USING WIRELESS DIAGNOSTICS

Application Note **31**

in Vantage Pro2™ and Vantage Pro® systems

INTRODUCTION

In addition to logging weather data, the Vantage Pro consoles and Weather Envoys™ continuously monitor the station's radio reception. You may find this information very helpful, especially when you are choosing where to locate your display console, Envoy and ISS.

DIAGNOSTIC SCREEN(S) ON THE DISPLAY CONSOLE

The method you use to access the diagnostic screen varies depending upon which system you have:

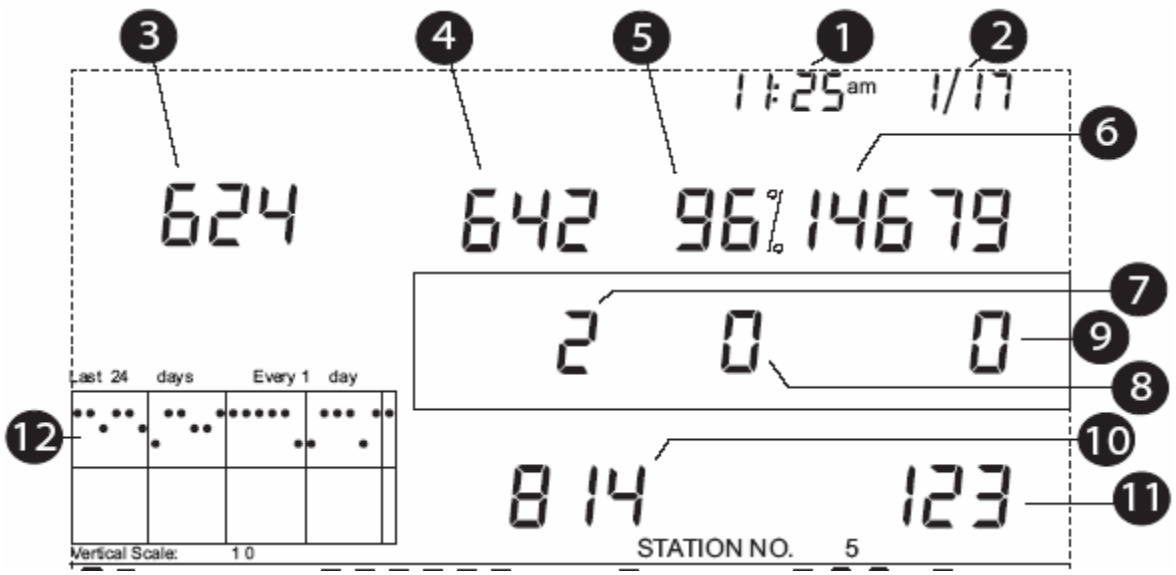
For Vantage Pro2 consoles:
From the Current Data screen, press and hold TEMP, then press the HUM key to access this screen. The right arrow is used to select various station transmitter IDs when the console is configured to receive multiple stations.

For Vantage Pro consoles:
From the Current Data screen, press and hold TEMP, then press the TIME key to access this screen. The STATION key is used to select various station transmitter IDs when the console is configured to receive multiple stations.

For both systems, press the DONE key to exit a diagnostic screen. This information is cleared at midnight automatically, so all data values represent those calculated since midnight. The data can be manually reset at any time using the Clear button while in the Reception Diagnostics screen on the LCD.

SCREEN 1: STATISTICAL DIAGNOSTIC SCREEN FEATURES

The following diagram illustrates the features that both Vantage Pro and Vantage Pro2 consoles have in common.



