

Berry Gardens Growers

Davis weather stations and Vital Weather



Weather Station training workshop – Berry Gardens Growers Feb 2013

Itinerary:

Outside sensors:

Vantage Pro (weather station) – communication concept

Configuring Vantage Pro systems

Adding mini stations

GPRS (Vital Weather) configuration

Console diagnostics

Extending the transmission range – antenna conversions / repeaters – set up and configuration

Maintenance:

Iss unit – periodic checks / annual maintenance

Mini stations – periodic checks and maintenance

GPRS (main unit) dos and don'ts

Vital Weather Software:

Summary weather views

Plotting weather data – overlaying graphs

Reports

Exporting data

Vantage Pro2 - Communication concept

The Console of the Vantage Pro weather station is the “hub” of the system.

All transmitter stations report directly to the Console

Up to eight transmitter stations can report to the Console

The Console’s standard range from the transmitter stations is 300 meters LINE OF SIGHT

The best way of increasing the range is fitting an external antenna which amplifies the signal.



The transmitters transmit their signal on a designated channel. The default channel is 1 (all three DIP switches down). Refer to page 7 for details on DIP switch settings for each channel. There are eight available channels.

Commonly the ISS (Integrated sensor suite) is set on channel 1. Subsequent transmitter channels are set numbering 2 upwards as illustrated below.

Channel 1



Transmitting Stations

Channel 2



Transmitting Stations

Console / Receiver Unit



Channel 3



Channel 4

Vital Weather - How it works



Data logger connected to GPRS modem



Web based data – no software required
updated every 15 minutes

Data collected by the data logger is transmitted via the GPRS network every 15 minutes to the Vital Weather web server

Data is processed and “webified” for the user to view and evaluate

Vantage Pro2 weather station with Vital Weather



Solar panels must point due south for maximum effect. The panels should be kept clean—films of dust will hinder their ability to supply enough current to charge the battery

ALWAYS clean with warm water only

Power switch — up is on—red exposed

Modem either on side of Console or positioned underneath

Battery test button

Battery enclosure

Console power supply lead



Main system battery located in enclosure behind the weather station console

The solar panel on the system will bring in 12—20 volts depending on light conditions. This voltage then passes through a regulator which regulates power down to the battery between 12 and 13 volts

Vital weather components

It is essential that the lead from the Davis data logger is securely fastened into the 9 pin D plug on the Vital weather modem (pictured below)

If the modem is updating the Vital weather web site but displays temperature of -17.8 celcius there is a communication breakdown between the logger and the modem.

Ensure that the Davis blue plug is inserted correctly into the modem by using a screw driver to secure the connection



Vantage Pro Console with data logger inserted into the rear of the Console. (if you ever need to remove the data logger ensure that the power is disconnected)

Data logger plugs into the Vital weather modem

Modem antenna (external antenna pictured)



Vital weather—modem

Green LED on permanently

Red LED will be on constantly after initial power up.

Once connected on to the Network red LED will flash intermittently

Data logger lead plugs in to this port

Chapter 3

Using Your Weather Station

The console LCD screen and keyboard provide easy access to your weather information. The large LCD display shows current and past environmental conditions as well as a forecast of future conditions. The keyboard controls console functions for viewing current and historical weather information, setting and clearing alarms, changing stations types, viewing and/or changing station settings, setting up and viewing graphs, selecting sensors, getting the forecast, and so on.

Console Modes

The Vantage Pro2 console operates in five different modes:

Mode	Description
Setup	Use Setup Mode to enter the time, date, and other information required to calculate and display weather data.
Current Weather	Use Current Weather Mode to read the current weather information, change measurement units, and to set, clear or calibrate weather readings.
High/Low	High/Low Mode displays the daily, monthly or yearly high and low readings.
Alarm	Alarm Mode allows you to set, clear, and review alarm settings.
Graph	Graph Mode displays your weather data using over 100 different graphs.

Setup Mode

Setup Mode provides access to the station configuration settings that control how the station operates. Setup Mode consists of a series of screens for selecting console and weather station options. The screens that display in Setup Mode vary depending on the weather station type (cabled or wireless), or if the console has a WeatherLink connection already established. (See the *WeatherLink Getting Started Guide* for more information on connecting your console to your computer.)

