN FUNCTION is the receipt of a command from a PC through the serial communications connector, if you have the optional communications software. As above, the keyboard will be mostly disabled; you will have to select a specific channel or program before you can do anything else.

**Button B—Mode:** Button B is used for switching between MONITOR and PROGRAM MODE. The mode you select is indicated by a light on either side of the STEP LED: red for PROGRAM MODE, green for MONITOR MODE.

MONITOR MODE is used for observing the status of any of your four channels. A channel must be in MONITOR MODE to perform any of the following functions:

- Display the current settings and status of the channel.
- Start a program (see "Button E").
- Initiate a non-programmed hold (see "Button D").
- Skip a step in the program that is running (see "Button E").
- Cancel the cycle (see "Button F").

When the GB5 is in PROGRAM MODE, you can enter, review or change the time and humidity or temperature of any step of your temperature profile for the currently displayed channel. As you enter times and temperatures into the profile, the step you are modifying is displayed in the STEP LED. You may review or change a program even while it is running. Simply press Button B twice to review the program for the channel currently being displayed. See section 3.3, page 16, for details on changing time and temperature settings.

**IMPORTANT NOTE:** Even though you can change the program that is currently running, do not attempt to change the step that is currently being executed as this may cause your channel to return to IDLE.

**Button C—Clear:** Button C is most commonly used when the GB5 is in PROGRAM MODE to allow entries to be changed. In MONITOR MODE, Button C is used to clear or retard various error indications.

In PROGRAM MODE, Button C is used to clear entries that you need to change. If only a time has been entered, then pushing Button C clears it. If both a time and a humidity or temperature have been entered in a step, pushing Button C once will clear only the humidity or temperature. If you do not want to change the time, you then can enter a new humidity or temperature setting. If you do want to clear both the existing time and humidity or temperature setting, push Button C twice; the first time to clear the humidity or temperature, the second to clear the time. You then can enter your new settings. While altering a profile during review, there is no way to clear the time without first clearing the humidity or temperature.

**NOTE:** If your display reads all “E”s (error in entry), you must push Button C in order to proceed. (See section 3.2, page 16, for a further explanation.)

Button C in MONITOR MODE has no effect.

**Button D—Hold:** Pushing Button D when the GB5 is in the MONITOR MODE immediately initiates a hold, called a “keyboard hold”. This means that the timer for that channel stops and the elapsed time does not advance beyond its present reading. The channel will be maintained indefinitely at the humidity or temperature displayed when the button was pushed.

When a hold is started, the yellow HOLD light (to the left of the keyboard) will come on. To resume normal operation, push Button E and then press the number of the channel being displayed.

While in PROGRAM MODE, Button D programs a hold (also known as a “soak”), at a specified humidity or temperature, but for an undetermined time. Once the button is pushed, the programmed hold is indicated by “H”s in the TIME display. The humidity or temperature is specified in the normal manner (see section 3.2, page 16). When the HOLD is encountered in the course of running the profile, the channel will continue to hold forever or until you release it by pushing the enter sequence (whichever comes first!) Do not use this button for a timed soak (see section 3.1, page 15). When a programmed hold step is reached, the TIME display will show “HHH HH”.

You can start a program with HOLD. You then can attend to other business while your unit reaches working humidity and temperature. Once you load the unit,

push Button E followed by the channel number, and the GB5 continues with the rest of the programmed cycle for that channel. Of course, it has continued to monitor and control all running channels during this time.

Button D also is used to program the special looping feature. Simply push Button D twice in succession while in the PROGRAM MODE. (See section 3.6, page 23, for a more complete description of the looping feature.)

### Confirmation Sequence

The functions described below, activated by Buttons E and F, are used to start your channels, skip steps in your programs, erase your programs, or reset your channels to STEP #1. Because of the importance of these functions, a special sequence is incorporated to avoid accidental use. After pressing Button E or F, you must push the number of the channel currently displayed. Pushing any other button after Button E or F will violate the *Confirmation Sequence* and thus prevent the action. For Button E, the Confirmation Sequence is required only when the GB5 is in MONITOR MODE. For Button F, the Confirmation Sequence is always required whether the GB5 is in MONITOR or PROGRAM MODE.

**Button E—Enter/Start:** Button E serves a different function depending on the mode of the GB5: in MONITOR MODE, Button E is the start/skip-step button; in PROGRAM MODE, it serves as the enter button.

Before starting your programmed profile, make sure the red IDLE and the green MONITOR MODE lights are lit and you have entered your program. Then, push Button E and press the number of the channel displayed in the upper left corner (UNIT). The red IDLE light will go out and the green RUN light will come on, showing that your program has started.