1. Time of day or the number of times the anemometer reed switch was seen closed*. The reed switch opens and closes once each revolution of the anemometer. Press the WIND key to toggle between these two values.
2. Date or the number of times the anemometer reed switch was seen open* is displayed. Press the WIND key to toggle between these two values.
3. Number of packets containing CRC errors that were received. The system runs a CRC check on data packets. Any data packets that don't pass this CRC check are considered to contain errors and the packet is discarded. These are considered "bad" packets.
4. Number of missed data packets. These are times when a data packet is expected, but is not recognized as a data packet by the wireless receiver. These are also considered "bad" packets.
5. Percentage of good data packets received.
6. Total number of good data packets received.
7. Number of times the console resynchronized with the transmitter. The console will attempt to resynchronize after 20 consecutive bad packets.
8. Maximum number of bad data packets in a row without resynchronization.
9. Current number of consecutive bad packets. The counter increments when the console is synchronized but a packet is bad. This value is reset to zero when a good packet is received.
10. Longest streak of consecutive good packets received.
11. Current streak of consecutive good packets received. This value is reset to zero when a bad packet is received.
12. Graph of the daily percentage of good data packets received over the last 24 days.

*Davis Instruments use only

The information displayed in the ticker or banner at the bottom of the display differs between the two systems. Below is how it looks on a Vantage Pro2 with recent firmware dated May 2005 or later.

13. Background noise level. This refers to the undesirable signal level the console hears while it is in the process of acquiring a signal from a station. The range displayed is from 5 to 60. When the noise level is high, you may need to move the console closer to the station to get a stronger signal. Small background noise level does not always guarantee good reception. The signal strength from a transmitter needs to be stronger than the background noise level in order for the console to receive clearly. If there are reception problems while a small background noise level is still being displayed, make sure the console is within reasonable range of the transmitter. If the console has currently acquired all the station signals it is set to receive, the background noise level displayed is the last noise level measurement taken before acquisition finished.
14. Current console battery voltage. If no batteries are installed, this number is meaningless.
15. Repeater ID currently communicating with console. If a repeater or group of repeaters is used to relay station information to the console, the Repeater ID is the repeater that the console is set to receive. If the console is not listening to repeaters, the section remains blank. Application Note 25 provides detailed information on using Vantage Pro2 repeaters.
16. The console's reception status: Blinking "X" = Receiving Packets, toggles on and off for each good packet received; "R" = Resynch, when the console is trying to reestablish reception, the console will try for about 10 minutes until going to the "L" mode: "L" = Loss of Signal; the console will stay in that mode for 15 minutes until returning to the "R" mode. You can manually force the console into "R" mode earlier by going into and back out of the Setup screen.

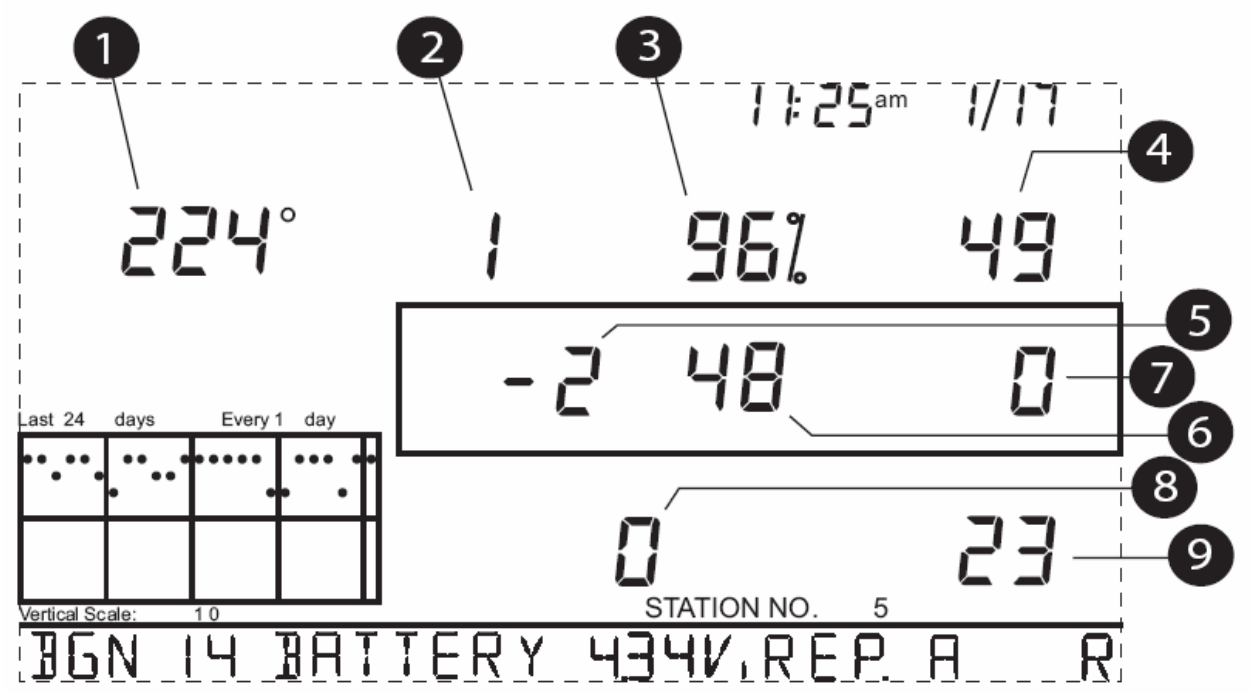
Here is how the ticker looks on a Vantage Pro2 with firmware dated before May 2005 and on ALL Vantage Pro consoles. This Receiver Gain Status indicator appears instead of the background noise level in the ticker.

