

INTRODUCTION

The Motorola Cell Phone Modem uses more power than the Davis Solar Power Kit (#7708) and Davis battery (#7711) can generate and backup. The Note discusses power management methods that can solve this problem.

ESTIMATING POWER REQUIREMENTS

There are three major factors to consider:

- The current required to run the weather station, RS-232 link, and sensors. A Wizard (#7420) or Monitor (#7440) system draws about 15 mA. The advanced stations, including GroWeather and Health Enviromonitor, draw about 20 mA. In all cases backlit lighting is assumed to be off. Use of backlit lighting is not recommended for solar panel operation. The weather station must remain powered at all times to retain its settings and data memory. The current draw per day will therefore range between 0.36 and 0.48 Amp-Hours.
- The current used by the cell phone modem in standby mode. This is about 200 mA or about 4.8 Amp-Hours per day. This is considerably more than the solar panel can deliver so the cell phone modem must be turned off for a large percentage of the day. For the Monitor or Wizard, a timer/relay (#7682) is used to program and control the period each day that the Cell Phone Modem is able to receive calls. The advanced weather stations can use the timer/relay (#7682) or the alarm output module (#7736) for the same purpose.
- The current used by the Cell Phone Modem in transmit mode. This averages about 2 Amps; the Amp-Hours depend on the connection time each day. For example: if the archive interval is set for one minute, it would take about 9 minutes to download all of the data records from the weather station. If done once a day this would consume about 0.3 Amp-Hours. If the archive interval was set longer, say 30 minutes, the Amp-Hours needed would drop to about 0.02 Amp-Hours. Both are well within the charging capability of the solar panel.

Assume that the solar panel can generate 50% of its rated capacity or about 2.4 Amp-Hours per day. (See Application Note 9, *Estimating power from the solar panel.*) A workable setup with some safety margin would be as follows:

Solar energy generated in a 24 hour period -	2.4 Amp-Hours
Run weather station continually for 24 hours -	-0.48 Amp-Hours
Enable cell phone modem standby for 1 hour -	-0.20 Amp-Hours
Cell Phone Modem transmits for 20 minutes -	-0.66 Amp-Hours
<hr/>	
Net reserve	1 Amp-Hour per day

This reserve insures that the battery stays fully charged and could deliver 4 days of operation in the event the solar panel fails or sunlight is abnormally obscured by heavy cloud cover or snow. It would also take about 7 days to recharge an almost discharged battery after the typical sunlight levels returned to normal. This example would be suitable for a typical temperate climate location. Also, for the typical archive interval of 15 to 30 minutes, the data could be downloaded daily, yet still leave about 2 hours per week to view the bulletin. However, your mileage may vary, so limit the number of hours per day that the cell phone modem is enabled and accessed to no more than you really need.

SITUATIONS THAT MAY REQUIRE MORE POWER

Sometime a situation may require more power than the Davis Solar Panel Kit and battery can generate. This section details two situations in which you need to increase the capacity of the solar panel kit.

- You want to operate the cell phone modem for more than 20 minutes each day. It may be that you need the larger operating time for only 1 or 2 days a week. This might still keep the average current draw within acceptable levels. In this case install the timer/relay (#7682), which may be programmed for each individual day of the week. If you want to operate the Cell Phone Modem every day for longer than 20 minutes, you will need a larger solar panel and storage battery. The exact requirements are highly variable, depending on modem operation, average solar radiation output, and periods of reduced solar output. A conservative rule of thumb would be to use a 15 watt rated solar panel capacity and a 12 Amp-Hour battery for the first hour of modem connection time. For each additional hour add 10 watts to the solar panel and 8 Amp-Hours to the battery. For example, if you wanted to connect 2 hours each day, you would install a 25 watt solar panel and a 20 Amp-Hour battery.
- The remote site experiences long periods during which the panel can generate little or no power and the transmit requirements of the cell phone modem are less than 10 minutes per day. In this situation, a larger storage battery may be all that is needed. A commonly available size 24M deep cycle battery can store about 75 Amp-Hours and could operate a system for about 75 days with no solar charging. This battery can be housed in an inexpensive battery case located on the ground at the base of the weather station. Once sunlight is restored it would take about 2.5 months to fully recharge the battery, so this approach is only useful where there is a very predictable time of no solar charging followed by a long period of solar charging.

Larger solar panels are available from many alternate energy suppliers. A larger solar panel will require a suitably sized regulator. West Marine Products sells a complete line of rugged solar panels and regulators for the recreational boating market. Contact 1-800-538-0775 for further information.

Larger capacity storage batteries can battery cases are available from many RV and boating suppliers. Also, most Sears Battery and Tire Centers carry deep cycle batteries and cases. Die Hard Model 96494, a deep cycle 24M battery cost \$59.99 in July 1997.

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As a Function of Cable Length

INTRODUCTION

This application note discusses the maximum wind speed readings that the station can measure as a function of anemometer cable length.

Some Davis Instruments weather stations—such as the Monitor II, Wizard II and III, GroWeather, Health EnviroMonitor and Energy EnviroMonitor—use wires to connect the weather measuring sensor (the transducer) to the weather station console. In general, the wires serve both to power the sensor and to transmit the signal back to the console. The console then interprets the signal into meaningful units, such as wind speed in miles per hour. Others like the Vantage Pro and Vantage Pro2 use wires to connect the weather measuring sensor to a transmitter, which then relays the measurements digitally over the air (wireless Vantage Pro) or down a cable (cabled Vantage Pro).

Using wire to deliver power to sensors and then to return the signals works well and imposes few constraints. However, one important constraint is the maximum length of the connecting wire. As the wire grows too long, the sensor begins to receive insufficient power, and the returning signal begins to lose integrity as it travels back to the console or transmitter.

VANTAGE PRO, MONITOR and WIZARD STATIONS

Loss of signal quality versus increasing cable length is most noticeable in our Monitor II and Wizard II and III and Vantage Pro and Vantage Pro2 anemometers. As the cable length increases, the accuracy of all but the highest wind speeds is unaffected, but the maximum measurable wind speed drops. That is to say, the maximum measurable wind speed decreases as cable length increases (see graph below).

The graph should be interpreted as showing “worst case” scenarios. Thus, if your station uses 140 feet (42 m) of cable, the station will measure *at least* 135 mph winds with large size cups. It may well measure higher wind speeds. If winds begin to exceed the measurable max, the console will indicate zero wind or will dash out (i.e., show dashes in place of numbers). Large cups and small cups are shown because they have different response characteristics relative to the actual wind. The numbers represent the maximum number that would appear on the Vantage Pro display. The numbers on a Monitor or Wizard display will be significantly higher at the maximum wind speeds (15% higher at 175 mph for small cups, 33% higher at 150 mph for large cups).

You can use the following website to determine the maximum wind speed you would expect in your area and thus the maximum cable length that would be suitable for your area. Use the city nearest you and the Annual value on the far right. Keep in mind that conditions may vary in-between the locations listed:

<http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/maxwind.html>

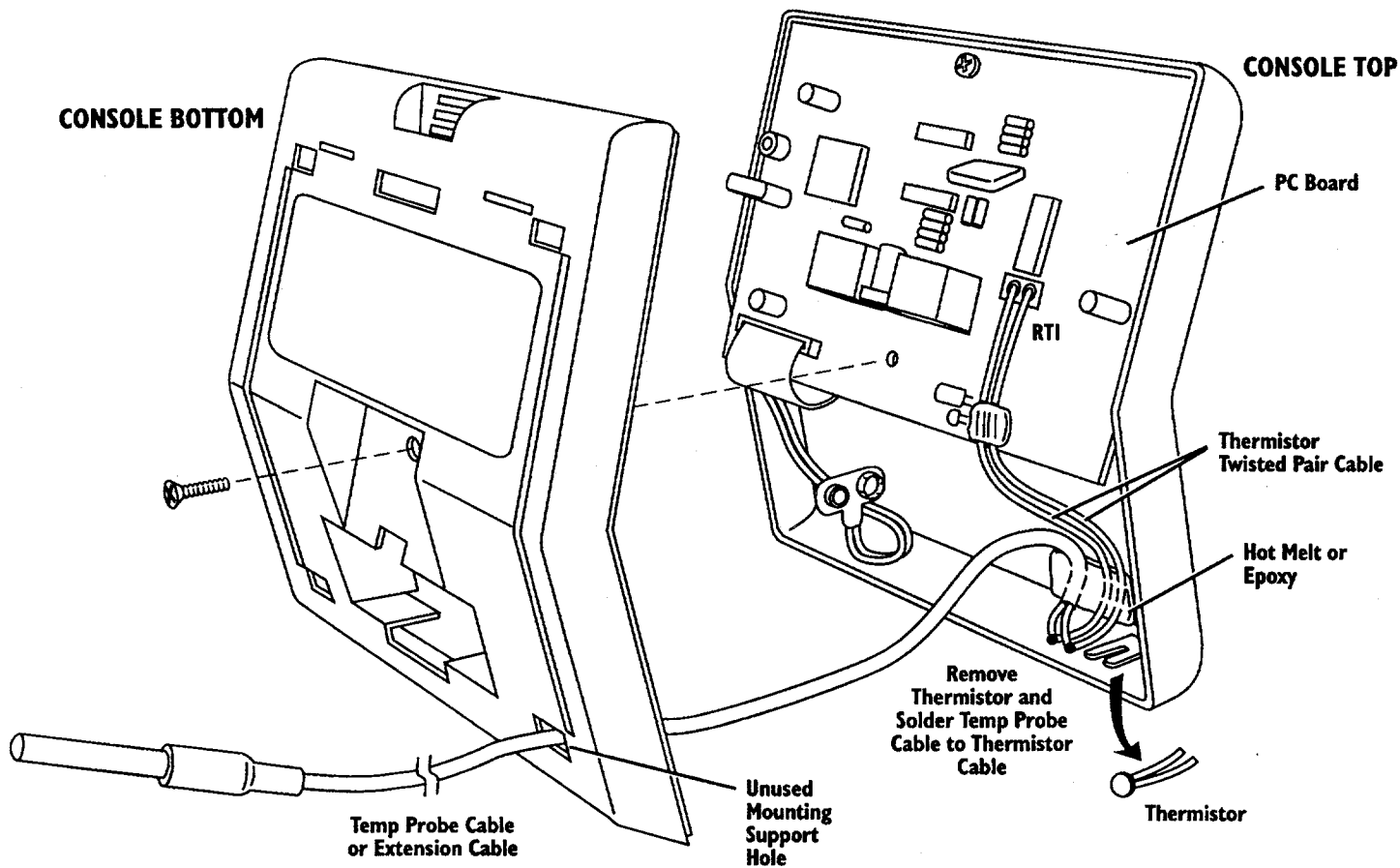
GROWEATHER, HEALTH and ENERGY STATIONS

The maximum measurable wind speed does *not* degrade in our advanced weather stations (GroWeather, Health EnviroMonitor and Energy EnviroMonitor). Our advanced stations use additional signal conditioning circuitry located in the Sensor Interface Module (SIM) to maintain signal quality right up to the maximum cable length—250 feet (75 m) from sensor to SIM and 250 feet (75 m) from SIM to console.

Follow the steps below to extend the temperature sensor contained inside the console of the Weather Monitor II using a Standard External Temperature Sensor or Standard Stainless Steel Temperature Probe. Using the external sensor/probe and extension cables, you may extend up to 200 feet (61 m) without degradation of accuracy. See the illustration on the following page as well.

1. Remove all power from the console by disconnecting the power adapter and battery.
2. Disconnect the junction box cable from the junction box. You may leave the sensor cables connected to the junction box.
3. There is a warning label on the bottom of the console (in the center). Remove this label to reveal the screw underneath. Remove this screw and separate the console bottom from the console top. **OPENING THE CASE VOIDS YOUR WARRANTY.**
4. Locate the thermistor at the bottom right of the console top, at the end of a pair of wires.
5. Cut off the thermistor, leaving the tinned leads of the thermistor wires exposed.
6. Cut the cable on the temperature sensor or probe (whichever you are using) or on the extension cable (if you are extending the sensor beyond the reach of the sensor cable itself) near the plug, removing the plug.
7. Strip approximately 1/2" (12-1/2 mm) from the ends of the four wires in the sensor, probe, or extension cable.
8. Twist together the yellow and green wires and solder. Do the same with the red and black wires.
9. Feed the cable through one of the unused mounting holes on the mounting base.
10. Twist together one pair of the sensor, probe, or extension cable wires and one of the thermistor wires (it does not matter which) and solder them together. Do the same with the other pair of sensor, probe, or extension cable wires.
11. Position the solder joints so they do not touch and secure to the console with hot melt or non-conductive epoxy.
12. After the hot melt or epoxy is cured, reattach the console base to the console top. Reattach the junction box cable, the power adapter, and the battery.

See the illustration on the following page.



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For Weather Stations and Sensors

This application note describes various mounting solutions for non-penetrable flat surfaces. The mounting platforms described in this note can be used to stabilize and ballast the Davis Mounting Tripod (#7716) and/or other Davis weather instruments. The mounts can be used whenever and wherever a user wants to avoid installing lag screws or bolts into a flat roof or mounting surface (e.g., school or office building installations).

This note describes three mounting options: the first two are user-constructed, the third can be purchased from a non-Davis retailer. The user-constructed mounts are designed to secure the Davis Mounting Tripod (#7716) that can then support the EZ-Mount and Wireless Weather Stations; the Sensor Mounting Arm; and/or individual sensors. The purchased mount, on the other hand, includes a vertical mounting pipe that can directly accommodate the sensing equipment described above (i.e., without the tripod).

MOUNT 1 - CONSTRUCTIBLE USING CONCRETE PARKING BUMPERS AS BALLAST

Components

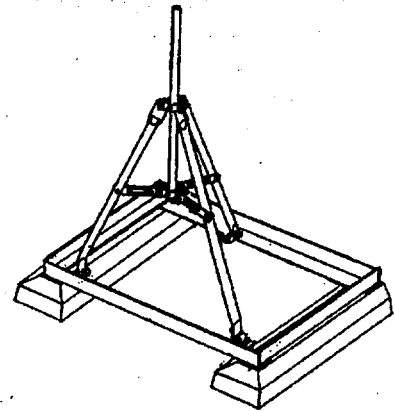
Part Description	Quantity
Parking Bumper, concrete, 3 ft. long*	2
Steel angle, 2"x2"x1/8" thick, 39" long**	2
Steel angle, 2"x2"x1/8" thick, 32" long**	2
3/8" bolt, 6" long***	4
3/8" flat washer	4
3/8" nut	4
5/16" machine screw, 3/4" long	7
5/16" flat washer	7
5/16" split lock washer	7
5/16" nut	7
Indoor/Outdoor Carpet, 36"x 44"	1

Notes:

* Parking bumper available from precast concrete supplier, approximately \$10.00 ea.

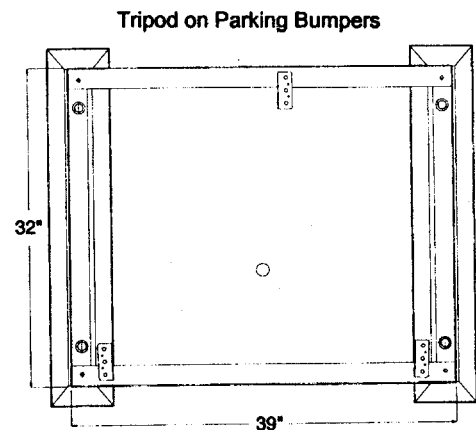
** Galvanized steel angles are preferred—otherwise paint. One 6 ft. long angle will make one 32" piece and one 39"-40" piece.

*** 3/8" bolt length determined by actual bumper used.



Assembly

1. Cut angles to length, drill and construct frame. Use 5/16" screws, flat washers, split lock washers, and nuts at corners.
2. Chisel a counterbore in bottom of parking bumpers at holes and install 3/8" bolts and flat washers from below. Drill 1/2" holes in frame to match hole locations in parking bumpers. Secure frame to bumpers with 3/8" nuts.
3. Place tripod on frame, mark hole locations, and drill 3/8" holes. Secure tripod to frame with 5/16" screws, flat washers, split lock washers, and nuts. Note: if roof has a slight slope, use a longer 5/16" nut under the tripod leg that is on the angle with the single mounting hole. Position the frame so that this single leg is on the downhill side. Place nuts or washers between top of frame and bottom of tripod foot to bring the mounting pole vertical.
4. A 36"x 44" piece of indoor/outdoor carpet can be placed under the parking bumpers to protect the roof.