Setup Mode Commands

Setup Mode displays when the console is first powered. This mode can be displayed at any time to change any of the console/weather station options. Use the following commands to enter, exit and navigate Setup Mode:

- Enter Setup Mode by pressing DONE and the - key at the same time.

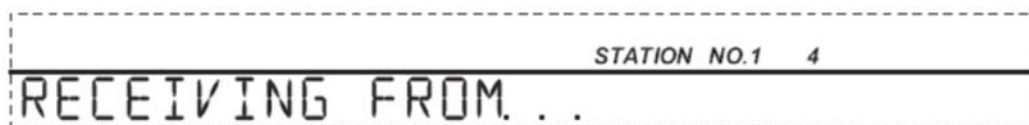
Note: The console automatically enters Setup Mode when first powered.

- Press DONE to move to the next screen in the Setup Mode.
- Press BAR to display the previous screen in the Setup Mode.
- Exit Setup Mode by pressing and holding DONE until the Current Weather screen displays.

Screen 1: Active Transmitters

Screen 1 displays the message “Receiving from...” and shows the transmitters being received by the console. In addition, an “X” blinks in the lower right-hand corner of the screen every time the console receives a data packet from a station. The rest of the LCD screen is blank.

If you have a cabled station, or if your wireless ISS uses the factory settings and you are receiving the signal, the screen displays “Receiving from station No. 1.” Any optional stations that have been installed should also display.



Screen 1: Active Transmitters

Note: An ISS or optional station must be powered for the console to recognize it. Refer to the *Integrated Sensor Suite Installation Manual* or optional station installation instructions for more information. It may take several minutes for the console to acquire and display a Transmitter ID.

1. Make a note of the station number(s) listed on the screen.

Note: If a Vantage Pro2 or Vantage Vue ISS has been installed in your area, its ID number may also be displayed.

2. Press DONE to move to the next screen.

The console can receive signals from up to eight transmitters total, but there is a limit on the number of certain types of transmitters. The table below lists the maximum number of stations allowable for a receiver:

Station Type	Maximum Number
Integrated Sensor Suite (ISS)	1
Anemometer Transmitter Kit (<i>replaces ISS anemometer</i>)	1
Leaf & Soil Moisture/Temperature Station	2*
Temperature Station	8
Temperature/Humidity Station	8

Maximum Number of Transmitters in a Network with One Receiver

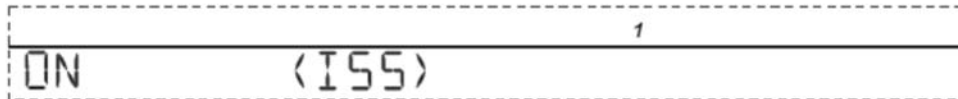
*Two are allowable only if both stations are only partially populated. For example, A network can either have both a Leaf Wetness/Temperature station and a Soil Moisture/Temperature station, or it can have one combined Leaf Wetness and Soil Moisture/Temperature station.

Note: Listening to more than one transmitter may reduce battery life significantly.

Screen 2: Configuring Transmitter IDs — Wireless Only

(If you have a cabled station, press DONE and continue on to “Screen 4: Time & Date” on page 12.)

Setup screen 2 allows you to change the ISS transmitter ID and to add or remove optional transmitter stations. The default transmitter ID setting is “1” (ISS), which works fine for most installations.



Screen 2: Transmitter ID configuration

If you have a cabled station, or if you have a wireless station and are using the default transmitter ID setting, press DONE to move to the next screen.

Note: Typically, you can use the default transmitter ID setting of 1 unless you are installing one of the optional transmitter stations. However, if you are having trouble receiving your station, there may be another ISS with ID 1 operating nearby. Try changing the ID of both the console and ISS to another ID number.