13. The Receiver Gain setting provides control over the receiver sensitivity. Press HI/LOW to toggle Gain on and off. If you're having trouble with reception, try changing the Gain. Note that Gain can adversely affect performance depending upon conditions. If you are having reception problems, you should try both settings. Gain should generally not be turned on when signal strength is above 30. See #4 below. Gain setting is automatic for later firmware versions.
14. Current console battery voltage. If no batteries are installed, this number is meaningless.
16. The console's reception status: Blinking "X" = Receiving Packets, "R" = Resynch, "L" = Loss of Signal. These have the same functions for all versions of Vantage Pro2 and Vantage Pro console firmware.

Note: The Repeater ID does not appear in the ticker in Vantage Pro2 firmware versions prior to May 2005 when the repeater was not supported. If you want to use repeaters with your Vantage Pro2, upgrade to a a firmware version of May 2005 or later.

Additionally, the Vantage Pro2 console includes a Reception Diagnostic screen that specifically addresses the statistics related to the quality of wireless reception. To view this screen, press 2ND and then press CHILL from the Diagnostic screen.

SCREEN 2: RECEPTION DIAGNOSTIC SCREEN FEATURES



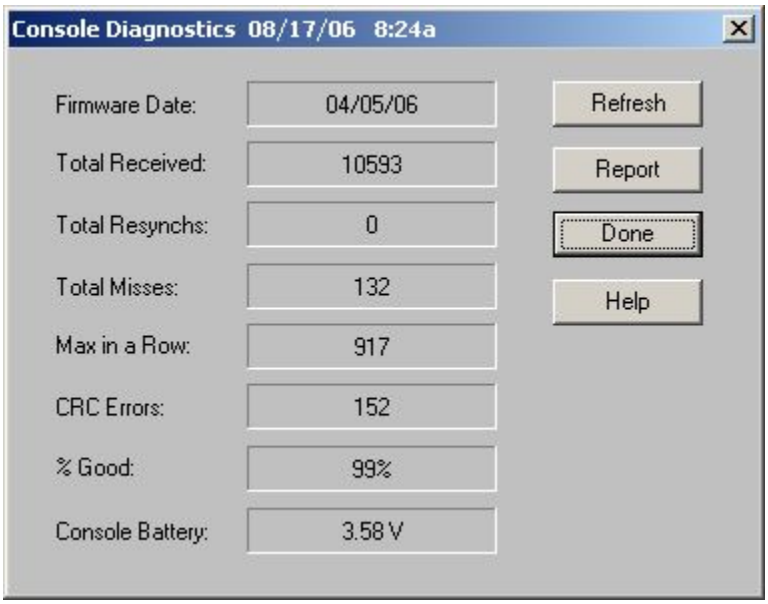
1. 8-bit timer value of next reception.* The degree sign displaying in the upper right hand corner next to this value verifies that the Reception Diagnostic screen is currently displayed.
2. Radio frequency error of the last packet received successfully. In normal operation, this value is +1, −1 or 0. This changes the value in # 5 below.
3. Percentage of good packets received.**
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 (--). See #13 on Screen 1 for details on receiver gain.
5. Current frequency correction factor. Shows 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.**

*Davis Instruments Engineering department development use only
**fields common to both diagnostic screens

DIAGNOSTICS ON THE WEATHER ENVOY™

With the Weather Envoy, you do not have access to the diagnostic screens that are normally viewed on the Vantage Pro console. What you do have access to is the Console Diagnostics dialog box under the Reports menu and the "ISS Recept" column in the WeatherLink® browser. This feature is available for both the Vantage Pro2 and Vantage Pro consoles.

