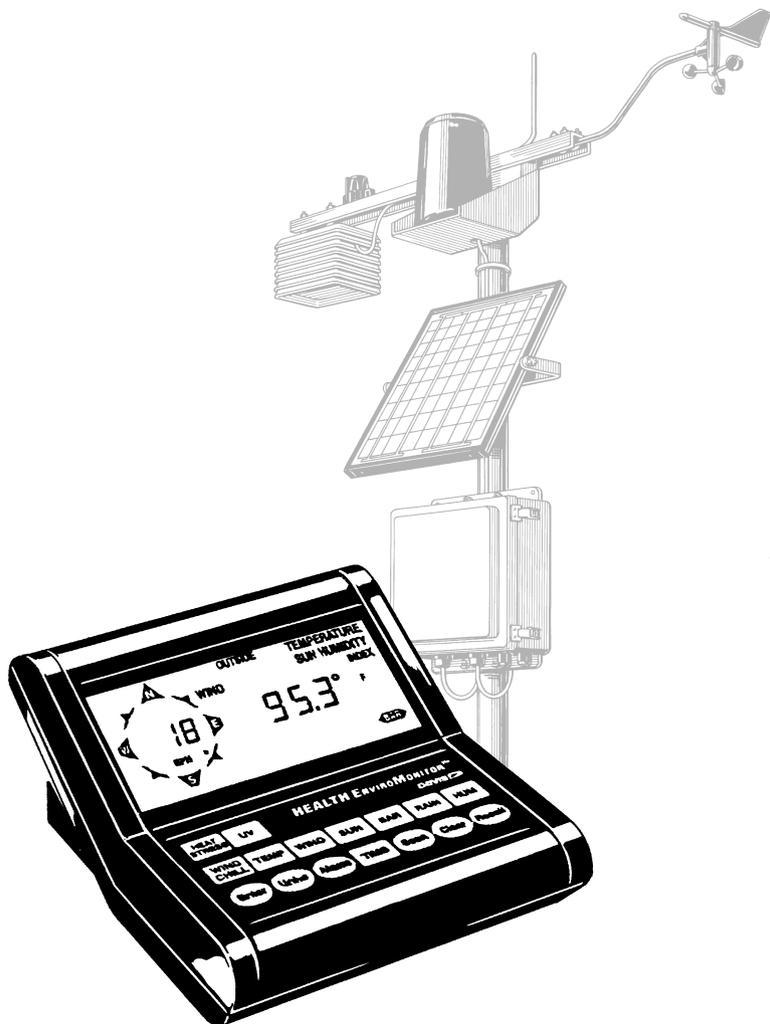


HEALTH ENVIROMONITOR™

DAVIS 

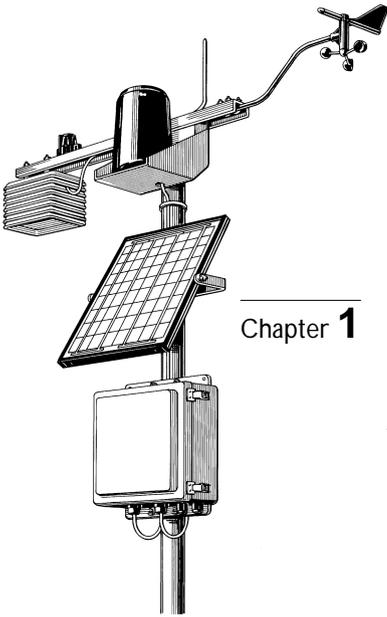


CONSOLE USER'S MANUAL

Product # 7470 & 7475

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Chapter 1

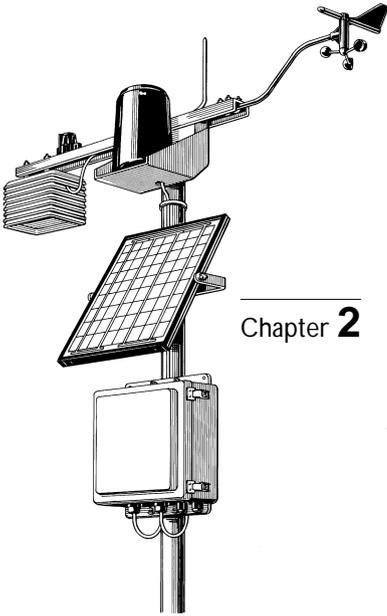
INTRODUCTION TO THE HEALTH ENVIROMONITOR

For use by individuals, radio and TV stations, parks, amusement parks, and resorts, the Health EnviroMonitor (Health EM) monitors the weather conditions that may contribute to health hazards: sunburn, skin cancer, heat stress, and hypothermia. This integrated weather station, computer, and data logger measures/calculates, displays, and stores wind speed and direction, wind run, solar radiation, solar energy, air temperature, heat stress and wind chill (apparent temperature), humidity, barometric pressure, UV radiation, UV dose, rainfall, and rate of rainfall. Current values, high and low values, cumulative totals, and daily averages are available for display at the push of a button. The system can even sound an alarm when values exceed a threshold set by the user.

OPTIONAL SENSORS

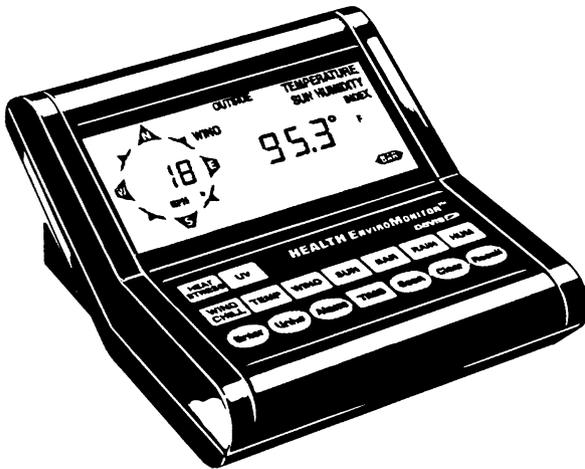
The following optional sensors enable the Health EM to measure and calculate specialized weather information. All optional sensors are available from your dealer or may be ordered directly from Davis Instruments.

- **Anemometer**
Enables you to measure and display wind speed, wind direction, and wind chill (with temperature sensor). The Health EM will also use the wind speed reading in calculating temperature-humidity-sun-wind index.



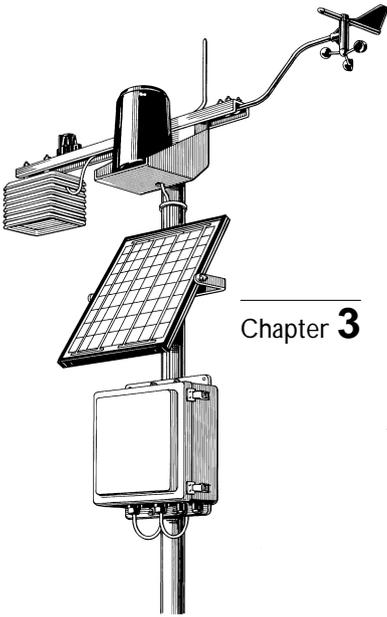
Chapter 2

HEALTH ENVIROMONITOR OVERVIEW



THE KEYBOARD

The Health EM's keyboard contains two different types of keys: function keys and operation keys. The larger and more square keys are the function keys and are used to display the various conditions measured and calculated by the Health EM. The smaller and more rounded keys are operations keys and are used to view or use the various features of the Health EM.



Chapter 3 USING THE HEALTH EM

USING THE ENTER KEY

The ENTER key is used to enter or change data (such as an alarm threshold setting). You should become familiar with the use of this key, since it serves many purposes in operating the Health EM. The ENTER key has two basic modes of operation, each of which is explained below.

- **Press and release**

In general, each digit in a value is changed separately. The “active” digit (the one which is currently ready to be changed) flashes on and off in the display. Pressing and releasing ENTER cycles through all available digits in a value, making each digit active in turn. Each time you press and release ENTER, the next digit becomes active. When you first begin to change a value, the leftmost digit will be active. Pressing and releasing ENTER will cause the second digit (from the left) to become active, and so on. When you get to the last digit in a value, pressing and releasing ENTER makes the first digit (the leftmost digit) active once again.

HEALTH ENVIROMONITOR SYSTEM CONSOLE QUICK REFERENCE

FUNCTION KEYS

The lists below indicate what condition appears when you press each function key. Each time you press the key, the next item in the list appears.

ET (Evapotranspiration)

- Daily ETo Sum
- Total ETo for the Period
- Average Daily ETo for the Period
- Period Start Date
- ETo AutoClear Status

DEG DAYS (Growing Degree-Days)

- Daily Degree-Day Sum
- Total Degree-Days for the Period
- Average Daily Degree-Days for the Period
- Base Degree-Day Threshold
- Upper Degree-Day Threshold
- Period Start Date
- Degree-Day Auto Clear Status

TEMP (Temperature)

- Current Air Temperature
- Current Soil Temperature
- Current Temperature-Humidity Index
- Current Wind Chill
- Temperature AutoClear Status

WIND (Wind)

- Current Wind Speed
- Daily Wind Run
- Average Daily Wind Run for the Period
- Current Wind Direction
- Period Start Date
- Wind AutoClear Status

SUN (Solar Radiation)

- Current Solar Radiation Intensity
- Daily Incident Solar Energy Sum
- Average Daily Solar Energy for the Period
- Period Start Date
- Daily Solar Energy AutoClear Status

RAIN (Rainfall)

- Daily Rainfall and Rate of Rainfall
- Total Rainfall
- Rainfall AutoClear Status

BAR (Barometric Pressure)

- Current Barometric Pressure

HUM (Relative Humidity)

- Current Relative Humidity
- Relative Humidity AutoClear Status

DEW (Dew Point/Leaf Wetness)

- Current Dew Point
- Current Leaf Wetness

TIME (Time and Date)

- Current Time
- Current Date
- Current Year
- AutoClear Time
- Period Start Date

HIGHS AND LOWS

See "Highs and Lows" on page 13 for a list of highs and lows stored by the console.

- To view the high or low, press the appropriate function key to display the desired condition. Press **Recall** to view the high/low. Wait a few seconds and the time at which the high/low occurred will appear. Press **Recall** again to view the low if both a high and low are stored.
- To clear a high/low, press the appropriate keys as necessary to display the desired high/low. Press and hold **Clear** until the high/low value is cleared.

ALARMS

See "Alarms" on page 14 for a list of available alarms.

- To view an alarm threshold, press the appropriate function key to display the desired condition. Press **Alarm** to view the threshold.
- To set an alarm, press the appropriate keys to display the desired alarm threshold. Use **Enter** to set the threshold.
- To silence an alarm, press **Clear**.
- To clear an alarm, press the appropriate keys to display the desired alarm threshold. Press and hold **Clear** until the alarm threshold is cleared.

