



WeatherStation

Powerboat Model PB100 Owner's Guide



Record the serial number found on the
WeatherStation for future reference.

Serial No. _____

Date of Purchase _____

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Warning: DO NOT use the WeatherStation for your primary navigational device. The two-axis compass can give inaccurate readings when the vessel is pitching and rolling.

Introduction

Thank you for purchasing the Airmar Ultrasonic WeatherStation. This exciting product is actually six different sensors in a single unit—without any moving parts. The compact housing is fully waterproof with a single removable cable. Data is output in digital NMEA 0183 format.

Functions of the WeatherStation

- Apparent wind speed
- Apparent wind direction
- Magnetic compass heading
- Air temperature
- Relative humidity
- Dew point temperature
- Wind chill temperature
- Angle of vessel pitch
- Angle of vessel roll
- Barometric pressure
- Global Positioning System (GPS)
- Vessel speed over ground (SOG)
- Vessel course over ground (COG)
- True wind speed
- True wind direction
- Heading relative to true north
- True wind chill temperature
- True wind speed relative to water—requires speed-through-water input

Important: Please read the owner's guide completely before proceeding with the installation.

Improve Course-Over-Ground and True Wind Readings

The WeatherStation incorporates a two-axis compass. Significant errors can occur in the heading when the vessel is pitching and rolling. If there is an error in the heading, there also will be a corresponding error in the true wind direction.

The True Wind error can be minimized or eliminated by using Course-Over-Ground instead of the internal compass to make calculations. (COG heading data is obtained from the GPS.) For instructions, go to “Advanced Setup”, “True Wind Options” in the WeatherCaster application.

Accuracy can also be improved with the addition of an external three-axis compass. This external compass data will override the WeatherStation compass. Install a compass using an Airmar Combiner. Instructions are located in the section, “Connecting to a Combiner”.

Adding External Sensors

The WeatherStation can receive data from external sensors when they are connected through an optional Combiner. This device processes additional received data and transmits it to the WeatherStation for use in true wind calculations. The WeatherStation will automatically detect whether these sensors are internal, external, or not available at all. Simply connect the sensor(s) to the Combiner or other NMEA 0183 repeater hardware.

The data provided by an additional sensor(s) such as heading or water depth can also be seen on displays connected to the Combiner.

- **GPS**—An external NMEA 0183 GPS can be connected instead of or in addition to the internal GPS. The WeatherStation gives priority to valid external GPS data when available.
- **Compass**—If an external electronic compass is installed and working, this external compass data will override the WeatherStation compass.
- **Speed-through-water sensor**—An external speed sensor with NMEA 0183 output can be installed, such as an Airmar Smart™ Sensor. Airmar recommends installing the DST800V to receive water depth, boat speed, and water temperature data.

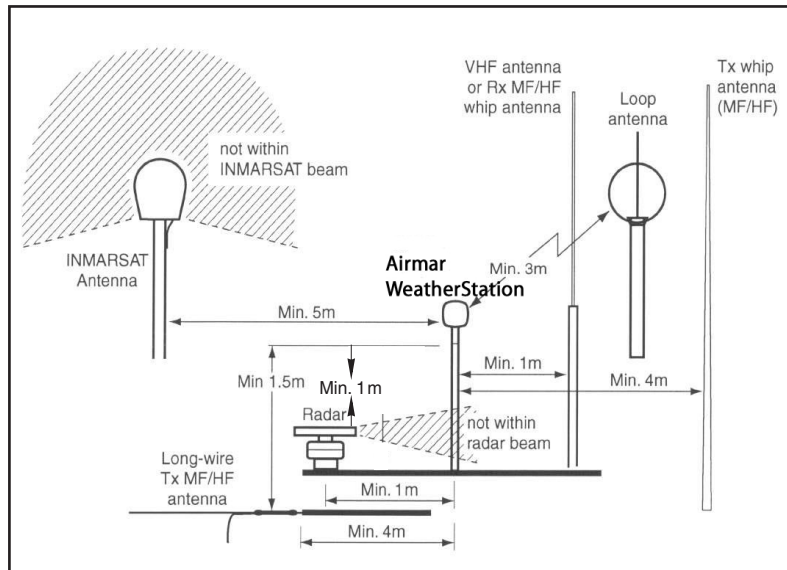


Figure 1. Antennas
 Courtesy of Northstar BNT, Acton, MA

Choosing the Mounting Location

For accurate readings and a reliable GPS signal, selecting the best location for the WeatherStation is very important. Easy access and appearance should be secondary considerations. Since each installation is unique, the best separation distances from other equipment on the boat will vary depending on the particular equipment and how it is configured. Choose a location that balances the requirements below (see Figure 1).

- The WeatherStation *must* be mounted in “clear air”—away from obstructions in any direction that will interfere with air flowing through the unit. If there is an obstruction, *be sure* to mount the WeatherStation at least 2 m (6') away. On land, avoid roof tops, chimneys, trees, etc.
- If possible, mount the WeatherStation higher than any other object. Mount it a minimum of 500 mm (20") above the surrounding surfaces. (Note that the higher the WeatherStation is mounted, the less accurate the pitch and roll readings will be.) For land use, mount a minimum of 10 m (33') above sea level.
- Because the WeatherStation has an electronic compass, it should be at least 1 m (3') away from any on-board radar equipment or other strong magnetic fields from equipment such as radio transmitters, boat engines, generators, etc.
- Because the WeatherStation has a GPS, it *must* be lower than any on-board INMARSAT communications antenna.
- Because the WeatherStation has a GPS, *be sure* it is as far as possible from high-powered transmitting antennas to avoid mutual interference.
- Because the WeatherStation has a GPS, check for any electromagnetic shading. That is, any obstructions from other vessels or shoreline buildings that will interfere with the GPS signals that the WeatherStation *must* receive.

Tools & Materials

Antenna mount with standard 1" - 14 marine threads and a pass-through for the cable (see Figure 2)

Hardware to install the antenna mount

Extension tube (optional)

Pencil

Level

Safety goggles

Dust mask

Electric drill

Drill bits

Phillips screwdrivers

Plumber's tape (optional)

Cutting pliers (some installations)

Wire strippers (some installations)

Electrical tape (some installations)

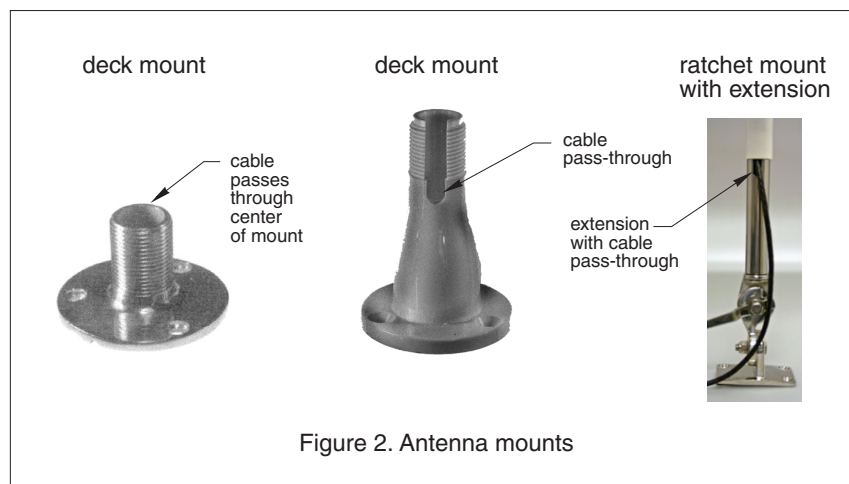
Converter (some installations)

Combiner (some installations)

Where to Purchase

Gemeco (USA)	Tel:	843.394.3565
	Fax:	843.394.3736
	email:	sales@gemeco.com

Airmar Europe	Tel:	45.45.81.04.18
	Fax:	45.45.81.04.93
	email:	sales@airmareurope.com



Installing the WeatherStation

Caution: The blue metal plate and the blue film found in the wind channel of the WeatherStation are essential to its operation (see Figure 3). Be careful not to scratch the plate, puncture the film, or damage them in any way.

Caution: Do not remove the waterproof connector(s) to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Cutting the cable or removing the waterproof connector(s), except when using Airmar's junction box, will void the sensor warranty.



Figure 3. Wind channel

1. Place the antenna mount at the selected location and mark the holes for the screws (see Figure 2). Also, mark the hole in the center of the mount for the cable to pass through. If you are using a ratchet mount, *be sure* you have purchased an extension with a cable pass-through.

Caution: The WeatherStation must be installed vertically—NOT tilted to one side. If the WeatherStation is tilted from the horizontal plane, it will introduce an error in the compass reading.