MOUNT 2 - CONSTRUCTIBLE USING CONCRETE CINDER BLOCKS AS BALLAST

Components

Part Description	Quantity
Concrete Cinder Blocks*	6
Steel angle, 2"x2"x1/8" thick, 39" long**	2
Steel angle, 2"x2"x1/8" thick, 32" long**	4
5/16" machine screw, 3/4" long	11
5/16" flat washer	11
5/16" split lock washer	11
5/16" nut	11
Indoor/Outdoor Carpet, 33"x 40"	1

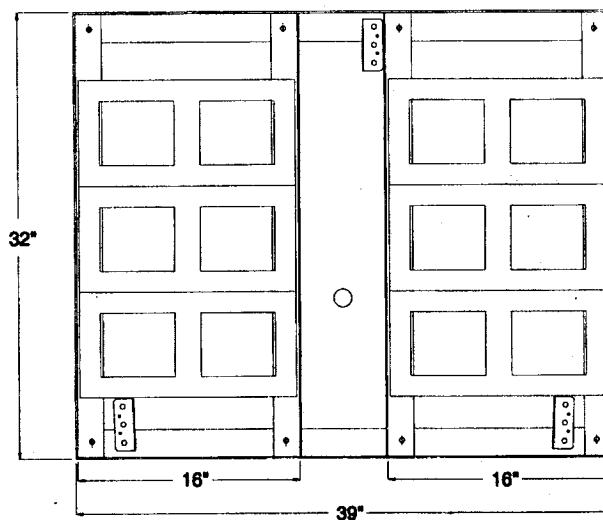
Notes:

- * Cinder blocks available from precast concrete supplier, approximately \$1.50 ea.
- ** Galvanized steel angles are preferred – otherwise paint. One 6 ft. long angle will make one 32" piece and one 39"-40" piece.

Assembly

1. Cut angles to length, drill and construct frame. Attach angles with 5/16" screws, flat washers, split lock washers, and nuts at corners.
2. Place tripod on frame, mark hole locations, and drill 3/8" holes. Secure tripod to frame with 5/16" screws, flat washers, split lock washers, and nuts. Note: if roof has a slight slope, use a longer 5/16" nut under the tripod leg that is on the angle with the single mounting hole. Position the frame so that this single leg is on the downhill side. Place nuts or washers between top of frame and bottom of tripod foot to bring the mounting pole vertical.
3. A 33"x 40" piece of indoor/outdoor carpet can be placed under the frame to protect the roof.

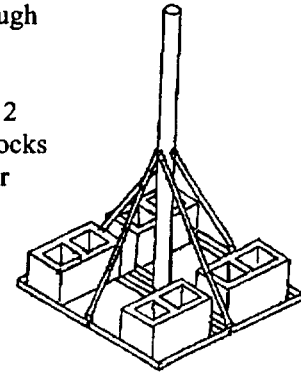
Tripod on Cinder Block Frame - With Blocks



MOUNT 3 - AVAILABLE FOR PURCHASE

Non-penetrating roof mounts frequently are used for small satellite dishes, wireless cable dishes and antennas. Many are stocked or can be ordered through local wireless communications equipment suppliers or ham radio stores.

One such mount is shown here, Rohn Model FRM 238SP5. It has a 5 ft. tall, 2 3/8" diameter pipe and can be purchased for approximately \$80.00 (cinder blocks not included). Call Rohn Tower Sales at (765) 654-4491 for the name of your closest distributor.



The 2 3/8" outside diameter pipe may be used for the Davis Sensor Mounting Arm. For EZ-Mount and Wireless installations, the extension tube can be attached with U-bolts or hose clamps (must be adapted by the user).

SAFETY NOTES

- Before installing, verify that the roof material and supporting structure have been investigated and found to be capable of withstanding all loads imposed by the weather station and its support platform. Confirm that the supporting surfaces, anchors, and/or safety cables, if required, are in conformance with all applicable local, state, and federal requirements.
- All installations must be grounded to meet applicable codes.

Note: Any metal object can and may attract a lightning strike, including your weather station or tripod. If lightning strikes your station or strikes somewhere nearby, the station's internal electronics may suffer anywhere between little to extensive damage. The station itself has been designed with considerable surge protection, but to safeguard nearby equipment and structures, we recommend following local recommendations on properly grounding your installation. For more information, contact your local lightning protection authority and/or refer to the following articles:

- MIL-HDBK-419A: *Grounding, Bonding, and Shielding for Electronic Equipments and Facilities*, 29 Dec 1987.
 - National Fire Protection Association, 1997: *Standard for Installation of Lightning Protection Systems*, 1997 ANSI/NFPA 780, National Fire Protection Association, Quincy, MA.
 - NEC, *National Electrical Code, 1996 Edition*: National Fire Protection Information, Quincy, MA.
- Ballast weights should be determined by a local professional engineer to prevent overturning or sliding at the design wind load.

Use common sense. The weather station is not very heavy or large. To check that the platform can withstand winds of up to 70 mph, pull on the top of the mounting arm with 60 to 70 lbs. of force. If higher winds are anticipated, use additional ballast or anchoring. If there is any chance of the platform sliding off the roof, install an anchor cable.

with WeatherLink™

INTRODUCTION

This document provides a step-by-step process on how to set up your own personal weather website including choosing an Internet Service Provider. WeatherLink™ is compatible with many of the ISPs out there and provides a great deal of flexibility in how you want to present your weather information: You can either use pre-made templates from Davis Instruments or create your own web pages.

INTERNET CONNECTION

First of all, you will need access to the Internet. If you already have access to the Internet, you may skip to the next paragraph. If you don't have access, you will need to get an Internet Service Provider (ISP). There are many out there to choose from. Some of the most well-known and well-liked ISPs are AOL, EarthLink, AT&T Yahoo, NetZero and Juno. Some offer only dialup service (low speed), while others offer only high speed service, and some offer both types of service. Dialup service is available to anyone with a phone line, but long-distance charges or other charges may apply in rural areas. High speed service, which may be supplied by either a phone company (e.g., AT&T, Qwest) or a cable company (e.g., Comcast, Cox) is typically only available in urban or suburban areas. High speed service is also available via satellite to anyone with a clear view of the southern sky (in the contiguous United States through HughesNet). High speed service generally costs more even though there are companies offering cheaper introductory rates or lower rates for somewhat lower speed service. High speed is generally a better value for speed. Also note that WeatherLink does not support secure FTP, so ask the ISP whether they require you to use secure FTP to upload information to your website.

You will need some personal web space on the ISPs server (or your own server) for your website. The cheaper services may not include this space for free. Others may not offer it at all. You should weigh the cost of the cheaper services + web space cost versus the cost of a more expensive service with web space included. To activate your personal web space on AOL, users must use the (keyword FTP) AOL FTP client to go to the Favorite Site "members.aol.com", where a "/screenname" directory is created. AOL includes 2 MB of web space with its service free. If you use the Davis Instruments web templates only (~80 KB), then the web space that is typically provided should be sufficient. Otherwise, you may want to consider the size and content of your website, usually quoted in MB (1000s of KB).

Ask a friend to print out the following websites for you. They contain information on choosing an ISP:

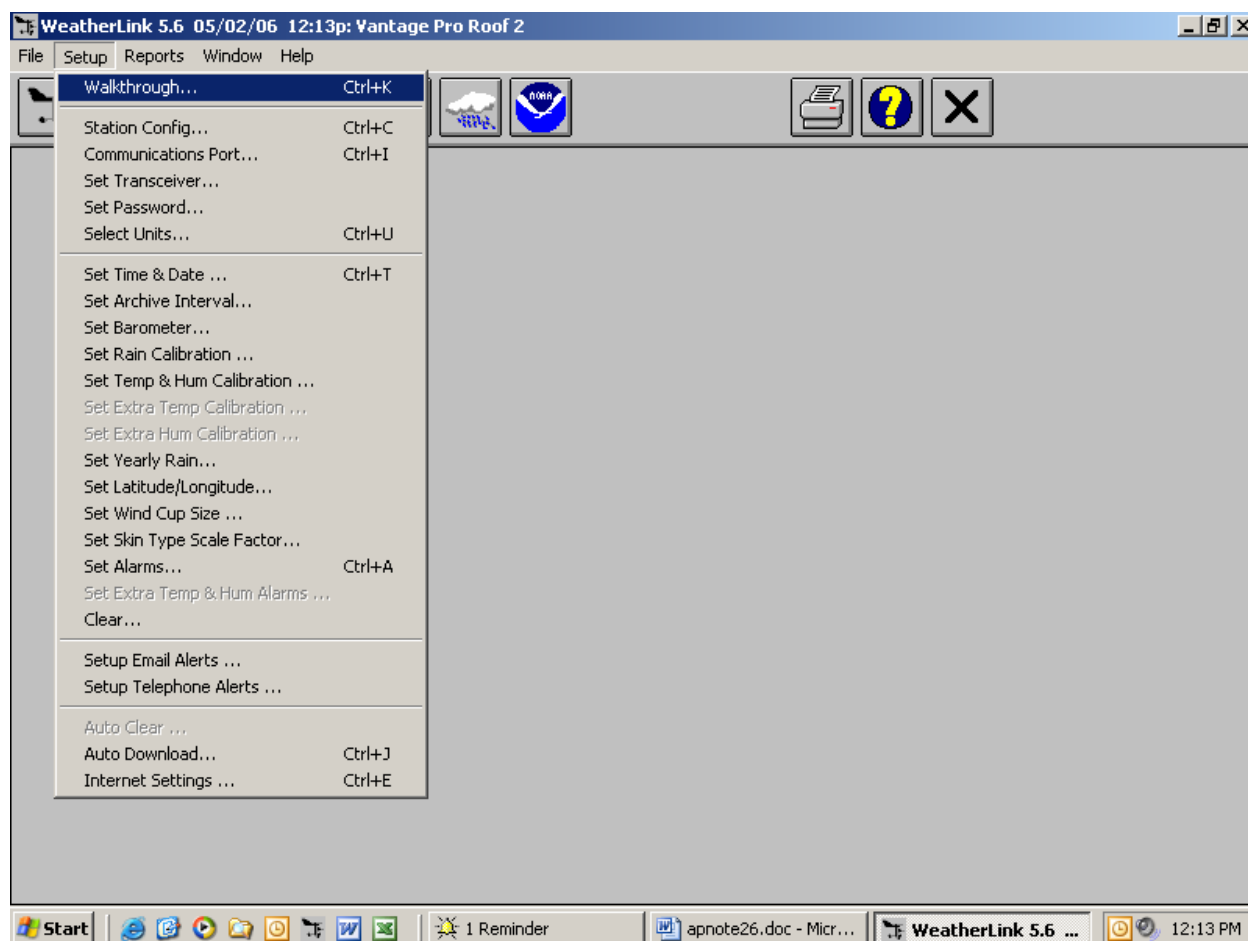
<http://www.consumersearch.com/www/internet/isp/comparisonchart.html>
<http://pcworld.about.com/magazine/1811p148id18624.htm>
<http://www.theispguide.com/>

Often times, the ISP will provide software that will automatically configure your computer's settings. If not, for a dial up connection, more recent versions of Windows will have a Wizard that will walk you through the setup. For a high speed connection, consult your ISP. Typically, for high speed service, you will need to have a "specialized" modem installed.

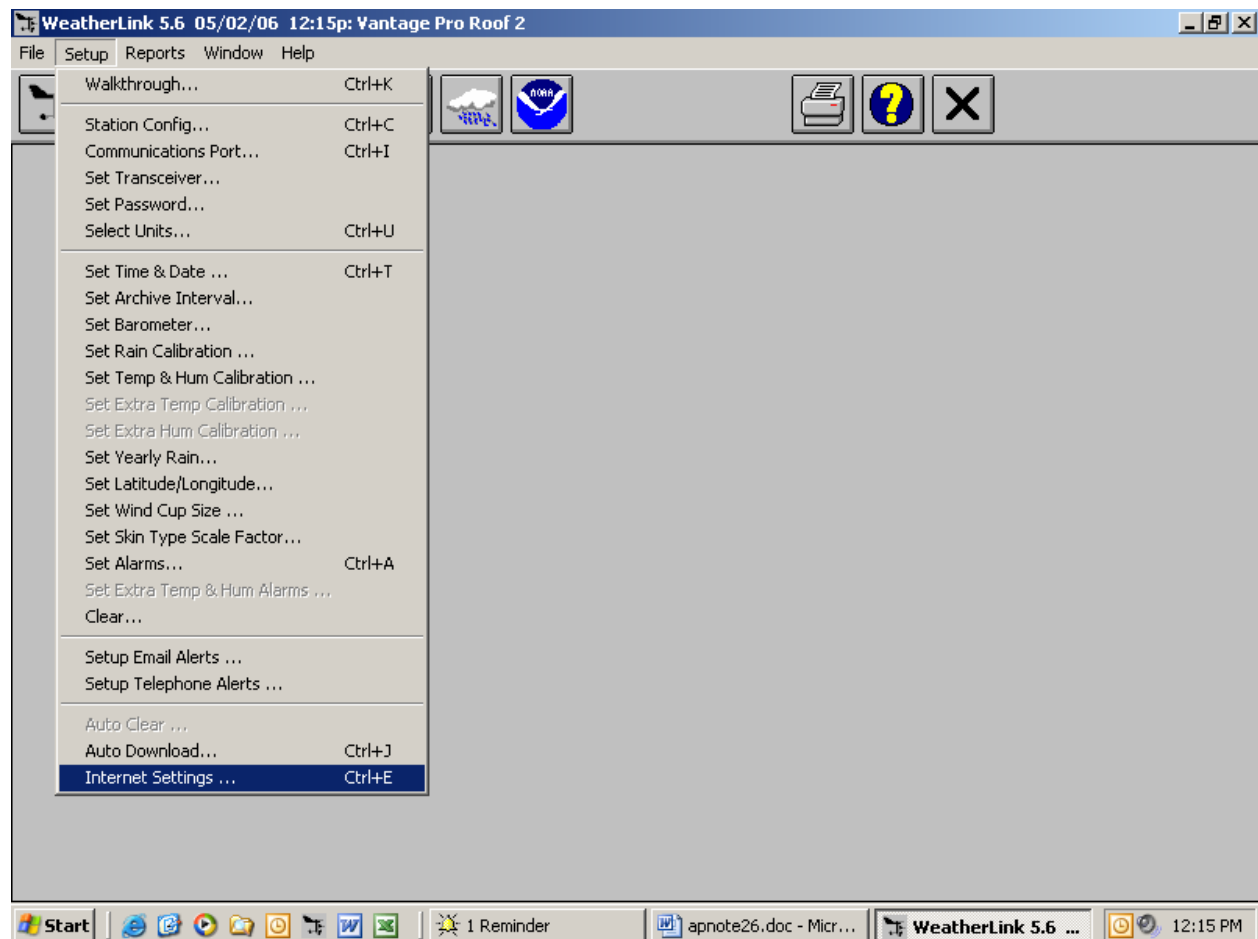
SETTING UP WEATHERLINK

To avoid interruptions in your day to day computing, it is best to have a dedicated stand-alone system and a router (which allows multiple computers to access the Internet). The router will allow multiple computers to access the Internet as needed. WeatherLink will work just fine on any compatible system, but will periodically interrupt your activities to inform you of its Internet upload activities. You will need a version of WeatherLink for Windows 5.1 or later and a Windows 95 PC or later or WeatherLink for Mac OSX and a Vantage Pro2, Vantage Pro, Weather Monitor II, Weather Wizard III, or Perception station. Consult your particular WeatherLink product for any other specific computer requirements.

Follow the installation instructions to install WeatherLink on your computer (if it isn't already installed). Use the Walkthrough feature on the Setup menu to setup your weather station on your computer. After those steps are completed, you are ready to start setting up the software to send updated weather information to your personal weather website.



Select Internet Settings on the Setup menu (at the bottom of the menu),



and then push the Internet Connection Settings button.