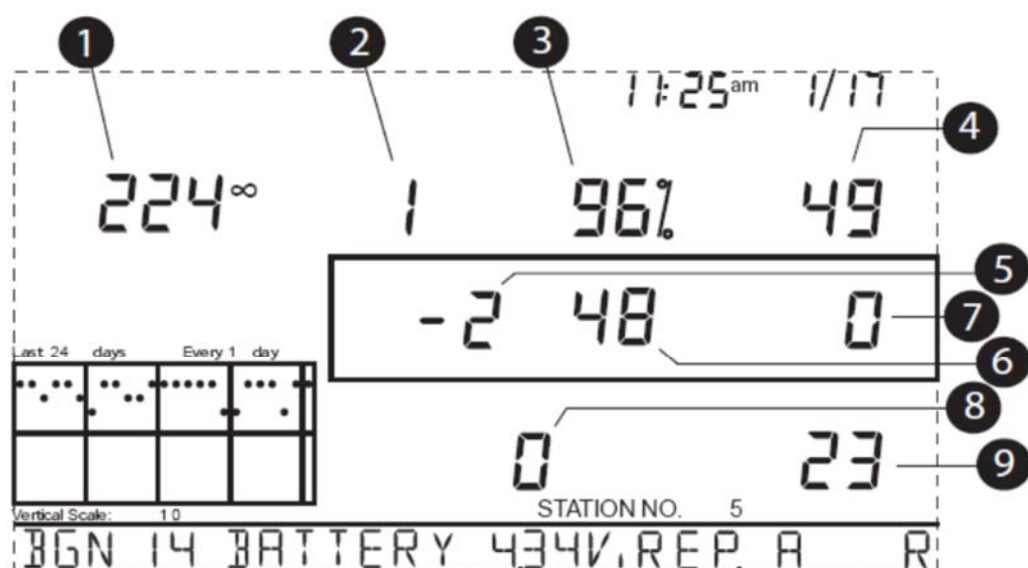
3. Press the < and > keys to select the transmitter ID.
When you select a transmitter ID, the ID number is displayed on the screen as well as the current configuration.
4. Press the + and - keys to toggle console reception of signals from transmitters using that ID on and off.
5. Press GRAPH to change the type of station assigned to each transmitter. Scroll through the station types - ISS, TEMP, HUM, TEMP HUM, WIND, RAIN, LEAF, SOIL, and LEAF/SOIL - until the correct type appears.
6. Press DONE to move to the next screen.

Note: This screen contains functionality for enabling repeaters. If the word "Repeater" displays in the right corner of the screen and you are not using repeaters as part of your network, see "Clearing Repeater ID" on page 52. If you are using repeaters as part of your network see "Wireless Repeater Configuration" (Appendix C) on page 51 for configuring repeaters on the console.

Diagnostic Screen Commands

- Press and hold TEMP, then press HUM to display the Statistical Diagnostic screen.
- Press the > key to display signal statistics for the next installed transmitter ID.
- Press 2ND and then press CHILL to toggle between the Statistical and Reception Diagnostic screens.
- A degree (°) sign displays in right corner of value 1 of the Reception Diagnostic screen (screen 2) to differentiate which screen is currently displayed.
- Press DONE to exit the diagnostic screen.

The information that is displayed in this screen includes:



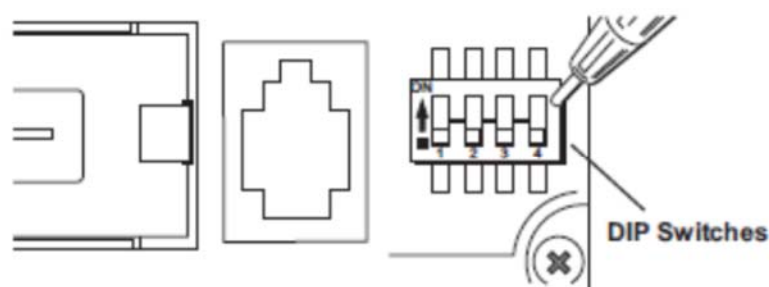
Screen 2: Reception Diagnostics Screen

1. 8-bit timer value of next reception.*
2. Radio frequency error of the last packet received successfully. In normal operation, this value is +1, -1, or 0. This value affects the value of #5 on the next page.
3. Percentage of good data packets.†
4. Signal strength of the last packet received. The values displayed in this field should generally be between 20 and 60. If a packet is not received successfully, the signal strength field is dashed out (--).
5. Current frequency correction factor. Shows the Automatic Frequency Control setting.
6. Frequency index of the next packet to be received.*
7. Current number of consecutive bad packets.‡
8. The number of times that the Phase Lock Loop did not lock.*
9. Current streak of consecutive good packets received.‡

Console Firmware Versions

In some cases, the problem may be that your console firmware doesn't support what you are trying to do. Use this command to determine the firmware revision level in your console. You can find more information on Vantage Pro2 console firmware versions and changes in the Weather Software Support section of our website. - for information.