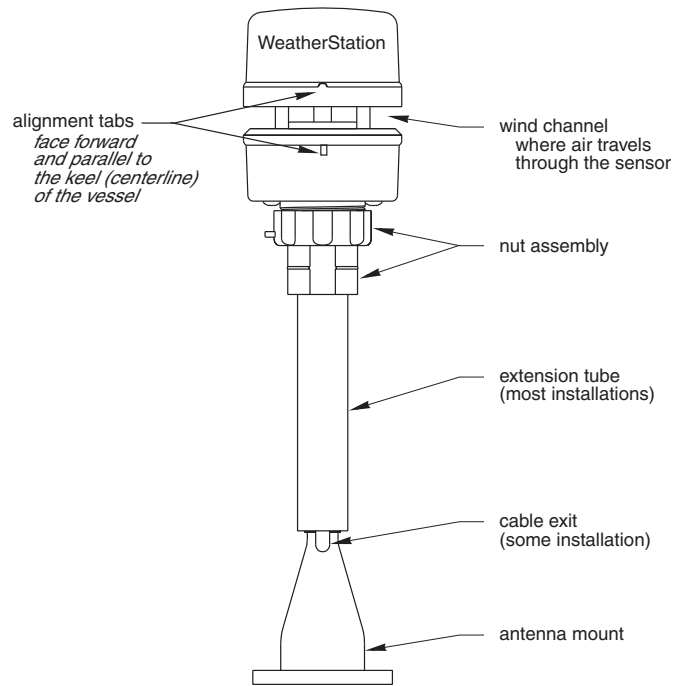


Figure 4. Installation

2. Position the antenna mount at a 90° angle to the deck. If necessary, use shims to make the mounting surface level (see Figure 4).

Warning: Always wear safety goggles and a dust mask.

3. Drill the holes for the mounting screws and the cable exit if necessary.
4. Using purchased screws, fasten the antenna mount in place.
5. Screw an extension tube onto the antenna mount if desired.

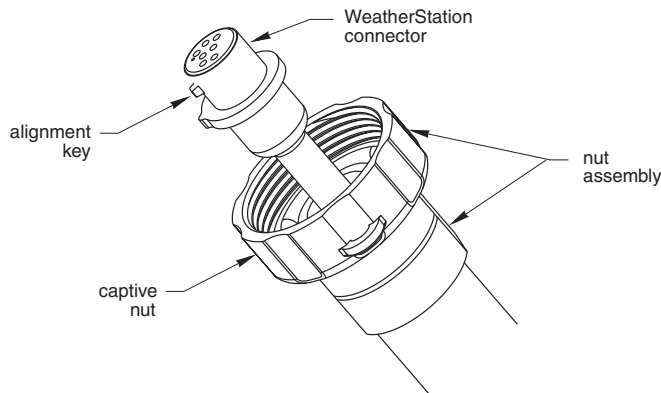


Figure 5. Connector

6. With the nut assembly on the cable near the WeatherStation connector, thread the cable through the extension tube (if used), antenna mount, and the cable exit. Allow several inches of cable topped by the connector above the nut assembly (see Figure 5).

Caution: *If you use a thread lock, use plumber's tape. Do not use a liquid thread lock as it may weaken the plastic, causing it to swell and crack.*

7. Screw the nut assembly onto the top of the antenna mount/extension tube. **Hand-tighten only.** Do not over tighten.
8. Remove the protective cover from the connector. (Save the cap to protect the connector, when the WeatherStation is removed.) Plug the 7-pin connector into the WeatherStation. The alignment key on the connector fits into a notch in the base of the WeatherStation.

Caution: *Be sure the alignment tabs on the WeatherStation point forward toward the bow and parallel to the centerline of the boat. This is necessary to accurately measure wind direction and vessel heading.*

9. *Be sure* the alignment tabs on the WeatherStation are facing forward and parallel to the keel (centerline) of the boat (see Figure 4). Slide the captive nut upward and screw it onto the base of the WeatherStation (see Figure 5). **Hand-tighten only.** Do not over tighten. *Be careful NOT* to rotate the WeatherStation or loosen the nut assembly from the antenna mount/extension tube. *Double check to be sure* the alignment tabs are still facing forward.

Cable Routing & Connecting

Depending on the equipment that you will be using, route the WeatherStation cable to a Converter, a Combiner, or directly to an NMEA 0183 display. Go to the section that is appropriate for your equipment.

Caution: Do not remove the waterproof connector(s) to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Cutting the cable or removing the waterproof connector, except when using Airmar's junction box, will void the sensor warranty.

Caution: To reduce electrical interference, separate the cables from other electrical wiring and the engine.

Caution: Be careful not to tear the cable jackets when passing them through bulkheads and other parts of the boat.

Caution: Coil any excess cable(s) and secure it with a zip-tie to prevent damage.

Connecting to a Converter

The Converter allows the WeatherStation measurements to be displayed on a PC by converting the data from NMEA 0183 to USB.

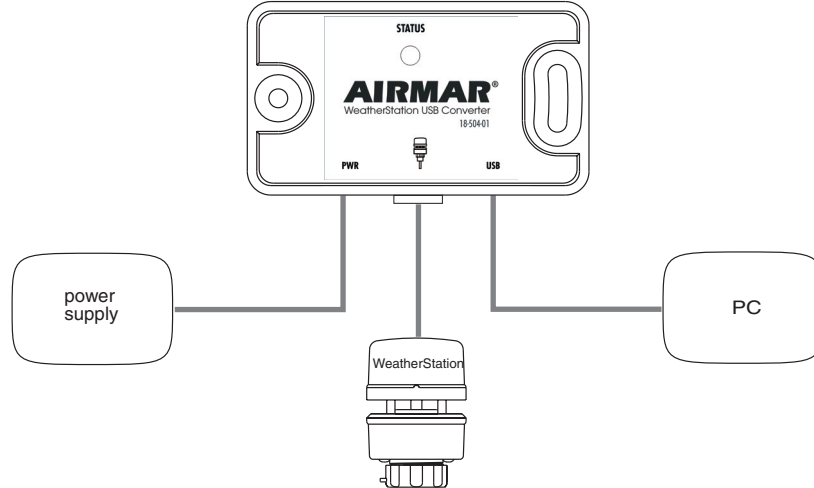


Figure 6. Converter installation

Mounting Location of the Converter

1. Select a convenient, dry, mounting location for the water-resistant Converter, about 1 – 2 m (3' – 6') from the PC (see Figure 6).
2. Hold the Converter at the selected location and mark the position of the screw holes. If the Converter will be mounted on a vertical surface, face the cables downward to avoid water seeping into the box.

Warning: Always wear safety goggles and a dust mask.

3. At the marked locations, drill the holes for the screws. *Do not* fasten the Converter in place at this time.

WeatherStation Cable

Route the WeatherStation cable to the Converter. *Do not* connect the WeatherStation cable or fasten it in place at this time.

USB Cable

Route the USB cable coming from the Converter into the USB port on the PC. *Do not* connect the cable or fasten it in place at this time.

Power Cable

Warning: The power panel must have a 1 amp fast-blow fuse or circuit breaker.

1. Route the power cable from the Converter to the power supply. *Do not* fasten the power cable in place at this time.
2. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
3. Strip 60mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable.
4. Cut off the bare wire flush with the cable jacket.
5. Strip 10 mm (3/8") of conductor insulation from the end of each colored wire.
6. Protect the cable's foil shielding from causing a short by wrapping electrical tape around the jacket where the wires emerge from the cable. The tape *must* overlap the wires a minimum of 6 mm (1/4").
7. Connect the wires to the power supply (10 – 16 V @ 0.5 amp required).
See the color code below.

Red	12 VDC +
Black	12 VDC –

Note: the Converter is powered by the USB port and the WeatherStation is powered by the power cable.

Completing the Installation

1. Fasten the Converter in place with the screws supplied.
2. Plug the WeatherStation cable into the Converter.
3. Plug the USB cable into the PC.
4. Fasten all the cables in place.

LED Indicator Light

The green LED indicator light will flash when the Converter is operating.

Install the Software

Go to "Installing the Software".

Connecting to a Combiner

The Combiner allows the WeatherStation data to be displayed simultaneously on both an NMEA display and a PC. On the Combiner, the two auxiliary grommets labeled AUX NMEA OUT can be used to connect additional devices capable of displaying WeatherStation data (see Figure 7). All display devices *must* be NMEA 0183.

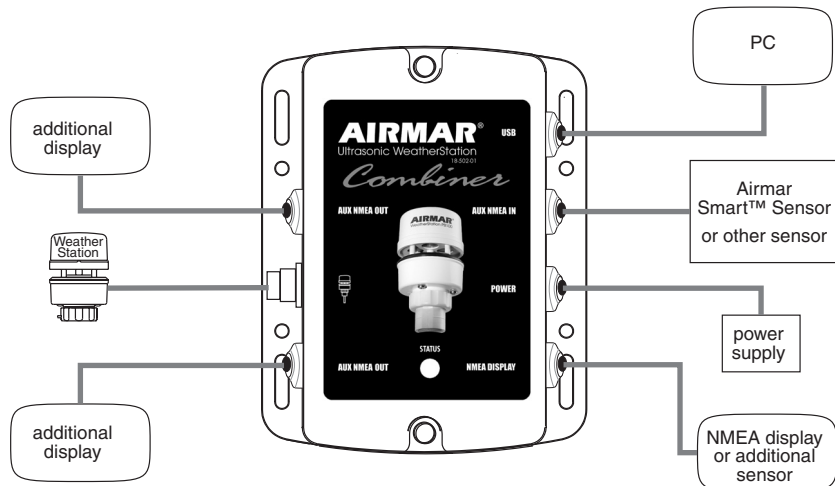


Figure 7. Combiner installation

What does NMEA IN and NMEA OUT mean?

NMEA IN represents *input* for data flowing into an NMEA device. An IN device is an NMEA listener. NMEA OUT signifies *output* for data flowing out of a device. OUT devices are NMEA talkers. The Combiner label *designates data flow as viewed by the device itself*. For example, the Combiner's *output* should be connected to a display's *input*.

The *output* of any NMEA device (talker) may connect to the *inputs of multiple devices* (listener). However, it is not permissible to connect the *output* of one NMEA device to the *output* of another. If the need arises to provide data from the outputs of two or more devices to the input of a given device, then a Combiner is required.