PERIOD INFORMATION

The console uses a single time period for all values which accumulate totals or calculate averages over an interval. See "Period" on page 12 for a list of values accumulated or averages calculated during the period.

- To clear all "period" information and start a new period, press **TIME** as necessary to display the period start date. Press and hold **Clear** until the period information is cleared.

AUTOCLEAR

The console may be set to automatically clear some or all daily values at the same time each day. See "AutoClear" on page 13 for a list of all information which may be cleared using AutoClear.

- To enable/disable AutoClear for a condition or group of conditions, press the appropriate function key as necessary to display the AutoClear status. Press **Enter** to toggle the AutoClear setting between OFF and ON.
- To set the time at which AutoClear clears values, press **TIME** as necessary to display the AutoClear time. Use **Enter** to set the desired time.

CHOOSING UNITS OF MEASURE

To select the unit of measure in which a condition is displayed, press the appropriate function key to display the desired condition. Press **UNITS** until the desired unit of measure appears in the display.

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- **Press and hold**

Pressing and holding ENTER makes the next digit in the value active *and* to begins cycling through all available entries for the active digit (or digits). As long as you hold ENTER down, the station will continue to cycle through all possible entries for that digit. When the desired entry appears, release ENTER.

Note: *To protect against accidental changing of the barometric pressure once it has been set, you must press and hold ENTER for at least 8 second before changing the barometric pressure value. As you hold ENTER for those 8 seconds, the entire value will flash as a further reminder.*

Entering Negative Numbers

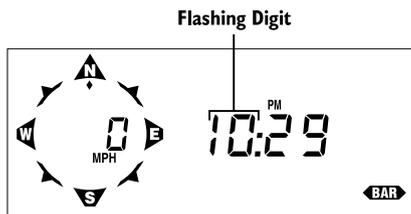
If you want to enter a negative number, first enter the number without the negative sign. Then press and release ENTER until the appropriate digit (the one where you want to place the negative sign) begins to flash. Hold ENTER as this digit cycles through the available entries, one of which will be a negative sign if a negative entry is valid.

Example of Using ENTER: Setting the Time

You should use the following step-by-step example of using the ENTER key to help you better understand its use.

1. Press TIME until the time display appears.
2. Press UNITS to change from the 12-hour format to the 24-hour format, as desired.
The 12-hour format is indicated by the symbol AM or PM. The 24-hour format is indicated by the symbol 24HR.
3. Press ENTER and hold it down.

The two left hand digits, which represent the hour, will begin to flash and then cycle through the possible entries. (Note that the two digits which represent the hour are linked together when using the ENTER key.) If you are using the 12-hour format, the digits cycle from 12 AM to 11 PM. If you are using the 24-hour format, the digits cycle from 0 to 23.

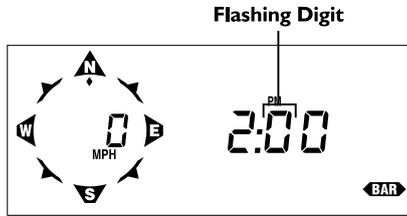


ENTERING THE HOUR DIGITS

4. Release ENTER when the correct entry appears.
5. Press and release ENTER to move to the next digit, the "tens" digit.
The "tens" digit begins to flash.

6. Press and hold ENTER down.

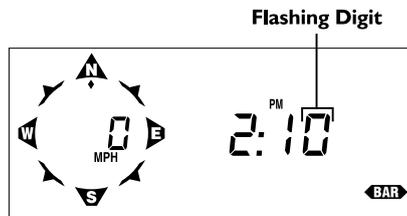
The “tens” digit will begin to cycle through the possible entries (0 to 5).



ENTERING THE “TENS” DIGIT

7. Release ENTER when the correct entry appears.
8. Press and release ENTER to move to the next digit, the “ones” digit.
The “ones” digit begins to flash.
9. Press and hold ENTER down.

The “ones” digit will begin to cycle through the possible entries (0 to 9).



ENTERING THE “ONES” DIGIT

10. Release ENTER when the correct entry appears.
11. If necessary, repeat the steps above to correct your entry for any of the digits.
12. When you have entered the correct time, wait four seconds without pressing any keys.
After four seconds, the Health EM saves the entry and returns to normal operation. The time you just entered will appear in the display as the current time.

APPARENT TEMPERATURE (HEAT STRESS)

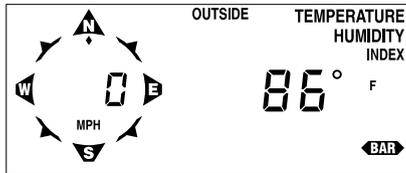
The Health EM displays the current outside T-H index, the current outside T-H-S-W index, and the current inside T-H index. In addition, you may view the high for any of these conditions along with the time at which they occurred. You may display all conditions in °F or °C.

Note: In order to get the most accurate solar contribution to T-H-S-W index readings, you must calibrate the Health EM for your latitude and use the Sensor Tilt Bracket. See “Calibration Numbers” starting on page 47 for details on calibrating the Health EM for your latitude.

Viewing Apparent Temperature

1. To display the current outside T-H index, press HEAT STRESS.

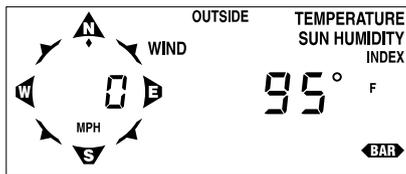
The current outside T-H index appears on the right of the display.



CURRENT OUTSIDE T-H INDEX

2. To display the current outside T-H-S-W index, press HEAT STRESS again.

The current outside T-H-S-W index appears on the right of the display.

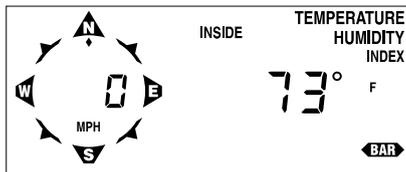


CURRENT T-H-S-W INDEX

Note: If the station does not have a solar radiation sensor, the SUN segment will be absent from the display. Likewise, if the station does not have an anemometer, the WIND segment will be absent from the display.

3. To display the current inside T-H index, press HEAT STRESS.

The current inside T-H index appears on the right of the display.



CURRENT INSIDE T-H INDEX

4. To display the status of the AutoClear function for high outside T-H index, high outside T-H-S-W index, and high inside T-H index, press HEAT STRESS again.

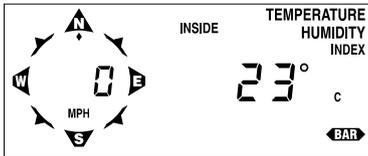
If the AutoClear function is enabled, the word **On** appears on the right of the display. If the AutoClear function is disabled, the word **OFF** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)

Note: You cannot enable/disable the AutoClear function separately for outside T-H index, outside T-H-S-W index, and inside T-H index. These functions are “linked” and AutoClear for them must be either enabled or disabled together.

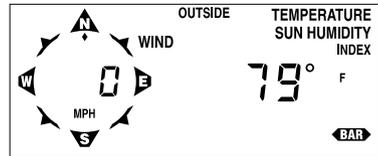
5. Continuing to press HEAT STRESS will cycle through the apparent temperature displays in a continuous loop.

Selecting Units of Measure

To select the desired unit of measure, simply press UNITS while viewing any of the apparent temperature displays (except Auto Clear). As you press UNITS, the Health EM alternates between °F and °C. All temperature information (including temperature, wind chill, and dew-point) will appear in the units of measure you select.



Celsius (°C)



Fahrenheit (°F)

SAMPLE UNITS OF MEASURE

High Apparent Temperature

The Health EM displays the high outside T-H index, the high outside T-H-S-W index, and the high inside T-H index along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Alarms

You may set a high alarm for outside T-H index, outside T-H-S-W index, and for inside T-H index. (See “Alarms” on page 42.)

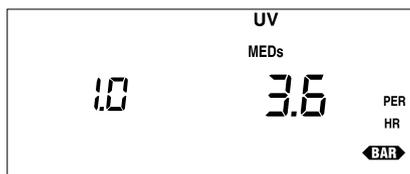
UV RADIATION

The Health EM displays the current UV radiation intensity, “daily” UV radiation dose, the UV radiation dose rate per hour, the accumulated UV radiation dose during a user-defined period, and the average daily dose of UV radiation during a user-defined period. In addition, you may view the highest UV radiation intensity along with the time at which it occurred. You may display current UV radiation intensity using either MEDs or the UV Index. All other UV radiation conditions are displayed in MEDs.

Viewing UV Radiation

1. To display the current UV radiation intensity, press UV.

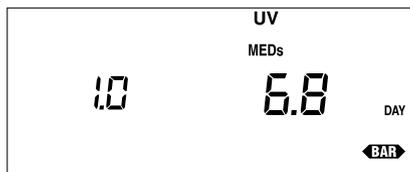
The current intensity of UV radiation appears on the right side of the display. If displaying in MEDs, the skin factor appears on the left of the display.



CURRENT UV RADIATION INTENSITY

2. To display the “daily” UV radiation dose, press UV again.

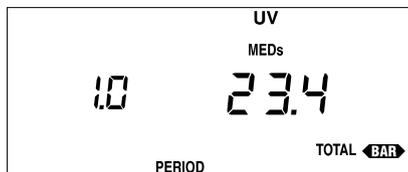
The accumulated “daily” UV radiation dose appears on the right side of the display. The skin factor appears on the left of the display.



“DAILY” UV RADIATION DOSE

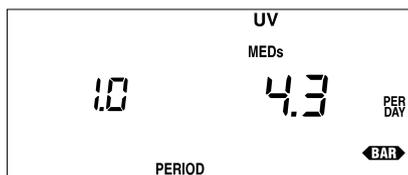
Daily UV dose represents the UV dose since the last time you (or AutoClear) cleared the daily UV dose register. For instructions on clearing daily UV dose, see “Clearing Daily and Total UV Dose” on page 23.

3. To display the accumulated UV radiation dose during the “period,” press UV again. The accumulated UV radiation dose appears on the right side of the display. The skin factor appears on the left of the display. The “period” represents a number of days during which you have accumulated UV radiation dose information. The “period” totals give you an extra UV radiation register so that you may track UV information over a couple of days, a week, a month, a year, or any other span of time which you desire. For information on clearing the “period” (and beginning a new “period”), see “Clearing Period Information/Starting a New Period” on page 24.



ACCUMULATED UV RADIATION DOSE

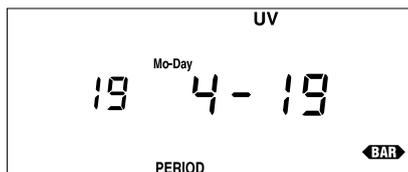
4. To display the average daily dose of UV radiation during the “period,” press UV again. The average daily dose of UV radiation during the “period” appears on the right side of the display. The skin factor appears on the left of the display. The “period” represents a range of days over which you have calculated the daily average dose. Depending on how often you clear the period, you may track average daily UV radiation dose over a couple of days, a week, a month, a year, or any other span of time which you desire. For information on clearing the “period” (and beginning a new “period”), see “Clearing Period Information/Starting a New Period” on page 24.