Press and hold DONE then press the + key at the same time to display the console firmware version in the ticker at the bottom of the screen.



Transmitter ID DIP Switches in Top-right Corner of SIM

To change to another ID, use a ballpoint pen or paper clip to toggle DIP switches #1, 2, and 3. The settings for Transmitter IDs 1 - 8 are shown in the table below.

Set the Vantage Pro2 console to the same ID as the transmitters, as described in the *Vantage Pro2 Console Manual*.

ID CODE	SWITCH 1	SWITCH 2	SWITCH 3
#1 (default)	off	off	off
#2	off	off	ON
#3	off	ON	off
#4	off	ON	ON
#5	ON	off	off
#6	ON	off	ON
#7	ON	ON	off
#8	ON	ON	ON

Using Multiple Transmitting Stations

This table shows the maximum number of each type of station that can be used with a single Vantage Pro2 console. The console can receive signals from a total of up to eight transmitters (stations).

Station Type	Maximum Number
Integrated Sensor Suite (ISS)	1
Anemometer Transmitter Kit*	1
Leaf & Soil Moisture/Temperature Station	2**
Temperature Station	8
Temperature/Humidity Station	8

*Replaces the ISS anemometer.

**Two are allowable only if both stations are only partially populated. For example, a network can either have both a Leaf Wetness/Temperature station and a Soil Moisture/Temperature station, or it can have one combined Leaf Wetness and Soil Moisture/Temperature station.

Maintenance and Troubleshooting

Maintaining UV and Solar Radiation Sensors

If the ISS is a Plus model and contains UV and solar radiation sensors, do not touch the small white diffusers on top of the sensors. Oil from skin reduces their sensitivity. If you are concerned that you have touched the diffusers at any time, clean the UV diffuser using ethyl alcohol with a soft cloth. When cleaning the UV diffuser, DO NOT use rubbing or denatured alcohols because they can affect accuracy of the sensor readings. Ethyl alcohol can be procured through an industrial or laboratory supply store. Clean the solar diffuser with a soft damp cloth.

Due to the sensitivity of ultraviolet and solar radiation sensors it is common practice for manufacturers to recommend re-calibration after a period of time. Users demanding high accuracy typically recalibrate their sensors annually. Here at Davis Instruments, we have seen less than 2% drift per year on the readings from these sensors.

Contact Technical Support about returning your sensor for calibration. See "Contacting Davis Instruments" on page 27.

Cleaning the Radiation Shield

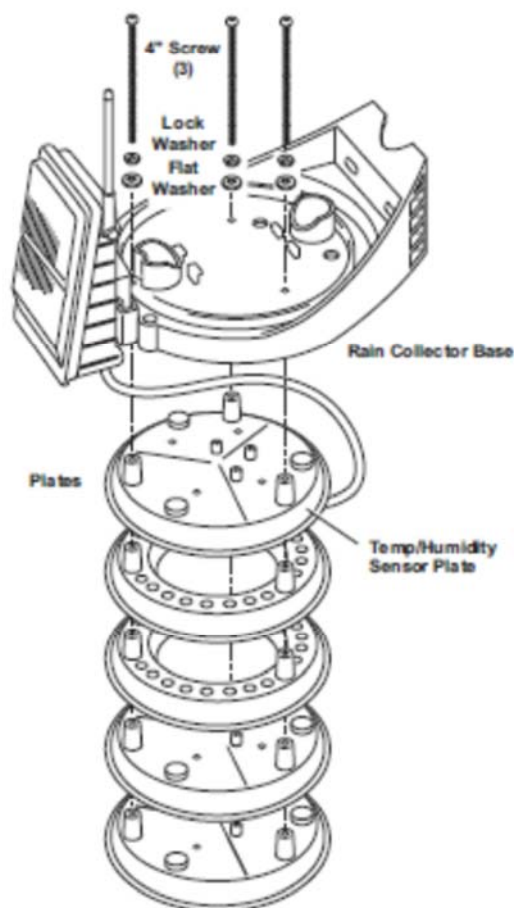
The outer plating of the radiation shield should be cleaned when there is excessive dirt and build-up on the plating. Use a damp cloth to clean the outer edge of each ring.