Caution: *Be sure to connect an NMEA talker to the NMEA IN terminal and NMEA listeners to the NMEA OUT terminals.*

Caution: *When connecting NMEA devices to one another, the cable shield only connects at ONE end of the cable, preferably at the device providing the NMEA output.*

Mounting Location of the Combiner

1. Select a convenient, dry, mounting location for the water-resistant Combiner, about 1 – 2 m (3' – 6') from the NMEA device and the PC.
2. Hold the Combiner at the selected location and mark the position of the screw holes. Note—If the Combiner will be mounted on a vertical surface, face the grommets to the sides to avoid water seeping into the box.

Warning: Always wear safety goggles and a dust mask.

3. At the marked locations, drill the holes. *Do not* fasten the Combiner in place at this time.

WeatherStation Cable

Route the WeatherStation cable to the Combiner. *Do not* connect the WeatherStation cable or fasten it in place at this time.

USB Cable

Route the USB cable coming from the Combiner to the USB port on the PC. *Do not* connect the cable or fasten it in place at this time.

NMEA Display/Additional Sensor Cable

1. Route the cable coming from the NMEA display/additional sensor to the Combiner. *Do not* fasten the cable in place at this time.
2. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
3. Remove the cover of the Combiner to expose the terminals inside (see Figure 8).

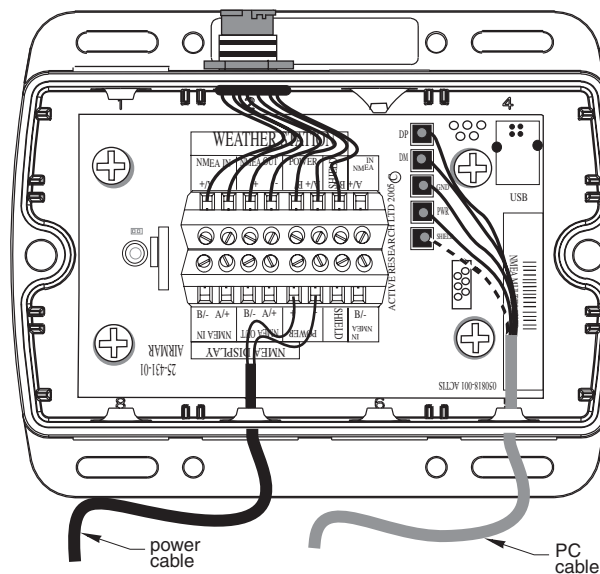


Figure 8. Inside a Combiner

4. Using a small Phillips screwdriver, puncture the grommet that corresponds to NMEA Display on the cover (see Figure 7). *Be careful* not to damage the circuit board.
5. Push approximately 200mm (8") of the cable through the grommet (see Figure 9). To ease sliding, apply alcohol to the cable jacket.

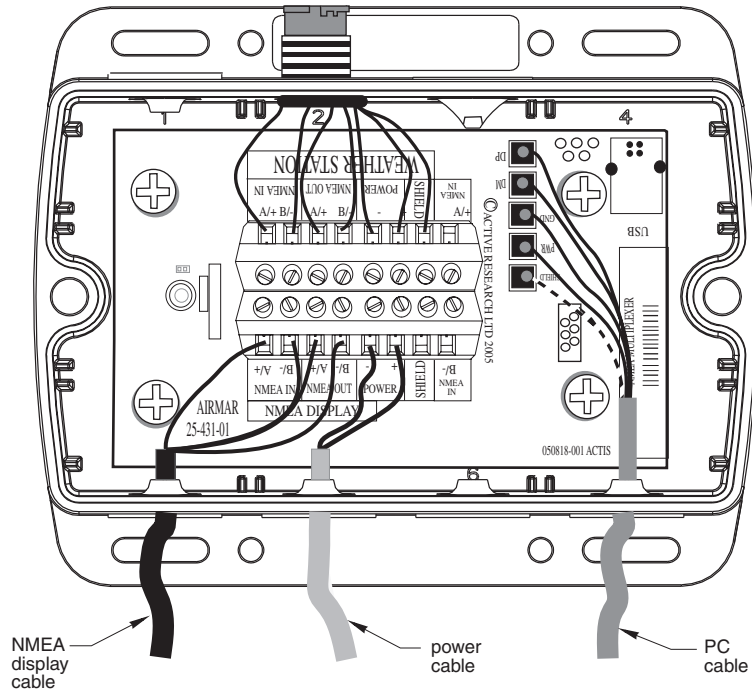


Figure 9. Wiring an NMEA display to a Combiner

6. Strip 60mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable.
7. Strip 10mm (3/8") of conductor insulation from the end of each colored wire.
8. Protect the cable's foil shielding from causing a short by wrapping electrical tape around the jacket where the wires emerge from the cable. The tape *must* overlap the wires a minimum of 6mm (1/4").
9. From outside the Combiner, *carefully* pull the cable until only 13mm (1/2") of the cable jacket remains inside.

10. Connect each wire in turn into the designated NMEA Display terminal. Loosen the screw, insert the stripped end of the wire into the square hole, and retighten the screw. *Be sure the stripped end of the wire is inserted up to its insulation only. Do not include any insulation inside the terminal.* Gently tug on the wire to ensure that it is securely fastened. Repeat this process until all the wires are connected. Refer to the owner's manual that came with the display/sensor and the wiring diagram below (see Figure 10).

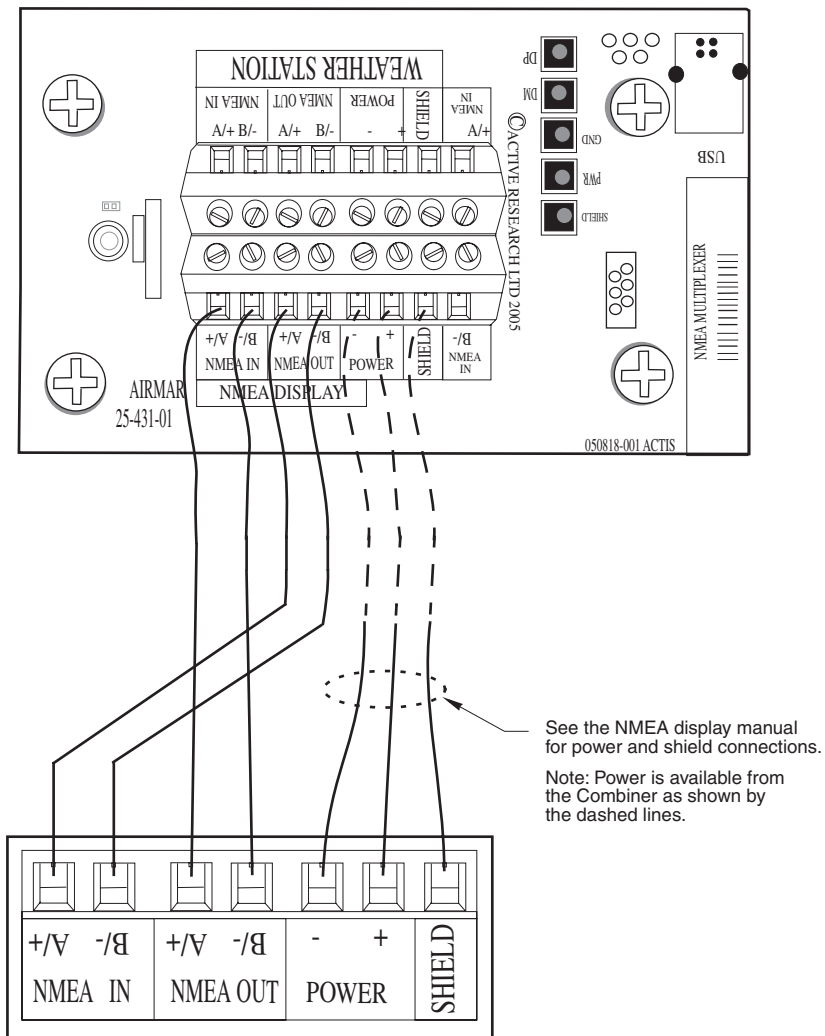


Figure 10. Wiring diagram to connect an NMEA display

Auxiliary NMEA IN Grommet.

Use the AUX NMEA IN grommet to connect an external NMEA 0183 sensor such as: an Airmar Smart™ Sensor, an external GPS, an external compass, or other sensor. An “IN” device will supply additional data to the WeatherStation.

The WeatherCaster software will automatically detect a Smart Sensor and display the appropriate data. Airmar recommends installing the DST800V to receive water depth, boat speed, and water temperature data. Other Smart Sensors can be connected, provided that your NMEA display can read the sentence output and is configured to display those values.

The AUX NMEA IN grommet can also be used to connect an external GPS. In some cases, a GPS receiver can be plugged directly into an NMEA port on the display, if it can repeat the input to the Combiner. This would leave the AUX NMEA IN grommet on the Combiner free to connect an Airmar Smart Sensor.

To wire a device through the AUX NMEA IN grommet, use the NMEA IN terminals on the printed circuit board (see Figure 11).

