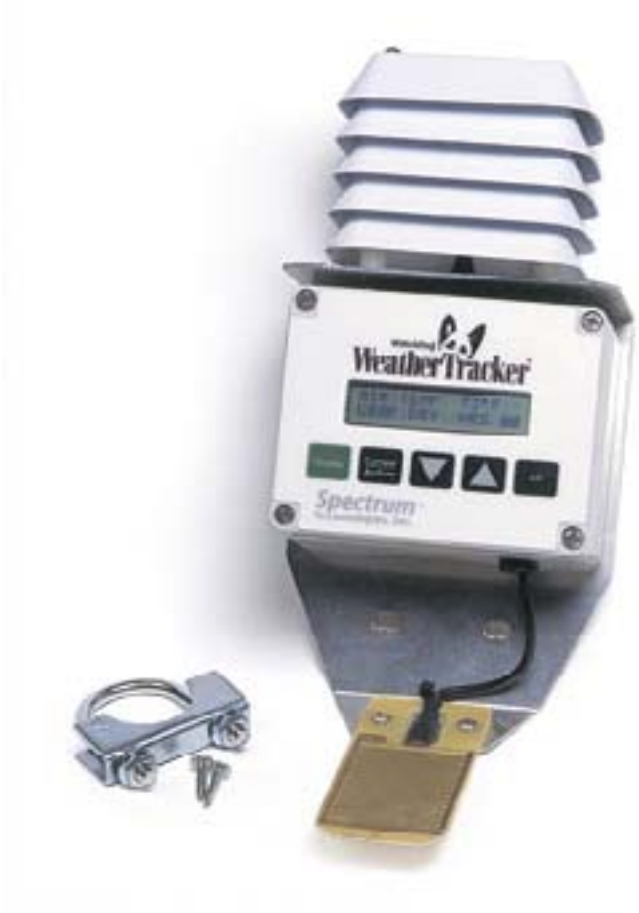
WeatherTracker

Pest Alert

Model #'s320, 325, 330



Spectrum

Technologies, Inc.

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This manual will familiarize you with the features and operation of your new WeatherTracker. Please read this manual thoroughly before using your instrument. For customer support, or to place an order, call

Spectrum Technologies, Inc.
(800)248-8873 or (815) 436-4440
between 7:30 am and 5:30 p.m. CST
FAX at (815)436-4460
E-Mail at info@specmeters.com

Spectrum Technologies, Inc
23839 W Andrew Rd.
Plainfield, IL 60544

General overview

Thank you for purchasing the WeatherTracker. This device will allow you to conveniently monitor temperature and leaf wetness throughout the growing season. Current conditions and historical data are easily viewed on the station's LCD screen.

The internal electronics calculate Growing Degree Days (GDD) for up to three degree day counters. For example, one counter can be activated at planting while another can track the development of insects. The station also calculates the number of Chill Hours, the total amount of hours during which temperatures have been below a specified low temperature. The arrow keys allow you to scroll through temperature and leaf wetness data as well as set your temperature ranges.

Station Installation

The WeatherTracker has the versatility to be located in any micro-climate for recording weather data. Hardware is included for attaching it to a 1" to 1¼" outside diameter mast (pipe). Use a 5' - 10' length of conduit or pipe as the mast mount. When purchasing and/or cutting the mast to size, plan on placing 1½' - 2' of the mast into the ground. It can also be mounted to a wooden post with the screws that are provided.

The radiation shield protects the temperature sensor from solar radiation and other sources of reflected heat. If other sensors are included, secure the sensor wires to the mast just below the display module with a plastic tie. This will make the wires less vulnerable to being accidentally severed during the season.

Figure 1: WeatherTracker mounted on 1" conduit

Meter Operation

The WeatherTracker does not have a button or switch for powering up and down. Instead, the device is operational whenever the battery is installed. The battery connection can be accessed by removing the face plate (fig. 2). Exercise care when replacing the plate to ensure the buttons aren't damaged. When replacing or reinstalling the battery, the time and date must be reprogrammed (see Parameter Update Screens, p. 5). The Current Conditions screen (see p. 4) is updated every 20 seconds.