Note: Spraying down or using water excessively to clean the radiation shield can damage the sensitive sensors or alter the data and readings the ISS is transmitting.

Check the radiation shield for debris or insect nests at least once a year and clean when necessary. A buildup of material inside the shield reduces its effectiveness and may cause inaccurate temperature and humidity readings.

To thoroughly clean the radiation shield:

1. Remove the rain collector cone.
2. Using a Phillips head screwdriver, loosen the three 4" (~100mm) screws holding the radiation shield plates together.
3. Taking care to maintain the order in which the five plates are assembled, separate the plates as shown and remove all debris from inside the shield.



Note: For some models of the ISS, the order in which the five radiation shield plates are assembled may be slightly different than the order shown in the figure on page 25. For this reason, ensure that you always reassemble the plates in the same order in which they were disassembled.

4. Reassemble the plates in the same order in which they were disassembled, and fasten them together using a Phillips head screwdriver to tighten the 4" screws, as shown in the illustration.

Cleaning the Rain Collector Cone

To maintain accuracy, thoroughly clean the rain collector several times a year.

Note: Cleaning the rain collector and tipping buckets may cause false rain readings. Unplug the RAIN sensor from the SIM before cleaning so that no inaccurate readings are logged, or clear the weather data that was logged on the Vantage Pro2 console after cleaning is complete. See your *Vantage Pro2 Console Manual* for instructions on clearing weather data.

1. Separate the cone from the base by turning it counter-clockwise.
2. Use a soft, damp cloth to remove any debris from the cone, cone screen, and tipping bucket.
3. Use pipe cleaners to clear the funnel hole in the cone and drain screens in the base.
4. When all parts are clean, rinse with clear water.
5. Re-attach the cone and replace the debris screen.

Troubleshooting

If a Sensor Functions Intermittently

Carefully check all connections from the sensor to the ISS. See "Check SIM Sensor Connections" on page 4.

Loose connections account for a large portion of potential problems. Connections should be firmly seated in receptacles and plugged in straight. To check for a faulty connection, try jiggling the cable while looking at the display. If a reading displays intermittently on the console as the cable is jiggled, the connection is faulty. Try removing and then re-installing the cable to correct the faulty connection. If the sensor still functions intermittently contact Technical Support. See "Contacting Davis Instruments" on page 27.

Most Common Rain Collector Problem

If the rain collector seems to be under-reporting rainfall, remove the rain collector cone to clean the tipping bucket and clear out any debris. Make sure the cable tie around the tipping bucket has been cut and removed.

Most Common Anemometer Problems

"The anemometer head is tilted when I mount the anemometer."

With the Allen wrench provided in the supplied hardware, loosen the screws holding the anemometer head on the arm. (The screws are on the bottom of the anemometer head, by the wind cups.) Turn the anemometer head so it is straight and then tighten the screws.

"The wind cups are spinning but my console displays 0 mph."

The signal from the wind cups may not be making it back to the display. Remove the cups from the anemometer (loosen the set screw). Put the cups back onto the shaft and make sure to slide them up the shaft as far as possible. Check your cables for visible nicks and cuts. Look for corrosion in the WIND connector on the SIM and on splices in the cable. If using an extension cable, remove it and test using only the anemometer cable. Contact Technical Support and ask for a wind test cable if the problem has not been resolved.

Note: If the anemometer is sending no data, the wind display indicates 0 speed and a north direction.

"The wind direction is stuck on north, or displays dashes."