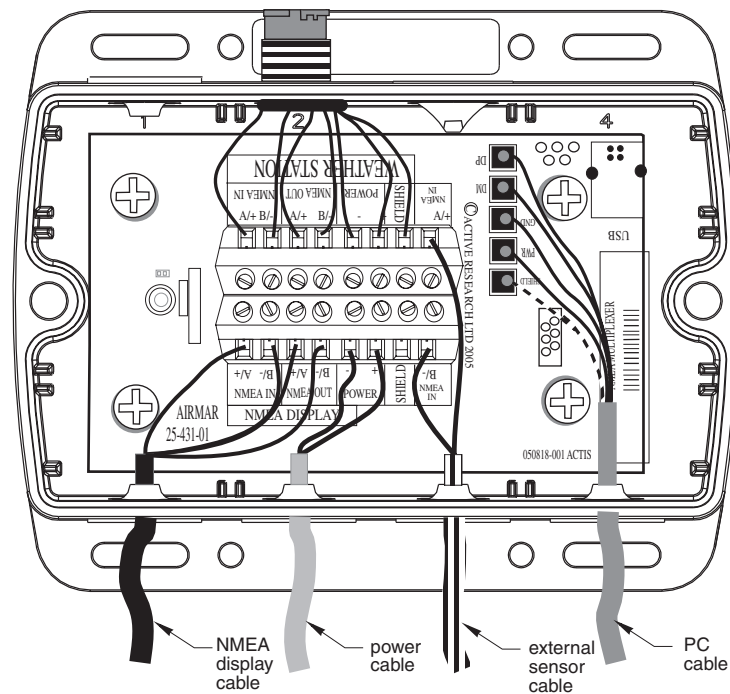


Figure 11. Wiring an external sensor to a Combiner

1. Route the cable coming from the external sensor to the Combiner. *Do not* fasten the cable in place at this time.
2. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
3. Remove the cover of the Combiner to expose the terminals inside (see Figure 11). Using a small Phillips screwdriver, puncture the grommet that corresponds to AUX NMEA IN on the cover (see Figure 7). *Be careful* not to damage the circuit board.
4. Push approximately 200mm (8") of the cable through the grommet (see Figure 11).
5. Strip 60mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable.
6. Strip 10 mm (3/8") of conductor insulation from the end of each colored wire.
7. Protect the cable's foil shielding from causing a short by wrapping electrical tape around the jacket where the wires emerge from the cable. The tape *must* overlap the wires a minimum of 6 mm (1/4").
8. From outside the Combiner, *carefully* pull the cable until only 13mm (1/2") of the cable jacket remains inside.

9. Connect each wire in turn into the designated NMEA IN terminal. Loosen the screw, insert the stripped end of the wire into the square hole and retighten the screw. *Be sure the stripped end of the wire is inserted up to its insulation only. Do not include any insulation inside the terminal. Gently tug on the wire to ensure that it is securely fastened. Repeat this process until all the wires are connected. Refer to the owner's manual that came with the sensor and the wiring diagram below (see Figure 12).*

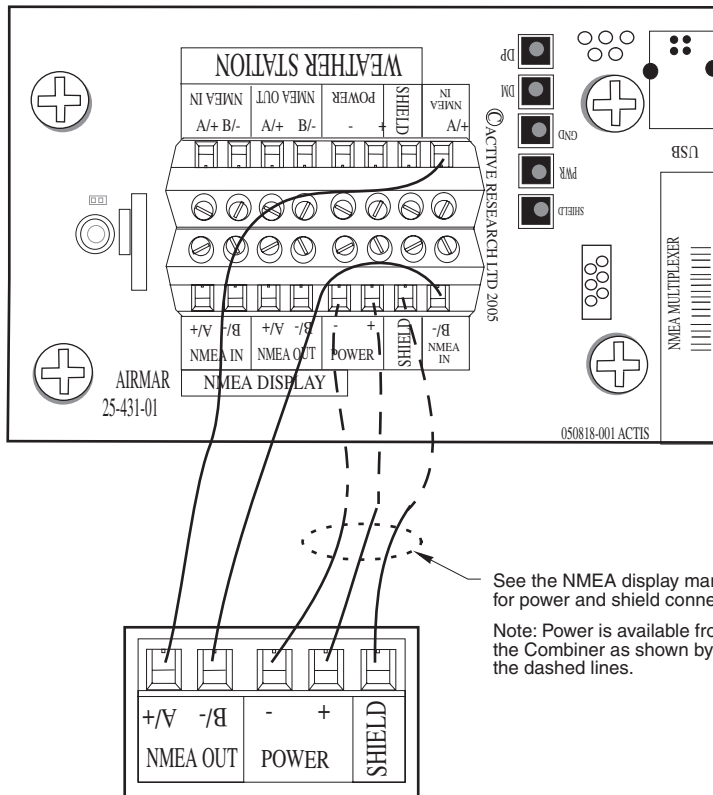


Figure 12. Wiring diagram to connect an external sensor

Auxiliary NMEA OUT Grommets

Use the AUX NMEA OUT grommets to connect one or two additional devices to receive and display data from the WeatherStation. To wire a device(s) through the AUX NMEA OUT grommet(s), use the NMEA OUT terminals on the printed circuit board (see Figure 13).

Note: If you will be connecting two devices, wire both devices to the same designated terminals—on top of one another.

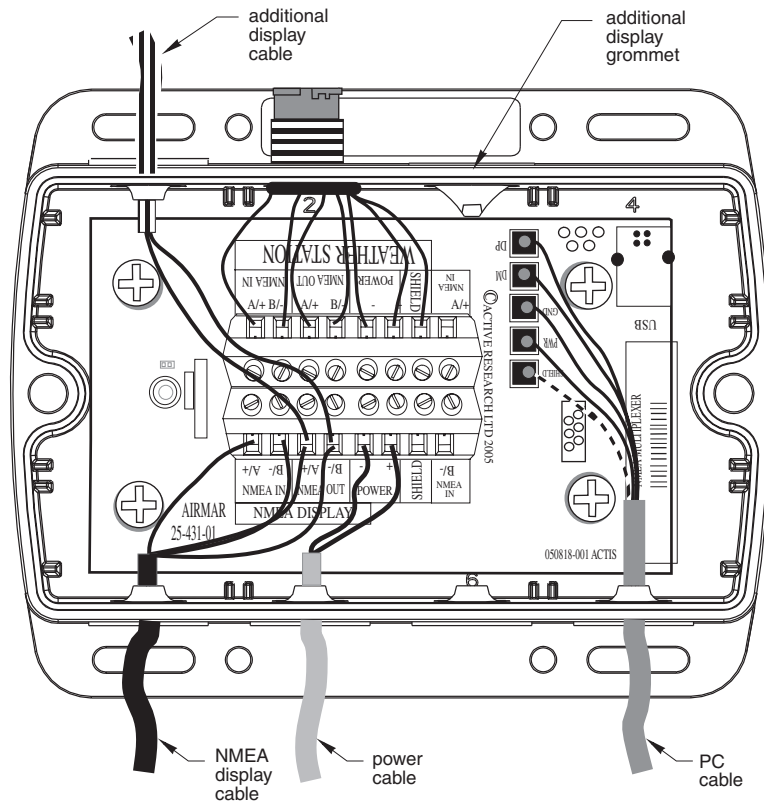


Figure 13. Wiring additional display devices to a Combiner

1. Route the cable coming from the additional display device(s) to the Combiner.
Do not fasten the cable in place at this time.
2. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
3. Remove the cover of the Combiner to expose the terminals inside.
4. Using a small Phillips screwdriver, puncture the grommet(s) that corresponds to AUX NMEA OUT on the cover (see Figure 7). *Be careful* not to damage the circuit board.

5. Push approximately 200mm (8") of the cable through the grommet(s) (see Figure 13).
6. Strip 60mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable (s).
7. Strip 10mm (3/8") of conductor insulation from the end of each colored wire.
8. Protect the cable's foil shielding from causing a short by wrapping electrical tape around the jacket where the wires emerge from the cable. The tape *must* overlap the wires a minimum of 6mm (1/4").
9. From outside the Combiner, *carefully* pull the cable until only 13mm (1/2") of the cable jacket remains inside.
10. Fasten each wire in turn into the designated AUX NMEA OUT terminal. Loosen the screw, insert the stripped end of the wire into the square hole and retighten the screw. *Be sure the stripped end of the wire is inserted up to its insulation only. Do not* include any insulation inside the terminal. Gently tug on the wire to ensure that it is securely fastened. Repeat this process until all the wires are connected. Refer to the owner's manual that came with the display/sensor and the wiring diagram below (see Figure 14).

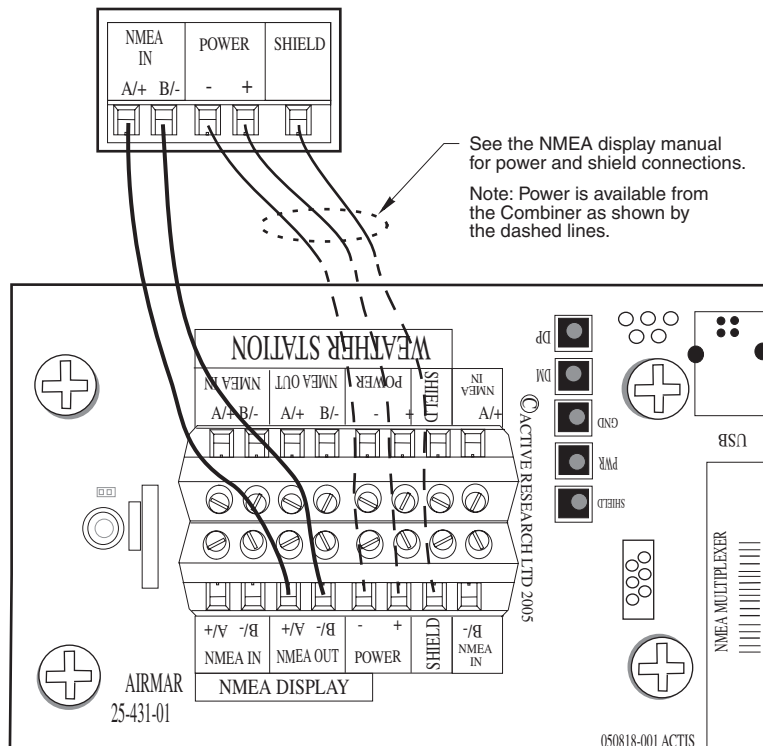


Figure 14. Wiring diagram to connect additional display devices

Power Cable

Warning: The power panel must have a 2 amp fast-blow fuse or circuit breaker.