Since humidity and temperature are controlled by separate but paired channels, you should start and stop both at the same time. Thus, to start operation requires that you select first one of the channels and start it and then select the paired channel and start it as a separate action. Similarly to force a stop, you must stop both channels individually.

At any time during the cycle you may cancel a given step and go on to the next step (this is called “skip-step” capability). Push Button E and then press the number of the channel displayed. The GB5 will skip to the next programmed step. Once you have skipped a step, there is no direct way to back up. However, you can always cancel the whole program (Button F), restart the program and skip to the beginning of any step. As with starting and stopping, skipping a step must be applied to each of the paired channels individually.

Button E also is used to continue your program from HOLD. Leaving a programmed HOLD is, after all, nothing more than skipping to the next step.

Recall that the GB5 also has a second kind of HOLD, the keyboard hold, which you can recognize because the yellow HOLD light will be on, but the TIME display will not show “HHH HH” but rather it will be stopped at the time you invoked the keyboard hold. Pushing Button E followed by the channel number will simply cause the program to continue from where it was stopped: the HOLD light will go out and the time will resume counting down.

When the GB5 is in PROGRAM MODE, Button E is used to enter the times and humidities or temperatures you select for your program. The Confirmation Sequence feature is not in effect in this mode. After selecting any time or temperature, you must press Button E to record your entry into the GB5’s memory. Then, proceed to your next entry.

Button E also is used to review your program. Each time you push Button E, the next time and humidity or temperature set-points appear in the LED displays. Pushing Button A followed by Button E backs up to the previous step. See section 3.3, page 16, for further information on reviewing a program.

**Button F—Cancel:** Button F either cancels or erases a program, depending on the mode. In MONITOR MODE, it is used to cancel a program and return the GB5 to IDLE. This does not erase your program; it shuts the displayed channel off and returns it to STEP #1.

In PROGRAM MODE, Button F erases your entire program.

In both MONITOR and PROGRAM MODE, once you press Button F, remember to follow this by entering the number of the channel displayed, as required by the Confirmation Sequence feature.



# Chapter 3

## Programming

### 3.1 Introduction

A profile for the GB5 may be thought of as a series of points, with each point consisting of a time and a humidity or temperature, depending on whether this is the profile associated with a hygrometer or temperature channel. When these points are connected by straight lines, they form a continuous graph. This graph represents the humidity or temperature profile you want your system to follow. You program your GB5 by entering these time and humidity or time and temperature points. The time you enter is always the length of the step; relative humidity is in percentage; and temperature is in degrees Fahrenheit. Your GB5 automatically calculates the rate (“ramp”) at which the humidity or temperature rises or falls between successive time points. Because of this automatic ramping, it is not unusual for programs to be only a few steps long.

A profile may consist of up to 15 such points, each of which is called a *step*. If you wish to hold a specific humidity or temperature for an indefinite period of time, you can use HOLD (see page 11). The HOLD acts as a substitute for a time setting. During a HOLD, the timer does not run, so there is no remaining time period to display. Instead, the GB5 displays “HHH HH”. When you are ready to continue with the program, you have to advance the GB5 to the next step manually (see page 12). A programmed HOLD counts as one step.

A typical use of HOLD is to stabilize the storage area at a fixed humidity and temperature for an indefinite time. When a change is required, the rest of the profile can commence. This is when you leave the HOLD step. If there are no subsequent steps, the system will return to IDLE.

If you wish to maintain a certain humidity or temperature for a specific time (a “timed soak”), you simply program it in the standard manner, using the same humidity or temperature for two consecutive set-points. You should not use the HOLD button for

a timed soak.

The GB5 controls both relative humidity and temperature, so two paired profiles must be programmed. Channels 1 and 2 correspond to humidity and temperature, respectively. Similarly, channels 3 and 4 also correspond to humidity and temperature, respectively.

## 3.2 Entering a Program

First, select the channel to be programmed by pressing Button A and the channel number (from 1–9) on the keyboard. For channels 5–9, the GB5 automatically switches to PROGRAM MODE. For channels 1–4, you must put your GB5 into PROGRAM MODE using Button B.

At this point, the STEP display will read “1” and the TIME display will read “0”. Now, punch in the time (in hours and minutes) on the keyboard. Then press Button E to enter the time. At this point, “0” will appear in the TEMPERATURE display. If you wish to change the time, or if you have made an error, press Button C (Clear). The TEMPERATURE will become blank and the TIME will read “0”. You can now enter a new time. Then, punch in a temperature. After pushing button E, the TIME will read “0” and the TEMPERATURE will be blank. The STEP will read “2”.