It is likely that there is a short somewhere between the wind vane and the display. Check the cables for visible nicks and cuts. Look for corrosion in the "WIND" jack on the SIM and on splices in the cable (if any). If possible, remove any extensions and try it with the anemometer cable only. If none of these steps get the wind direction working, contact Technical Support and ask for a wind test cable.

"The wind cups don't spin or don't spin as fast as they should."

The anemometer may be located where wind is blocked by something, or there may be friction interfering with the cups' rotation. Remove the wind cups (loosen the set screw) and clear out any bugs or debris. Turn the shaft the cups rotate on. If it feels gritty or stiff, contact Davis Technical Support.

Note: Do not lubricate the shaft or bearings in any way. When replacing the cups, make sure they are not rubbing against any part of the anemometer head.

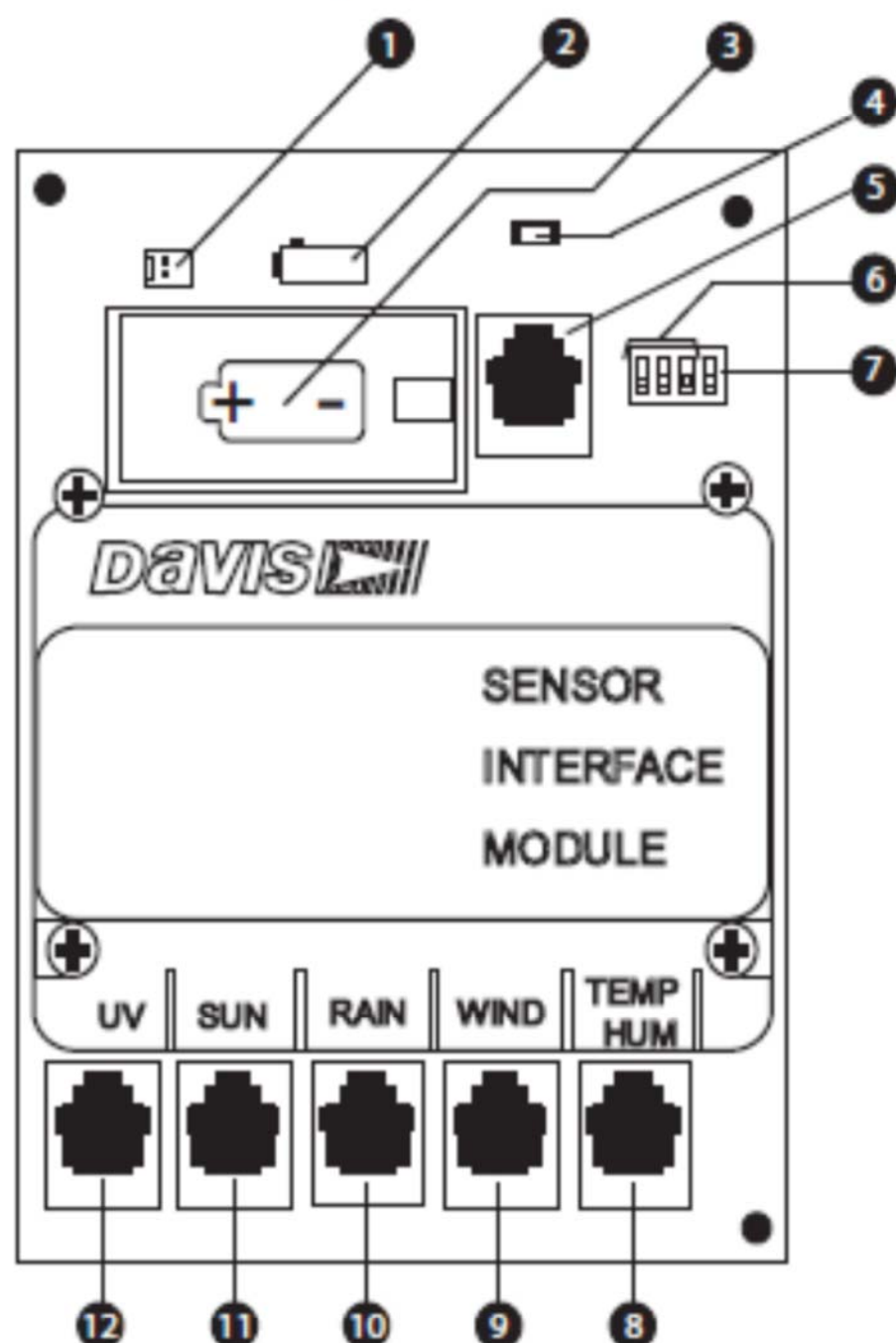
"Readings aren't what I expected them to be."