Note: If an active Degree Day counter is disabled or reset, the entire archive for that counter will be erased (see Parameter Update Screens, p. 11).

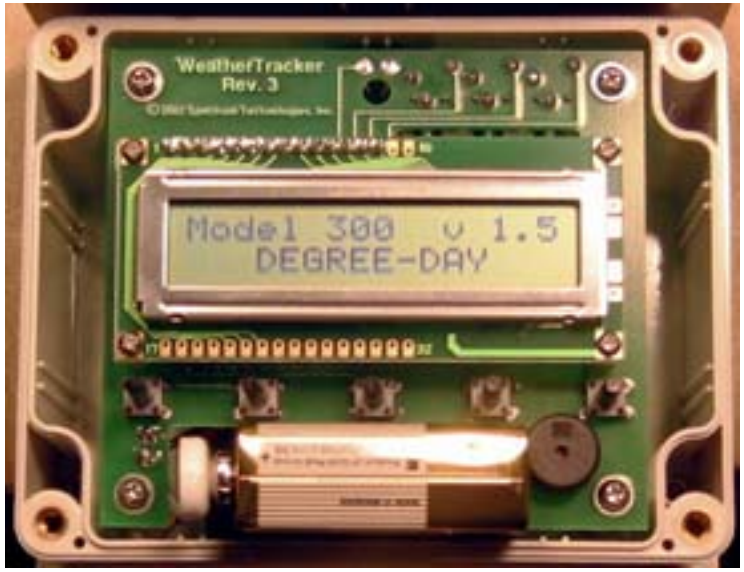

Figure 2: WeatherTracker Battery Compartment

Archives

The WeatherTracker features two archives that allow you to look at historical data for that location. The archives are regularly updated whenever the WeatherTracker is actively collecting data. The archives are accessed by pressing the **Current/Archive** key (see pg. 4).

Daily Archive

The Daily Archive retains the last 30 days of data. If the battery power runs low, the WeatherTracker will stop measuring and archiving data until the battery is replaced. See **Keypad Operation** (p. 4) for information on accessing the archive information.

After using the arrow key to select a certain day from the Daily Archive, the WeatherTracker will then cycle through all the information stored for that day. This will include a screen with the high and low temperatures for that day, any active degree day counters and the average readings for any sensors connected to the device. If a currently active Degree Day Counter was not active on that day, the screen will say "No Data".

Monthly Archive

The Monthly Archive retains 12 months of data. When a month is selected, the WeatherTracker will then cycle through all the information stored for that month. This will include a screen with high and low temperatures for the month, degree day data and the cumulative rainfall (if applicable) for that month. If a currently active Degree Day Counter was not active at the end of a month, the screen will say "No Data" for that month.

Note: If an active Degree Day counter is disabled or reset, the entire archive for that counter will be erased (see Parameter Update Screens, p. 5).

Keypad operation

Display

Pressing the **Display** key once brings the LCD display to life. The screen will initially display descriptive information about the station. The screen then displays current conditions. Pressing the **Display** key a second time will deactivate the display. The station continues to record conditions when the display is not active. To conserve battery power, the display goes off after 2 minutes of inactivity.

▼

Press the **Arrow** key to scroll through the different screens. The screen then displays current conditions. The **Current Conditions** screen gives the temperature, wet/dry status of the leaf and the amount of time the leaf has been wet.

Model 330 v 1.2 Grape IPM Alert	*-Initial information screen*
Air Temp 74°F Leaf Wet Hours 05	*-Current Conditions*
HI 74°F 12:00 AM LO 66°F 01:58 PM	*-Daily High and Low Values*
DD #1 50-86° 16 Since 07/03 2125	*-Degree Day Counter*
09-08-02 07:09PM BATTERY AT 90%	*-Time, Date* *-Battery Level*
POWDERY MILDEW ASC=NONE CON=100	*-Disease Name* *-Index Values*

Keypad operation (Cont.)

Current

After the display is activated, pressing the **Current/Archive** key once will put the LCD into the "Daily Archive" mode. Press the **arrow-down** key select the day for which you wish to view archival data. Press the **Current/Archive** key again to enter "Monthly Archive" mode. Press the **arrow-down** key to select the month for which you wish to view archival data. The arrow buttons are then used to review the last 30 days of daily history or the last 12 months of monthly history. Pressing the **Current/Archive** key again will allow you to see the Current Values (see p. 3).