You now are ready to enter the second point in your program. This process is repeated until you have entered your entire program. Remember, you have as many as 15 steps to work with for each channel. If you enter fewer than 15 steps, your program will terminate upon reaching the first unfilled step (zero time).

NOTE: When your profile has finished running, the GB5 will go into IDLE MODE and, to indicate that the profile has finished, the STEP display will show one more than the last step of your profile, and the TIME display will show zero time remaining. For example, when a profile with 5 steps has completed, the IDLE light goes on, the STEP display shows “6”, and the TIME display shows “0”. Similarly, when a profile with ten steps has completed, the IDLE light goes on, the STEP display shows “b” (which looks similar to a “6”), and the TIME display shows “0”. If you press Button F, the display will change to show a STEP of “1”, with the TIME replaced by dashes.

## 3.3 Reviewing a Program

Switching from PROGRAM MODE to MONITOR MODE, and back to PROGRAM MODE (by pressing Button B), automatically sets the STEP display to Step # 1. The time and humidity or temperature settings you selected for the first step now will be displayed. Pushing Button E (Enter) advances you through the succeeding steps of your program.



Pushing Button A followed by Button E backs up to the previous step. You may review your program in this manner even while the program is running.

At any time during your review, you may make changes to your program by first clearing and then reentering new times and temperatures. However, it is generally not advisable to change the program for a channel that is currently running. If you choose to do so, you must be extremely careful to ensure you do not change the time of the step that is currently being executed. This is because changing a time entails returning the time to zero which, in turn, will terminate your program and put the GB5 into IDLE for that channel.

NOTE: To change the time setting in your program, you first must clear the humidity or temperature by pressing Button C once. Then you can clear the time by pressing Button C again. This step of your program now is ready to enter a new time and humidity or temperature. If you want to change only the humidity or temperature, just push Button C once and the time will remain unchanged. It is not possible to change the time without first clearing the humidity or temperature.

### 3.4 Sample Programs

To see how easy it is to program the GB5, consider the following sample warming protocol: To bring items from cold storage to room temperature, the acclimatization room starts by holding at 40% relative humidity and 40°F. Once the items are in the room, the temperature and humidity should rise over a six hour period to room temperature, say 55% humidity and 70°F. Then the room should be kept at those values until the system is turned off. A graph of the two profiles for this protocol is in Figure 3.3. Explicit directions for entering these profiles are given in Figure 3.1.

Once the programs are entered, you start the programs by pressing a few more buttons, as described in Figure 3.2. Note that after the items are placed in the room, which is accomplished while the GB5 is HOLDing, you use skip-step to begin the actual warming phase.

Next, we include a pair of sample profiles that could be used to prepare the acclimatization room to accept items and then cool them for storage. This entails raising the room from its cool state to ordinary room temperature (a relative humidity of 55% and a temperature of 70°F) a bit more quickly than in the previous sample, say three hours, then holding those conditions until the items have been placed into the room. After that, the room is returned over six hours to its cool state (a relative humidity of 40% and a temperature of 40°F). The profiles are depicted in Figure 3.5. The instructions for entering these profiles are given in Figure 3.4.

Press: To:

- 
- A 1 Let the GB5 know you want to program channel #1.  
 B Put the GB5 into PROGRAM MODE.<sup>†</sup>  
 D E Program channel #1 to HOLD a relative humidity of 40%  
 40 E This is Step #1.  
 600 E Program channel #1 to ramp up evenly to a humidity 55%  
 55 E over a period of six hours.  
 This is Step #2.  
 D E Program channel #1 to HOLD humidity at 55%  
 55 E This is Step #3.  
 The program for channel #1 is now entered.
- A 2 Let the GB5 know you want to program channel #2.  
 B Put the GB5 into PROGRAM MODE.<sup>†</sup>  
 D E Program channel #2 to HOLD a temperature of 40°F  
 40 E This is Step #1.  
 600 E Program channel #2 to ramp up evenly to a temperature 70°F  
 70 E over a period of six hours.  
 This is Step #2.  
 D E Program channel #2 to HOLD a temperature 70°F  
 70 E This is Step #3.  
 The program for channel #2 is now entered.
- 

<sup>†</sup> If the profile does not appear to be empty at this point, press F followed by the channel number to clear it.

Figure 3.1: Entering Sample Warming Profiles

Press:	To:
B	Return to MONITOR MODE.
E 2	Start channel #2 running.
A 1	Let the GB5 know you want to control channel #1.
E 1	Start channel #1 running.
Once the acclimatization room has been filled, begin the actual warming.	
E 1	Advance channel #1 to step #2.
A 2	Let the GB5 know you want to control channel #2.
E 2	Advance channel #2 to step #2.