Internet Connection Summary	
Internet Transfer Enabled:	Off
Internet login:	
FTP host:	
Local Transfer Enabled:	Off
Connection Type:	Connect through LAN.
FTP login:	
FTP Path:	\\
Proxy Server:	Use Default Proxy Server
Local Path:	H:\\Engineering\\Users\\Jason\\WebPage\\
Internet Connection Settings	

Data Upload Summary								
	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	Profile 7	Profile 8
Offset Time:	---	---	---	---	---	---	---	---
Upload Frequency	1 min.	---	---	---	---	---	---	---
Automatically download before Internet upload	Yes	---	---	---	---	---	---	---
Number of Template Files to transfer	3	0	0	0	0	0	0	0
Number of Reports to transfer	0	0	0	0	0	0	0	0
Number of Current Data Images to transfer	26	0	0	0	0	0	0	0
Number of Historical Data Images to transfer	31	0	0	0	0	0	0	0
	Configure	Configure	Configure	Configure	Configure	Configure	Configure	Configure

First indicate whether you connect to the Internet using a dialup connection or not. Select the "Connect through a Dialup Connection" for dialup, otherwise select the "Connect through a local server". If you have a Dialup connection, your connection should be listed in the box below. If not, you may need to setup one. You will still need to enter your username and password for your Internet connection. AOL users must use the "local server" selection and manually connect or sign-on to AOL before attempting a web page upload. The reason for this is "The Internet-connected machines at AOL do not have access back to the systems where the membership data is kept, so there is currently no way to verify login/password information on external connects."

Internet Connection Settings

Internet Connection

☒ Connect through a local server
☐ Connect through a Dialup Connection
 Select a Dialup Connection: [Empty List Box]
 User Name: [Empty Text Box]
 Password: [Empty Text Box]

☐ Stay Connected all the Time
☒ Only Connect during Transfer

Number of times to attempt to connect: [5]
 Seconds to wait between connection attempts: [5]

FTP

Host: [Empty Text Box]
 Port: [21] ☐ Use Passive Mode
 User Name: [Empty Text Box]
 Password: [Empty Text Box]
 Remote Path: [\]

Proxy Settings

☐ Direct ☐ Proxy ☒ Pre-configured
☒ Auto-Proxy
 Proxy Server: [Empty Text Box]

☐ Internet Transfer Enabled Browse...
☒ Local Transfer Enabled Local Path: [H:\Engineering\Users\Jason\WebPage\]

OK Cancel Help

If you have dialup service, choose whether you want to “Stay Connected all the Time” to the Internet or whether you want WeatherLink to “Only Connect during Transfer”. If you do not have a second phone line, you should select “Only Connect During Transfer”. You will need the phone line open for phone calls when not in use. You can alter the settings for connection attempts if you wish. Unless you experience issues with your connection, these settings should be fine.

Next, enter your FTP information unless you are transferring data to local hard drive. A local hard drive is a letter drive accessible from your computer. You will need to get FTP information from your ISP. The host is a domain name such as www.davisnet.com or a series of numbers with dots in-between (Internet Protocol address). The host is sometimes different from your ISP domain address. For AOL users, the FTP host is “members.aol.com”. The FTP port number is usually 21 and is the default setting. Enter a user name and password, if required, to FTP. These may be different than those used to connect to your ISP. AOL users will need use the user name ANONYMOUS and the password is your AOL e-mail address: screen-name@aol.com for the FTP settings. Enter a remote path or subdirectory where you want the data files to be transferred if desired. If you plan to only have one web page on your website, you don’t need a remote path or subdirectory.

Proxy settings of “Pre-Configured” and “Auto-Proxy” are generally the correct choice for most ISPs. Use these settings unless the pre-configured setting is not working for you. The “Proxy” should be used if you will be using a different proxy server for uploading data than you use for

browsing the Internet or checking e-mail. (This is not common). "Direct" is when you know that you do not need to use a proxy server (when you are connected directly to the server through a LAN or WeatherLink is running on the server).

If you have Local Transfer (to a local hard drive) enabled, you will need to enter a file path name or use the Browse button to select a location. It is recommend to test uploading to a local hard drive first before attempting to upload to your website. This way, you may determine whether any problems you encounter are due to the upload information or the Internet Connection setup.

CHOOSING YOUR PREFERRED TYPE OF WEB PAGE

WeatherLink provides sample template files that you can use without having to design your own web pages. We provide you samples that will match your station type. WeatherLink provides detailed instructions on how to select and setup any of the sample templates for your web page. Under the Help file Index, type or search for "Sample Templates" or look under "Sample HTML Templates". The sample templates come in three basic flavors:

- "Weather Summary" (Current conditions text only)
- "Current". Current conditions with text , graphics, and historical information in a Java applet "ticker"
- "History". Historical data with text. graphics, and current conditions in a Java applet "ticker"

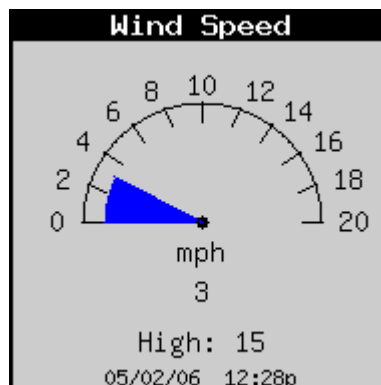
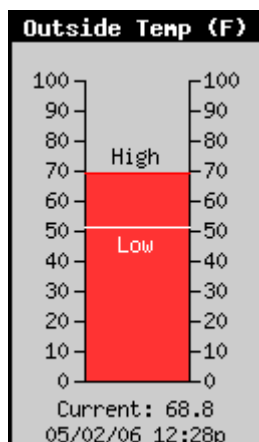
If one of these pages is all the content you want on your website, you can name the template file "index.htx" and your website address will take visitors directly to that page. Otherwise, use this as your main page. You may name it index.htm if it does not contain weather data tags.

However, you may design your own web pages as well. WeatherLink provides several style elements that can be utilized in the design of your web page:

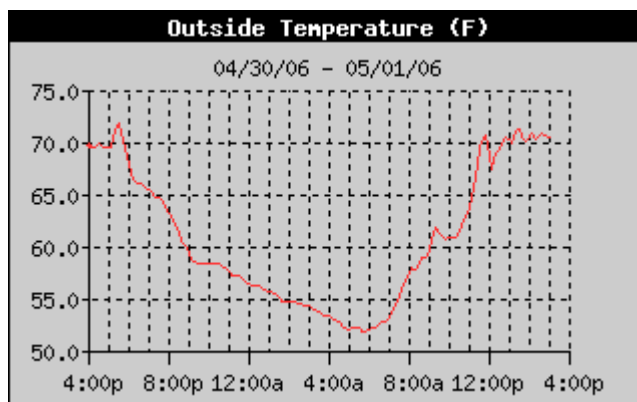
- Current and Historical text
- Current data graphics
- Historical data graphics
- Reports
- Java applet "ticker"

WeatherLink uses what are called "weather tags" or place holders for weather data. These are called "comment tags" in HTML syntax: <!--outsideTemp-->. The software parses through a template file with the default extension *.htx and replaces these tags with actual weather data before uploading the web page to its destination site. From that, WeatherLink creates an *.htm page with actual weather data values on it. These can either be current conditions or highs and lows (daily in the Vantage Pro, high/low from the console display for the Monitor, Wizard, or Perception)

WeatherLink uses a *.gif file format to generate graphics representing current data conditions. WeatherLink generates a bar graph with current data value and the current time as of upload and the option to show a low and/or high. The wind graphics use a dial format.



WeatherLink also uses *.gif to generate history graphics. These are graphs of history weather data. You pick the plot span of choice in the Profile options.



These images are created by the WeatherLink software at the time of upload and placed at your destination web page location. Thus, these images exist only at the destination location.

Reports: WeatherLink also allows you to upload text reports. The choices of upload to your website are NOAA summaries, or text listing of weather records for the past 2 days or the past week. Additionally, you may provide your weather data to the Citizen Weather Observer Program (CWOP) or Weather Underground. Please note that none of the Reports are part of the Sample Templates. You will need to configure them manually if you want to use them.

Depending upon your version of WeatherLink, to upload to Weather Underground, you may need to get a software plug-in from Weather Underground and it may appear as a separate feature item on the Setup menu. To utilize this as a separate feature item, you will need to consult their documentation or website for details: <http://www.wunderground.com>. Otherwise, the feature is documented in the WeatherLink Help file.

The CWOP captures the data that is sent by the APRS feature for use in improving NOAA's forecast models. You will need to sign up before sending your data. This process gives you a

“call sign” which is a unique identifier for your weather station. Details on this are provided in the WeatherLink software Help file and at the following website: <http://www.wxqa.com>

Java Applet “Ticker”: We include a Java applet called “davisticker.class” that will show you a text string in a “ticker” format. The Sample History template is designed so that the applet gets its data from a separate data file. You may configure your own custom web page to do the same or you may embed the text weather data within the java code itself. The following website includes instructions on how to specialize the ticker to your own preferences: <http://www.davisnet.com/support/weather/davisticker.asp>

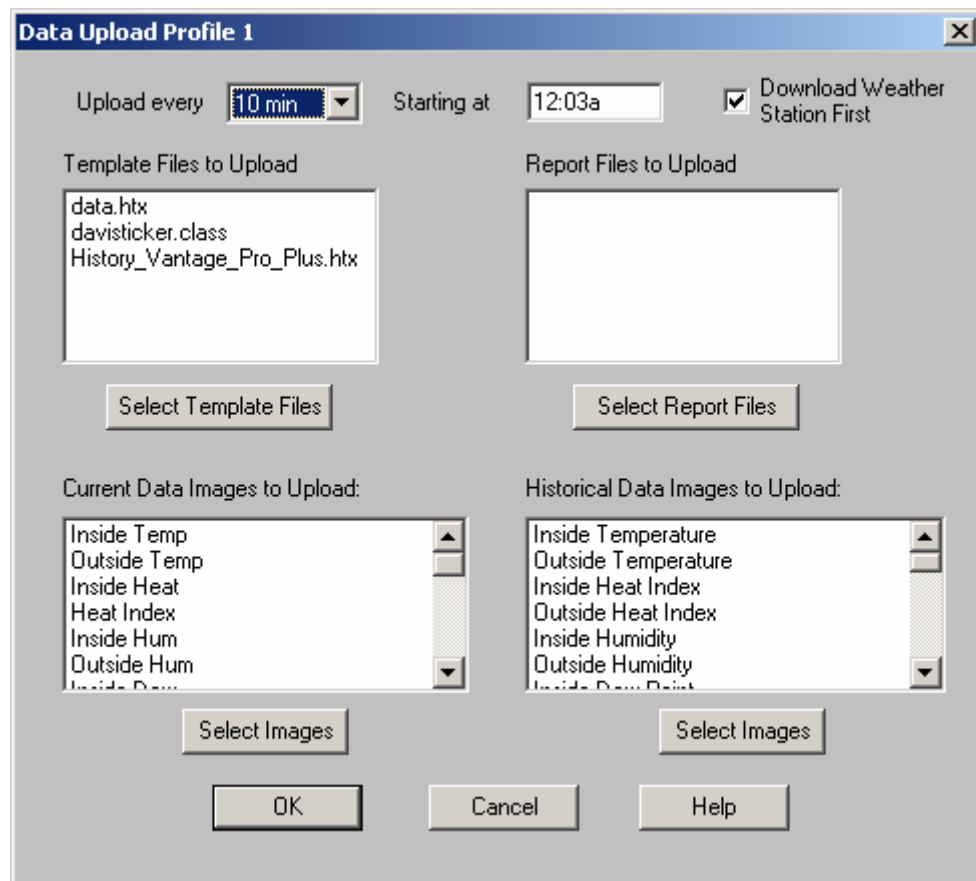
SETTING UP YOUR CUSTOM WEB PAGE

WeatherLink provides a number of Profiles to give you flexibility in the timing of updating data. Depending upon the data presented on your website, you may want to update some data less often than other data. For example, you may want to update your current data every 10 minutes, but update your reports twice a day. The APRS report may be an exception to this. NOAA retrieves the data every 15 minutes. Sending APRS data any more often than this will not benefit NOAA.

To configure a particular profile, select one of the Configure buttons on the main Internet Settings dialog box at the bottom.

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	Profile 7	Profile 8
Offset Time:	---	---	---	---	---	---	---	---
Upload Frequency	1 min.	---	---	---	---	---	---	---
Automatically download before Internet upload	Yes	---	---	---	---	---	---	---
Number of Template Files to transfer	3	0	0	0	0	0	0	0
Number of Reports to transfer	0	0	0	0	0	0	0	0
Number of Current Data Images to transfer	26	0	0	0	0	0	0	0
Number of Historical Data Images to transfer	31	0	0	0	0	0	0	0

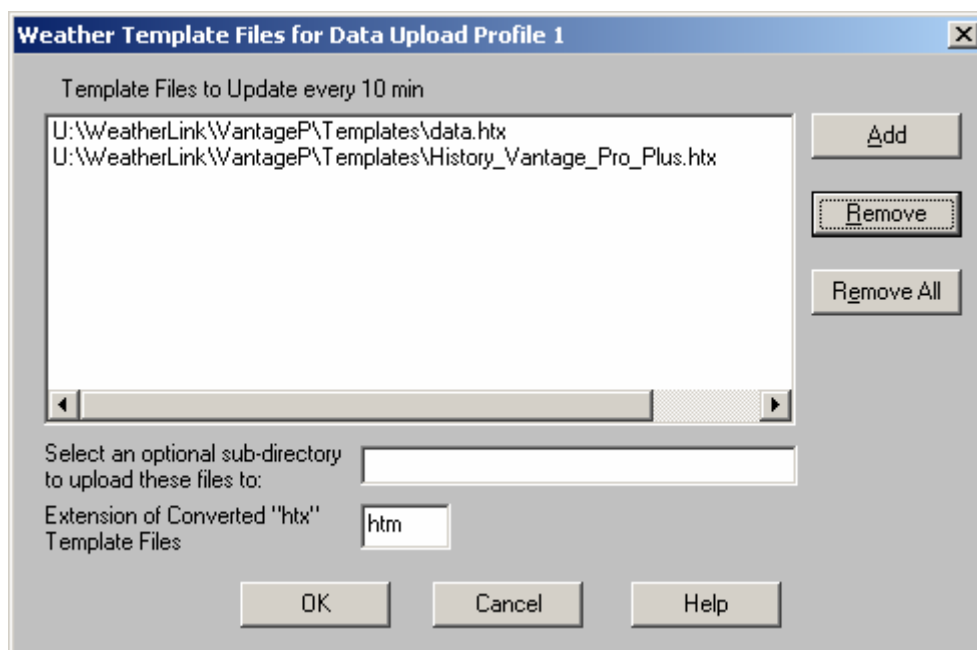
Each dialog box lets you select what you want to update. Choose the Upload Interval to indicate how often you want to update your web page data. Select "Download Weather Station First" if you are uploading Historical data or a report to ensure the most up to date data is uploaded. For web pages that contain current data, choose an Upload Interval that balances the need to have updated data with the need to conserve bandwidth or computer resources. 10 minutes is generally a good interval for most people, particularly if you have a high speed connection. You may want a slower interval, like 1 hour, if you have dialup, particularly if you don't have a second dedicated phone line for Internet access. For updating reports, twice a day is a good upload interval. An interval of 1 minute should *only* be used if you are transferring data directly to a server ("direct" FTP) or a local hard drive. For testing purposes, temporarily set the "Starting at" time to 2 minutes later than the current time to force an upload. You may leave the Upload Interval set to the value you normally have set. Note that due to finite bandwidth, ISPs have limits on how much data you can transfer at any given time.



The dialog box is titled "Data Upload Profile 1". It contains the following elements:

- Upload every:** A dropdown menu set to "10 min".
- Starting at:** A text box containing "12:03a".
- Download Weather Station First:** A checked checkbox.
- Template Files to Upload:** A list box containing "data.htx", "davisticker.class", and "History_Vantage_Pro_Plus.htx". Below it is a "Select Template Files" button.
- Report Files to Upload:** An empty list box. Below it is a "Select Report Files" button.
- Current Data Images to Upload:** A list box containing "Inside Temp", "Outside Temp", "Inside Heat", "Heat Index", "Inside Hum", "Outside Hum", and "Inside Dew". Below it is a "Select Images" button.
- Historical Data Images to Upload:** A list box containing "Inside Temperature", "Outside Temperature", "Inside Heat Index", "Outside Heat Index", "Inside Humidity", "Outside Humidity", and "Inside Dew Point". Below it is a "Select Images" button.
- Buttons:** "OK", "Cancel", and "Help" buttons at the bottom.