Set

Pressing the **Set** key will bring up the **Parameter Option Screen** which will allow you to scroll through all parameter options and change any of the station's settings. These include time/date, display units and degree day and chill hour temperature ranges. Use the arrow keys to scroll to the parameter of interest and press the **Set** key again to enter a parameter update screen. Once in a parameter update screen, pressing the **Set** key will allow you to scroll through the different components of that parameter. The component that is modifiable will display ***'s. At this point, use the arrow keys to adjust that component. After the last component has been set, the LCD screen will return to the current conditions screen. Press the **Set** key again to modify more parameters or the arrow keys to return to the data screens.

Select Parameter To Be Set (↑↓)

-Parameter option screen.

Keypad operation (Cont.)

Parameter Update Screens:

TIME & DATE Press SET	➡	09-22-** 11:45AM Press SET

Successively pressing the **Set** key will allow you to set the month, day, year, hour and minute.

DISPLAY UNITS Press SET

Allows you to select whether temperature is displayed in ^{o}F or ^{o}C. If ^{o}C is selected, rainfall will be displayed in mm.

DEG DAY COUNT #1 Press SET	➡	Counter:Disabled Base=** Upper=86

Allows you to select the base and upper temperatures used in the Degree Day calculations as well as configure a Degree Day counter. A Degree Day counter will display one of two modes; Enabled or Disabled. When a Degree Day counter is enabled, it is actively computing and summing degree days and adding to the Daily and Monthly archives. If the **Set** key is pressed to make this parameter modifiable (see description of **Set** key on p. 4), the user has two options; Disabled or StartNow. The Disabled option will turn off the counter and remove it from the archive and list of display screens (see p. 4). The StartNow option erases all the data from the archives and resets and restarts that counter from zero.

RESET DISEASE Press SET

Restarts the disease model calculations. This should be done at the beginning of the season

Caution: Be careful when entering a parameter update screen for a Degree Day counter when that counter is enabled. If the **Set** key is pressed, the counter status will become modifiable and the archives WILL BE ERASED. If this is not desirable, press one of the arrow keys instead of the **Set** key to exit the screen.

Growing Degree Days

Temperature is a key factor contributing to the development of plants, insects and plant diseases. Degree Days are a way to quantify the amount of heat that is available, which is a function of the time the temperature is within a given temperature range. For example, if the base temperature is determined to be 40 degrees and the actual temperature is 41 degrees for 24 consecutive hours, one Degree Day is said to have accumulated (41 – 40 = 1 degree for 24 hours or 1 day). Degree Days indicate the developmental stage of a pest generation. This allows for more precise pesticide recommendations.

The WeatherTracker calculates Degree Days using the integral method. Degree Day values are calculated at 15 minute intervals to produce Degree Quarter-Hours (DQH), which are then summed over a full day. DQH are calculated as follows:

$DQH = T_{avg} - T_{base}$

Where T_{avg} is the average temperature over the 15-minute interval and T_{base} is the base temperature. If the average temperature is greater than the upper limit of the temperature range, the upper temperature limit is used instead of the average temperature when calculating DQH. If the average temperature is less than the base temperature, DQH is set equal to zero for that interval.

Vegetable IPM Alert Model 325

Tom-Cast

SpecWare uses **Tom-Cast**, a tomato disease forecasting program designed to predict Early Blight, Septoria Leaf Spot, and Anthracnose. (Pitblado ~1985; Bolkan and Reinert 1994) **Tom-Cast** calculates a disease severity value (**DSV**) to predict the development of these diseases.

An increasing number of leaf wetness hours and a higher temperature cause the **DSV** (disease severity value) to increase at a faster rate. A **Cumulative DSV** of 15 to 20 is usually viewed as the threshold for initiating a spray program. Contact your State Agricultural Extension Service for further information regarding disease management in your area.