Figure 3.2: Starting Sample Warming Profiles

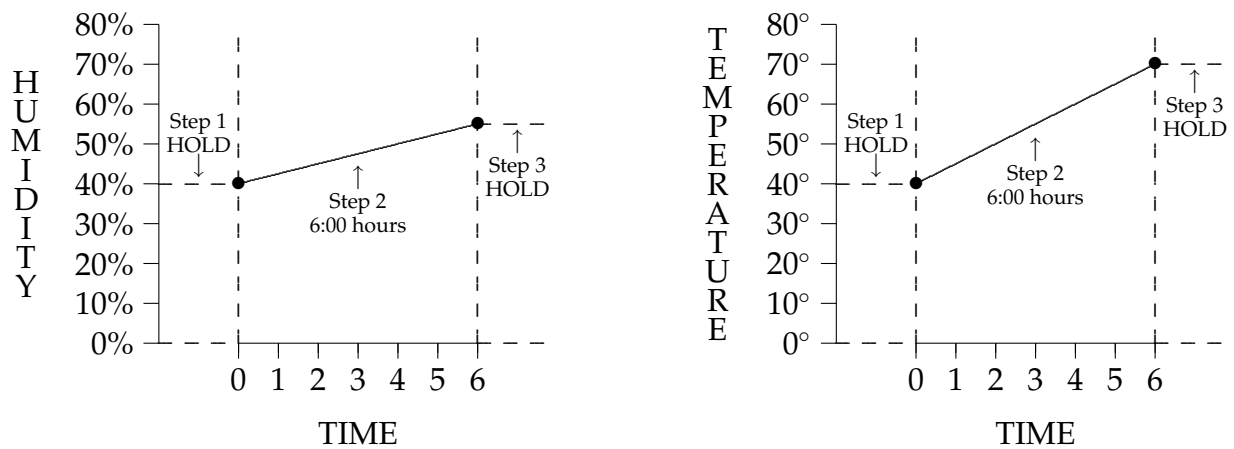


Figure 3.3: Sample Warming Profiles

Press: To:

---

A 1 Let the GB5 know you want to program channel #1.  
 B Put the GB5 into PROGRAM MODE.<sup>†</sup>  
 300 E Program channel #1 to ramp up evenly to a humidity 55%  
 55 E over a period of three hours.  
 This is Step #1.  
 D E Program channel #1 to HOLD humidity at 55%  
 55 E This is Step #2.  
 600 E Program channel #1 to ramp down evenly to a humidity 40%  
 40 E over a period of six hours.  
 This is Step #3.  
 D E Program channel #1 to HOLD a relative humidity of 40%  
 40 E This is Step #4.  
 The program for channel #1 is now entered.  
 A 2 Let the GB5 know you want to program channel #2.  
 B Put the GB5 into PROGRAM MODE.<sup>†</sup>  
 300 E Program channel #2 to ramp up evenly to a temperature 70°F  
 70 E over a period of three hours.  
 This is Step #1.  
 D E Program channel #2 to HOLD a temperature 70°F  
 70 E This is Step #2.  
 600 E Program channel #2 to ramp down evenly to a temperature 40°F  
 40 E over a period of six hours.  
 This is Step #3.  
 D E Program channel #2 to HOLD a temperature of 40°F  
 40 E This is Step #4.  
 The program for channel #2 is now entered.  
 B Return to MONITOR MODE.  
 E 2 Start channel #2 running.  
 A 1 Let the GB5 know you want to control channel #1.  
 E 1 Start channel #1 running.

---

<sup>†</sup> If the profile does not appear to be empty at this point, press F followed by the channel number to clear it.