1. Route the power cable from the Combiner to the power supply (see Figure 13).
Do not fasten the cable in place at this time.
2. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
3. Strip 60 mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable (s).
4. Cut off the bare wire flush with the cable jacket.
5. Strip 10 mm (3/8") of conductor insulation from the end of each colored wire.
6. Protect the cable's foil shielding from causing a short by wrapping electrical tape around the jacket where the wires emerge from the cable. The tape *must* overlap the wires a minimum of 6 mm (1/4").
7. Connect the wires to the power supply (10 – 16 V @ 0.5 amp required).
See the color code below.

Red	12 VDC +
Black	12 VDC –

Completing the Installation

1. From outside the Combiner, carefully pull each cable until only about 13 mm (1/2") of the cable *jacket* remains inside the box. This will invert the nipples to form a watertight seal.
2. Arrange the wires neatly inside the Combiner, *being sure* that no bare wires are touching.
3. Attach the Combiner cover with the screws provided.
4. Fasten the Combiner in place, using the screws provided.
5. Plug the WeatherStation connector into the designated WeatherStation port on the Combiner.
6. Plug the USB cable from the Combiner into the USB port on the PC.
7. Fasten all the cables in place.

LED Indicator Light

The green LED indicator light will be flashing when the Combiner is operating.

Install the Software

Go to "Installing the Software".

Connecting to a Generic NMEA 0183 Display

1. Route the WeatherStation cable to the display. *Do not* fasten the cable in place at this time.
2. Connect the WeatherStation to the display.
 - **Connector**—If your WeatherStation came with a connector, and it can be plugged into the port on your NMEA 0183 display, do so now. Coil any excess cable and secure it with a zip-tie to prevent damage. Fasten the cable in place.
 - **No connector**—If your WeatherStation does not have a connector on the display end, it *must* be hard wired. Follow “Guidelines for Making Connections” to prepare the cable. Refer to the owner’s manual that came with your display and connect the colored wires as shown in the table below and Figure 15.

WeatherStation Function	WeatherStation Cable	Display Function
NMEA input A/+	Yellow	NMEA output A/+ (see Note 2)
NMEA input B/-	Orange	NMEA output B/-
NMEA output A/+	White	NMEA input A/+
NMEA output B/-	Blue	NMEA input B/-
12 VDC +	Red (see Note 1)	12 VDC + (see Note 3)
12 VDC -	Black	12 VDC -
Shield	Bare	Shield

Note 1: The WeatherStation must be supplied with 12 VDC+ at 0.5 amp between the red and black leads.

Note 2: If your display does not have NMEA output connections, the yellow and orange wires are not needed and their ends should be taped separately. (Alternatively, yellow and orange wires can be connected to an external sensor.)

Note 3: The display power may be wired directly to the WeatherStation cable, or it may be wired separately.

Wiring

Warning: The power panel must have a 1 amp fast-blow fuse or circuit breaker.

1. Route the power cable from the WeatherStation to the power supply. *Do not* fasten the power cable in place at this time.
2. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
3. Cut off the bare wire flush with the cable jacket.
4. Strip 10 mm (3/8") of conductor insulation from the end of each colored wire.
5. Protect the cable's foil shielding from causing a short by wrapping electrical tape around the jacket where the wires emerge from the cable. The tape *must* overlap the wires a minimum of 6 mm (1/4").
6. Connect the wires to the power supply (see Figure 15).
7. Fasten all cable in place.
8. Your installation is complete. To begin receiving weather readings, refer to the owner's manual that came with your display.

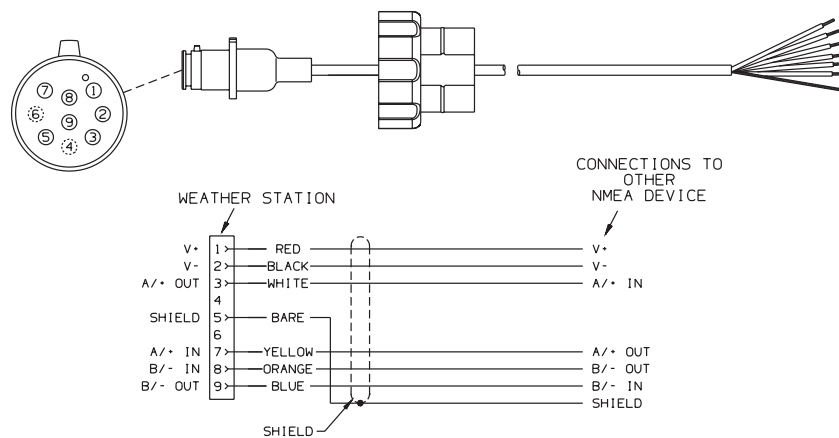


Figure 15. Wiring diagram to connect to a generic NMEA display

Installing WeatherCaster Software

CONVERTER OR COMBINER INSTALLATION ONLY

If your installation includes a Converter or a Combiner, installing the WeatherCaster software on your PC allows you to communicate with the WeatherStation. WeatherCaster is designed to work with Windows® XP.

Caution: The screen resolution must be set at 1024 x 768 pixels per square inch for WeatherCaster to operate properly.

Installing the Application

1. Power your PC.
2. Insert the WeatherStation CD into the CD-ROM drive on your PC. The Airmar WeatherStation CD Browser window will appear (see Figure 16). Click the Install Software button.



Figure 16. Airmar WeatherStation CD Browser window

3. Another Airmar WeatherStation CD Browser window will appear (see Figure 17). Click the Install Application button.



Figure 17. Airmar WeatherStation CD Browser install window

Note: If WeatherCaster is already installed on your PC, the older version needs to be uninstalled before the installation can continue. WeatherCaster will automatically detect an old version, and the Previous Version window will appear (see Figure 18). Click Yes to uninstall the old version of WeatherCaster. Follow the screen prompts.



Figure 18. Previous Version window

4. The WeatherCaster Installation Wizard window will appear (see Figure 19). Click Next to continue.



Figure 19. WeatherCaster Installation Wizard window

5. The License Agreement window will appear (see Figure 20). Click the "I accept the terms of the license agreement" button to accept the agreement, then click Next to continue.



Figure 20. License Agreement window

6. The Choose Destination Location window will appear (see Figure 21). Follow the screen prompts. Click Next to continue.

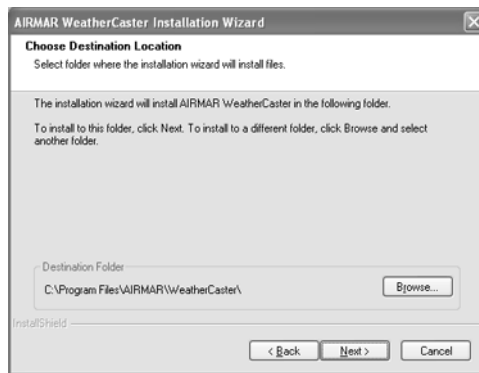


Figure 21. Choose Destination Location window

7. The Ready to Install window will appear (see Figure 22). Click Install. The Setup Status window will appear while WeatherCaster is being installed.

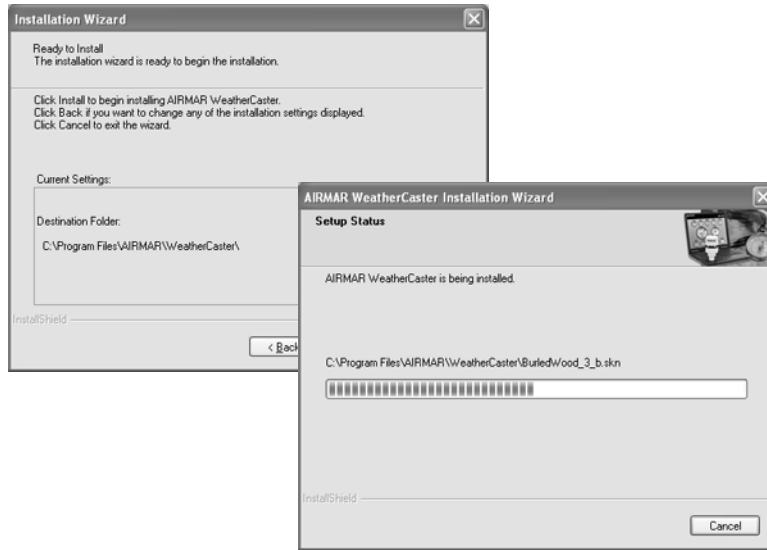


Figure 22. Ready to Install and Setup Status windows

8. The Installation Complete window will appear when WeatherCaster has been successfully installed (see Figure 23). Click Finish. Return to the Airmar WeatherStation CD Browser window and click the Install Drivers button (see Figure 17).