AVERAGE DAILY UV RADIATION DOSE

5. To display the date on which the current period started and the number of days in the current period, press UV again.

The day on which the current period started appears on the right of the display. The number of days in the current period appears on the left of the display.



PERIOD INFORMATION

- To display the status of the AutoClear function for high UV radiation intensity and high daily UV radiation dose, press **UV** again.

If the AutoClear function is enabled, the word **On** appears on the right of the display. If the AutoClear function is disabled, the word **OFF** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)

Note: You cannot enable/disable the AutoClear function separately for “daily” UV radiation dose and UV radiation dose rate. These functions are “connected” and AutoClear for them must be either enabled or disabled together.

- Continuing to press **UV** will cycle through the UV displays in a continuous loop.

Setting Skin Factor

MEDs may be scaled to take into account skin type because different skin types burn at different rates. You may change the scale to reflect your skin type, if desired. The table below may give you guidance in determining the skin factor you wish to use. The lower the skin factor, the longer it takes skin to burn. Note that MEDs, as a standard unit of measure, are based on a skin factor of 1.0.

<u>SKIN TYPE</u>	<u>HISTORY OF SUNBURNING AND TANNING</u>	<u>SKIN FACTOR RANGE</u>
I	Always burns easily, never tans	1.2 to 1.4
II	Always burns easily, tans minimally	0.9 to 1.1
III	Burns moderately, tans gradually and uniformly	0.7 or 0.8
IV	Burns minimally, always tans well	0.5 or 0.6
V	Rarely burns, tans profusely	0.4 or 0.5
VI	Never burns, deeply pigmented	0.3 or 0.4

Note: Be aware that skin types are only related to the sun burning effects of UV. Other UV-related health problems such as cataracts and immune system suppression are unrelated to skin type. Therefore, changing skin factors may cause the Health EM to underrepresent the danger of UV exposure.

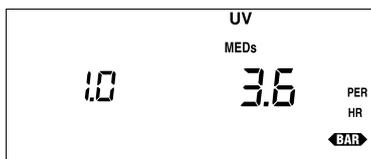
- To change the skin factor, press **UV** as necessary to view any UV display in which the skin factor appears.
- To change the skin factor, press and release **ENTER**.

Each time you press **ENTER**, the skin factor (which appears on the left of the display) increases by 0.1. When you get to 1.4, pressing **ENTER** returns the skin factor to the minimum, 0.1.

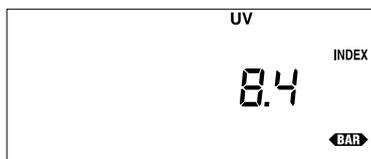
Note: Changing skin factor does not affect the stored radiation data. You may scan through skin factors to observe the effect of current UV intensity and dose on various skin types.

Selecting Radiation Intensity Scale

To select the desired UV radiation intensity scale, simply press UNITS while viewing the current UV radiation intensity display. As you press UNITS, the Health EM alternates between MEDs and the UV Index.



MEDs



UV Index

MEDs AND UV INDEX

High UV Radiation Intensity

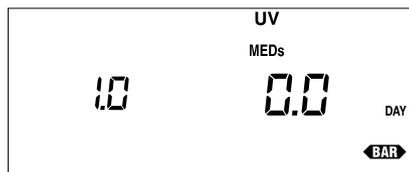
The Health EM displays the high UV radiation intensity along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Clearing Daily and Total UV Dose

You may clear daily or total UV dose at any time to begin a new total.

Note: *Clearing total UV dose resets the period. See “Clearing Period Information/Starting a New Period” on page 24 for information on the period.*

1. Press UV as necessary to display either daily or total UV dose.
2. Press and hold down CLEAR until the UV dose total resets to zero.



DAILY UV DOSE CLEARED

Clearing Period Information/Starting a New Period

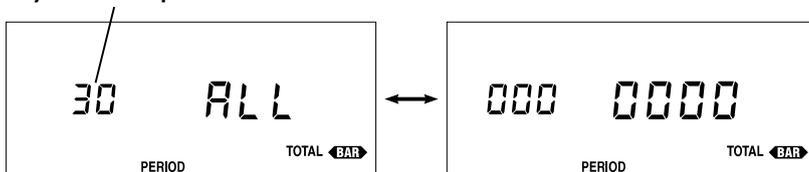
Beginning a new period clears all data from the previous period. The system stores the beginning date of the period, which you may display along with the number of days which have elapsed since the beginning of the period. A new total UV radiation dose begins to accumulate and the Health EM begins to calculate a new average daily UV radiation dose. To clear period information and begin a new period you may clear total UV dose as described in “Clearing Daily and Total UV Dose” on page 23 or as described below.

Note: The system records the start time of the period to the nearest 90 minutes. Therefore, all average values are exact to the nearest 90-minute mark throughout the period. However, averages calculated during the period are most accurate when the period length is an exact number of days (that is, if you display the average at the same time of day at which the period started). When the length of the period is displayed, the GroWeather rounds down to the nearest whole day COMPLETED.

1. Press UV as necessary to display the period information.
2. Press and hold down CLEAR.

As you hold down CLEAR, the display alternates between showing the number of days in the period and the word ALL and showing zeros (0 0 0 0) on both sides of the display. This provides you ample warning that the Health EM is preparing to clear the period information and begin a new period.

Days in current period



DISPLAY TOGGLE DURING PERIOD CLEAR

3. To clear the UV period totals and begin a new period, hold down CLEAR until the display stops flashing and the period information display returns to normal.

When the display stops flashing, it means that the Health EM has cleared the UV period totals and begun a new UV period.

Alarms

You may set a high alarm for current UV radiation intensity and “daily” UV radiation dose. (See “Alarms” on page 42.)

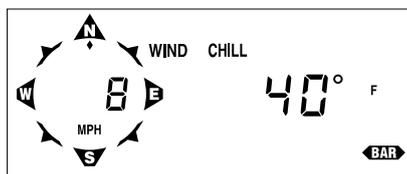
WIND CHILL

The Health EM displays the wind chill as well as the low wind chill along with the time at which it occurred. You may display wind chill in °F or °C.

Viewing Wind Chill

1. To display the current wind chill, press WIND CHILL.

The current wind chill appears on the right side of the display.



CURRENT WIND CHILL

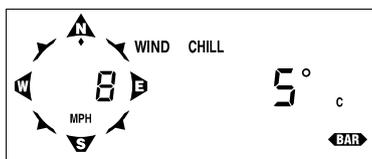
2. To display the status of the AutoClear function for low wind chill, press WIND CHILL again.

If the AutoClear function is enabled, the word **O n** appears on the right of the display. If the AutoClear function is disabled, the word **O F F** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.).

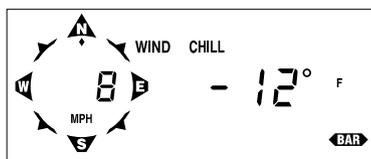
3. Continuing to press WIND CHILL will alternate between the wind chill and AutoClear displays.

Selecting Units of Measure

To select the desired unit of measure, simply press UNITS while viewing the any of the wind chill displays (except Autoclear). As you press UNITS, the Health EM alternates between °F and °C. All temperature information (including apparent temperature, temperature, and dew-point) will appear in the units of measure you select.



Celsius (°C)



Fahrenheit (°F)

SAMPLE UNITS OF MEASURE

Low Wind Chill

The Health EM displays the low wind chill along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Alarms

You may set a low alarm for wind chill. (See “Alarms” on page 42.)

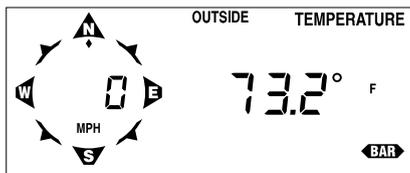
OUTSIDE AND INSIDE TEMPERATURE

The Health EM displays the current outside and inside temperature. In addition, you may view the high and low outside and inside temperatures along with the time at which they occurred. You may display outside and inside temperature in °F or °C and at a resolution of either 0.1° or 1°.

Viewing Temperature

1. To display the current outside temperature, press TEMP.

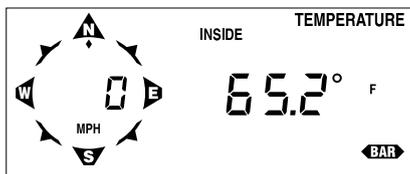
The current outside temperature appears on the right of the display.



CURRENT OUTSIDE TEMPERATURE

2. To display the current inside temperature, press TEMP again.

The current inside temperature appears on the right of the display.



CURRENT INSIDE TEMPERATURE

3. To display the status of the AutoClear function for high and low outside and inside temperature, press TEMP again.

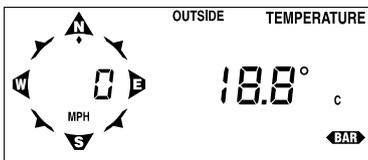
If the AutoClear function is enabled, the word **On** appears on the right of the display. If the AutoClear function is disabled, the word **OFF** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)

Note: You cannot enable/disable the AutoClear function separately for outside and inside temperature. These two functions are “linked” and AutoClear for them must be either enabled or disabled together.

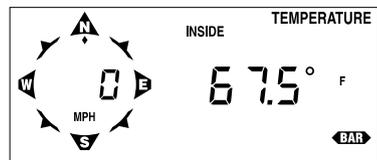
- Continuing to press TEMP will cycle through the outside and inside temperature displays in a continuous loop.

Selecting Units of Measure

To select the desired unit of measure, simply press UNITS while viewing any of the temperature displays (except AutoClear). As you press UNITS, the Health EM cycles through the available units and resolutions in the following order: 1°F, 0.1°F, 1°C, 0.1°C. All temperature information (including apparent temperature, wind chill, and dew-point) will appear in the units of measure you select.



Celsius (°C)



Fahrenheit (°F)

SAMPLE UNITS OF MEASURE

High and Low Temperature

The Health EM displays the high and low outside and inside temperature along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Alarms

You may set a high and a low alarm for outside and inside temperature. (See “Alarms” on page 42.)

WIND

You may select to display current wind speed and current wind direction (in degrees) on the right side of the display. In addition, you may view the high wind speed along with the direction of the gust and the time at which it occurred. You may display wind speed in either miles per hour (MPH), Knots (kts), kilometer per hour (km/h), or meters per second (m/s).