Figure 3.4: Entering Sample Cooling Profiles

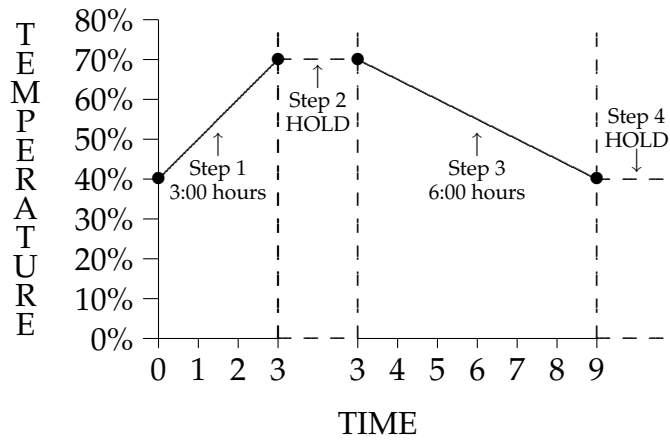
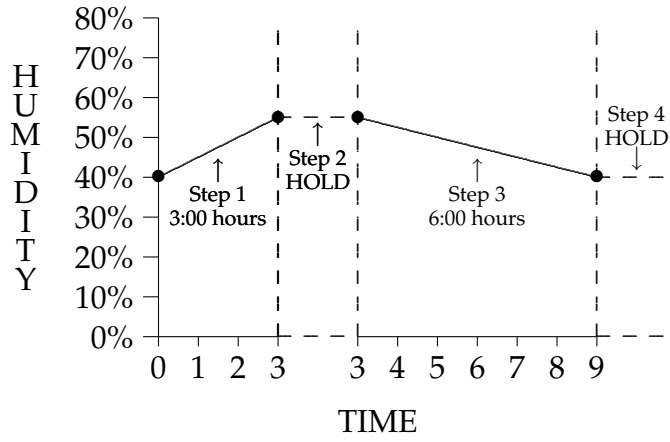


Figure 3.5: Sample Cooling Profiles

### 3.5 Copying and Exchanging Programs

As mentioned in section 2.5, page 8, channels 5, 6, 7, 8, and 9 have no hardware attached to them; you may think of them as “phantom channels”. However, they may be programmed just as the channels 1–4 are. Since there are no humidity or temperature inputs or relay outputs for these phantom channels, you cannot run them. There is nothing for them to do except to store extra programs for future use. The programs in 5–9 are entered, reviewed and edited (changed) just as those in one through four. To use one of these programs, you must copy it into channel 1, 2, 3, or 4 as described in the following paragraphs. To simplify the language in what follows, we will call the program for channel 1, “program 1”, etc.

Note that there is no distinction between humidity or temperature in profiles 5–9. This means that the maximum permitted program values that are enforced when you enter profiles into channels 1–4 are not enforced when entering values into channels 5–9. Be careful that you have the correct values whenever you copy stored profiles.

You can exchange any two programs with just a few button pushes. You can also copy (replicate) a program into a completely blank program. You will be notified whether a copy or exchange is to occur by the symbols in the TIME display: “LS-LS” for exchange or “LL-LL” for copy.<sup>1</sup> With regard to copying and exchanging, all programs 1–9 are on equal footing. You may copy (or exchange) from any one to any other.

Now for the details:

- First select your target program with Button A as usual. Put channel in program mode if it is one of 1–4. (Channels 5–9 will automatically be in program mode.)
- If you want to copy another program into the target (as opposed to exchanging another program with the target program), you must first completely clear the target program. This means that all 15 steps must be zero. If only the first few steps have been cleared, the program may seem empty without being so. If you get the LS-LS symbol, you can be sure that one of the 15 steps has data in it. Using Button F, you can clear all steps without having to explicitly find the non-zero steps. If your target is not totally cleared, it will be exchanged with the source program. In other words, if you are not careful here, you will find that the source program has changed when you did not expect it to do so.
- Now push Button A twice in a row. The appropriate symbol, LL-LL or LS-LS, will appear in the TIME display and a dash will appear in the TEMPERATURE display.

---

<sup>1</sup>While these may not be the most obvious symbols, bear in mind that only a limited number of possible characters exist for the display. It may help to think of the exchange symbol as “load and store” and the copy symbol as “load”.

This dash will turn into the source program you wish to load or copy from when a digit (1–9) is pressed. If any other button is pushed, you will get an error (“E”s will appear in the TIME display), and then you need to push Button C (Clear Entry) and start again. You may change the number without first clearing it; just push a different one.

- After having chosen the source program, push the enter key. Voilà... the exchange or copy will take place! Note that when you do two exchanges in a row, you will be back to where you started. If you do a copy, the source program will remain where it is and also be replicated in the target program. We note the obvious fact that if you exchange two programs which are exactly the same, it is equivalent to having done absolutely nothing!
- Also note that it is impossible for one program to overwrite another—they merely interchange themselves. If you want to overwrite the target, you must first wipe it out with Button F and then copy over the blank program.

#### Summary

- Target program completely empty means you will replicate the source program into the target. The symbol is “LL-LL”.
- Target program not completely empty means the source and target will be exchanged. The symbol is “LS-LS”.

## 3.6 Looping

To accommodate repetitive use, such as a daily cycle, the GB5 contains a loop command which allows indefinite repetition of a profile. After reaching the last programmed step, the program immediately will return to Step #1. When the repeat feature is operational, the program will never stop by itself. The repeat can be cancelled by pressing Button F or removed by changing your program.