If your web pages contain weather data “tags”, select the “Select Templates Files” button to tell WeatherLink where you’re template files are located. You will need to do this whenever you have text weather data on your web page that needs to be updated regularly. It is recommended that you store these files in the Templates folder of your station folder.



If the pages contain Current or History Data image *.gifs, be sure to indicate which *.gifs your web page will need.

Current Images for Data Upload Profile 1 [X]

Select the images to update every ----

<input checked="" type="checkbox"/> Inside Temp	<input checked="" type="checkbox"/> Outside Temp	<input checked="" type="checkbox"/> Heat Index	<input checked="" type="checkbox"/> Inside Heat Index
<input checked="" type="checkbox"/> Inside Humidity	<input checked="" type="checkbox"/> Outside Humidity	<input checked="" type="checkbox"/> Dew Point	<input checked="" type="checkbox"/> Inside Dew Point
<input checked="" type="checkbox"/> Wind Direction	<input checked="" type="checkbox"/> Wind Chill	<input checked="" type="checkbox"/> Wind Speed	<input checked="" type="checkbox"/> 10 min Avg Wind Speed
<input checked="" type="checkbox"/> Barometer	<input checked="" type="checkbox"/> Solar Rad	<input checked="" type="checkbox"/> UV	
<input checked="" type="checkbox"/> Daily Rain	<input checked="" type="checkbox"/> Rain Storm	<input checked="" type="checkbox"/> Month Rain	<input checked="" type="checkbox"/> Year Rain
<input checked="" type="checkbox"/> Rain Rate	<input checked="" type="checkbox"/> Daily ET	<input checked="" type="checkbox"/> Month ET	<input checked="" type="checkbox"/> Year ET
<input checked="" type="checkbox"/> EMC	<input checked="" type="checkbox"/> Air Density	<input checked="" type="checkbox"/> THW Index	

Background:

- ☐ Transparent
- ☐ Green
- ☐ Yellow
- ☐ White
- ☐ Blue
- ☐ Grey
- ☒ Default

Clear All Select All

Select an optional sub-directory to upload these images to:

☒ Show Hi/Low Values ☒ Use Websafe Colors

OK Cancel Help

If you plan to update reports as often as you update your web pages, then select the reports you want to update. Otherwise, select another Profile, and choose the Reports feature to active one or more of the reports. Use the Upload Interval to determine how often to update the reports. As stated earlier, you may want to select another Profile to activate your APRS weather report to specifically update every 15 minutes.

Upload Weather Reports for Data Upload Profile 1 [X]

Reports

<input type="checkbox"/> NOAA This Month	<input type="checkbox"/> NOAA Last Month
<input type="checkbox"/> NOAA This Year	<input type="checkbox"/> NOAA Last Year
<input type="checkbox"/> 2-Day Data Archive	<input type="checkbox"/> 1-Week Data Archive

Select an optional sub-directory to upload these reports to:

APRS Weather Report

OK Cancel Help

TESTING YOUR WEB PAGE

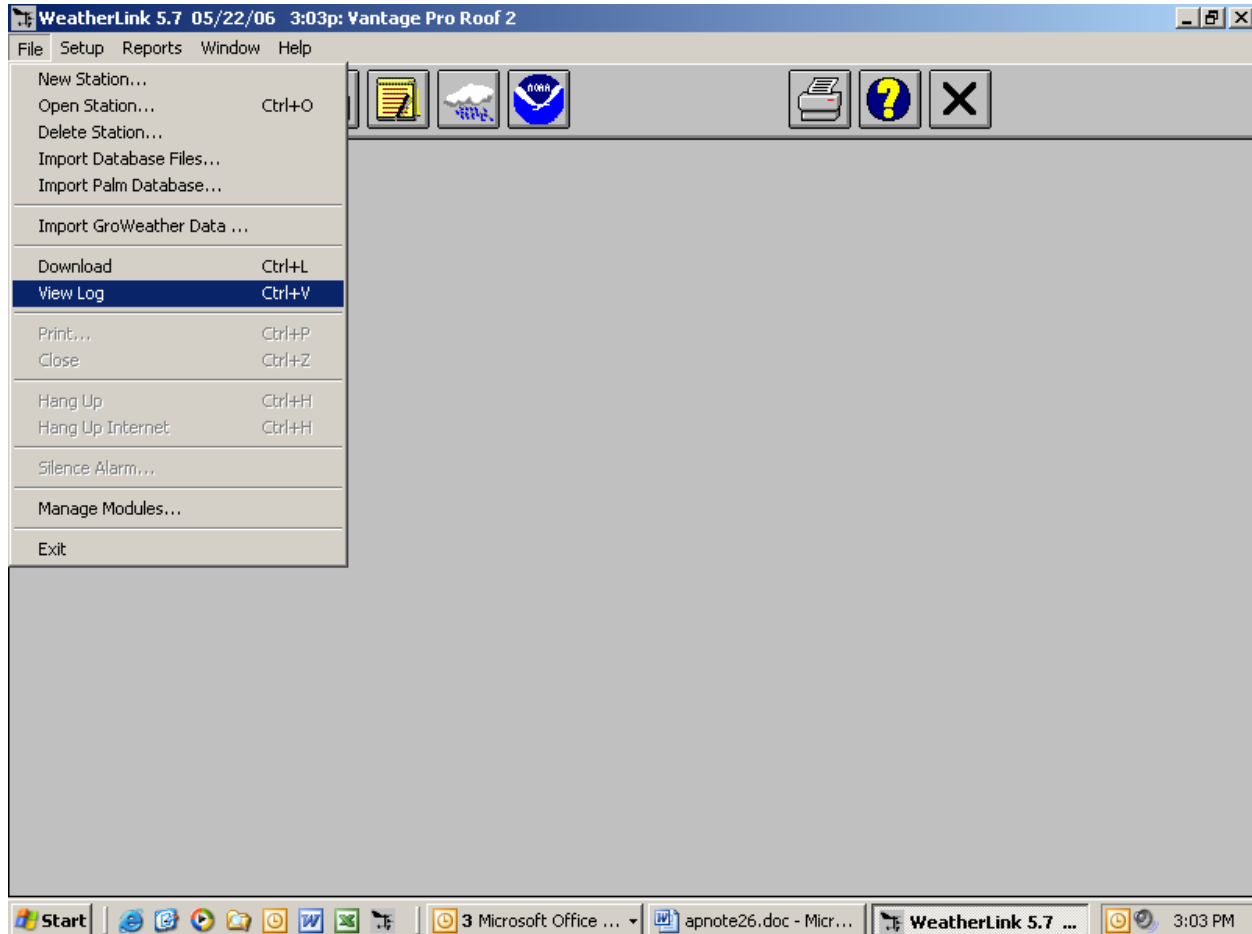
First, configure your web page to transfer to a location on a local hard drive (any file location you can access using a letter drive) to ensure that the web page is being properly created. Be sure to enable your "Local Transfer" by selecting the button on the main Internet Settings or checking the check box on the Internet Connection Settings dialog box.

Note that only Current and History images files and web template files need to be uploaded each time. Other files such as the Davis logo or the davisticker need only be uploaded to your FTP site once. Once these are confirmed to have successfully transferred to your website, you remove these files from the upload list. If you are only transferring files to a local drive, you can simply copy these other files to the destination location without using the automated WeatherLink mechanism. AOL does not support file names that have spaces in them, so you will need to rename the "Davis Logo.gif" file either "Davis_Logo.gif" or "DavisLogo.gif".

If the local drive transfer is successful, next try to transfer to your FTP site (if you have one). Be sure to enable your "Internet Transfer" by selecting the button on the main Internet Settings or checking the check box on the Internet Connection Settings dialog box. AOL users will need to be signed-on to AOL to FTP files to their AOL web page.

TROUBLESHOOTING

WeatherLink keeps track of the success of each Internet upload in its “Log” file. Generally, this can be used as a helpful tool to diagnose any upload problems you may have. Select “View Log” from the File menu to see the log file.



If you can successfully create and transfer web pages to a local drive, but you cannot successfully FTP to your website, then your FTP settings may not be configured correctly, or there may be technical problems at your FTP site.

If you have problems creating a web page on your local drive, then check your Profile settings to ensure that you are uploading enough information (files) to properly generate a web page:

If you have missing weather data text in your web page, check to make sure that the web page is selected as a template for upload. Dashes indicate proper data encoding, but missing data being reported by your weather station. Check your weather station documentation for troubleshooting this problem.

If you are missing a Current or History image, then check to make sure that these images are selected under the “Select Images” dialog box. These images must be checked here for them to be generated. It may be simpler to use the “Select All” option when troubleshooting the upload of an image. In normal practice, only the images used on the web page should be

selected to reduce upload time and minimize bandwidth issues, particularly with a dialup connection. These images are created by the WeatherLink program and transferred to your FTP or local transfer site. These images will not appear in your station's Templates folder. Be sure you are looking at the web page at the final destination before deciding if your images uploaded correctly.

If you are using a History image, select "Download Weather Station First" to make sure the history graph is filled out with the latest data. Also, if you have no data at all, the images will not be created.

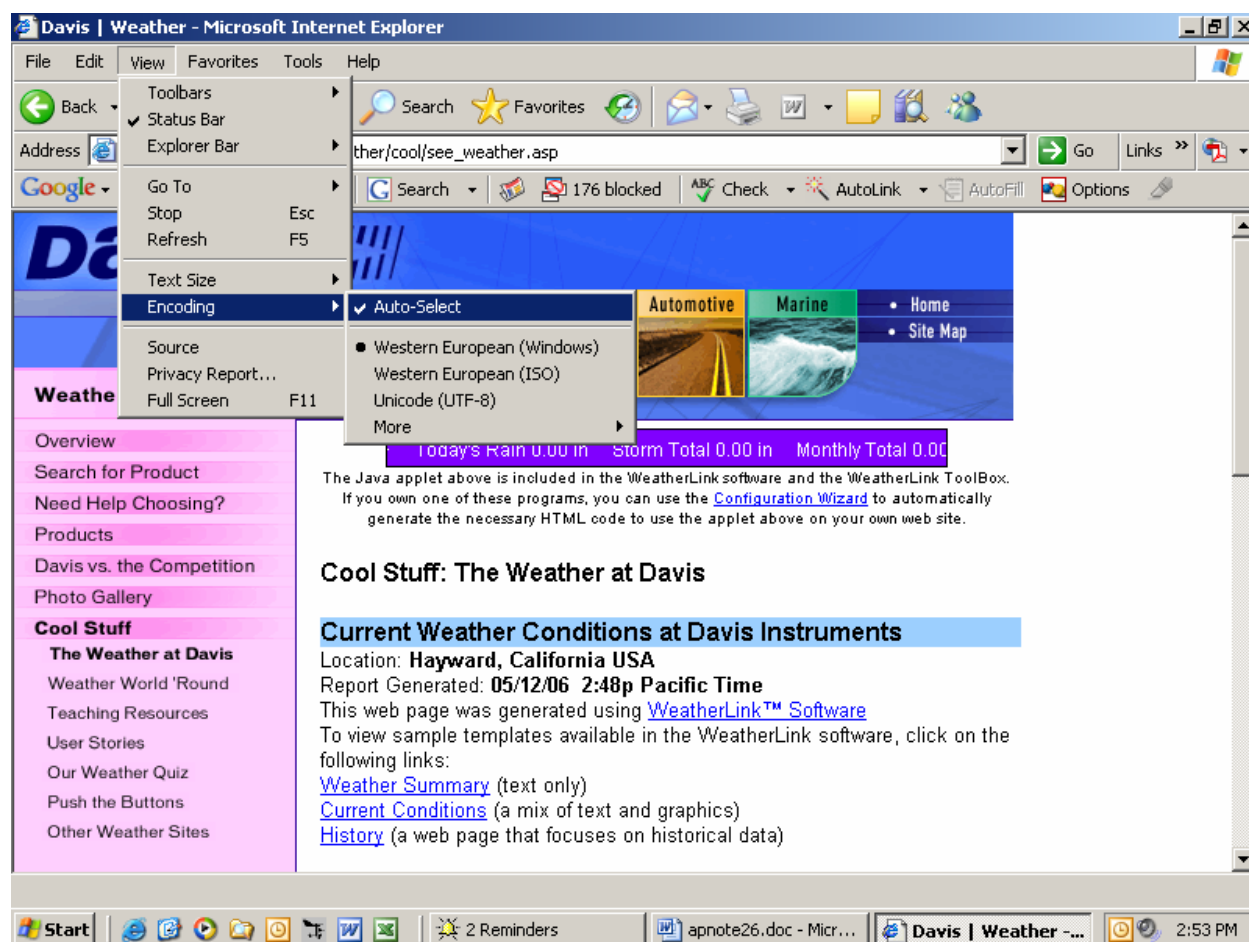
If you are missing a Report, check to make sure that it is selected in the Select Reports dialog box. You may want to test these separately from your other web page elements when initially testing.

If you are using a java applet such as the "davisticker.class" file, be sure this file resides at the destination location. If your applet does not appear on your web page, this may explain why. If the applet appears, but is missing data, check to make sure that this data file is selected for upload as a template file. Also note that there is a 200 character buffer limit for the Java ticker applet. If the 200 character limit falls within a tag then the software will not recognize it as a tag and just display it as text. To fix this do a <cr> right before the Tag.

If you are attempting to use one of the Sample Templates, you will find the various selections under the Sample Templates folder in the WeatherLink folder. The selection you choose should be copied from this folder to the Templates folder under your particular station folder.

If you are attempting to upload your own custom web page, and the data does not appear correctly, try uploading a sample template. If the sample template uploads correctly, you may want to check your HTML code for errors. Remember, WeatherLink uses the comment tag syntax as place holders for inserting current weather data.

WeatherLink uses a degree symbol for temperature units and a superscript 2 for the solar radiation units. These may not appear properly depending upon your web browser text encoding settings. You should use an Auto-Select setting, if available. In Windows' Internet Explorer, this setting is accessible under Encoding under the View menu.



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with WeatherLink® for Windows® Serial Version Only

INTRODUCTION

This document provides guidelines on how to set up a remote modem connection. This type of connection allows you to setup your weather station in a remote location and receive data at a more convenient location. AC power and a phone line are required at the weather station site. If you have a Vantage Pro2™, you may want to consider using a repeater (see Application Note 25 for Vantage Pro2 repeaters) if you lack either AC power or a phone line and the distance you want to send data is under 14.4 miles (23.3 km).

This application details the use of a “landline” modem (a modem attached to a telephone line). Setting up a link using a cellular modem is similar. However, you will have to read the manual for your cell modem carefully, and adjust the set up commands in this application note to those required for your modem. You must also have “circuit switched service” activated on your cellular account to make the modem connection work. Unfortunately, some US cellular providers no longer provide this service.

The information in this application note is a supplement to the instructions in the WeatherLink Getting Started Guide. Please consult it (especially the “Remote Connections” sections) for additional information about setting up and using your weather station.

EQUIPMENT NEEDED

There is a lot to consider when connecting one of our weather stations to a remote modem. You should be aware that there are compatibility issues between different modems. This is not a turnkey system and some degree of effort is required. In recent years, modem manufacturers have put many commands in software “drivers” that automatically configure the modem. These are usually optimized for Internet dialup applications. Some of these settings will hinder the ability to communicate with a Davis weather station. A suggested example is provided in the “Turnkey Remote Modem Solution” of using a 56k US Robotics modem.

A remote modem connection requires two modems. One modem will be used as the remote modem connected to the station and must be an external modem. The other modem will be connected to the computer often referred to as the originating modem. Do not use a USB modem at the remote end because it will not work with our WeatherLink USB product. This is due to USB protocol design constraints.