Note: If you are replacing an old version of WeatherCaster with a new one, you can begin using it now. DO NOT install the device drivers again.



Figure 23. Installation Complete window

Installing the USB Serial Converter Driver

Caution: THE DRIVER INSTALLATION IS IN TWO PARTS. Both drivers must be installed for the WeatherStation to communicate with WeatherCaster.

The first driver is called the USB Serial Converter. It converts the USB data packets to a serial data stream. The second driver, called the USB SERIAL PORT driver, makes the USB connection appear as a COM port in the Windows® Device Manager.

Important: Be sure the WeatherStation CD is inserted into the CD-ROM drive on your PC BEFORE the Combiner or Converter hardware is connected.

1. The Airmar WeatherStation CD Browser window will appear (see Figure 17). Click the Install Drivers button to begin the process of copying the Airmar device drivers to your PC.
2. The Driver Installer window will appear (see Figure 24). Click Next to continue.



Figure 24. WeatherStation Driver Installer window

3. The License Agreement window will appear. Click the Agree button to accept the License Agreement. Click Next to continue.

4. The Hardware Installation caution window will appear (see Figure 25). The USB Serial Converter driver is not Microsoft Windows® certified. However, it has been tested for stable and reliable operation. Click Continue Anyway to proceed with the installation.



Figure 25. Hardware Installation caution window

5. When the driver installation is complete, click Finish.
6. Power the Converter or Combiner.
7. Plug the USB cable into an open USB port on your PC.
8. The Found New Hardware Wizard window will appear (see Figure 26). Click "NO, not this time" to allow the driver installation. Click Next to continue.



Figure 26. Found New Hardware Wizard window

9. Another Found New Hardware Wizard window will appear (see Figure 27). Click “Install the software automatically”.

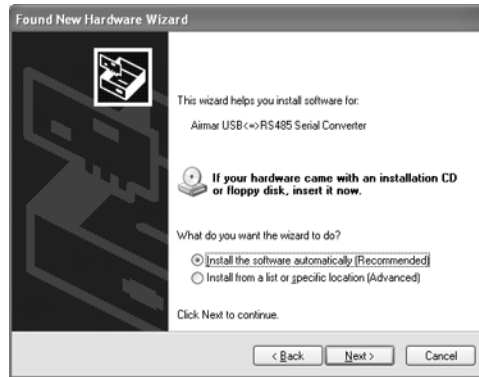


Figure 27. Found New Hardware Wizard window continued

10. Click Next to continue. The drivers will begin to install.
11. The Hardware Installation caution window will appear (see Figure 25). The USB Serial Converter driver is not Microsoft Windows® certified. However, it has been tested for stable and reliable operation. Click Continue Anyway to complete the installation.
12. The USB Serial Converter driver is being installed (see Figure 28). Click Finish and wait for the Found New Hardware Wizard window to appear again.



Figure 28. Completing the Found New Hardware Wizard window

IMPORTANT: THE NEW HARDWARE WIZARD MUST RUN TWICE FOR A COMPLETE INSTALLATION.

Installing the COM Port Driver

1. When the Found New Hardware Wizard window appears again, it will guide you through the USB Serial Port driver installation (see Figure 26). Repeat steps 5 through 10.
2. Click Finish to complete the installation. When the installation is complete, “Your new hardware is installed and ready to use” icon will appear in the bottom right corner of your screen (see Figure 29).



Figure 29. “Your new hardware is installed and ready to use” icon

3. Close the browser window. Eject the WeatherStation CD and store it in a safe place.

Setting Up WeatherCaster

After WeatherCaster is successfully installed, click the WeatherStation icon on your PC's desktop. When WeatherCaster opens, you will see a Setup screen with gauges in the middle and dials on the left and right sides (see Figure 30). The center gauges display the data being sent from the WeatherStation in both analog and digital format. The dials on the sides are settings that can be changed by the user. This screen is for setting up the display *only*.

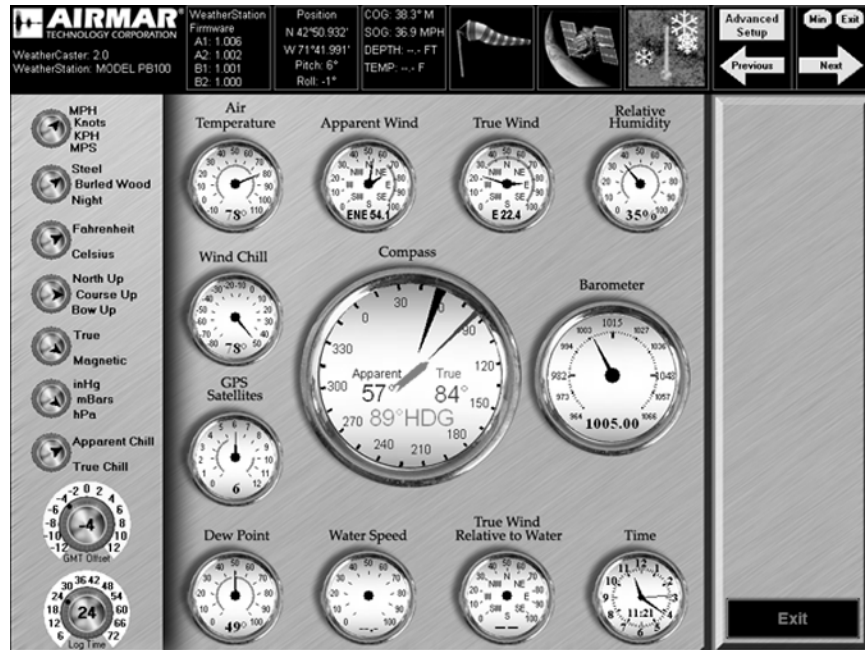


Figure 30. Setup screen

Settings



Wind Speed Setting Dial

This dial allows you to display wind speed in the following units of measure.

- MPH—Miles Per Hour
- Knots—1 Knot = 1.15 Miles Per Hour
- KPH—Kilometers Per Hour
- MPS—Meters Per Second

To change the setting, click the text to the right of the dial.



Background Color Dial

This dial allows you to choose the screen background.

- Steel
- Burlled Wood
- Night

To change the setting, click the text to the right of the dial.



Temperature Setting Dial

This dial allows you to display all of the temperature readings in the following units of measure.

- Fahrenheit
- Celsius

To change the setting, click the text to the right of the dial.



Compass Orientation Dial

This dial allows you to orient the compass display one of three ways.

- North Up—The traditional orientation in which north is displayed at the top of the compass.
- Course Up—This orientation will provide wind readings relative to the true course of the boat. The compass will display 0 – 180° on the port side from bow to stern. And it will display 0 – 180° on the starboard side from bow to stern. This setting is useful when the vessel is underway, as it helps determine how the wind will affect the course and speed of the boat.
- Bow Up—This orientation will provide wind readings relative to the bow of the boat. The compass will display 0 – 180° on the port side from bow to stern. And it will display 0 – 180° on the starboard side from bow to stern. This setting is useful when the vessel is underway, as it helps determine how the wind will affect the direction and speed of the boat.

To change the setting, click the text to the right of the dial.



True or Magnetic North Dial

This dial allows you to set the compass using either true or magnetic north.

- True North—the direction to the geographic North Pole.
- Magnetic North—The direction to the magnetic North Pole.

To change the setting, click the text to the right of the dial.



Barometric Pressure Setting Dial

This dial allows you to display the barometric pressure in the following units of measure.

- inHg—Inches of Mercury
- mBars—Millibars
- hPa—HectoPascal

To change the setting, click the text to the right of the dial.



Wind Chill Setting Dial

This dial allows the WeatherStation to calculate the wind chill temperature based on:

- Apparent wind speed
- True wind speed

To change the setting, click the text to the right of the dial.



GMT Offset Dial

The Greenwich Mean Time (GMT) Offset Dial allows you to change the clock, so it displays the time in your current location. After identifying your current Time Zone, change the setting by clicking on the number that corresponds to your Time Zone.



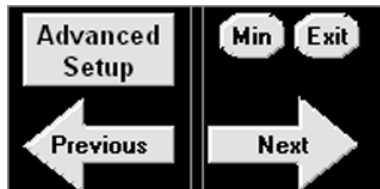
Log Time Interval Dial

The WeatherStation saves weather data for a set period of time. This dial allows you to choose the length of time that data will be saved. The log time can be adjusted in six-hour intervals from 6 – 72 hours. To change the setting, click the number that corresponds to the length of time that you would like data to be saved.



Exit Button

To exit WeatherCaster, click Exit.



Advanced Setup Button

To change settings in the WeatherStation firmware, click Advanced Setup.

Minimize and Exit Buttons

To minimize the screen, click Min. Close the WeatherCaster application by clicking Exit.

Next Arrow

To move to the next display screen, click the Next arrow. (WeatherCaster has three screens.)

Previous Arrow

To return to the previous display screen, click the Previous arrow. (WeatherCaster has three screens.)

Advanced Setup—WeatherStation Firmware Settings

Before using the WeatherStation for the first time, you may want to adjust some settings. The WeatherStation firmware resides in the WeatherStation itself and is separate from the WeatherCaster software. To access these settings, click the Advanced Setup button on the top right of the WeatherCaster screens.

Sensor Hardware

There are two tabs at the top of the Advanced Setup window (see Figure 31). The first tab is labeled Sensor Hardware. Information about your WeatherStation model and its software is displayed in the left box.