The loop command can be used only once in a program. It always sends the program back to the very beginning. It is invoked from the PROGRAM MODE by pushing Button D twice in succession. The “H”s and blanks in the TIME and HUMIDITY or TEMPERATURE displays will change. The HUMIDITY or TEMPERATURE display will read “LOOP” and the TIME will have dashes. When this occurs, press Button E. (Failure to do this will result in an error. You then must clear the step by pressing Button C and start this step over again.)

When Button E is pushed, the display will show all horizontal bars indicating that no further program steps may be entered, regardless of what the STEP display reads. This is because the loop is always the last thing you do. Pushing Button E at this point will have no effect. You can gain access to the remaining program segments by clearing “LOOP” (press Button C). If you push Button E after pushing Button D just once, the GB5 will assume that it is a HOLD. In this case, a subsequent push of Button D will be ignored, since the GB5 is expecting a temperature. In short, the sequence of buttons to be pressed is:

For a HOLD: D, E, (humidity or temperature)

For a LOOP: D, D, E

When set on a 24-hour cycle, the times may slowly “creep” over a period of days. A channel set to come on at 8:00 a.m. gradually will come on later in the day. There are several reasons for this. First, due to technical constraints, the GB5’s internal clock is off by about 15 seconds a day. Although this amounts to only about 2 minutes a week, it eventually will add up. Second, anything that stops the timer, such as power failures (which may well go unnoticed because of the GB5 Memory Back-up) or pushing Button D (HOLD), will delay the cycle. Third, if the channel goes into AUTO-HOLD for any reason, the cycle will be delayed.

When using the looping feature, the current channel humidity or temperature is read as the starting point for calculating the temperature slope on the first segment of the profile. Thus, if your channel humidity or temperature is higher during the second run of an increasing cycle, there will be a less steep ramp than the first time. If you want the repeat to start from some specific point, you must put that into your program.

### 3.7 Delayed Start

The GB5 has a *delayed start* feature. The main use of this is to have your room waiting for you at working temperature when you arrive in the morning. With the GB5, you do not have to leave the channel on all night to accomplish this, thus saving on your fuel bill and your time. All you have to do is set the first step of your profiles to zero humidity and zero temperature and set the times to indicate the amount of time that should elapse before the channel should begin to heat.<sup>2</sup> Then set the second steps to HOLD at the desired morning humidity and temperature. Be sure to start the HOLD soon enough to allow the room to attain desired humidity and temperature before you need to use it.

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<sup>2</sup>Whenever the programmed humidity or temperature is set to zero, the GB5 will run its clock without turning on the channel and without engaging AUTO-HOLD.



# Chapter 4

## Special Features of the GB5

The GB5 is designed with several special features to enhance its ease of use and reliability. These include

- stretching the length of steps to meet the capabilities of your system using automatic holds,
- preservation of your programs in the event of a power failure, and
- monitoring of memory integrity.

### 4.1 Automatic Hold

Using the program you entered, the GB5 calculates a humidity and temperature for each minute of the cycle. It bases its decision about automatic holding on these values. Essentially, if your room is not able to keep up with the humidity and temperature changes you requested, the GB5 clocks for these channels will be stopped until the channels catch up.

On heating steps (ramping up), the AUTO-HOLD light will come on if the channel temperature is more than 2°F below the calculated temperature for the current minute. On cooling steps, the AUTO-HOLD light will come on whenever the channel temperature exceeds the calculated temperature for the current minute by more than 2°F.

Once the AUTO-HOLD is engaged because of the temperature, it keeps both clocks stopped until the required temperature calculated for the current minute is actually achieved.

Similarly, if the measured relative humidity lags more than two percent behind the profile — i.e., the actual humidity is two percent too low if ramping up or two percent too high if ramping down — AUTO-HOLD will be engaged.

Once the AUTO-HOLD is engaged because of humidity, it keeps both clocks stopped until the required humidity calculated for the current minute is actually achieved.

Under normal circumstances, AUTO-HOLD is thought of as something that compensates for unusual demands placed on your system's ability to follow a profile. If you open the room, *e.g.* to add or remove something, you will probably engage AUTO-HOLD.

## 4.2 Guaranteed Humidity and Temperature

At the end of each step, the GB5 guarantees that the system actually reaches the programmed humidity and temperature before allowing it to go on to the next step. When necessary, the clock will be stopped during the last minute of a step to allow the system to reach these values. The AUTO-HOLD light will come on while the clock is stopped.

## 4.3 Error Messages

There are certain serious problems that could cause improper temperature readings or overheating of a channel. When this happens, an error code of the form "ERR??" will appear in the display to identify the problem. An ERR represents a problem that affects all channels.