For the originating modem, most computers today come with an internal modem already installed. If for some reason your computer does not already have a modem installed, you will likely need to purchase a second modem to connect to your computer (which may be external or internal to the computer). Internal modems plug directly into a slot inside your computer. External modems may require you to buy a separate cable connection to your computer (not sold by Davis Instruments). Should you choose to buy an internal modem, check with your computer manufacturer to determine which internal modems are compatible with your computer.

For the remote modem, you will need a serial modem and a Davis modem adapter. For a Vantage Pro® or Vantage Pro2 station you would need part number 6533...

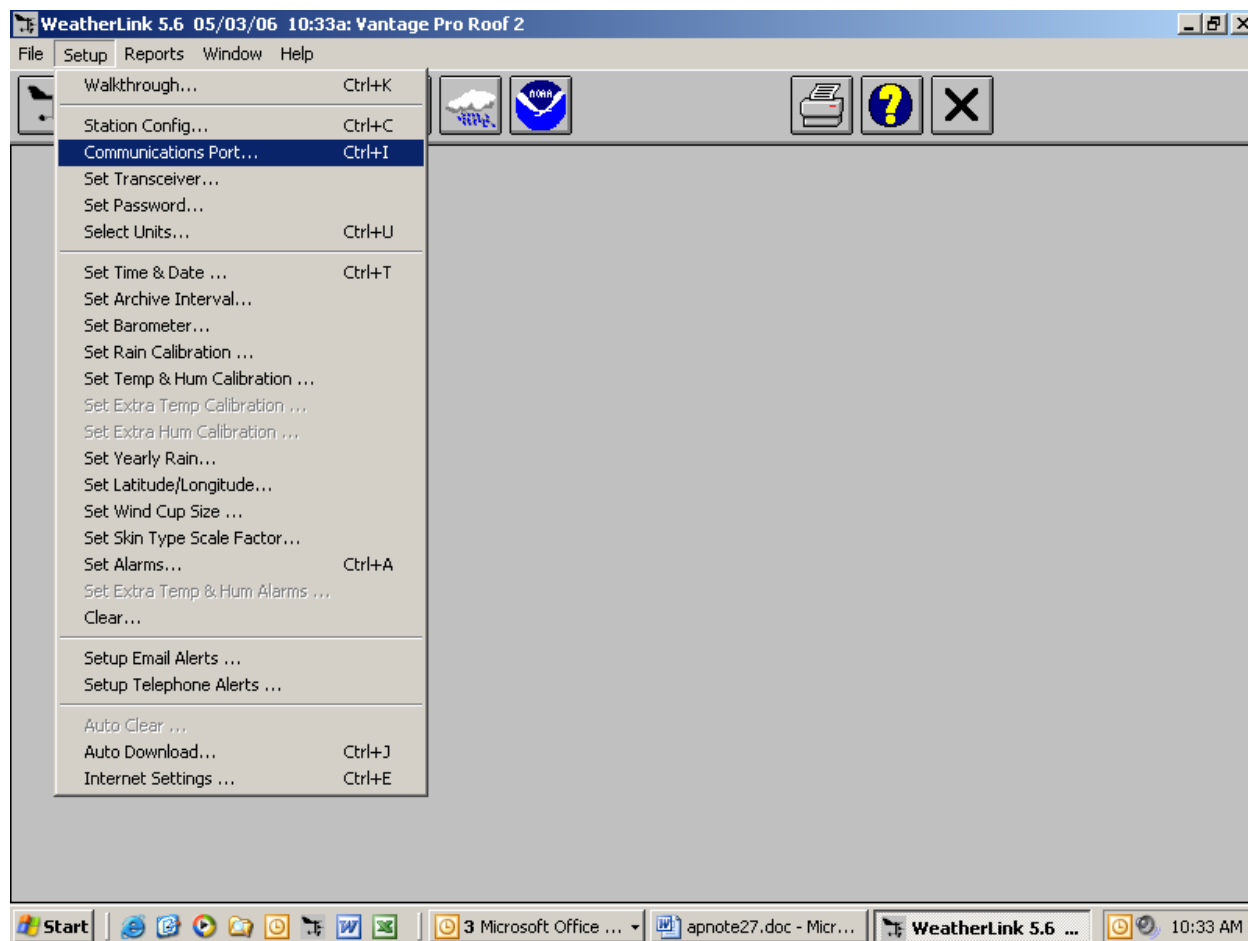
http://www.davisnet.com/weather/products/weather_product.asp?pnum=6533

For our older stations you would need part number 7870...

http://www.davisnet.com/weather/products/weather_product.asp?pnum=7870

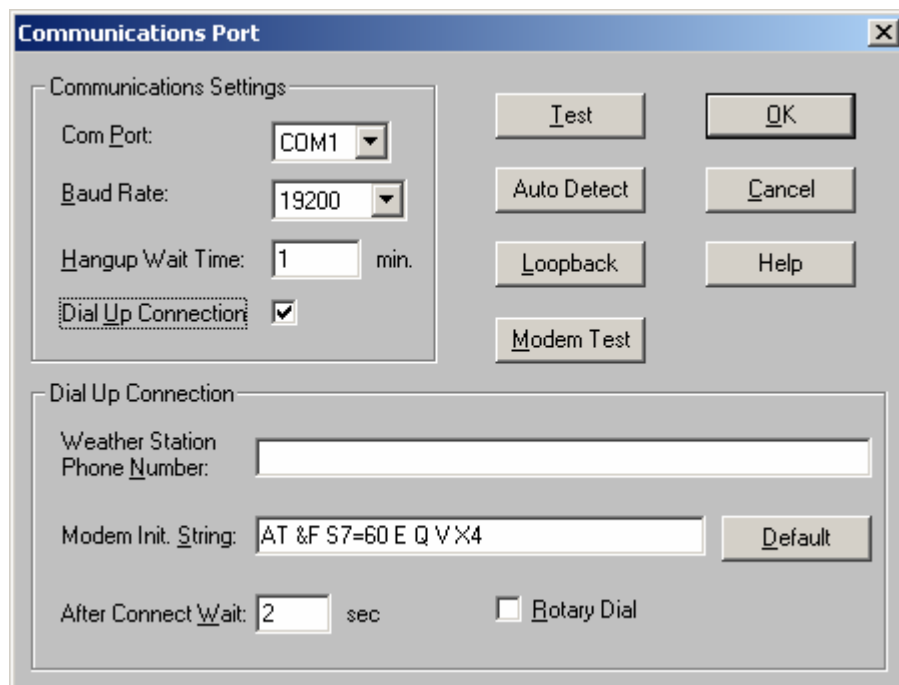
SETTING UP WEATHERLINK AND THE ORIGINATING MODEM

Start by connecting the weather station directly to the PC as described in the WeatherLink Getting Started Guide. Under the Setup Menu is the Communications Port feature that allows you to test the connection to the weather station (whether direct or via remote modem). Run WeatherLink and verify that the weather station is working.



If a direct connection is successful, setup the connection for communication via the modem. If possible, test the connection to your weather station at a more convenient location before attempting to test and configure the modem at the remote location. You will need to check "Dial Up Connection" for the modem connection. Be sure and select the correct COM port that the modem on your computer is connected to (whether physical or virtual, in the case of a USB modem) and enter the phone number of the phone line the remote modem is connected to at the weather station end. You should use the Modem Test button to test the functioning of your modem. If the Modem Test is successful, use the Test button to test the connection to your

remote weather station once you have the remote modem properly configured. More detailed information can be found in the WeatherLink Help files.



SETTING UP THE REMOTE MODEM

If you have access to a second phone line at the PC location, you can test the remote modem and weather station before permanently installing the weather station and modem in the remote location. Otherwise, you will need to bring a laptop to the remote site. Connect the remote modem to the other phone line (whether local or remote), connect the station to the modem, and power on the modem. Follow the instructions below to configure the modems using the instructions in the appropriate Getting Started Guide for your weather station model. For Vantage Pro and Vantage Pro2 system consoles, be sure to follow the step of checking the Baud Rate Settings. For Weather Monitor II, Weather Wizard III, and Perception II stations, be sure to repower the unit. This sends an initialization string that configures the modem to work with the weather station: "ATS0=4 E0 Q1 &W". The console's "AT" initialization string sets 3 values: "S0=4" - answer after 4 rings, "E0" - do not echo modem commands back to the PC, and "Q1" - quiet (no result codes) mode enabled. All other settings will remain unchanged and all settings are saved with the "&W" command. The last three settings are most critical. You will need to manually enter configuration settings when the default values on the modem for any other parameter besides S0, E, or Q need to be changed in order to work with the weather station. This setting can be useful in determining whether the modem received the commands you set it. Both WeatherLink and the weather stations want NO echo and NO result codes in normal operation. If you have an Envoy, you will need to follow the advanced settings procedure below.

TURNKEY REMOTE MODEM SOLUTION

EQUIPMENT NEEDED

One possible solution for implementing a remote modem connection would be to use two external US Robotics *serial* modems. One modem would connect to the station while the other modem would connect externally to your computer. The idea of using an external modem as the originating modem eliminates the guesswork with configuring your existing internal modem.

US Robotics *serial* modems can be purchased at the following website:

<http://www.usr.com/products/home/home-product.asp?sku=USR5686E>

You will need a serial port to connect this modem to your computer. If your computer only has a USB port, you can add a serial port using a USB to serial adapter. USB to serial adapters are sold by many electronic outlets. Davis Instruments sells a USB to serial adapter (part number 8434). http://davisnet/drive/products/drive_product.asp?pnum=08434 . You would also need to purchase a serial cable to allow connection between the modem and the computer's serial port (not sold by Davis Instruments).

SETUP

The configuration switches for the originating modem (the modem connected to your computer) can remain in the out of the box, default position (switches 3, 5 and 8 down). Note some external modems use physical hardware switches.

The remote or answering modem (the one that will connect directly to the weather station) will require configuring the modem before connecting it to the station. To do this, you first need to configure the switches on the modem. Make sure the modem is set for SMART MODE and NO ECHO. On a US Robotics modem this would mean that switches 4 and 8 are set in the down position and all other switches set in the up position. The complete settings should be...

Data terminal ready normal
Verbal result codes
Suppress result codes
No echo offline commands
Auto answer on first ring or higher if specified in NVRAM
Carrier detect normal
Load NVRAM defaults
Smart Mode

Open Hyperterminal or any other terminal communication software. Details on the location and use of Hyperterminal follow this section. You also will need to write to one of the S registers (internal registers of the modem used to configure the modem) to complete the configuration. Send the following AT string to the modem (AT &F0 S41=255 &W0). The &F0 resets to factory defaults (US Robotics switches may override this command). The S41=255 is necessary to enable remote access. The &W0 saves configuration settings in memory. After this command is sent you can verify the settings by using the command AT I5. The resulting display should look similar to the one shown below: However, displays may vary.

```
AT I5
U.S. Robotics 56K FAX EXT NVRAM Settings...
```

```
Template Y0
```

```
DIAL=TONE B0 F1 M1 X1
BAUD=19200 PARITY=N WORDLEN=8
```

```
&A1 &B0 &G0 &H0 &I0 &K1 &M4 &N0
&P0 &R1 &S0 &T5 &U0 &Y1
```

```
S00=001 S02=043 S03=013 S04=010 S05=008 S06=004 S07=060
S08=002 S09=006 S10=014 S11=070 S12=050 S13=000 S15=000
S19=000 S21=010 S22=017 S23=019 S25=005 S27=000 S28=008
S29=020 S30=000 S31=128 S32=002 S33=000 S34=000 S35=000
S36=014 S38=000 S39=000 S40=001 S41=255 S42=000
```

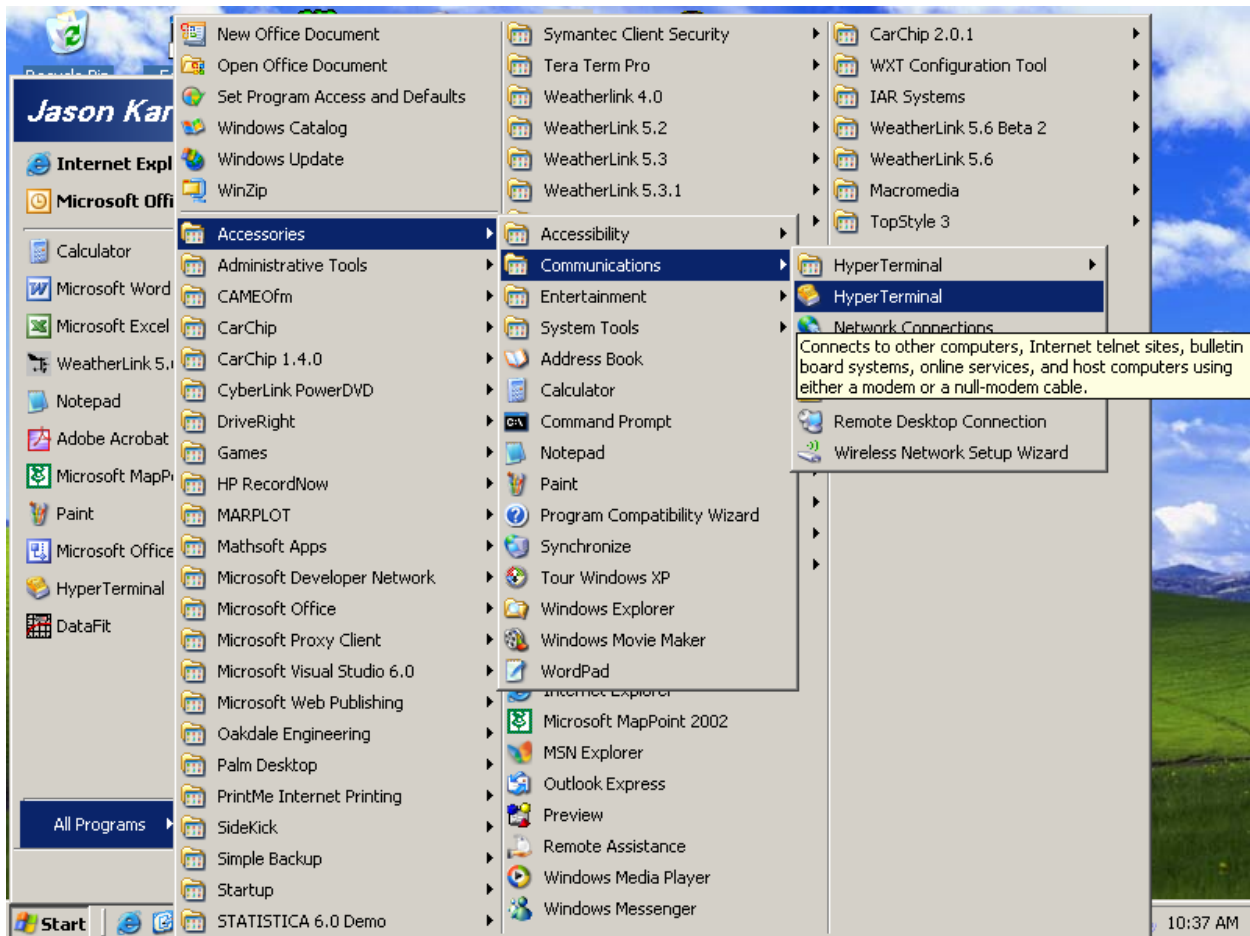
Note: In the command AT I5 that the character before the 5 is the letter I and (not the number 1).

USING HYPERTERMINAL

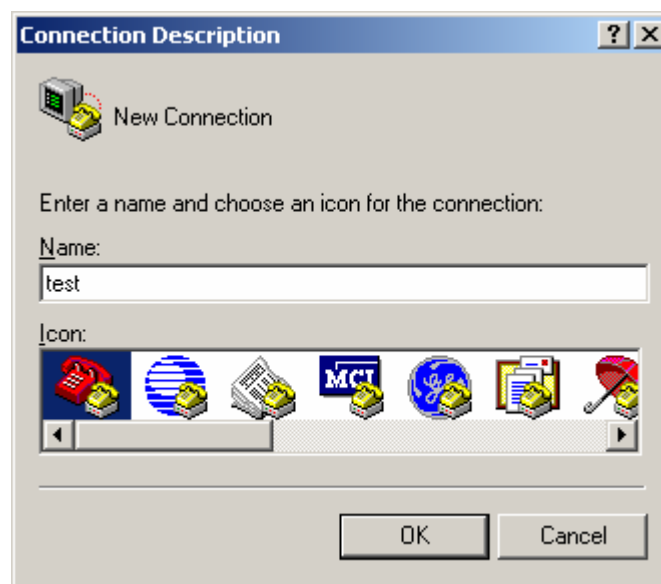
If you are unfamiliar with using HyperTerminal (which comes as part of the Windows Operating System), here are some notes on how to use Hyperterminal...