Self-test Status

Your WeatherStation performs a self-test each time the unit is powered on. Click Details to check the results of a self-test.

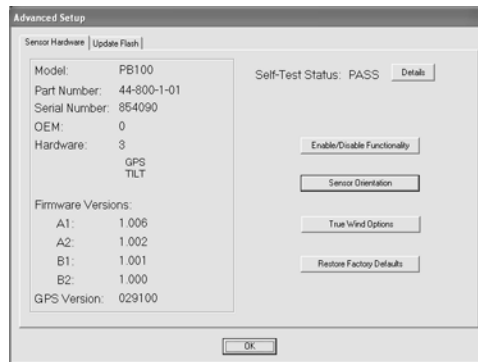


Figure 31. Advanced Setup window

A Self-test Results window will appear (see Figure 32). Click OK to continue.

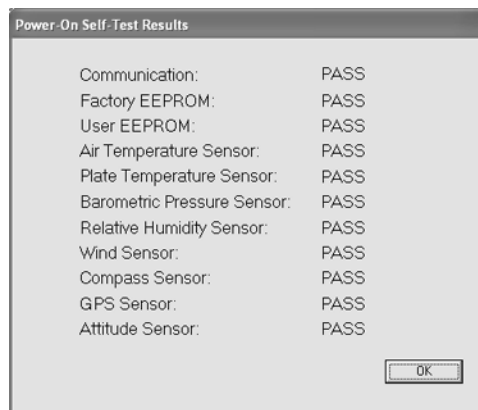


Figure 32. Self-test Results window

Enable/Disable Functionality

You can enable or disable the WeatherStation transmission of individual NMEA 0183 sentences and specify the number of seconds between the transmission of each sentence (see Figure 33.). In the Enable/Disable Functionality window, follow the screen instructions.

Note: The "Bandwidth Used" cannot exceed 100%.

Green Adequate bandwidth

Yellow Approaching maximum bandwidth

Red Maximum bandwidth exceeded.

Reduce one or more intervals until the color is yellow.

Click Defaults to return to the factory settings. Click Save to accept the changes and continue.

Note: The Save button is enabled only after changes have been made.

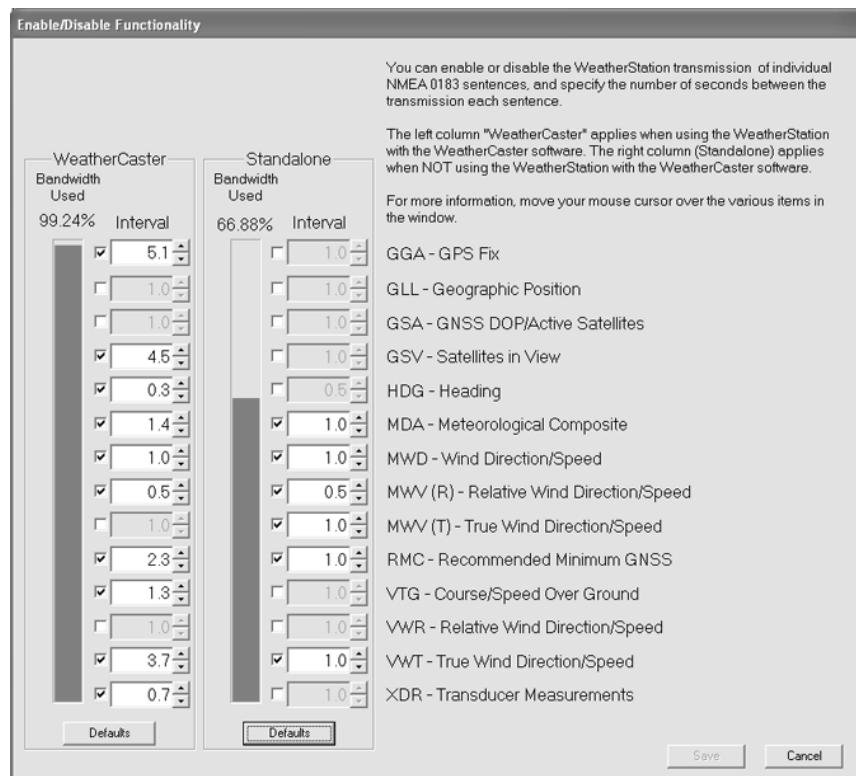


Figure 33. Enable/Disable Functionality window

Sensor Orientation

Depending upon the mounting location of the WeatherStation, the azimuth, pitch, and/or roll settings may need to be changed (see Figure 34). To change a setting, click Change and follow the screen instructions. To return all settings to zero, click Zero. For help in setting the azimuth, pitch, and roll, click Run Assistant. To save changes, click Save.

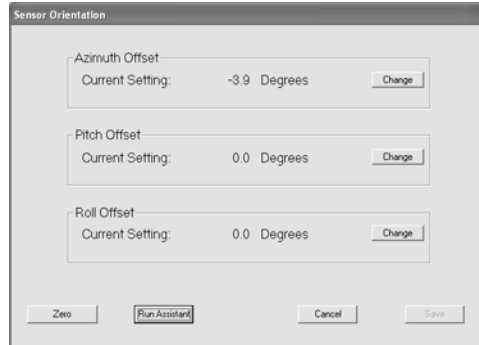


Figure 34. Sensor Orientation window

Azimuth Offset

If the WeatherStation is *NOT* installed with the alignment tabs pointing forward and parallel to the keel (centerline), enter the offset angle in the text box (see Figure 35). (To calculate the azimuth offset angle, compare the WeatherStation compass reading to an independent compass reading.) To return the setting to zero, click Zero. Click OK to accept the change and continue.

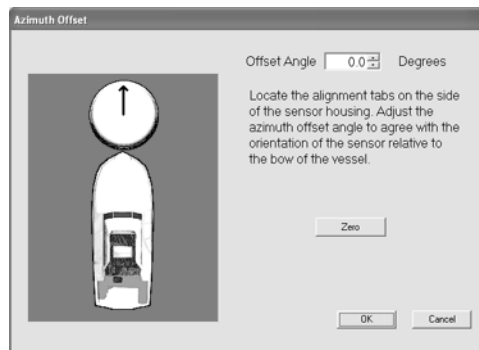


Figure 35. Azimuth Offset window

Pitch Offset

If the WeatherStation is *NOT* installed perpendicular to the waterline, enter the pitch offset angle in the text box (see Figure 36). (To measure the pitch offset angle, place an angle finder against the side of the WeatherStation and facing forward.) To return the setting to zero, click Zero. Click OK to accept the change and continue.

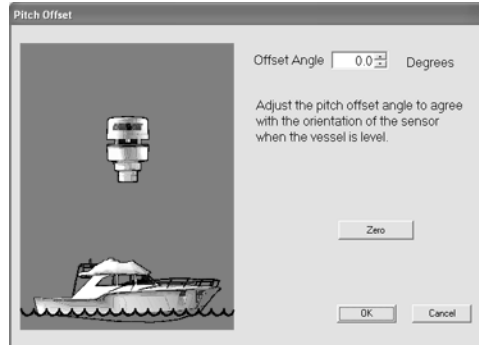


Figure 36. Pitch Offset window

Roll Offset

If the WeatherStation is *NOT* installed vertically relative to the port-starboard axis, enter the roll offset angle in the text box (see Figure 37). (To measure the roll offset angle, place an angle finder against either the port or starboard side of the WeatherStation.) To return the setting to zero, click Zero. Click OK to accept the change and continue.

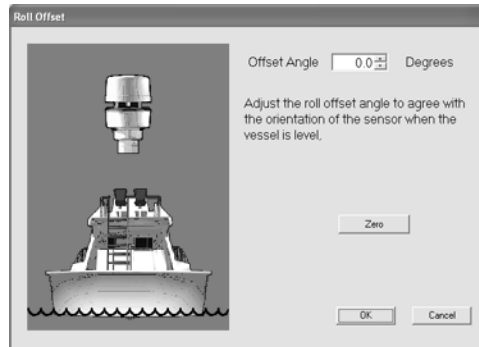


Figure 37. Roll Offset window

Run Assistant

For help in setting the azimuth, pitch, and roll offset angles, click Run Assistant in the Sensor Orientation window (see Figure 34).

The Azimuth Orientation window will open (see Figure 38). If the WeatherStation is *NOT* installed with the alignment tabs pointing forward and parallel to the keel (centerline), enter the offset angle in the text box. (To calculate the azimuth offset angle, compare the WeatherStation compass reading to an independent compass reading.) To return the setting to zero, click Zero. Click Next to accept the change and continue.

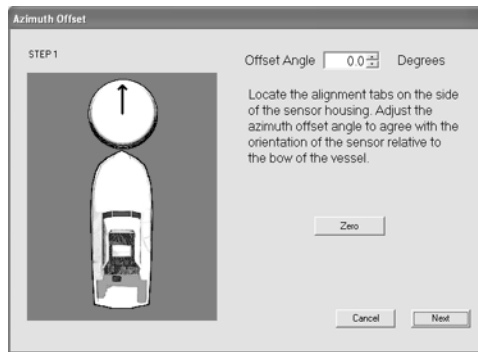


Figure 38. Azimuth Offset

The Pitch and Roll Offset window will open (see Figure 39). Follow the screen instructions and the WeatherStation will compensate for the pitch and roll. To return the setting to zero, click Zero. Click Next to accept the change and continue.