The "ERR??" display is made up of unusual-looking characters. "ERR" is an uppercase E, two lower-case r's, and then two digits (represented here by question marks). We mention all this because the messages can be very confusing when first seen, and we hope you see them seldom enough that you never get used to them!

These are the various error messages and their interpretations.

**ERR10, ERR24, ERR28:** The GB5's internal circuitry has detected an evanescent error, probably caused by environmental electrical noise. If this happens repeatedly, you may need a power line conditioner.

**ERR21** The line voltage has dropped below that required for reliable operation of the GB5. The GB5 will shut itself down until the line voltage is restored.

**ERR4?** These errors occur when there is a timing problem in the optional serial communication.

**ERR5?, ERR60, ERR70:** These all correspond to internal errors indicating problems with the analog to digital converter. If the first digit is 5, the second digit helps Digitry locate the cause of the difficulty.

All these error messages are self-clearing; they remain active only so long as the problem is detected; once the problem disappears, the error clears itself. However, if the problem recurs frequently, the corresponding error will appear to latch on.

## 4.4 Behavior During Power Failures

Special components and circuitry are used within the GB5 to preserve its memory during power failures. The GB5 will remember:

- which channels were running and which were idle when the power failed,
- the program step and time of each running channel when the outage occurred, and
- the last humidity or temperature reading of each running channel at the time of the power failure.

During the power failure, the face of the GB5 will look blank. When power is restored, “8”s will appear in the TIME and TEMPERATURE displays while the GB5 takes new, reliable humidity and temperature readings. Concurrently, the UNIT display counts down from four to one<sup>1</sup>.

After the GB5 has measured the temperature of all channels, the SCAN FUNCTION will be triggered (see section 2.5, page 8). Note that even a very short power failure will cause the SCAN FUNCTION to be activated.

## 4.5 Memory Failure

Your GB5 continually checks its internal memory for accuracy. In case of a memory failure, the green and red MODE lights alternately will light about every one-half second and “P”s (for “Problem”) will flash across the TIME and TEMPERATURE displays.

In the event of a memory failure, the GB5 is designed to protect your work and channels by running the following sequence. First, it will turn off all channels for about one minute to allow the humidity and temperature readings to stabilize. Then, it will read the current humidity and temperature of each channel and hold at those values until you reprogram the GB5.

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<sup>1</sup>It is important to realize that many power failures are extremely short, so short that you may not even notice them. As a consequence, from time-to-time your GB5 may appear to count down spontaneously. This is invariably a result of power difficulties of some sort.

When the GB5 signals a memory failure, pushing any button on the keyboard will reset it. It then will stop flashing, display UNIT #1, clear all memories and set all channels to IDLE. If you do not reprogram the GB5, your channels will begin to cool down.

Fortunately, memory failure is quite unusual. It can usually be traced to one of two causes:

- A voltage transient so fast and so powerful that it swamps the GB5's protective circuitry and modifies program memory. Digity's memory assurance scheme is so sensitive that it will detect the alteration of even a single digit.
- Power failure while you are entering a program. In this case, the memory assurance scheme may detect inconsistent information.

# Chapter 5

## Reference

### 5.1 GB5 Specifications

The GB5 Programmable Humidity and Temperature Controller, basic model, can be used with two humidity and two temperature probes. Channel one is associated with relative humidity and channel two, with temperature. Channels three and four are configured to parallel one and two, so these could be used to control a second acclimatization room or as back-up for the first room.

**Power Requirements:** 10 watts at 110–130 volts AC, 60 cycle, grounded outlet (220–240 volts, 50 cycle available).

**Temperature Measurement Range:** 2 channels, 32° to 122°F.

**Relative Humidity Measurement Range:** 2 channels, 0% to 100%.

**Programmable Temperature Range:** 32° to 80°F.

**Programmable Relative Humidity Range:** 0% to 70%.

**Resolution:** 1 part in 4100.

**Repeatability:** 1°F temperature; 1% relative humidity.

**Timing:** crystal controlled.

**Output:** 4 channels, ON/OFF control via UL approved solid state relays with zero crossing detection; 3 amps at 24–140 volts AC, fused internally, minimum 1000 volts isolation between input and output.

**Programming:** 9 programs; 15 set-points per program; maximum of 543 hours in one minute increments for each program.

**Dimensions (H×W×D):**  $9'' \times 12\frac{11}{16}'' \times 6\frac{1}{8}''$

**Shipping Weight:** 7 lbs. (3.18 kg.)

**Operator Interface:**  $\frac{1}{2}''$ , 7-segment, red LED; 16-position sealed keyboard (dust and moisture resistant).