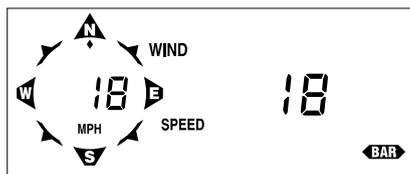
The Compass Rose

Wind speed and direction are also displayed in the compass rose on the left of the display. The compass rose is divided into 16 points. Wind direction is indicated by a flashing diamond at one of these points. Current wind speed and the unit of measure in which wind speed is being displayed appear at the center of the compass rose. The compass rose appears on the Health EM display at almost all times (it does not appear when displaying UV or rainfall, for example).

Viewing Wind Conditions

1. To display the current wind speed, press WIND.

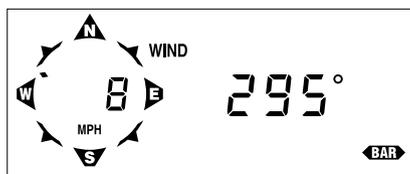
The current wind speed appears on the right of the display.



CURRENT WIND SPEED

2. To display the wind direction in degrees, press WIND again.

The wind direction reading, to a resolution of 1°, appears on the right of the display.

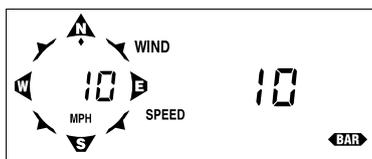


WIND DIRECTION

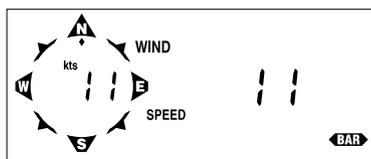
3. To display the status of the AutoClear function for high wind speed, press WIND again. If the AutoClear function is enabled, the word **O n** appears on the right of the display. If the AutoClear function is disabled, the word **O F F** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)
4. Continuing to press WIND will cycle through the wind displays in a continuous loop.

Selecting Units of Measure

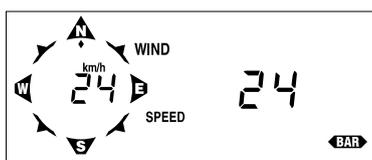
To select the desired unit of measure, simply press UNITS while viewing the wind speed display. As you press UNITS, the Health EM cycles through the available units of measure in the following order: MPH, km/h, m/s, kts.



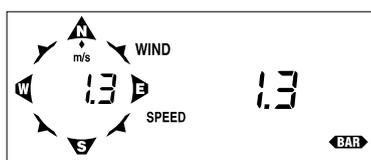
Miles per Hour (MPH)



Knots (kts)



Kilometers per Hour (km/h)



Meters per Second (m/s)

SAMPLE UNITS OF MEASURE

High Wind Speed

The Health EM displays the high wind speed along with the time at which it occurred and the direction of the high gust. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Alarms

You may set a high alarm for wind speed. (See “Alarms” on page 42.)

SOLAR RADIATION

The Health EM displays the current solar radiation intensity and the highest solar radiation intensity along with the time at which it occurred. Solar radiation intensity is displayed in Watts per square meter (W/m^2).

Viewing Solar Radiation

- To display the current solar radiation intensity, press SUN.

The current solar radiation intensity appears on the right of the display.



CURRENT SOLAR RADIATION INTENSITY

2. To display the status of the AutoClear function for the high solar radiation intensity, press **SUN** again.

If the AutoClear function is enabled, the word **O n** appears on the right of the display. If the AutoClear function is disabled, the word **O F F** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)

3. Continuing to press **SUN** will alternate between the two solar radiation displays.

High Solar Radiation Intensity

The Health EM displays the high solar radiation intensity along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

BAROMETRIC PRESSURE

The Health EM displays current barometric pressure in inches of Hg (in), millimeters of Hg (mm), and hectoPascals (hPa).

Barometric Trend Indicator

The barometric trend indicator, which appears on the bottom right hand corner of the display, gives you a visual indication of whether barometric pressure is steady, rising, or falling. The barometric trend indicator updates approximately every 15 minutes.

- **Steady Barometric Pressure**

If barometric pressure changed by less than .02 inches of Hg (1.5 mm or .7 hPa) over the past hour, the steady barometric pressure indicator appears.



STEADY BAROMETRIC PRESSURE INDICATOR

- **Rising Barometric Pressure**

If barometric pressure rose by .02 inches of Hg (1.5 mm or .7 hPa) or more over the past hour, the rising barometric pressure indicator appears.



RISING BAROMETRIC PRESSURE INDICATOR

- **Falling Barometric Pressure**

If barometric pressure fell by .02 inches of Hg (1.5 mm or .7 hPa) or more over the past hour, the falling barometric pressure indicator appears.



FALLING BAROMETRIC PRESSURE INDICATOR

Viewing Barometric Pressure

1. To display current barometric pressure, press BAR.

The current barometric pressure appears on the right of the display.



CURRENT BAROMETRIC PRESSURE

Selecting Units of Measure

To select the desired unit of measure, simply press UNITS while viewing the current barometric pressure. As you press UNITS, the Health EM cycles between in, mm, and hPa.



Millimeters of Hg (mm)



HectoPascals (hPa)

SAMPLE UNITS OF MEASURE

Entering Barometric Pressure

Because atmospheric pressure varies with both altitude and local weather conditions, you must enter the current barometric pressure for your location. Wait at least one hour after powering the Health EM (to allow the circuit a chance to stabilize) before you enter barometric pressure. Once the barometric pressure is set, the Health EM will calculate and display the correct barometric pressure until the unit is moved to a different altitude or power is interrupted.

1. Determine the current barometric pressure.

Many TV and radio weather reports carry this information. Or you may call your local airport control tower.

2. Press BAR to display current barometric pressure.
3. Press and hold down ENTER until the barometric pressure reading stops flashing. At first, the entire barometric pressure reading will flash as a warning. After four seconds the Health EM will revert to normal entry mode (i.e., only one digit flashing).
4. Use ENTER to set the correct barometric pressure. See "Using the Enter Key" on page 15 for instructions on using ENTER.
5. When finished setting the barometric pressure, press any function key to exit.

The Health EM saves the barometric pressure reading.

Alarms

You may set a special barometric pressure alarm which will alert you to changes in the barometric pressure. (See “Setting the Barometric Pressure Alarm” on page 44.)

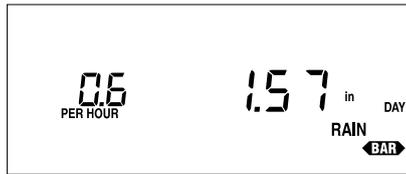
RAINFALL

You may display the daily rainfall and the total rainfall on the right side of the display. Whenever you view daily rainfall, the rate of rainfall appears on the left side of the display. In addition, you may view a daily high rate of rainfall along with the time at which it occurred. You may display rainfall in either inches (in) or millimeters (mm). Rate of rainfall is displayed in inches per hour (in/hr) or millimeters per hour (mm/hr).

Viewing Rainfall

1. To display “daily” rainfall, press RAIN.

The amount of daily rainfall appears on the right of the display. The current rate of rainfall appears on the left of the display.



DAILY RAINFALL

Daily rainfall represents the amount of rainfall since the last time you (or AutoClear) cleared the daily rainfall register. For instructions on clearing daily rainfall, see “Clearing Daily and Total Rainfall” on page 35.

2. To display the total rainfall, press RAIN again.

The total rainfall appears on the right of the display.



TOTAL RAINFALL

Total rainfall represents the amount of rainfall since the last time you cleared the total rainfall register. For instructions on clearing total rainfall, see “Clearing Daily and Total Rainfall” on page 35.

- To display the status of the AutoClear function for daily rainfall and for the high rate of rainfall, press RAIN again.

If the AutoClear function is enabled, the word **O n** appears on the right of the display. If the AutoClear function is disabled, the word **O F F** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)

Note: You may not enable/disable the AutoClear function separately for daily rainfall and high rate of rainfall. These two functions are “linked” and AutoClear for them must be either enabled or disabled together.

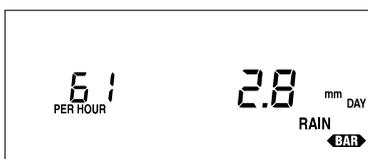
- Continuing to press RAIN will cycle through the rain displays in a continuous loop.

Selecting Units of Measure

To select the desired unit of measure, simply press UNITS while viewing any of the rainfall displays (except AutoClear). As you press UNITS, the Health EM alternates between inches and millimeters. Rate of rainfall switches from inches per hour to millimeters per hour automatically.



Inches (in)



Millimeters (mm)

SAMPLE UNITS OF MEASURE

Entering Total Rainfall

You may have previously recorded rainfall amounts which you want reflected in the Health EM's total rainfall amounts. Use the procedure below to enter a total rainfall amount.

- Press RAIN as necessary to display total rainfall.
- Use ENTER to set the desired amount of total rainfall.
See “Using the Enter Key” on page 15 for instructions on using ENTER.
- When finished entering the total rainfall amount, press RAIN.
The Health EM saves the total rainfall amount. The system will add any further rainfall to this total, until you clear total rainfall.

High Rate of Rainfall

The Health EM displays the high rate of rainfall along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Clearing Daily and Total Rainfall

You may clear daily and/or total rainfall at any time to begin a new total.

Note: *The daily and total rainfall values must be cleared separately.*

1. Press RAIN as necessary to display either daily or total rainfall.
2. Press and hold down CLEAR until the rainfall total resets to zero.



TOTAL RAINFALL CLEARED

Note: *To prevent accidental clearing of the total rainfall, you need to hold CLEAR down for 7 seconds before total rainfall clears. Daily rainfall clears after only 3 seconds.*

Alarms

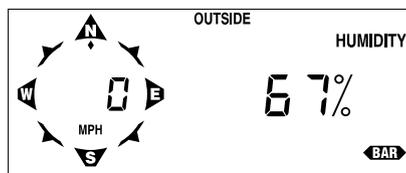
You may set a high alarm for daily rainfall. (See “Alarms” on page 42.)

RELATIVE HUMIDITY

The Health EM displays the current outside and inside humidity and the current dew-point. In addition, you may view the high and low outside and inside humidity along with the time at which they occurred. You may display dew-point in either °F or °C.

Viewing Humidity

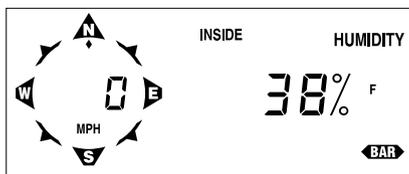
1. To display the current outside humidity, press HUM.
The current outside humidity appears on the right of the display.



CURRENT OUTSIDE HUMIDITY

2. To display the current inside humidity, press HUM again.

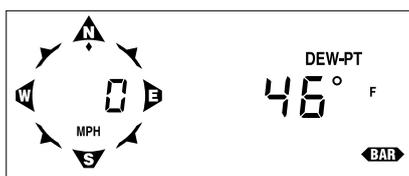
The current inside humidity appears on the right of the display.



CURRENT INSIDE HUMIDITY

3. To display the current dew-point, press HUM again.

The current dew-point appears on the right of the display.