TOMCAST DSV DAY=2 ACCUM=010

Infection Severity Screen

Disease Severity Value Chart					
Average Temp During Leaf Wet Hours (C)	**Hours of Leaf Wetness per Day**				
13-17	0-6	7-15	16-20	21 +	
18-20	0-3	4-8	9-15	16-22	23+
21-25	0-2	3-5	6-12	13-20	21+
26-29	0-3	4-8	9-15	16-22	23+
Daily DSV =	**0**	**1**	**2**	**3**	**4**

Apple IPM Alert Model 320

SpecWare will predict the approximate "Infection Degree" for **Apple Scab**. The infection severity (None,Light, Medium, or Heavy) is triggered by the accumulation of sufficient hours of leaf wetness that occur between the base and upper temperature limits. The Weather Tracker uses the Mills **Apple Scab** model
as modified by A.L. Jones 1980. A modified Mills table is shown on the following 2 pages.

APPLE SCAB Infect NONE

Infection Severity Screen

Modified Mills Table

Approximate numbers of hours of wetting required for primary apple scab infection at different air temperatures			
Average Temp.	Degree of Infection (hrs)		
(°F)	Light	Medium	Heavy
78	13	17	26
77	11	14	21
76	9.5	12	19
63 to 75	9	12	18
62	9	12	19
61	9	13	20
60	9.5	13	20
59	10	13	21
58	10	14	21
57	10	14	22
56	11	15	22
55	11	16	24
54	11..5	16	24
53	12	17	25
52	12	18	26
51	13	18	27

Modified Mills Table (Cont.)

Approximate numbers of hours of wetting required for primary apple scab infection at different air temperatures			
Average	Degree of Infection (hrs)		
(°F)	Light	Medium	Heavy
50	14	19	29
49	14.5	20	30
48	15	20	30
47	15	23	35
46	16	24	37
45	17	26	40
44	19	28	43
43	21	30	47
42	23	33	50
41	26	37	53
40	29	41	56
39	33	45	60
38	37	50	64
37	41	55	68
33 to 36	48	72	96

Grape IPM Alert
Model 330

Powdery Mildew - Grape

SpecWare predicts two infectious stages, an ascospore stage and a conidial stage (Thomas, Gubler, and Leavitt 1994; Weber, Gubler, and Derr 1996)Ascospores are released in the spring from the structure in which the disease overwintered. Conidial spores are the result of an ascospore infection. Ascospores cause primary infections and conidial spores cause secondary infections. Your State Agricultural Extension Service can advise you about which stage is important in your area.

Ascospore Infection risk is determined using the daily average temperature and the hours of leaf wetness. A modified Mills Table (2/3 the original Mills leaf wetness value) is used to determine the development of a **'Heavy' Ascospore Infection**, the point at which treatment should begin.

Three consecutive days with temperatures between 70°F and 85°F are required to initiate the **Conidial Index**. Thereafter, the index increases by 20 with each day having six consecutive hours between 70°F and 85°F. The index decreases by 10 on days with less than six consecutive hours in the range of 70°F to 85°F and on days with a maximum temperature greater than 95°F. The index will always be between zero and 100.

Infection Severity Screen

Grape IPM Alert
Modified Mills Table

Daily Average Temperature (F)	Hours of Leaf Wetness required for heavy ascospore infection (2/3 original Mills value)
42	40
43	34
44	30
45	27.3
46	25.3
47	23.3
48-49	20
50	19.3
51	18
52	17.3
53	16.7
54-55	16
56-57	14.7
58-59	14
60-61	13.3
62	12.7
63-75	12
76	12.7
77	14
78	17.3

Conidial Index:
0 - 30 = **Light** infection risk
40 - 50 = **Medium** infection risk
60 - 100 = **Heavy** infection risk

Warranty

The WeatherTracker is warranted to be free from defects in materials and workmanship for a period of 1 year from the date of original purchase. During the warranty period, Spectrum will, at its option, either repair or replace products that prove to be defective. This warranty is void if the product has been damaged by customer error or negligence, or if there has been an unauthorized modification.

Returning Products to Spectrum

Before returning a failed unit, you must obtain a Returned Goods Authorization (RGA) number from Spectrum. You must ship the product(s), properly packaged against further damage, back to Spectrum (at your expense) with the RGA number marked clearly on the outside of the package. Spectrum is not responsible for any package that is returned without a valid RGA number or for the loss of the package by any shipping company.

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