## 5.2 Sales and Service

The main offices of Digitry Company, Inc., are located at:

188 State Street, Suite 21  
Portland, ME 04101  
USA  
Phone +1-207-774-0300  
Email [info@digitry.com](mailto:info@digitry.com)  
Internet [www.digitry.com](http://www.digitry.com)

Write or call for all sales, service, or technical information.

## 5.3 Loaner Program

If your GB5 should malfunction after the warranty has expired, you can return the GB5 to Digitry for repair.

Realizing that the GB5 will become an indispensable part of your facility, Digitry will, upon request, immediately send a GB5 “loaner” for the duration of the repair. Please call the Maine office for the current cost of the loaner and the deposit amount. There is a daily surcharge if the loaner is kept for more than 3 working days after you receive your repaired GB5.

## 5.4 Warranty Information

DIGITRY COMPANY, INC., (“SELLER”) WARRANTS THAT THE PROGRAMMABLE TEMPERATURE CONTROLLER (“PRODUCT”) SOLD TO PURCHASER SHALL BE OF STANDARD QUALITY OF SELLER. SELLER’S OBLIGATION AND LIABILITY UNDER THIS WARRANTY IS EXPRESSLY LIMITED

TO REPAIRING OR REPLACING, AT SELLER'S OPTION, A PRODUCT NOT OF SELLER'S STANDARD QUALITY FOR A PERIOD OF NINETY (90) DAYS FROM THE DATE OF DELIVERY. SELLER MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. SELLER'S OBLIGATION UNDER THIS WARRANTY SHALL NOT INCLUDE ANY TRANSPORTATION CHARGES OR COSTS OF INSTALLATION OR ANY LIABILITY FOR DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES, DELAY OR LOSS OF PROFITS, EVEN IF SELLER HAS BEEN INFORMED BY PURCHASER OF THE POSSIBILITY OF SUCH DAMAGES.

IF REQUESTED BY SELLER, A PRODUCT ON WHICH A WARRANTY CLAIM IS MADE SHALL BE RETURNED TRANSPORTATION PREPAID TO SELLER'S PRINCIPAL PLACE OF BUSINESS. ANY IMPROPER USE, OPERATION, SUBSTITUTION OF PARTS, OR ALTERATION OR REPAIR BY OTHERS IN SUCH A MANNER AS IN SELLER'S JUDGMENT AFFECTS A PRODUCT MATERIALLY AND ADVERSELY SHALL VOID THIS WARRANTY. NO EMPLOYEE OR REPRESENTATIVE OF SELLER IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR TO GRANT ANY OTHER WARRANTY.





# Chapter 6

## Glossary

### **Auto-Hold**

Automatic function that halts the channel timer if the actual humidity or temperature varies too far from its programmed value.

### **Channel**

All the components, both hardware and software, that correspond to a given input line.

### **Confirmation Sequence**

A feature of the GB5 that requires you to enter a specific sequence of keys to prevent accidental starting, erasing, or resetting of programs.

### **Hold**

Function that stops the channel timer and maintains the programmed humidity or temperature for an indefinite period of time (also known as an indeterminate “soak”).

### **Idle**

Condition in which control power to a channel and the channel timer are off and the GB5 is ready to start at the beginning of a profile.

### **Looping**

Command that triggers the indefinite repetition of a humidity or temperature profile.

### **Memory Back-up**

Safety device to ensure program retention in the event of power failure.

**Monitor Mode**

Operating mode used to display current time and humidity or time and temperature set-points for a given channel. GB5 must be in this mode to start or stop a channel.

**Program Mode**

Operating mode that permits entering, changing or examining GB5 humidity and temperature profiles.

**Ramping**

An increase or decrease in humidity or temperature over time.

**Run**

State in which the channel timer is activated and the channel follows its programmed operations.

**Scan Function**

Feature that automatically cycles through each channel, displaying time and humidity or temperature for a few seconds before going to the next one.

**Set-Point**

The target humidity or temperature of the channel at any given instant. During a soak, the set-point is the soak humidity or temperature. When your GB5 is ramping up or down, the set-point can change as often as every minute. The GB5 automatically calculates the set-point based on elapsed time and the profile you have entered. This term is also used for the times and humidity or temperatures you punch in to define a program.

**Skip-step**

Function that instructs the program to jump to the following programmed step.

**Slope**

The pitch, or rate of increase or decrease in humidity or temperature, determined by time and humidity or time and temperature set-points.

**Soak**

Function that holds a specific humidity or temperature setting for a designated period of time.

**Step**

A single pair of time and humidity or time and temperature instructions to be executed in a program, corresponding to a single ramp up, ramp down, soak or hold.

**Voltage transient**

An electrical disturbance of very short duration, typically caused by lightning or by heavy electrical equipment.