CURRENT DEW-POINT

4. To display the status of the AutoClear function for high and low outside and inside humidity (On/Off), press HUM again.

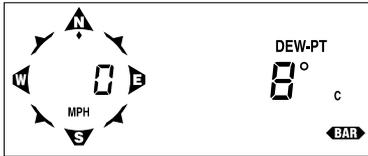
If the AutoClear function is enabled, the word **O n** appears on the right of the display. If the AutoClear function is disabled, the word **O F F** appears on the right of the display. (See “Enabling/Disabling AutoClear” on page 46 for instructions.)

Note: *You may not enable/disable the AutoClear function separately for high and low outside humidity, inside humidity. These functions are “linked” and AutoClear for them must be either enabled or disabled together.*

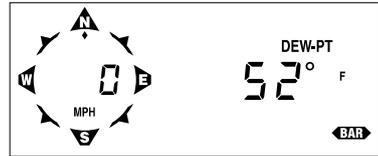
5. Continuing to press HUM will alternate between the humidity and dew-point displays.

Selecting Units of Measure

To select the desired unit of measure for dew-point, simply press UNITS while viewing any dew-point display. As you press UNITS, the Health EM alternates between °F and °C. All temperature information (including apparent temperature, temperature, and wind chill) will appear in the units of measure you select.



Celsius (°C)



Fahrenheit (°F)

SAMPLE UNITS OF MEASURE

High and Low Humidity

The Health EM displays the high and low outside and inside humidity along with the time at which it occurred. For information on displaying and clearing highs and lows, see “Highs and Lows” starting on page 40.

Alarms

You may set a high and a low alarm for both outside and inside humidity. You may set a special alarm for dew-point which alerts you if temperature comes within 2°F (1°C) of dew-point. (See “Alarms” on page 42.)

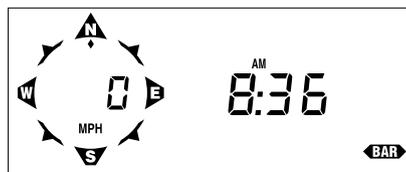
TIME

The Health EM displays the current time, date, year, and the time at which the Health EM performs the AutoClear each day. You may display time in either 12-hour (AM/PM) or 24-hour (24h) format. You may display date in either Month-Day (Mo-Day) or Day:Month (Day:Mo) format. You may set the time, date, year, and the time at which you wish the Health EM to perform the AutoClear each day.

Displaying Time Functions

1. To display the current time, press TIME.

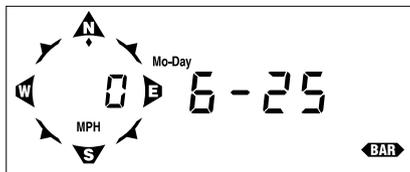
The current time appears on the right of the display.



TIME

2. To display the current date, press TIME again.

The current date appears on the right of the display.



DATE

3. To display the current year, press TIME again.

The current year appears on the right of the display.



YEAR

4. To display the time at which the Health EM executes the AutoClear function each day, press TIME again.

The time at which the Health EM executes the AutoClear function each day appears on the right of the display.



TIME OF AUTOCLEAR

5. Continuing to press TIME will cycle through the time displays in a continuous loop.

Selecting Display Format

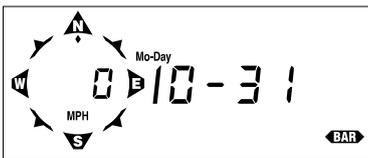
To select the desired display format, simply press UNITS while viewing either the time or the date. As you press UNITS, the Health EM alternates between the available time/date formats.



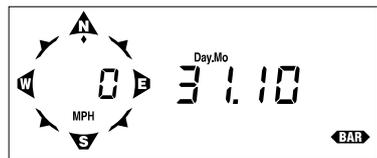
Time: 12-hour Format



Time: 24-hour Format



Date: Month-Day Format



Date: Day.Month Format

SAMPLE DISPLAY FORMATS

Entering Time, Date, or Year

1. Press TIME as necessary to display the time, date, or year, as desired.
2. Use ENTER to set the time, date, or year.
If using the 12-hour format, make sure you correctly set the time to AM or PM, as desired.
3. Press TIME to exit.
The Health EM saves the time, date, or year.

Setting the Time for AutoClear

1. Press TIME until the AutoClear screen appears.



AUTOCLEAR TIME

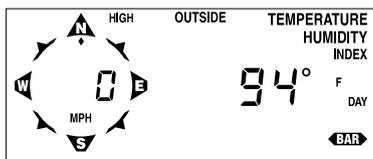
2. Use ENTER to set the time at which you wish to have the AutoClear values cleared (see "AutoClear" on page 12).
If using the 12-hour format, make sure you correctly set the time to AM or PM, as desired.

3. Press TIME to exit.

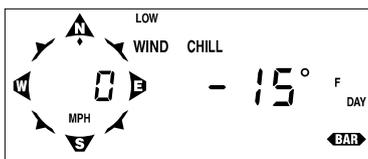
The Health EM saves the AutoClear time. At the set time each day, the Health EM clears those functions for which AutoClear is enabled (See “Enabling/Disabling AutoClear” on page 46).

HIGHS AND LOWS

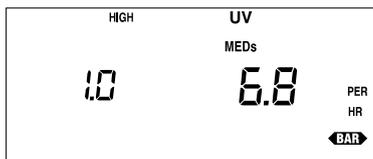
The Health EM stores highs/lows for many of its functions. The table contained in “Highs and Lows” starting on page 13 lists all of the highs and lows stored/displayed by the Health EM. The procedure for displaying and clearing highs and lows is the same for each high/low. The general procedure is covered below.



High Outside T-H Index



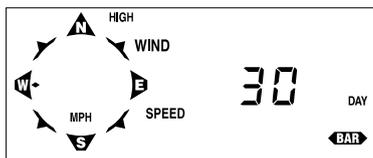
Low Wind Chill



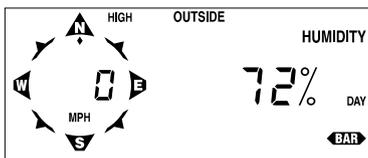
High UV Radiation Intensity



High Rate of Rainfall



High Wind Speed



High Outside Humidity

SAMPLE HIGH/LOW DISPLAYS

When viewing high wind speed, the direction of the high gust appears as a steady (not flashing) diamond at one of the points.

Displaying Highs and Lows

1. Press the appropriate key as necessary to display the desired weather condition.
2. To view the high/low, press Recall.

The high/low reading appears on the right of the display. (If a function stores/displays both a high and a low, the high reading appears first.)

3. To view the time at which the high/low occurred, watch the display without pressing a key.
After approximately four seconds, the time at which the high/low occurred will appear on the right of the display. As long as you do not press a key, the Health EM will continuously alternate between the high/low reading and the time.
4. If a function stores/displays both a high and a low, press Recall again to view the low. The low reading appears on the right of the display.
5. To view the time at which the low occurred, watch the display without pressing a key. After approximately four seconds, the time at which the low occurred will appear on the right of the display. As long as you do not press a key, the Health EM will continuously alternate between the low reading and the time.

Clearing Highs and Lows

Clearing a high or a low value erases the currently stored value in order to obtain a new high/low reading.

1. Press the appropriate key as necessary to display the desired weather condition.
2. Press RECALL as necessary to display the high or low for that condition.
3. Press and hold down CLEAR until the high/low value is cleared.

When the value stops flashing it means that the high/low has been cleared. It is not uncommon for another high/low reading to appear almost immediately. This is simply because the Health EM is constantly in the process of recording new highs and lows.

4. Press any function key to exit.
Each high/low is independent of every other. For instance, clearing the high air temperature does not clear the low air temperature. You must clear each individually.

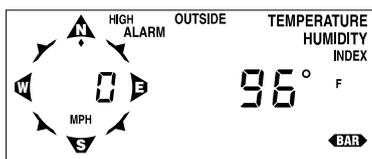
ALARMS

All alarms (except barometric pressure, dew-point, and time) behave in basically the same way. The general procedure for displaying and setting alarms is covered below.

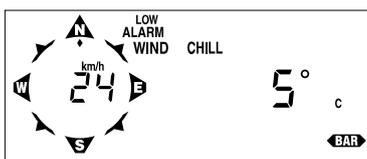
The Alarm Display

When an alarm is triggered, the Health EM beeps and immediately displays the weather function triggering the alarm. The word ALARM flashes on and off in the display. The alarm display continues until alarm conditions are no longer met (see “Alarms” on page 14) or until the alarm is cleared.

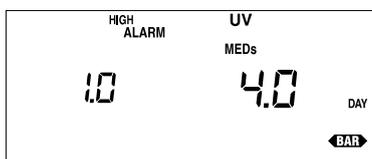
Note: You may silence the beeping by pressing CLEAR at any time, though the alarm display remains.



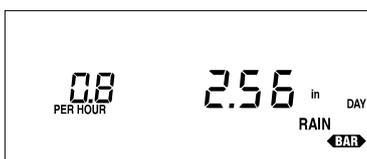
High T-H Index Alarm



Low Wind Chill Alarm



High “Daily” UV Dose Alarm



High “Daily” Rainfall Alarm

SAMPLE ALARM DISPLAYS

If more than one alarm is triggered at once, the Health EM scans through all of the triggered alarms, displaying each for approximately four seconds before moving to the next.

Note: If you have the Alarm Output Module certain alarm conditions may be used to provide electrical contact closures for activating or inhibiting external controllers or electrical equipment.

Viewing an Alarm Threshold

1. Press the appropriate key(s) to display the desired weather condition.
2. Press ALARM.

If the selected weather condition has only one alarm, the alarm threshold for that weather condition appears. If the weather condition has two alarms, the threshold for the high alarm appears first.

- To display the low alarm threshold for a weather condition with two alarms press **ALARM** again.
The threshold for the low alarm appears.
- Press any function key to exit.

Setting a Normal Alarm Threshold

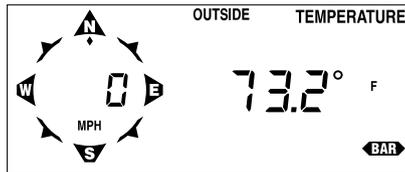
Follow the procedure below for instructions on setting a standard high or low alarm threshold. Specific instructions for setting the barometric pressure and dew-point alarm are explained separately below.

- Press the appropriate key(s) to display the desired weather condition.
- Press **ALARM** as necessary to display the desired alarm threshold.
- Use **ENTER** to set the alarm.
- Press any function key to save and exit.

Example of Setting an Alarm Threshold: Low Outside Temperature Alarm

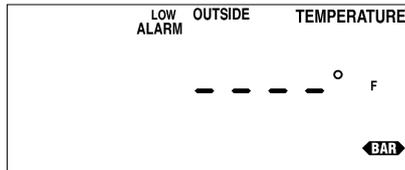
This example shows you how to set the Health EM's low outside temperature alarm to 32°F.