Comparing data from your ISS to measurements from TV, radio, newspapers, or a neighbor is NOT a valid method of verifying your readings. Readings can vary considerably over short distances. How you site the ISS and anemometer can also make a big difference. If you have questions, contact Technical Support.

Contacting Davis Instruments


If you have questions about the ISS or Vantage Pro2 system, or encounter problems installing or operating the weather station, please contact Davis Technical Support.

SIM Board Display and Contents




- | | |
|-----------------------------|---|
| 1 Solar Panel Tab | 7 Test DIP Switch |
| 2 AC Adapter Socket | 8 Temperature/Humidity Sensor Connector |
| 3 Battery Socket | 9 Wind Sensor Connector |
| 4 Test LED | 10 Rain Sensor Connector |
| 5 Cabled Connection | 11 Solar Radiation Sensor Connector |
| 6 Transmitter ID DIP Switch | 12 UV Sensor Connector |

Station summary page




Sat Jan 26 15:56:23 2013



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Davis Weather Instruments



SUMMARY
HISTORY
ANALYTICS
NOAA
G.D.D.
T.H.H.
CHILL


HIGHS / LOWS
FORECAST
RAIN MAP
TEMP. MAP
WIND MAP
CONSOLE
ALERTS
USERS

Staffordshire													
NO.	WEATHER STATION	MPH	DIR	OUT T.°C	T1.°C	T2.°C	T3.°C	OUT H.%	H1.%	H2.%	H3.%	RAIN	UPDATED
1	Lower Reule Farm Ltd	0	N Y	-17.8	-67.8	-67.8	-67.8	-	-	-	-	0 mm	off-line


Herefordshire													
NO.	WEATHER STATION	MPH	DIR	OUT T.°C	T1.°C	T2.°C	T3.°C	OUT H.%	H1.%	H2.%	H3.%	RAIN	UPDATED
2	N.J.Cockburn	0	N Y	-	-	-	-	-	-	-	-	0 mm	15:42

Perthshire													
NO.	WEATHER STATION	MPH	DIR	OUT T.°C	T1.°C	T2.°C	T3.°C	OUT H.%	H1.%	H2.%	H3.%	RAIN	UPDATED
3	AP Barrie & Co	3	WSW ➤	3.2	-	-	-	84%	-	-	-	3.8 mm	15:49

History page




Sat Jan 26 16:13:05 2013



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SUMMARY
HISTORY
ANALYTICS
NOAA
G.D.D.
T.H.H.
CHILL

HIGHS / LOWS
FORECAST
RAIN MAP
TEMP. MAP
WIND MAP
CONSOLE
ALERTS
USERS

HISTORY

Select a Station: Allanhill Farming Company ▼

Show Graph for:

☐ Wind Speed Km/h ▼

☐ Wind Direction

☐ Rain Fall

☐ Temperature (I.S.S.) °C ▼

☐ Pressure (QNH)

☐ Pressure Rate

☐ Humidity (I.S.S.)

☐ Dewpoint (I.S.S.) °C ▼

☐ Solar Radiation

☐ Density Altitude

☐ Fire Danger Index (FDI)

☐ UV Index

☐ Console Temperature

☐ Console Humidity

☐ Console Battery Level

☐ Multi-Temperature

☐ Multi-Humidity

☐ Air Density

Start Date: 26 ▼ Jan ▼ 2013 ▼ End Date: 26 ▼ Jan ▼ 2013 ▼

Export all data to a CSV file for the selected date ☐

GO >>

ADDITIONAL STATION SENSORS



Aux Temperatures: ☐ 11B TUNNELS ☐ 11F TUNNELS ☐ Temperature 3 ☐ Temperature 4 °C ▼