- 1) Connect the external modem to a com port of your computer using a serial cable.

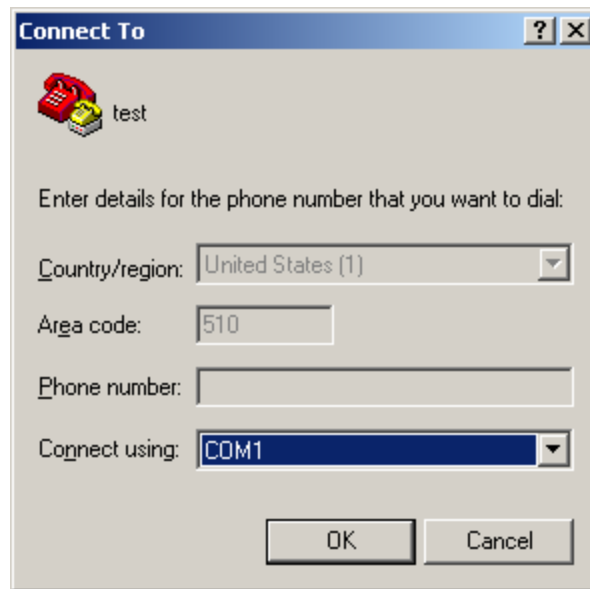
2) Open HyperTerminal (Usually under Accessories in the Program Menus of the Start Menu).



3) In the CONNECTION DESCRIPTION dialog box enter a name for your connection then click OK. For example, enter the name "test".



- 4) In the CONNECT TO dialog box select the com port you will be using by selecting from the options in the CONNECT USING dropdown menu. Click OK.



The image shows a Windows-style dialog box titled "Connect To". It has a blue title bar with a question mark icon and a close button. Below the title bar is a red telephone icon and the text "test". The main area contains the instruction "Enter details for the phone number that you want to dial:". There are four input fields: "Country/region:" with a dropdown menu showing "United States (1)", "Area code:" with a text box containing "510", "Phone number:" with an empty text box, and "Connect using:" with a dropdown menu showing "COM1". At the bottom are "OK" and "Cancel" buttons.

Connect To

test

Enter details for the phone number that you want to dial:

Country/region: United States (1)

Area code: 510

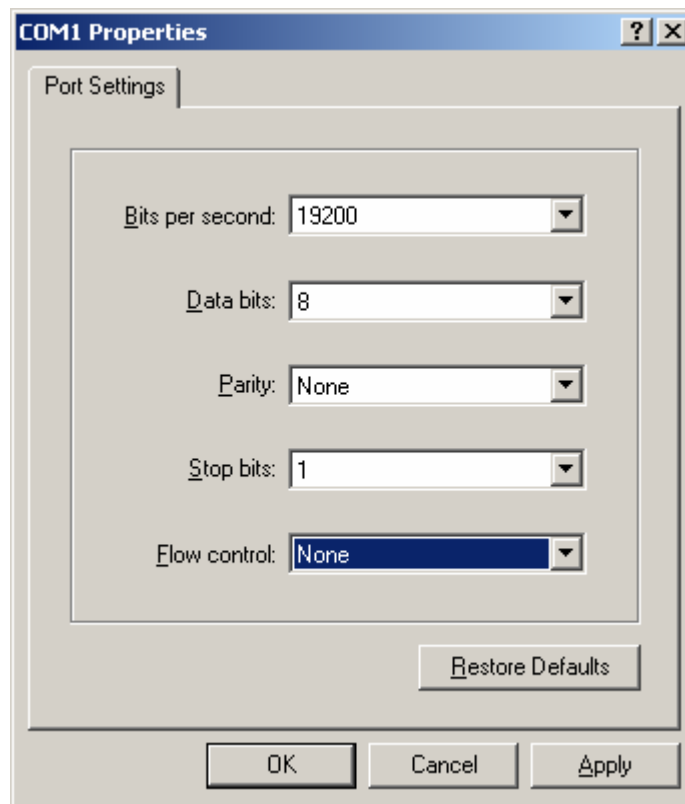
Phone number:

Connect using: COM1

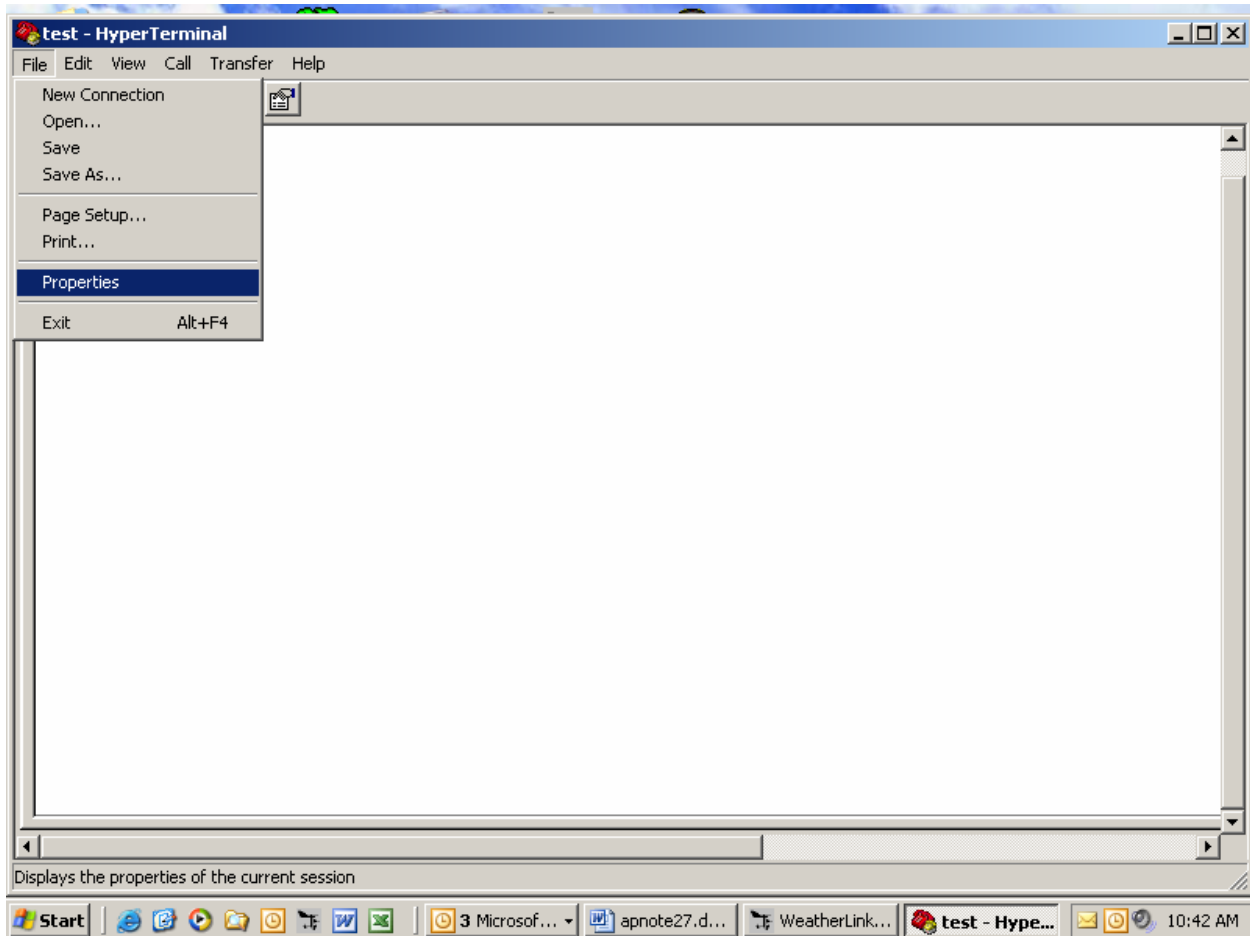
OK Cancel

5) Under the properties dialog box select...

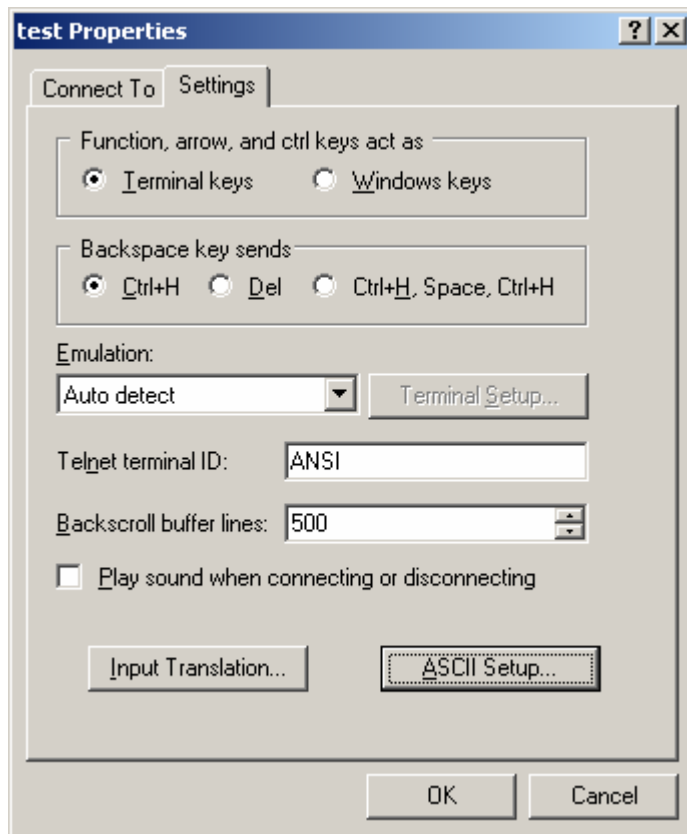
bits per second 19200 (can be any baud rate, but be sure to select the one the weather station will be set to. Weather Monitor II, Wizard III and Perception II stations have a max baud rate of 2400)
data bits 8
parity none
stop bits 1
flow control none
and then Click OK



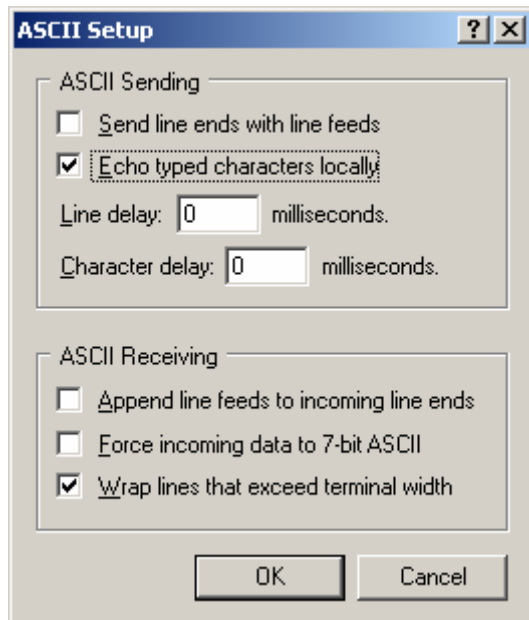
6) From the main FILE menu select PROPERTIES.



7) Click the Settings tab and then click the ASCII SETUP button. Note that if you have the modem command “E” enabled, you want to skip these last two steps.



- 8) Check "Echo typed characters locally". If you have the "E" command enabled and this HyperTerminal setting checked, you will see each character displayed twice in the window. If you need to check that the modem is receiving commands, you may want to leave this setting unchecked.



After all this you can enter AT commands in the large white area of Hyperterminal. You should see a cursor. When you press the ENTER key, the command will be sent to the modem. If you make a mistake, press ENTER and retype the command. Be sure to turn result codes and echo modem commands OFF ("Q1" command, quiet mode enabled and "E" command) before exiting HyperTerminal.

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and other weather observation groups

INTRODUCTION

This document provides guidelines for the setup and installation of your weather station so as to provide the highest quality observations for use by NOAA (National Oceanic and Atmospheric Administration) and other weather groups. Through the Citizen Weather Observer Program (CWOP), NOAA ingests weather data into its weather forecast models at the Forecast Systems Laboratory in Boulder, Colorado. As a Cooperative Observer (COOP), it is possible to supplement the sensor data from the NOAA equipment with data from your weather station. However, it should be noted that no consumer system has been officially approved for COOP use other than the equipment provided by the NWS. Other private media groups also have interest in “backyard” weather station data.

Since the number of “official” real-time observations is limited to the Automated Surface Observing System (ASOS) which has sites primarily at airports and military installations, using private weather stations provides a means to capture more observations without expending substantial resources to acquire, install, and maintain these high-end systems. More observations means better forecast prediction and forecast verification (checking to see if the forecast was correct). However, the quality of observations is also just as important. Since Davis Instruments weather station specifications closely mirror those used by the meteorological community, you can report professional quality observations for just a fraction of the price. Proper siting and installation of the weather station is the primary key here.

As the owner of a Davis Instruments weather station, you can help NOAA improve their forecasts by providing more ground-truth observations. The guidelines here follow recommendations provided by CWOP, NOAA and the National Weather Service (NWS). Data provided to other private weather groups also helps them in a similar manner since they also do their own in-house weather forecasting and forecast verification.

EQUIPMENT NEEDED

You can use any Davis Instruments weather station, but you will also need a PC with Windows 95 or Mac OSX or later, WeatherLink™ software and an Internet Connection to report your data to CWOP. If you have a Weather Wizard III® or Weather Monitor II®, it is highly recommended that you obtain a Radiation Shield (P/N 7714), the reasons for which will be discussed later. Refer to the weather station instruction manual for a list of tools and weather station mounting options. The WeatherLink Help files cover how to set up the software to report your data to CWOP. Additionally, Application Note 26 provides guidelines on choosing an Internet Service Provider (ISP) and setting up your Internet data transfer. This document will cover more information on becoming a member of CWOP or COOP later.

Optionally, you may choose to have your unit NIST certified. In the U.S., the National Institute of Standards and Technology (NIST) develops and maintains the standards of measurement to which all others are ultimately compared and certified. NIST certification is typically required by public agencies that monitor weather conditions, but it is not a requirement for CWOP at this time. If you are a member or want to be a member of COOP, contact your local NWS office to see if NIST traceability is a requirement for your Davis Instruments weather station. For more

information about NIST, check out their website at <http://www.NIST.gov> . If resources allow, you may choose to have your weather station NIST certified. If so, then you have documentation that proves that your system has been compared to a higher-order standard. This may alleviate some concerns about data quality that may arise in the future. To be continually certified, you will need to be certified once every year. Contact Davis Instruments Customer Service for more details about having your station NIST certified.

ASSESSING YOUR ENVIRONMENT

Whether the weather station is installed at a business or at home, the type of building and surrounding environment has a dramatic effect on the values of the weather parameters throughout this location. It is generally best to have plenty of naturally (best) or artificially landscaped ground space that is flat or on a gentle slope away from the building. Also, the location should not be heavily shaded by trees. If you lack sufficient or acceptable ground space on the property, the next best, but not ideal location, is a rooftop location. Cases where rooftop installations are the only option are generally urban areas including multi-story office buildings, apartments, condominiums, or office space where the ground space is almost entirely paved. Never install a weather station over or near any sort of paved surface regardless of whether it is asphalt or concrete. Try to be at least 100 feet away from any driveway or roadway. If you lack a suitable location, see if your neighbors have an acceptable location and would be willing to allow you to put a weather station on their property. Be sure and tell them it is possible to locate it in an inconspicuous location. If you fail to find an “ideal” location, don’t be discouraged. Data can still be of value. In most cases, any data is better than no data.