- Press **TEMP** as necessary to display outside temperature.



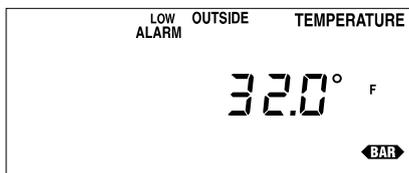
OUTSIDE TEMPERATURE

- Press **UNITS** as necessary to select °F.
- Press **ALARM** twice to display the low alarm threshold.
The high alarm threshold appears first, then the low alarm threshold.



OUTSIDE TEMPERATURE LOW ALARM THRESHOLD (NO SETTING)

- Use ENTER to set the alarm to 32° F.



LOW OUTSIDE TEMPERATURE ALARM THRESHOLD (32° F)

- Press TEMP to save and exit.

The alarm is now set and will sound when the outside temperature drops to 32°F.

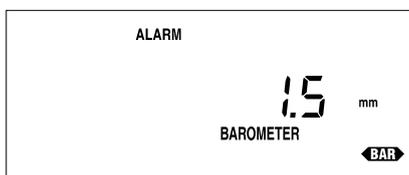
Setting the Barometric Pressure Alarm

This section describes the barometric pressure alarm. The barometric pressure alarm is a special alarm in that it is triggered when the rate of change in the barometric pressure equals or exceeds the alarm threshold. There are three possible barometric pressure alarm thresholds: 0.02", 0.04", or 0.06" (0.5 mm, 1.0 mm, 1.5 mm or 0.7 hPA, 1.4 hPA, 2.0 hPA). The alarm is triggered whether the barometric pressure rises or falls. To determine which way the barometric pressure is moving, check the barometric trend arrow.

- Press BAR to display the current barometric pressure.
- Press ALARM to display the barometric pressure alarm threshold.
- Press and hold down ENTER.

The unit will cycle through the available alarm thresholds in a continuous loop as long as you hold down ENTER.

- Release ENTER when the desired setting appears.



BAROMETRIC PRESSURE ALARM (1.5 MM PER HOUR)

- Press BAR to save and exit.

The alarm is now set and will sound when the rate of change in the barometric pressure equals or exceeds the alarm threshold.

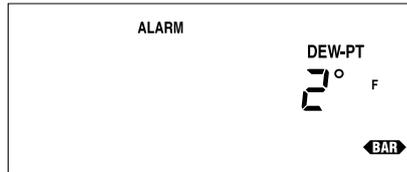
Setting the Dew-Point Alarm

This section describes the dew-point alarm. The dew-point alarm is a special alarm in that it is triggered when the temperature comes within 2°F of the dew-point.

- Press HUM as necessary to display the current dew-point.
- Press ALARM to display the dew-point alarm threshold.

3. Press ENTER to activate the alarm.

There is only one threshold for the dew-point alarm (2°F/1°C) which will appear in the display when you press ENTER. Pressing ENTER again has no effect.



DEW-POINT ALARM (2°F)

4. Press DEW to save and exit.

The alarm is now set and will sound when the temperature comes within 2°F of the dew-point.

To Silence an Alarm

To silence an alarm that has been triggered, press CLEAR. The beeping sound stops, though the alarm is not cleared. The word ALARM and the function triggering the alarm remain on the display until alarm conditions are no longer met or the alarm is cleared (as explained below). If a new alarm is triggered, the console will begin beeping again.

To Clear an Alarm

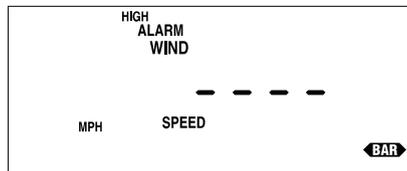
1. Press the appropriate key(s) to display the desired weather condition.

Note that, when an alarm has been triggered, the weather condition causing the alarm will appear on the display automatically (See “The Alarm Display” on page 42). If more than one alarm has been triggered at once, wait until the weather condition you want to reset appears on the display and then press ALARM.

2. Press ALARM as necessary to display the desired alarm threshold (high or low) for that function.

3. Press and hold down CLEAR until a series of dashes replaces the alarm threshold on the display.

Dashes in an alarm display indicate the alarm is not active.



ALARM CLEARED

4. Press any function key to exit.

Each alarm threshold is independent of every other. For instance, clearing the high air temperature alarm does not clear the low air temperature alarm. You must clear each alarm individually

ENABLING/DISABLING AUTO CLEAR

The general procedure for enabling and disabling the AutoClear function for individual weather conditions is covered below.

1. Press the appropriate key(s) to display the desired weather condition's AutoClear display.



TYPICAL AUTO CLEAR STATUS

2. Press ENTER to alternate the status between on and off.

3. Press any function key to save and exit.

GENERAL HIGH/LOW CLEAR

The Health EM includes a general clear feature which enables you to quickly clear most of the high and low registers. The general clear feature, however, will not clear any high/low value for which AutoClear (see "AutoClear" on page 12) has been turned on.

The following registers are cleared by the general clear feature:

- High Outside and Inside T-H Index
- High Outside T-H-S-W index
- Low Wind Chill
- High and Low Outside and Inside Temperature
- High Wind Speed
- High Solar Radiation Intensity
- High and Low Outside Humidity

The following registers are NOT cleared by the general clear feature:

- "Daily" UV Radiation Dose
- Accumulated UV Radiation Dose
- "Daily" Rainfall
- Total Rainfall
- High Rate of Rainfall

To Use General Clear Feature

1. Press a function key to display any condition other than “daily” rainfall, total rainfall, or UV.

General clear will not work from any display in which the CLEAR key already performs some action. Therefore it will not work in high/low displays or alarm displays either.

2. Press and hold down CLEAR.

The display will flash seven times as a warning.

3. When the display stops flashing, release CLEAR.

When the display stops flashing, the unit clears the registers listed above and returns to normal operation.

CALIBRATION NUMBERS

Calibration numbers exist for many conditions and enable you to adjust the displayed value to your satisfaction. This section explains calibration numbers and how to set or change them.

T-H-S-W Index Latitude

The T-H-S-W index uses a latitude calibration to estimate the position of the sun and increase the accuracy of the readings. You need to determine your latitude and then select the closest available latitude CAL. The possible entries are as follows: -55°, -45°, -40°, -35°, -30°, -25°, 0°, 25°, 30°, 35°, 40°, 45°, 50°, 55°, 60°, 70°.

Default CAL = 40°

Inside and Outside Temperature

You may use temperature CAL to adjust the temperature up or down a specific number of degrees. Note that there are individual CAL numbers for both inside and outside temperature. If you change CAL for temperature, any calculated data which uses temperature (wind chill, for example) will also be affected.

$$\text{Calibrated Temperature} = \text{Temperature} + \text{CAL}$$

Default CAL = 0 (for ° F and ° C).

Outside Humidity

You may use humidity CAL to adjust the humidity up or down a specific number of percentage points. Note that there is a CAL numbers for outside humidity only. If you change CAL for humidity, any calculated data which uses humidity (T-H index, for example) will also be affected.

$$\text{Calibrated Humidity} = \text{Humidity} + \text{CAL}$$

Default CAL = 0%.

Wind Speed

You may change the wind CAL to adjust the wind speed readings according to the equation shown below. If you change CAL for wind speed, any calculated data which uses wind speed (wind chill, for example) will also be affected.

$$\text{Calibrated Wind Speed} = \text{Revolutions} * (1600/\text{CAL})$$

Default CAL = 1600 (for mph), 995 (for kph), 1843 (for knots), or 3578 (for m/s).

Rainfall

Rainfall CAL determines how much rainfall each increment (pulse) represents. The default rainfall CAL of 100 works for a 0.01" increment.

$$\text{Calibrated Rainfall} = \# \text{ of pulses} * (1/\text{CAL})$$

Default CAL = 100 (for 0.01" rain collector).

If you use a rain collector which measures in a different increment, or if you wish to display rainfall in a unit of measure other than the rain collector's native unit of measure, consult the table below to determine the correct calibration number for your purposes.

<u>RAIN COLLECTOR'S "NATIVE" INCREMENT</u>	<u>DISPLAY UNITS</u>	<u>RAINFALL CAL</u>
0.01 inches	Inches	100 (default)
0.01 inches	Millimeters	N/A (See note below table.)
0.1 inches	Inches	10
0.1 inches	Millimeters	N/A (See note below table.)
0.2 mm	Inches	127
0.2 mm	Millimeters	5
1 mm	Inches	N/A (See note below table.)
1 mm	Millimeters	1

Note: Rainfall CAL must be a whole integer (no decimals). Generally, if the Health EM is set to display rainfall in a unit of measure other than the rain collector's "native" unit of measure, you would be required to enter a CAL number which was not a whole integer. Therefore, we STRONGLY advise you to always set your Health EM to display the rain collector's native unit of measure before entering, changing, or viewing rainfall CAL. Failure to do so may result in inaccurate rainfall readings. Be aware, however, that no so long as have the correct rainfall CAL for your rain collector, the Health EM will accurately convert rainfall amounts from inches to millimeters (and vice versa).

Changing Calibration Numbers

1. Press the appropriate function key as necessary to display the reading for which you wish to change the CAL. Hold down the function key after pressing it for the final time. For example, if you want to change the CAL for inside temperature, press TEMP until the outside temperature appears. Then press and hold TEMP to display inside temperature. After holding the function key for approximately three seconds, the word CAL begins to alternate in the display with the reading. After a few more seconds, the current calibration number appears.
2. Use ENTER to set CAL.
See “T-H-S-W Index Latitude Calibration” on page 49 for information on the latitude CAL. See “Entering Negative Numbers” on page 16 for instruction on entering negative CAL numbers.
3. When finished, press any function key to save the new CAL and exit the calibration display.

T-H-S-W Index Latitude Calibration

The procedure for setting the latitude CAL differs slightly. Instead of entering a number, you must select the closest latitude from the available CAL entries. To select the latitude entry, press and hold ENTER when viewing the T-H-S-W index latitude CAL display. The display will cycle through all available entries, release ENTER when the desired entry appears on the display.

Resetting Calibration Numbers to Default

To completely reset all calibration numbers to their default settings, follow the procedure below to completely remove power from and then restart the station. When the station restarts, all default calibration values are restored.

Note: *This resets all station information including highs/lows, barometric pressure, total rainfall, UV period information, etc.*

1. Write down the total rainfall, barometric pressure, and all alarm settings. You will need to reenter these values later.
2. If desired, write down all highs, lows, daily rainfall, and UV period information. These values will be lost and cannot be restored.
3. Disconnect all power sources from the station, including the power adapter, battery backup, solar power, etc.
All power must be removed from the unit.
4. Reattach the power adapter and insert the battery.
The unit will start up again and all CAL numbers will be reset to their default values.
5. Re-enter the total rainfall, barometric pressure, and all alarm settings.