The WeatherLink Console Diagnostics dialog box is found under the Reports menu. This menu contains data calculated in the display console or Envoy and normally displayed on the wireless diagnostic screen of the Vantage Pro console. This dialog box is a snapshot. You must hit the Refresh button to get newer numbers. The Report button will generate a text file with the same information. The data here is based on the reception of the actual transmitter data packets as defined in WeatherLink's Set Transceiver dialog box. On an Envoy the way to manually clear the data is to go into the Set Transceiver dialog box and press the OK button. This causes the unit to perform a "resynch". Repowering the Envoy will also reset these values. Like with the console diagnostic screen, this information is automatically cleared at midnight. The % Good is calculated from the total received good packets and the total number of bad packets since the data was last reset. Reception diagnostics are not available.



The “ISS Recept” column in the WeatherLink browser is an RF reception percentage statistic only for that archive interval. The ISS Reception numbers are intended to show the overall quality level of the radio reception between the Vantage Pro consoles and the ISS transmitter. The reception value is a percentage calculated from the number of wind speed samples received (reported in the “Wind Samp” column of the data browser) divided by the expected number of packets. The possible number of wind samples is based upon the transmitter ID and the archive interval period. Since wind speed data is in every data packet, it is possible to determine how many packets should have been received during the archive interval. The actual number of wind packets received is listed in the “Wind Samp” column. Since this figure is based on wind speed packets, if you are using an Anemometer Transmitter Kit, the column actually represents the reception statistics for your anemometer transmitter only.

ET	Wind Samp	Wind Tx	ISS Recept	Arc. Int.
0.017	104	5	100.0	5
0.000	104	5	100.0	5
0.000	102	5	98.1	5
0.000	105	5	100.0	5
0.000	104	5	100.0	5
0.000	105	5	100.0	5
0.000	103	5	99.0	5
0.000	103	5	99.0	5
0.000	103	5	99.0	5
0.000	106	5	100.0	5

If you have an anemometer transmitter in your network, but you want to log the ISS reception in the software, you can temporarily disable the wind transmitter, and then the data you view in the ISS Reception column will represent the ISS. If you are worried about missing wind data, it may be possible to temporarily string the anemometer cable over to your ISS since it is 40’ (12 m) in length. If needed, additional extension cables and couplers are available from Davis Instruments.

The number of packets with wind speed data received by a VantagePro2 system is approximately 3% more than the number received by a VantagePro system. The software, however, uses the same "expected number of packets" for both systems which will result in a small overestimation of the ISS reception value for VantagePro2 systems.

Below are tables that list the expected number of wind speed packets for each transmitter ID and archive interval. WeatherLink uses the VantagePro table. The VantagePro2 table is listed for reference purposes only.

Expected number of Wind Speed packets
VantagePro

	Archive Interval (min)						
Tx ID	1	5	10	15	30	60	120
1	23	114	228	342	684	1368	2736
2	22	111	222	333	667	1335	2670
3	22	108	218	326	652	1302	2606
4	21	106	212	318	637	1273	2545
5	21	104	207	311	622	1244	2487
6	20	102	202	304	608	1216	2432
7	20	99	199	297	595	1189	2379
8	19	97	194	291	582	1165	2328

VantagePro2

	Archive Interval (min)						
Tx ID	1	5	10	15	30	60	120
1	23	117	234	351	702	1405	2810
2	23	114	229	343	686	1371	2743
3	22	112	223	335	670	1340	2679
4	22	109	218	327	655	1309	2618
5	21	107	213	320	640	1280	2560
6	21	104	209	313	626	1252	2504
7	20	102	204	306	613	1226	2451
8	20	100	200	300	600	1200	2400

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