FINDING AN INSTALLATION LOCATION

If you manage to find an available location on your property or nearby, next determine your exact station location and configuration. Generally and ideally, you should locate the temperature/humidity and rain sensors in the open ground space area and the wind sensor (anemometer) on the building rooftop. If possible, also try to choose a location not visible from the street. Some homeowner’s association covenants and city ordinances require that systems such as these not be visible to the general public. Generally, this means siting the weather station in a backyard or lot and a rooftop location toward the back of the building away from the street. Finally, make sure the location is easily and safely accessible. One important part of quality data is maintenance, so you should be able to return to the installation location to check, clean, and, if necessary, replace sensors. If you have the resources, professional contractors will, for a fee, install items for you.

First, assess your ground location. If possible, select a location that has a natural ground cover surface. This way, your readings will be “representative” of the natural, local environment. Natural surfaces will have vegetation that grows naturally in the climate in which you live. In semi-arid or arid areas, such surfaces are referred to as “xeriscapes” or dry landscaping that may consist of cactus, scrub brush and be interspersed with sandy areas. You can check with a local landscaping company or supplier for what types of vegetation grows naturally in your area. Otherwise, regularly mowed turf-grass will suffice. Note that all agricultural applications where the calculation of evapotranspiration (ET) is involved, the temperature and humidity sensors need to be installed over well-irrigated, regularly mowed grass. If possible, install all the sensors between two orchards, two vineyards or two row crops. If this is not possible, install the sensors near the edge of the primary crop of interest. Be sure and locate the weather station where a sprinkler system will not directly spray the weather station. This can adversely affect the readings. Choose an area with the gentlest slope possible. Never install on a steep hillside

if at all possible unless the entire neighborhood is located on a hillside. The rain collector will need to be installed level regardless of the slope of the landscape. Never install near a body of water such as a pond, lake or swimming pool. Avoid low lying areas that don't drain well, that is, areas that experience a lot of standing water.

It is highly recommended that Weather Wizard III or Monitor II users obtain the Davis Radiation Shield, P/N 7714. If this is prohibitive, the temperature sensor will need to be installed in a shady location. Unfortunately, this is often times on the north side of a building. If you must install your temperature sensor up against a building, avoid locations near heating or air conditioning units, exhaust vents, or other sources of heat. Choose a location that remains in the shade all day long, and if possible, is over a landscaped or dirt surface. Stay away from areas with asphalt, concrete, or brick pavement.

Siting your rain collector in a manner that limits the effect of "rain shadow" or blockage from nearby objects needs to be assessed. Rain shadow occurs when rain, that otherwise might fall into the gauge, is captured or deflected by obstructions upstream. As a rule of thumb, the top edge of the rain collector should be no less than twice the height away from any obstruction such as a fence, tree, or building. Never install a rain collector near a building. For heavily forested areas, site your rain collector in a clearing or meadow. Because temperature/humidity sensors should be installed about 5 feet (1.5 m) above the ground, on a Vantage Pro or Vantage Pro2 Integrated Sensor Suite (ISS, where the rain collector is above the temperature/humidity radiation shield), the rain collector will be about 6 feet (2 m) off the ground. In this case, the distance between a 10 foot (3 m) wall and the ISS can be 8 feet (0.5 m) because the difference in height between the 10 foot wall and the Vantage Pro rain collector is only 4 feet (1 m). If necessary, you can site your rain collector away from your ISS. See Application Note 32 for details.

Next, assess the location for your anemometer. As stated before, the easiest way to get your anemometer up into the wind is to install it on the roof of the building or on a tall antenna tower. If at all possible, install it on a rooftop location. If you cannot, then you should install it as high as possible in the surrounding landscape.

Finally, your barometric pressure readings will also be sent to NOAA if you join the CWOP. The barometric sensor is located inside your display console or Weather Envoy. If at all possible, the console should be located indoors in a dry, indoor location away from outside doors, heating and cooling registers, and direct sunlight. Barometric sensors can be affected by rapid changes in temperature from these sources. Avoid pressurized rooms.

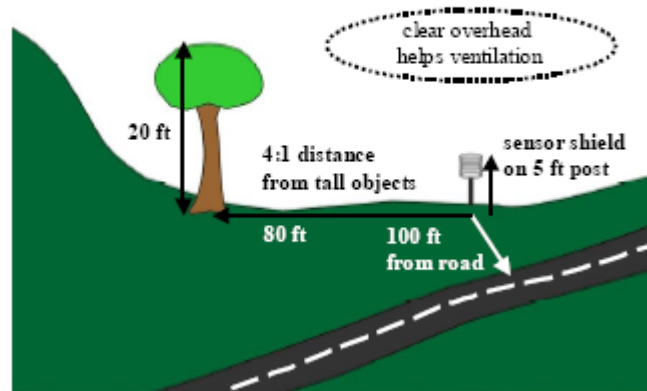
If your weather station location is remote, obtain the Complete System Shelter P/N 7724 to house the console or Envoy. Do not completely seal off the shelter because your system will need exposure to outside air to obtain the true air pressure and to ventilate excessive hot air on hot days. You will also need to connect to the weather station from a phone line and transfer the data to your computer and then to CWOP. Application Note 27 provides guidelines on setting up a remote modem.

INSTALLATION GUIDELINES

TEMPERATURE AND HUMIDITY

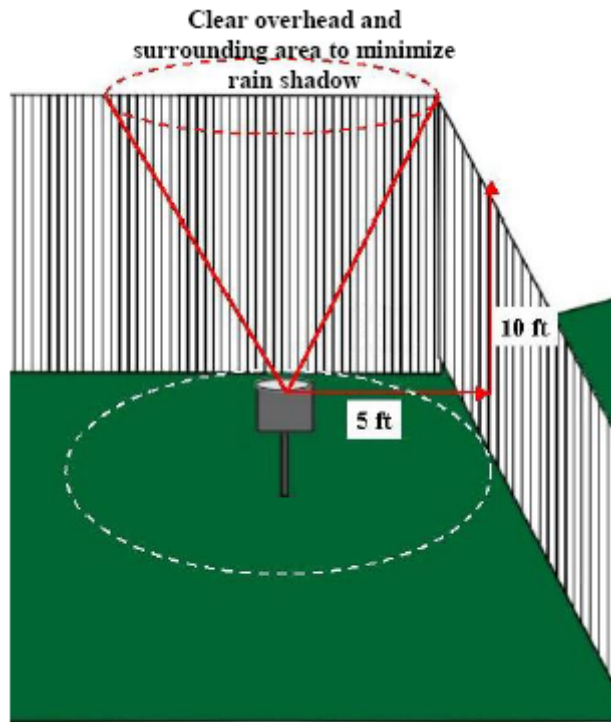
As stated before, the best location for the temperature/humidity sensors is inside a radiation shield located over the ground. Second best is a rooftop location. Either way, the shield

should be mounted so that the sensors are about 5 feet (1.5 m) +/- 1 foot (0.3 m) above the ground or rooftop (or, for ground installations or flat roof installations, 2 feet (0.6 meters) above the average maximum snow depth, whichever is higher).

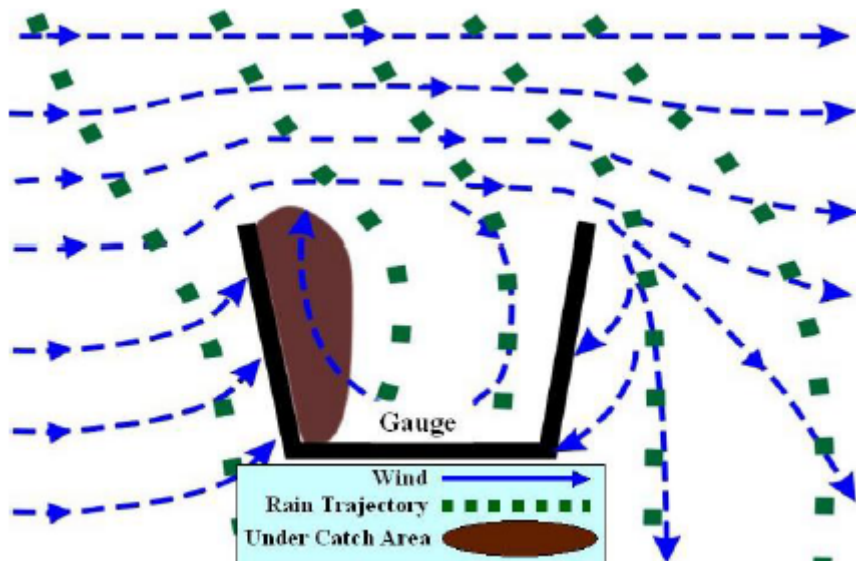


RAIN COLLECTOR

If you have a Vantage Pro or Vantage Pro2 system, your rain collector will be mounted above your temperature/humidity radiation shield since both are included as part of the ISS. If you have a Weather Wizard III or Weather Monitor II, you will need to find a separate location for your rain collector. Generally, the best location will be similar to that of the temperature-humidity sensors. A 2 foot (0.6 m) mounting height for stand-alone gauges is usually best. The area above the gauge should be free of obstructions. Avoid areas where a sprinkler system will produce false rain readings. Make sure the rain collector is as level as possible. Since Davis rain collectors use tipping bucket technology, accuracy degrades significantly if the unit is not level. A T-shaped trough in the base of the rain collector provides a simple way to determine how level the rain collector is. Consult the appropriate instruction manual for more details. The Rain Collector Shelf (Part #: 7704) and Sensor Mounting Arm (Part #: 7702) back plate can be used together to mount a rain collector to a pole.



If you live in an area that receives significant snowfall throughout the year, you should mount the rain collector 2 feet (0.6 meters) above the average maximum snow depth. You will need to obtain a Rain Collector Heater (Part #: 7720) to measure the liquid equivalent of falling snow. Additionally, you may want to consider installing a small fence (the top of which is at the same height as the top edge of the rain collector), particularly if you experience frequent wind driven snow. This will ensure blowing snow falls into the rain collector and doesn't blow around and by it.



The following figure provides an example of a wind shield that professionals use. Some shields use aluminum and others use wood. Either way, it may be possible to build an inexpensive version of your own.



ANEMOMETER (WIND SENSOR)

As stated before, it is easiest to mount your anemometer on your roof to achieve height. The standard mounting height is 33 feet (10 m) for most applications. For agricultural applications when calculating ET, 6 feet (2 m) is the standard mounting height. For two or more story buildings, this can be achieved by installing the anemometer at least 10 feet (3 m) above the highest point on the roof (regardless of height above the ground) to minimize the affects of the roof on the wind. For most single story buildings, you will need to use an already existing, secured TV or radio antenna tower to achieve this height. Seek profession help to install a TV or radio tower. Generally, if you are uncertain about the safety of your proposed task, seek professional help.

If there are obstructions such as trees within 66 feet (20 m) of the anemometer, you should mount your anemometer at least 7 feet (2 m) above these tree tops. Due to stability issues, CWOP does not encourage members to install masts longer than 16 feet (5 m), if tripod mounted, or 33 feet (10 m), if ground based mast connected to a building or supported using guy wires. For masts higher than 33 feet (10 m), seek professional installation.

If you decide you cannot mount your anemometer from your rooftop, you should make every attempt to satisfy the siting guidelines. Never install an anemometer near the side of a building. Get as far away from the building as possible. Install the anemometer as high off the ground as possible. If there are no other obstructions such as trees on your property, and you have at least 0.25 acre of property and a one story building, you may be able to use a Mounting Tripod if you place it at least 50 feet (15 m) away from the building. For two or more story buildings, you will probably need to use a tower mount for any ground based installation unless you have approximately 2.5 acres or more. Any property with a lot of large trees will probably require a tower mount. As with a rooftop mounting, if you have trees on your property, you may want to consider installing the anemometer at least 7 feet (2 m) above the height of the tree tops.

Note that the Vantage Pro anemometers are designed to be mounted with the mounting arm facing “true” north. If you live in an area where all the streets run north-south or east-west in a

square-grid pattern, it will be relatively easy to determine which direction is true north. Otherwise, you can use a local map of your area and align the map so that the street or highway near your building on the map and the actual street are parallel to each other. You can also use a magnetic compass, but keep in mind that the compass will have to be corrected to read the true direction. The National Geophysical Data Center (NGDC) has a page that will calculate this correction or “declination” for you: <http://www.ngdc.noaa.gov/seg/geomag/jsp/Declination.jsp> . Here’s a link to a declination map for the CONUS (lower 48 states of the U.S.): http://www.spacecom.com/customer_tools/html/body_mag_dec_map.htm . A GPS receiver can also be used, but they tend to be very inaccurate in determining direction when used in a stationary position. If you decide that you must face the anemometer a different direction, instructions are provided in the manual on how to recalibrate your direction readings. (For the most precise calibration, remove the wind vane, using the numeral direction display turn the wind pot until the unit displays as close to 180° (true south) as possible, and then reinstall the vane with the nose pointing to the south.) Consult the instruction manual for more details.

MOUNTING OPTIONS

Davis Instruments weather equipment is designed so that it can be mounted to either a pole or a post or flat surface. Davis also provides a Mounting Tripod (Part #: 7716) and Mounting Pole Kit (Part #: 7717) to assist in mounting. The provided poles have nearly the same diameter as poles for mounting TV antennas, thus you may also obtain additional accessories for attaching poles to buildings. Application Note 18 provides guidelines on how to use these mounting accessories whenever a user wants to avoid installing lag screws or bolts into a flat roof or mounting surface (e.g., school or office building installations). Roof mounts are used frequently for small satellite dishes, wireless cable dishes and antennas. Many are stocked or can be ordered through local wireless communications equipment suppliers or ham radio stores.

If you find you need to mount all your sensors in the same general location, use a radiation shield for the temperature/humidity sensor (if the installation site is in direct sunlight) if you have a Monitor or Wizard. Follow the guidelines for each parameter to optimize the final location.

SHARING YOUR WEATHER OBSERVATIONS

There are many entities out there who would like you to share your weather data with them. The ones mentioned primarily in this document are under the jurisdiction of the NOAA. NOAA has the highest standards for quality, so the guidelines in this document are more critical than they are for other groups such as WeatherUnderground and WeatherBug. Additionally, local newspapers, radio and TV stations also like to receive observations from local observers due to the lack of a substantial number of official NOAA sites available. However, the better quality of data you provide, the more useful it is to the meteorological community at large. So, regardless of who you share your observations with, it is highly recommended that you site your weather station in the best location(s) possible to achieve the highest quality and most representative data for your neighborhood.

After you setup your weather station, the next step is to become a part of the volunteer weather observer community. The following paragraphs give general instructions on how to join each network. In many cases, and Internet connection is essential, but not always.

THE COOPERATIVE OBSERVER NETWORK (COOP) (United States Residents Only)

The following website provides guidelines on how to join:

<http://www.weather.gov/om/coop/become.htm>. In summary, contact your local NWS office and they will determine whether there is a need for a COOP site in your location. If you are selected for COOP, your local NWS office will provide the “official” equipment for monitoring. Unofficially, many COOP observers supplement their “official” readings with readings from their Davis Instruments weather stations.

THE CITIZEN WEATHER OBSERVER PROGRAM (CWOP)

It is possible there may not be a need for a COOP station in your location. It is possible to provide data to NOAA through the CWOP program. The program is open to anyone who has the equipment listed at the beginning of this document. The following website provides details on how to join: <http://www.wxqa.com/SIGN-UP.html>. Most of the information in this document is based on the guidelines CWOP has provided.

GLOBE

If you are an educator or member of an educational institution, then you may participate in the GLOBE program. Global Learning and Observations to Benefit the Environment is a worldwide hands-on, primary and secondary school-based education and science program. Teachers and other educators who wish to lead students in GLOBE need to attend special workshops in order to fully participate in the program. Visit the following website for more details:

<http://www.globe.gov/fsl/html/aboutglobe.cgi?intro&lang=en&nav=1>

WEATHER UNDERGROUND

As with CWOP, you only need Internet access to send data to Weather Underground. Contact Weather Underground for the software that will interface with WeatherLink. This software is not compatible with WeatherBug (below). The following website allows you to sign up:

<http://www.wunderground.com/signup/signup.asp?mode=pws>

WEATHERBUG

WeatherBug offers a co-branded version of Davis Instruments weather stations. These operate just like our weather stations except they have a different name on the box and display console. They also include WeatherBug software that automatically uploads data to their network. This software does not include the Weather Underground feature and may not include the CWOP upload feature. Visit the following website for details: <http://www.weatherbug.com/backyard/>

LOCAL MEDIA (Newspapers, Radio & TV Stations)

Contact your local media weather departments and ask them if they would be interested in your weather data. Note that one outlet in each TV market will probably have exclusive agreements with other weather station vendors that will not allow you to use a Davis Instruments weather station to send them data. Other than those, they should be happy to receive your data.