DISPLAY SCAN

The Health EM comes with two pre-programmed scan routines which continuously cycle through various displays. The short scan routine displays every condition measured or calculated by the Health EM. The long scan routine displays every condition measured or calculated and every high/low stored by the Health EM. The long scan routine does not show the times at which highs/lows were recorded.

Starting the Scan Routines

1. To start the short scan routine, press SCAN.

The unit begins to cycle through the short scan routine. Until you stop the scan routine, it will continuously cycle through every condition measured or calculated by the Health EM.

2. To start the long scan routine, press SCAN again.

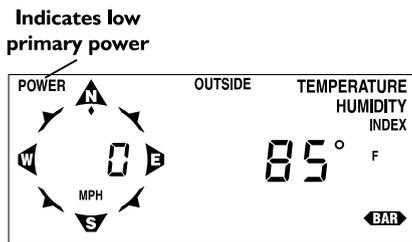
The unit begins to cycle through the short scan routine. Until you stop the scan routine, it will continuously cycle through every condition measured or calculated by the Health EM and every high/low stored by the Health EM.

Stopping a Scan Routine

A scan routine will continue until you manually stop it or an alarm is triggered. To stop a scan routine, simply press any function key. The unit will cease cycling through the scan routine and display the appropriate condition.

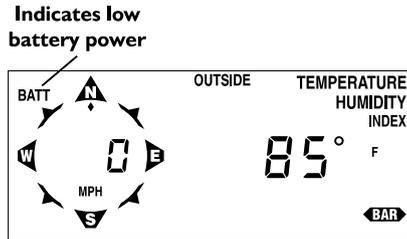
PRIMARY POWER AND BATTERY BACKUP INDICATORS

The Health EM display contains two “troubleshooting” indicators which help protect against accidental interruption of power. Both indicators appear in the upper left hand corner of the display and they may appear singly or together. Flashing of the POWER indicator indicates low power state or a disruption of the primary power source (the power source connected to the POWER jack on the bottom of the unit). If you see this indicator, check the connection of the primary power from the POWER jack all the way to the power source.



POWER INDICATOR

Flashing of the BATT indicator indicates that the backup battery is low on power. You should replace the battery when you see this indicator, or the backup battery may not last through an unexpected power outage and data will be lost.



BATT INDICATOR

WEATHER CONDITIONS MEASURED/CALCULATED

This section outlines each of the weather conditions measured/calculated by the Health EM. Each section includes a brief discussion of the weather condition and a listing of the various ways in which the unit displays or stores that condition. Be aware that some of the weather conditions require an optional sensor in order to measure/calculate a value (see “Optional Sensors” on page 1). If you do not have the required sensor that reading will appear as a series of dashes in the Health EM display.

Values which are described as “Daily” readings will provide true daily readings only if they are cleared each day. You may clear these values yourself or use AutoClear (see “AutoClear” on page 11) to clear them for you. If you do not clear the values every day, then you can use the “daily” readings to represent any interval you desire: two days, one week, one month, etc.

The notation “(AutoClear)” next to a weather condition indicates that the Health EM’s AutoClear function may clear the weather condition at a set time every day. For information on AutoClear, see “AutoClear” on page 11.

The notation “(Alarm:)” next to a weather condition indicates that an alarm exists for the weather condition. The type of alarms are noted after the colon. For information on Alarms, see “Alarms” on page 12.

Heat Stress (Temperature-Humidity Index)

Temperature-humidity index (T-H index), commonly called heat stress, uses the temperature and the relative humidity to determine how hot the air actually “feels.” When humidity is low, the apparent temperature will be cooler than the air temperature since perspiration can rapidly evaporate into the air. However, when humidity is high (i.e., the air is saturated with water vapor) the apparent temperature will be higher than the air temperature.

If you have an anemometer and solar radiation sensor, the Health EM takes into account the effects of sun and wind in determining how hot the air actually “feels.” This reading is called the Temperature-Humidity-Sun-Wind index (T-H-S-W index). If you have only an anemometer or only a solar radiation sensor, the Health EM will still report the T-H-S-W index, taking into account whatever factors are available. In addition, the display only shows those segments for which you have a sensor. For example, if you only have a temp/hum sensor and an anemometer, the Health EM will calculate the T-H-W index (taking into account only the effects of temperature, humidity, and wind) and only display the TEMPERATURE, HUMIDITY, and WIND segments. Unfortunately, the absence of either the anemometer or the solar radiation sensor can lead to inaccurate readings, especially when the wind or solar radiation readings are high.

Note: *The Health EM measures T-H index (and T-H-S-W index) only when temperature is above 68° F (20° C) because it is a measure of heat stress which is not significant at lower temperatures. 125° F (52° C) is the highest T-H index for which calculation factors are available. Above 125° F (52° C), the system simply reports that T-H index is “high.”*

- Current Outside T-H Index (Alarm: Max)
- Current Outside T-H-S-W Index (Alarm: Max)
- Current Inside T-H Index (Alarm: Max)
- “Daily” High Outside T-H Index with time of occurrence (AutoClear)
- “Daily” High Outside T-H-S-W Index with time of occurrence (AutoClear)
- “Daily” High Inside T-H Index with time of occurrence (AutoClear)

UV Radiation

Energy from the sun reaches the earth as visible, infrared, and ultraviolet (UV) rays. Exposure to UV rays can cause numerous health problems, such as sunburn, skin cancer and other skin damage, cataracts, and can suppress the immune system. The Health EM can help analyze the changing levels of UV radiation and can serve to warn of situations where exposure is particularly unacceptable.

Be aware, however, that the Health EM’s UV readings do not take into account UV reflected off snow, sand, or water, which can significantly increase the amount of UV to which you are exposed. Nor does the Health EM take into account the dangers of prolonged exposure to UV radiation and the readings do not suggest that any amount of exposure is safe or healthful. Do not use the Health EM to determine the amount of UV radiation to which you expose yourself. Individual response to UV may vary widely. Scientific evidence suggests that UV exposure should be avoided and that even low UV doses can be harmful.

There are two scales in which UV is displayed. The first scale is MEDs. MED stands for Minimum Erythral Dose, which is defined as the amount of sunlight exposure necessary to induce a barely perceptible redness of the skin within 24 hours after sun exposure. In other words, exposure to 1 MED will result in a reddening of the skin. You can determine the number of minutes of sun exposure it will take to burn by dividing 60 by the MEDs per hour. Of course, different skin types burn at different rates, a fact which is accounted for by the use of skin factors, which are explained in “Setting Skin Factor” on page 22.

The second scale is the UV Index, which assigns a number between 1 and 16 to the current UV intensity. The lower the number, the lower the danger of sunburn. The following exposure categories have been assigned to the various index numbers:

<u>INDEX VALUES</u>	<u>EXPOSURE CATEGORY</u>
0 - 2	Minimal
3 - 4	Low
5 - 6	Moderate
7 - 9	High
10 +	Very High

- **Current Intensity of UV Radiation (Alarm: High)**
- **“Daily” UV Radiation Dose**
- **UV Radiation Dose Rate per hour**
- **Accumulated UV Radiation Dose during user-defined period**
- **Average Daily Dose of UV Radiation during user-defined period**
- **High UV Radiation Dose Rate with time of occurrence**

Wind Chill

Wind chill takes into account how the speed of the wind affects our perception of the air temperature. The body warms up the air molecules which surround it by transferring heat from the skin to the surrounding air. If the wind is completely still, this “insulating layer” of warm air molecules stays next to the body, offering some protection from the cooler air molecules and limiting further transfer of heat. When the wind is blowing, however, the warm air surrounding the body is swept away. The faster the wind blows, the faster the heat is carried away and the colder you feel.

- **Current Wind Chill (Alarm: Low)**
- **“Daily” Low Wind Chill with time of occurrence (AutoClear)**

Outside and Inside Temperature

The Health EM has a built-in temperature sensor which reports inside temperature. You may use either the external temperature sensor, stainless steel temperature probe, or external temperature/humidity sensor (see “Optional Sensors” on page 1) to measure outside temperature. Outside temperature does not necessarily have to measure outside temperature, of course. It measures the temperature wherever you have located your temperature sensor.

- **Current Outside Temperature (Alarm: High/Low)**
- **Current Inside Temperature (Alarm: High/Low)**
- **“Daily” High and Low Outside Temperature with time of occurrence (AutoClear)**

- “Daily” High and Low Inside Temperature with time of occurrence (AutoClear)

Wind

The Health EM measures and displays both wind speed and wind direction. In general, wind speed and wind direction readings are visible at all times in the compass rose on the left side of the display.

- Current Wind Speed (Alarm: High)
- Wind Direction (in compass rose only)
- High Wind Speed with direction of high and time of occurrence (AutoClear)

Solar Radiation

What we call “current solar radiation” is technically known as Global Solar Radiation, a measure of the intensity of the sun’s radiation reaching the earth’s surface. This irradiance includes both the direct component from the sun and the diffuse component from the rest of the sky. The solar radiation reading gives a measure of the amount of solar radiation hitting the solar radiation sensor at any given time, expressed in Watts per Square Meter (W/m^2).

- Current Solar Radiation Intensity
- “Daily” High Solar Radiation with time of occurrence

Barometric Pressure

The weight of the air which makes up our atmosphere exerts a pressure on the surface of the earth. This pressure is known as atmospheric pressure. Generally, the more air above an area, the higher the atmospheric pressure, which means that atmospheric pressure changes with altitude. To compensate for this difference and facilitate comparison between locations with different altitudes, atmospheric pressure is generally adjusted to the equivalent sea-level pressure. This adjusted pressure is known as barometric pressure. In reality, the Health EM measures atmospheric pressure. When you enter the barometric pressure for your location (see “Entering Barometric Pressure” on page 32), the Health EM stores the necessary offset value to consistently translate atmospheric pressure into barometric pressure.

Barometric pressure also changes with local weather conditions, which makes barometric pressure an extremely important and useful weather forecasting tool. High pressure zones are associated with fair weather while low pressure zones are associated with poor weather. For forecasting purposes, however, the absolute barometric pressure value is generally less important than the change in barometric pressure. In general, rising pressure indicates improving weather conditions while falling pressure indicates deteriorating weather conditions.

- Current Barometric Pressure (Alarm: rate of change)
- Trend of Barometric Pressure (rising, falling, steady) over previous one hour

Rainfall

The Health EM provides two separate registers for tracking rainfall totals. One is referred to as “daily” rainfall and the other is referred to as “total” rainfall. In truth, these registers can be used to record rainfall over any period of time you desire. The “daily” register can be cleared daily using the AutoClear function (see “AutoClear” on page 11) to provide true daily rainfall totals or you may clear it manually every few days, after a storm, at the end of the month, etc. The total rainfall amount must be cleared manually and how often you clear the register determines what period of time its rainfall total reflects. The Health EM also calculates the rate of rainfall using the amount of time between each .01” or .2 mm rainfall increment.