Aux Humidity: ☐ 11B TUNNELS ☐ 11F TUNNELS ☐ Humidity 3 ☐ Humidity 4


Aux Dewpoint: ☐ Aux Sensors 1 ☐ Aux Sensors 2 ☐ Aux Sensors 3 ☐ Aux Sensors 4 °C ▼

Aux Soil Temperatures: ☐ Soil Temp. 1 ☐ Soil Temp. 2 ☐ Soil Temp. 3 ☐ Soil Temp. 4 °C ▼

Analytics page



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Sat Jan 26 16:29:44 2013

SUMMARYHISTORYANALYTICSNOAAG.D.D.T.H.H.CHILL
HIGHS / LOWSFORECASTRAIN MAPTEMP. MAPWIND MAPCONSOLEALERTSUSERS

ANALYTICS

Select a Station: Allanhill Farming Company

Show Graph:

- ☒ Wind Speed Averages
- ☒ Wind Speed Distribution Classes
- ☐ Wind Turbulance
- ☒ Wind Direction Distribution
- ☒ Temperature Averages
- ☒ Rainfall

Wind Speed scale: mph



Temperature scale: Celcius

Rain scale: Millimeters


Highs and Lows: ☒ Show data

Year: 2013 ANALYSE

Growing Degree Day report



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Sat Jan 26 16:24:07 2013

SUMMARYHISTORYANALYTICSNOAAG.D.D.T.H.H.CHILL
HIGHS / LOWSFORECASTRAIN MAPTEMP. MAPWIND MAPCONSOLEALERTSUSERS

GROWING DEGREE DAYS

Select a Station: Allanhill Farming Company

Start Date: 1 Jan 2013 End Date: 26 Jan 2013

Baseline Temperature: 5 °C Cap Temperature: 30

Select Sensor: I.S.S. Temperature

G.D.D. Needed: 300

Display Daily G.D.D. : ☒

GO >>

Plotting temperature - from the History tab



Routine maintenance

Batteries

All Davis transmitter stations use a CR 123 3 volt lithium battery to power the unit. Those that have solar panels (ISS unit, Soil and leaf station) will get their power during daylight directly from the solar panels. The panel also charges the super cap on the unit such that after dark power is being provided by this capacitor for up to three hours. During the hours of darkness the battery takes over.

The batteries have differing life spans depending on the type of station that they are powering. The recommended battery change intervals are as laid out below

Station Type	Battery	Duration
Vantage Pro ISS	CR 123	12 months
Wireless temp / rh station	CR 123	3 months
Wireless soil and leaf station	CR 123	4 months
Long range repeater	CR 123	2 months
Short range repeater	CR 123	2 months

Maintenance contd.

- Every three months check for sediment build up on the rain tipper spoons. Before cleaning ensure to disconnect the lead connecting the rain tipper to the ISS unit. Check also for cob web build up. Be careful not to touch the reed switch directly underneath the weight on the underside of the rain collector spoons.
- Check for debris and clean the rain collector cone.
- Once per year thoroughly clean the screens on the temperature sensors, ISS unit and clear out any debris build up / insect build up etc. If you do not do this periodically temperature and humidity readings could be affected.
- Clean the solar panels with a soft cloth and warm water - this will ensure max performance of the panel.
- Clean any cob web build up around both the wind vane and cups.
- Clean out any insect build up in the transmitter stations
- If the main system battery drops below 10 volts the modem will cease to function correctly. Drop in power could be caused by, dirty solar panel, solar panel cable damage, ageing battery, extreme cold weather, prolonged low light levels. The battery can be re-charged using a standard 12 volt car battery charger on a trickle charge. If the power does go down REMEMBER when the console comes "back to life" the screen will display "receiving from station no". In this mode NO DATA will be recorded and the temp displayed on the main web page may well be -17.8 degrees. WHENEVER the system is re-booted one will need to press the DONE button on the console display to resume normal working conditions when weather data will be recorded

For more tips on maintenance and troubleshooting refer to the exerts from the station manuals earlier in this booklet.



ISS –Integrated Sensor Suite

Temperature / Humidity station

TNC Connector for external antenna
cable—DO NOT OVERTIGHTEN HERE

Long range antenna

Secure fencing around weather station