MAINTENANCE AND QUALITY CONTROL

In general, the maintenance required for all the sensors will be infrequent and relatively simple. Periodically inspect your sensors to ensure that they are relatively free of dust, leaves, twigs, spider webs, and insect and bird nests. DO NOT remove nesting insects or animals by spraying insecticide because this may damage the plastic and sensors. Generally, if sited properly and well maintained, your Davis Instruments weather station should give you years of quality data and trouble-free performance. However, be sure and keep a periodic eye on your data readings. If they appear suspect, the following section will provide specific guidelines to determine whether you have incorrect readings and if so, how to address them. Although not covered below, missing data (dashes) in readings may indicate a severed cable, loose connection, or poor wireless reception. Consult your instruction manual for troubleshooting suggestions for these types of problems. Also, for CWOP use, be sure you have the latest version of WeatherLink™ software. It will probably have the latest fixes and corrections to the CWOP upload feature. CWOP uses the Automated Position Reporting System (APRS) data protocol text format to transfer data.

TEMPERATURE AND HUMIDITY

NOAA will perform quality control checks on the temperature and humidity data that your weather station reports. However, you should also verify yourself that the data your weather station reports are correct. In addition to following the siting and installation guidelines above, you can use an inexpensive sensor to compare your readings. Make sure the other sensor is properly shaded and located in the same well-ventilated location. If you are a member of COOP, the temperature readings of the MMTS shield and your Davis weather station should agree to within a few degrees if properly sited. You can also check the readings at a nearby airport. When making these comparisons, keep these issues in mind. Differences in elevation will affect temperature (on average 5.5°F (3.0°C) cooling per 1000 feet (300 m) rise in elevation), and subsequently, relative humidity. Differences in your micro-climate will make significant differences in temperature readings, whether you are located in urban area or the countryside or whether you live in a valley or on top of a ridge. Large differences of 5°F (3°C) in temperature or 10% relative humidity or more between your inexpensive device or MMTS shield and the Davis weather station or differences of 10°F (5°C) or more or 20% relative humidity between your weather station and the nearest airport (if within the 100' elevation difference or less) may indicate either improper siting or sensor malfunction. If it is determined there are no siting issues, following the guidelines below for cleaning and maintenance. If these efforts don't solve the problem, contact Davis Instruments Technical Support.

To remove dust build-up from the temperature/humidity sensor, using a clean, dry toothbrush, gently brush the gold-colored mesh cloth. (If you have a Monitor II system, you will need to remove the lower portion of the temperature/humidity sensor cover by loosening the two screws.) Clean the white plastic cover with water and a mild liquid detergent, and rinse thoroughly before replacing. Depending upon the vintage of your humidity sensor, it may need to be recalibrated once every five years. Contact Technical Support with your manufacturing code and station model type to determine whether your humidity sensor supports calibration. Also, both the temperature and humidity readings can be manually adjusted through settings on the display console or in the WeatherLink software.

The outer portion of the plates of the radiation shield should be cleaned when there is excessive dirt and build up on them. Use a damp cloth to clean the outer edge of each ring. The effectiveness of the radiation shield will be reduced if the surfaces of the shield become dusty or

dirty. A buildup of material inside the shield reduces its effectiveness and may lead to inaccurate temperature and humidity readings. Keep areas between radiation shield plates free of debris that may obstruct air flow. This type of maintenance will probably need to be done on an annual basis, or more often during drier times of the year when regular rains do not wash dust off the radiation shield. Consult the appropriate instruction manual for details on how to disassemble and reassemble the radiation shield.

RAIN COLLECTOR

Determining if your rainfall measurements are correct is more difficult. Precipitation can be highly variable over very short time and distance. For this reason, NOAA does not yet have quality control algorithms to verify the accuracy of rainfall readings. So, maintaining rainfall accuracy is up to you. In addition to following the siting guidelines earlier in this document, use the maintenance guidelines below to ensure the most accurate readings.

For greatest accuracy, clean several times a year. Dust and debris can accumulate on the tipping bucket, affecting its operation. Spiders and insects can make their homes in the base, and birds have been known to nest in the funnel. To clean the rain collector, remove the funnel from the base. Gently clean the tipping bucket and the funnel with water and a mild liquid detergent. Rinse thoroughly.

If you use the Rain Collector Heater, only use the device during periods when freezing weather is expected. The heat generated by the heater is enough to cause evaporation of rain water when used during liquid precipitation events. As a general guideline, leave it turned off during the summer months.

To check the accuracy of the rain collector, compare the Davis Rain Collector with a tube type "manual" rain gauge. Use a rain gauge with an opening diameter of at least 4 inches. If you are a COOP member, you can safely use this type of gauge for comparison provided it is located near your weather station. Rain gauges with openings smaller than 4 inches (1.5 cm) will not be sufficiently accurate or precise. Make sure there are no cracks in the rain gauge. In areas that experience freezing weather, plastic gauges can crack and develop leaks. Place the tube type rain gauge directly next to the Davis rain collector. If using the device to measure frozen precipitation, remove the funnel and center tube and melt the catch. Use the center tube for measurement. Compare the totals on three storms. Based on this, develop an average for how far off the readings are. There are adjustment screws under the rain collector bucket that are designed to fine tune readings. Use at least three rain storms to determine the appropriate adjustment. DO NOT compare rainfall readings to reading obtained from television, radio, newspapers, or the neighbors. Due the wide variation in rainfall over small distances, such readings are not an accurate measurement of the weather readings taking place at your site. The rain collector is carefully tested and calibrated at the Davis Instruments factory to conform to its stated specifications.

Additionally, the NWS WSR-88D Doppler radar measures storm precipitation amounts (to the nearest 0.25 inch). Check the storm total precipitation amount over your location from the WSR-88D total precipitation product for a gross check (generally good in non-winter precipitation events). Doppler radar precipitation reports are available on your local NWS Weather Forecast Office web page, which can be found by going to the NWS national page and clicking on your location on the map: <http://www.weather.gov/>.

ANEMOMETER (WIND SENSOR)

Generally, if you mounted your anemometer at an ideal height and either pointed it in the correct direction or calibrated it to report correctly, your wind speed readings should be correct. You can validate your wind direction by monitoring your winds against area airport winds to see if your wind direction is consistent with their data. Complete your wind direction validation on an afternoon that is the day before or the day after a cold frontal passage. Use the readings on your display console, don't look at the unit on the roof. The roof device will always point into the wind regardless of the calibration setting. Ideally you want moderate, but not overly gusty, winds where flow is relatively uniform in speed and direction throughout your region. If wind direction is consistently off by more than 30 degrees from your reference station, apply a correction to your direction so it is consistent with area wind direction. This can be done on a Vantage Pro system using your weather station display console. A Monitor II or Wizard III unit will have to be manually calibrated on the roof.

Generally, if you mounted your anemometer at an ideal height, your wind speed readings should be correct. Wind speed will be difficult to validate using local airport data due to the large fluctuations in wind speed over time. Obstructions surrounding your anemometer may also decrease your wind speed significantly relative to your local airport's wind speed. Use the Beaufort Scale below for wind speed (land version) to determine whether your wind speed readings are in the "ballpark". Observe the motion of tree leaves, twigs, and chimney smoke plumes to estimate wind speed at the elevation of the anemometer.

Beaufort Code	Speed (mph)	Speed (km/hr)	Wind Category Description	Effects on the Environment
0	< 1	< 1	calm	smoke rises vertically
1	2 - 3	1 - 5	light air	smoke drifts slowly
2	4 - 7	6 - 11	light breeze	leaves rustle, wind can be felt, wind vanes move
3	8 - 12	12 - 19	gentle breeze	leaves and twigs on trees move
4	13 - 18	20 - 29	moderate breeze	small tree branches move, dust is picked up from the ground surface
5	19 - 24	30 - 38	fresh breeze	small trees move
6	25 - 31	39 - 51	strong breeze	large branches move, telephone and power overhead wires whistle
7	32 - 38	51 - 61	near gale	trees move, difficult to walk in the wind
8	39 - 46	62 - 74	gale	twigs break off from trees
9	47 - 54	75 - 86	strong gale	branches break off from trees, shingles blown off roofs
10	55 - 63	87 - 101	whole gale	trees become uprooted, structural damage on buildings
11	64 - 74	102 - 120	storm	widespread damage to buildings and trees
12	> 75	> 120	hurricane	severe damage to buildings and trees

Another method for checking anemometer performance is to use a less-expensive, separate hand-held anemometer such as the Davis Wind Scribe (Part # 276), Wind Wizard (Part #281), or Turbo Meter (Part # 271). Taking a series of comparisons between the hand-held anemometer and your weather station anemometer readings will help validate your anemometer's readings. Bear in mind that you will need to take these measurements at or near the same location as the anemometer itself. DO NOT attempt this method if the anemometer is in a difficult to reach location and/or if winds are currently in excess of 25 mph or if you are uncertain about the safety of going on your roof.

Your anemometer should provide years of trouble-free service. However, spiders and insects can affect its operation. If wind speed seems low, use an Allen wrench to loosen the set-screw on the side of the wind cups. Remove the wind cups, and clean the exposed portion of the shaft with a damp cloth or cotton swab. Clean the wind cups with water and a mild liquid detergent. Rinse thoroughly before replacing. *Do not use or add grease, oil, or a spray lubricant of any kind.* After replacing the wind cups and tightening the setscrew, check to make sure that the wind cups spin freely. If they do not, the bearings may be worn and need factory-replacement. To ensure accurate wind direction readings, check the orientation of the wind vane annually. Consult the instruction manual for details.

BAROMETER (ALTIMETER SETTING)

CWOP prefers to receive barometer data in the form of altimeter. Altimeter is the CWOP pressure standard because it is the simplest pressure reduction format that most CWOP members can reliably deliver. The National Meteorological Services use this information to determine the uncorrected pressure value at your location, called station pressure. Altimeter uses only elevation to determine a sea-level pressure value. Sea-level pressure is determined from temperature and humidity also, making it more difficult to determine station pressure. Davis Instruments weather stations normally report sea-level pressure.

WeatherLink versions 5.7 and later automatically convert Vantage Pro and Vantage Pro2 barometer data to altimeter. Monitor II data is reported as is. Vantage Pro barometers only need the elevation to be set once to report properly. Monitor II barometers require a user offset calibration to be entered whenever powered up. The following procedure is the CWOP guidelines for checking barometric pressure tailored specifically for Davis weather stations. To ensure you are reporting the correct value, the following procedure is highly recommended. For Vantage Pro systems, you should get your CWOP/APRS upload working before beginning this procedure.

1. Select a nearby (within 20 miles or 28 km) airport weather station to provide your reference or calibrated pressure. Data online is available through the following website if you know your airports 4-letter identifier (in the US, it is the 3-digit code with a K at the beginning: e.g., Chicago O'Hare's identifier is KORD): <http://weather.noaa.gov/weather/metar.shtml> . Otherwise, you can go to your local National Weather Service website <http://www.weather.gov/> , click on the map for your location, and scroll down to Current Conditions. The link to "Other Local Obs" will provide a list of other nearby weather reports. Be sure to select an airport and not a CWOP station (indicated by call letters, rather than a name).
2. Vantage Pro users should set their correct elevation in the setup procedure and configure their WeatherLink APRS upload feature for frequent uploads. If not feasible at this time, set the elevation to zero and use the on-screen displayed value.

3. If making an adjustment or correction, wait for optimal weather conditions to conduct a series of comparisons; these conditions are:
 - High pressure is nearly overhead
 - Wind is less than 5 mph (3 m/s), preferably calm
 - Outside air temperature should be relatively stable or slowly changing
 - The best time to conduct pressure comparisons is in the early afternoon; if the winds are light, then you are reasonably certain high pressure is in the areaIf starting up the weather station new or new to CWOP, simply use the readings you have regardless of the weather conditions.
4. For Vantage Pro users, take a series of four pressure measurements using the altimeter setting from the airport and your APRS altimeter value in the View Log file (or on-screen value if unavailable); each comparison should be at least 15 minutes apart (see procedure below for obtaining airport observations).
For Monitor II users, take a series of four pressure measurements using the altimeter setting from the airport and your on-screen displayed barometer reading; each comparison should be at least 15 minutes apart (see procedure below for obtaining airport observations). If the unit is newly in use, use the first reading to adjust your Monitor II to match, for an initial working value. Consult the instruction manual on details on how to set the barometer.

Notes:

- Some airports only report every hour on the hour, so you will have to take 4 hourly comparisons in this case.
 - Check that the time of your weather station reading and the airport reading are within 5 minutes of each other.
5. After completing the four comparisons noting your altimeter and the reference airport pressure simultaneously; sum the differences between the comparisons and divide by 4 (the number of comparisons) to get a mean difference.
 6. If the mean difference between your station and the reference station is more than ± 0.03 inches (± 1.0 mb) add (or subtract) the difference from the on-screen barometer reading and use that value to correct the appropriate reading. Let the pressure settle for at least 15 minutes and try another series of comparisons to see if you get within ± 0.03 inches (± 1.0 mb). Repeat the procedure until you achieve the goal a pressure difference of less than ± 0.03 inches (± 1.0 mb).
 7. Stop the comparison series when the mean difference is less than or equal to ± 0.03 inches (± 1.0 mb).
 8. Barometers occasionally will “drift” requiring re-calibration. Therefore, do barometer comparisons at least once every 3 months.
 9. Keep a record of your comparisons to monitor performance over time.

It is also possible to check the readings you send to CWOP online. This is recommended because the data you see on your display console may not match the data that gets sent to CWOP. If it doesn't match, make sure the elevation you report to CWOP is correct and matches what you entered into your Vantage Pro system, if applicable. You can get direct access to station data by simply entering your call sign in the search bar:
<http://www.wxqa.com/search.htm>.

Finally, if your unit is NIST certified, it does not guarantee that the unit could be damaged or fail within the year long certification period. NIST is mainly an indication that if your unit appears to be reporting information that is within “ball-park” expectations, it probably is reporting the correct value. If your readings are in question, but your system appears to be functioning normally, double-check to make sure the sensors have not been unintentionally moved. You may also

want to reconsider your sensor siting especially if your original installation was less than ideally located. NIST certification on the temperature and humidity sensors certifies that the sensors will read within specifications within the environment they are exposed to, but does not guarantee the radiation shield's effectiveness in blocking various forms of radiation. It is up to you to install the sensors within the radiation shield correctly according to the directions in the instruction manual. As with all sensors, it is your responsibility to locate them according to the guidelines in this document since NIST only certifies that the sensors will properly report the readings of the environment to which they are exposed.

Davis Instruments weather stations are designed to meet specifications. If you believe your unit to need repair or replacement, we have a fully staffed Support and Repairs team available to help you address your problem. (For residents outside the U.S. and Canada, most countries have a local Davis service center available to help. Contact our Customer Service department for the service center in your country.) Call our Tech Support department and our fully knowledgeable, friendly and helpful staff will listen to your problem and offer suggestions to rectify your problem. If they recommend a repair, they will provide you with the necessary information to get your unit fixed and returned in a timely fashion. If your readings are critical, you can shorten the total time the unit is out of service by shipping it to us via next day delivery and requesting that we return the unit to you the same way. Depending on where you are located, this can shorten the time the unit spends in transit by two weeks or more. We must, of course, charge you for the cost of returning the unit to you by next day delivery, whether it is under warranty or not. We will also send you a replacement part with the repair charge in exchange for returning the original part. This way, you do not have to wait for the unit to be repaired. Failure due to a power surge or lightning damage is not covered by our one year warranty and may not be repairable. In such cases, you may have to pay the full price to replace your unit. Repairs or replacement items have a 90 day warranty period.

REFERENCE

CWOP Weather Station Siting, Performance, and Data Quality Guide, March 2005

Federal Standards for Siting Meteorological Sensors at Airports, August 1994, Julian M. Wright, Jr., Federal Coordinator

Weather Station Siting and Installation Tools, 1997, Campbell Scientific, Inc.

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