- “Daily” Rainfall (Alarm: High) (AutoClear)
- Current Rate of Rainfall
- Cumulative Total Rainfall
- “Daily” High Rate of Rainfall with time of occurrence

Inside and Outside Humidity and Dew-Point

Humidity refers to the amount of water vapor in the air. However, the amount of water vapor which the air can contain changes with changes in air temperature and pressure. Relative humidity takes into account these factors and offers a humidity reading which reflects the amount of water vapor in the air as a percentage of the amount the air is capable of holding. Relative humidity, therefore, is not actually a measure of the amount of water vapor in the air, but a ratio of the air’s water vapor content to its capacity.

It is important to realize that relative humidity changes with temperature, pressure, and water vapor content. A parcel of air with a capacity for 10 g of water vapor which contains 4 g of water vapor will have a relative humidity of 40%. Adding 2 g more water vapor (for a total of 6 g) would change the humidity to 60%. If that same parcel of air is then warmed so that it has a capacity for 20 g of water vapor, the relative humidity drops to 30% even though water vapor content does not change.

Dew-point is the temperature to which air must be cooled for saturation (100% relative humidity) to occur, providing there is no change in water content. The dew-point is an important measurement used to predict the formation of dew, frost, and fog. If dew-point and temperature are close together in the late afternoon when the air begins to turn colder, fog is likely during the night. Dew-point is also a good indicator of the air’s actual water vapor content (as opposed to relative humidity). High dew-point indicates high vapor content; low dew-point indicates low vapor content. You can even use dew-point to predict the minimum overnight temperature. Provided no new fronts are expected overnight, the afternoon’s dew-point gives you an idea of what minimum temperature to expect that night, since the air is not likely to get colder than the dew-point anytime during the night.

- Relative Outside Humidity (Alarm: High/Low)

- Relative Inside Humidity (Alarm: High/Low)
- Current Dew-Point (Alarm: when temperature is within 2° F of dew-point)
- “Daily” High And Low Relative Outside Humidity with time of occurrence (AutoClear)
- “Daily” High and Low Relative Inside Humidity with time of occurrence (AutoClear)

Time

The GroWeather has a clock and a calendar for tracking time and date. The calendar automatically adjusts during leap years, providing you enter the current year (see “Entering Time, Date, or Year” on page 39) when you apply power to the unit.

- Current Time (Alarm: standard alarm clock)
- Current Date
- Current Year
- AutoClear Time Setting

AUTOCLEAR

The Health EM’s AutoClear function may be used to automatically clear some or all of the “daily” values at the same time each day. The time at which values are cleared is the same for all values and may be set by the user (default is mid-night). The AutoClear function may be enabled/disabled individually for the values listed below. Note that the AutoClear function for some values (for example, “daily” UV radiation dose and high UV radiation dose rate) is linked; you may enable or disable the AutoClear for all linked values, not for each individual value. The list below shows all vales which may be cleared using AutoClear. Those listed together must be cleared as a group.

- High T-H Index, High T-H-S-W Index, and High Inside T-H Index
- “Daily” UV Radiation Dose, High UV Radiation Dose Rate
- Low Wind Chill
- High and Low Outside and Inside Temperature
- High Wind Speed
- High Solar Energy
- “Daily” Rainfall and High Rate of Rainfall
- High and Low Outside and Inside Humidity

HIGHS AND LOWS

The Health EM records highs and lows for many weather conditions. All highs and lows represent the maximum or minimum reading since the last time you cleared each individual high/low register. If you have enabled AutoClear for a particular high/low (see “Enabling/Disabling AutoClear” on page 46), this reading will represent the high/low since the time of the AutoClear. In other words, it will track highs and lows over a 24 hour period. If you do not use AutoClear, you may track daily, weekly, monthly, or yearly values, depending on how often you clear the high/low. For all highs and lows the time at which they occurred is stored along with the value.

The table below summarizes the highs and lows stored by the Health EM.

<u>CONDITION</u>	<u>HIGH</u>	<u>LOW</u>	<u>TIME</u>	<u>AUTOCLEAR</u>	<u>ADDITIONAL INFORMATION</u>
Outside T-H Index	Yes		Yes	Yes	
Outside T-H-S-W Index	Yes		Yes	Yes	
Inside T-H Index	Yes		Yes	Yes	
UV Radiation Intensity	Yes		Yes	Yes	
Wind Chill		Yes	Yes	Yes	
Outside Temperature	Yes	Yes	Yes	Yes	
Inside Temperature	Yes	Yes	Yes	Yes	
Wind Speed	Yes		Yes	Yes	Direction of Gust
Solar Radiation	Yes		Yes	Yes	
Rate of Rainfall	Yes		Yes	Yes	
Outside Humidity	Yes	Yes	Yes	Yes	
Inside Humidity	Yes	Yes	Yes	Yes	

ALARMS

The Health EM features a set of alarms which can be programmed to sound whenever a reading exceeds a particular value. With the exception of barometric pressure, dew-point, and time, all alarms sound when a reading reaches the alarm threshold and will continue to sound until the reading returns to within the threshold. This means that for all high alarms, the alarm sounds when a reading reaches the alarm threshold continues to sound until the reading drops below the alarm threshold. On all low alarms, the alarm sounds when a reading reaches the alarm threshold and continues to sound until the reading rises above the alarm threshold.

The table below summarizes the Health EM’s alarms.

<u>CONDITION</u>	<u>HIGH ALARM</u>	<u>LOW ALARM</u>	<u>SPECIAL ALARM</u>
Outside T-H Index	Yes		

<u>CONDITION</u>	<u>HIGH</u> <u>ALARM</u>	<u>LOW</u> <u>ALARM</u>	<u>SPECIAL ALARM</u>
Outside T-H-S-W Index	Yes		
Inside T-H Index	Yes		
"Daily" UV Radiation Dose	Yes		
Current UV Radiation Intensity	Yes		
Wind Chill		Yes	
Outside Temperature	Yes	Yes	
Inside Temperature	Yes	Yes	
Wind Speed	Yes		
Barometric Pressure			Rate of Change per Hour
"Daily" Rainfall	Yes		
Outside Humidity	Yes	Yes	
Inside Humidity	Yes	Yes	
Dew-Point			Temperature within 2° F (1° C) of Dew-Point
Time			Standard "Alarm Clock"

The three special alarms are described below:

- Barometric Pressure**
 The barometric pressure alarm alerts you to changes in barometric pressure. You may select a rate of change per hour (0.2"/0.4"/0.6", 0.5 mm/1.0 mm/1.5 mm, 0.7 hPa/1.4 hPa/2.0 hPa) and the Health EM's alarm will sound if the rate of change (in either direction) exceeds your threshold.
- Dew-Point**
 The dew-point alarm alerts you when the temperature comes within 2° F (1° C) of the dew-point.
- Time**
 The time alarm is a standard "alarm clock" type of alarm. It will sound for one minute after it is triggered.

- **External Temperature Sensor**
Enables you to measure and display outside temperature.

Note: You may use EITHER the external temperature sensor, external temperature/humidity sensor, or the stainless steel temperature probe.

- **External Temperature/Humidity Sensor**
Enables you to measure and display outside temperature, outside humidity, dew point, and temperature-humidity index. If you also have the solar radiation sensor and anemometer, the Health EM calculates and displays the temperature-humidity-sun-wind index as well. (See note in external temperature sensor section for restrictions.)
- **Rain Collector**
Enables you to measure and display daily and total rainfall and rate of rainfall. Separate models measure rainfall in either 0.01-inch or 0.2-mm increments. Optional Rain Collector Heater enables you to measure the moisture content of snowfall or freezing rain.
- **Solar Radiation Sensor**
Enables you to measure and display solar irradiance and incident energy. The Health EM will also use the solar irradiance reading in calculating temperature-humidity-sun-wind index.
- **Stainless Steel Temperature Probe**
Enables you to measure and display outside temperature. Rugged stainless-steel construction makes sensor ideally suited to measuring soil or water temperature. (See note in external temperature sensor section for restrictions.)
- **UV Sensor**
Enables you to measure and display UV radiation, dose rate, daily dose, and accumulated dose.

OPTIONAL ACCESSORIES

The following accessories, designed for use with the Health EM, are available from your dealer or may be ordered directly from Davis Instruments.

- **Health WeatherLink[®]**
Stores data gathered by the Health EM, downloads it to your PC, and generates reports and graphical displays. Storage interval (1, 5, 10, 15, 30, 60, or 120 minutes) is set by the user. The data logger will store 16 hours or 3, 7, 10, 21, 42, or 85 days worth of data depending on storage interval. Windows[™]-compatible software enables you to analyze, plot, print, sort, and summarize the data. Sunburn screen shows approximate time to sunburn for each skin type at current UV levels. Automatically generates NOAA reports. Requires Windows 3.1 or Windows 95 and one free serial port.

- **Sensor Mounting Arm**

A single-location mounting option. The Sensor Mounting Arm includes provisions for optimal mounting of all Davis sensors: anemometer, temperature sensor (with Radiation Shield), solar radiation sensor, Rain Collector Shelf, etc.

- **Sensor Tilting Bracket**

Enables you to adjust the position of the solar radiation sensor and the UV sensor to match the angle of the sun's rays for maximum readings.

Note: *The temperature-humidity-sun-wind index calculation is most accurate when the solar radiation sensor is pointed directly at the sun at solar noon. You may use the Sensor Tilting Bracket to hold the sensor in this position.*

- **Radiation Shield**

Protects the temperature sensor or temperature/humidity sensor from solar radiation and other sources of radiated and reflected heat. Increase the life of the sensor and the accuracy of the readings.

- **Rain Collector Shelf**

Provides a horizontal surface for mounting the rain collector. May be used with Sensor Mounting Arm or mounted on other surfaces.

- **Shelters**

We have a pair of weather-resistant shelters which will enable you to mount some or all of your system components outside. Optional heaters enable you to keep components operating even in cold weather.

- **Solar Power Kit**

Powers the weather station using energy from the sun; no AC power is required. Requires our 6.5-Amp-Hour Battery or other battery of your choice.

- **Alarm Output Module**

Enables you to use weather station alarms to automatically start or stop external devices such as irrigation systems, heaters, or fans.

- **Surge Protectors**

For upgraded protection against lightning-induced power surges, power-cross conditions, and ground potential rises, use Surge Protectors. Use one Surge Protector for every two wires and mount inside one of our surge-protector shelters.

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Davis Instruments Part Number: 7395-072
Health EnviroMonitor™, Standard and Industrial
Rev. B Manual (10/14/99)

This product complies with the essential protection requirements of the
EC EMC Directive 89/336/EC.

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