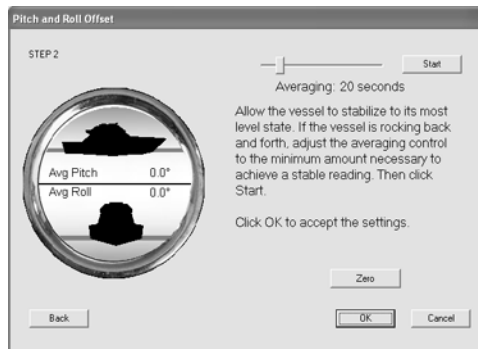


Figure 39. Pitch and Roll Offset window

True Wind Options

To enable the use of Course-over-Ground instead of the internal compass heading in calculating the True Wind direction and speed, click the check box in the True Wind Options window (see Figure 40). For more information, click Help. To accept the change and continue, click OK.



Figure 40. True Wind Options window

Restore Factory Defaults

In the Advanced Setup window, all settings can be returned to the factory defaults. Click Restore Factory Defaults (see Figure 41). When the default settings are restored, the Confirm Reset window will appear. Click OK to accept the default settings and continue.

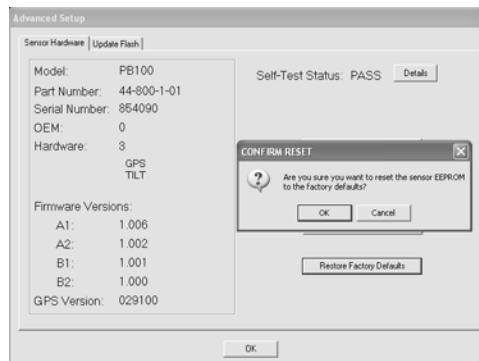


Figure 41. Advanced Setup window and Confirm Reset window

Update Flash

Periodically, Airmar will release updated versions of the WeatherStation firmware that resides in the WeatherStation itself. (This software is separate from the WeatherCaster software.) The latest version of the WeatherStation firmware with updates and enhancements can be downloaded from Airmar's website or a CD can be mailed by Airmar's technical support personnel.

Updating the WeatherStation Firmware

Caution: *DO NOT exit the WeatherStation while programming is in process.*

Caution: *DO NOT interrupt the power while programming is in process.*

In the Advanced Setup window, click the Update Flash tab (see Figure 31). Click Select File (see Figure 42). When the Open window appears, highlight the correct file on your computer. Click Program to install the file. First one and then another progress bar will appear.

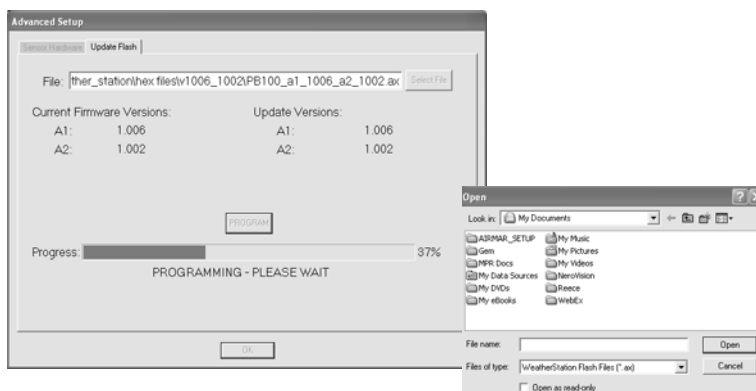


Figure 42. Advanced Setup window with Update Flash tab and Open window

When Updating and Programming are complete, the window will say "Programming complete" and "EEPROM Update Complete". Click OK to return to the WeatherCaster application.

Using WeatherCaster

Warning: The Airmar WeatherCaster software and its functions serve as an aid to displaying weather conditions. This software is not designed as an aid to navigation. Only official government charts contain all the information needed for safe navigation and, as always, the user is responsible for their prudent use.

WeatherCaster has three display screens. To move between screens, click the Next or the Previous arrow.

- Setup Screen—This screen contains gauges in the center and dials on the sides. The dials are settings that can be changed by the user (see Figure 30).
- Analog Gauge Screen—This screen displays the data being sent from the WeatherStation on gauges in both analog and digital format (see Figure 43). After setup is completed, this screen will display automatically when WeatherCaster is launched.
- Large Compass and Digital Readout Screen—This screen displays a large compass on the left and weather readings in digital format on the right (see Figure 44).

Analog Gauge Screen

After WeatherCaster has been setup, the next time you start the application an Analog Gauge Screen will appear (see Figure 43). The gauges display the data being sent from the WeatherStation. Each gauge displays data in both analog and digital formats.

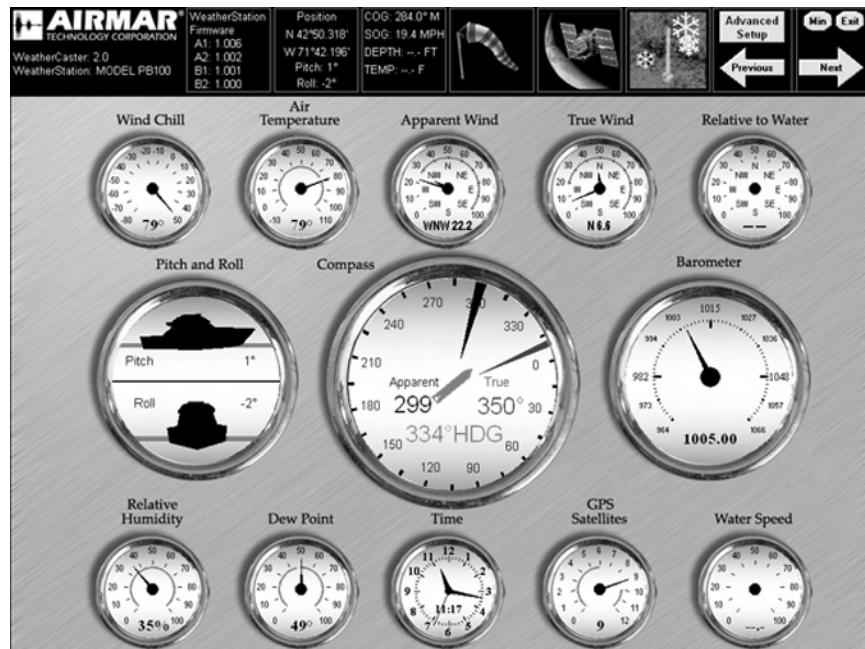


Figure 43. Analog Gauge screen

High and Low Readings

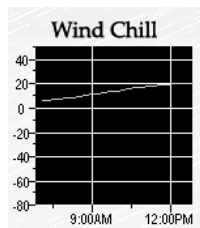
Some gauges display a colored arc. A blue arc shows the lowest reading in a 24 hour period. A red arc show the highest reading in a 24 hour period. And white space between a blue and a red arc shows the range of the readings in a 24 hour period. Blue and red arcs may appear on all gauges except the Pitch and Roll gauge, the Compass, the Barometer, and the Clock.

Displaying Historical Data

You can view historical data for each gauge except the Pitch and Roll gauge, the Compass, and the Clock. When you click on a gauge, a graph will appear. The graph displays time at the bottom and the unit of measure on the left. A red line will indicate the history.

Gauges

Note: The True Wind Relative to Water gauge and the Water Speed gauge will appear only if an Airmar Smart™ Sensor is installed and connected through an optional Combiner.

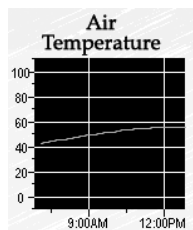


Wind Chill Gauge

This gauge uses a needle to indicate the wind chill temperature, and there is a digital readout at the bottom.

To view historical wind chill data, click the gauge. A graph will appear as shown. To return to the Wind Chill gauge, click the graph.

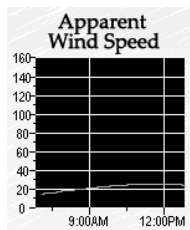
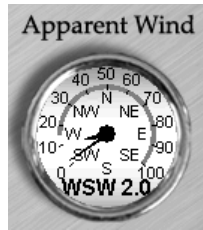
Note: The wind chill temperature is calculated only when the air temperature is less than 10°C (50°F) and the wind speed is greater than 2.6Kn (3MPH).



Air Temperature Gauge

This gauge uses a needle to indicate the air temperature, and there is a digital readout at the bottom.

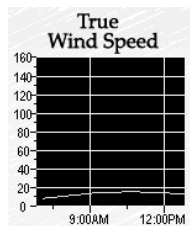
To view historical air temperature data, click the gauge. A graph will appear as shown. To return to the Air Temperature gauge, click the graph.



Apparent Wind Gauge

This gauge uses needles to indicate the apparent wind speed and direction. The long needle points to the wind speed, and the short needle points to the wind direction. There is also a digital readout at the bottom.

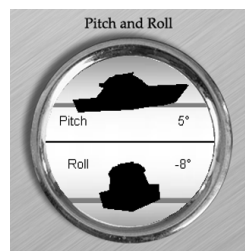
To view historical apparent wind speed data, click the gauge. A graph will appear as shown. To return to the Apparent Wind gauge, click the graph.



True Wind Gauge

This gauge uses needles to indicate the true wind speed and direction. The long needle points to the wind speed, and the short needle points to the wind direction. There is also a digital readout at the bottom.

To view historical, true wind speed data, click the gauge. A graph will appear as shown. To return to the True Wind gauge, click the graph.



Pitch and Roll Gauge

This gauge uses boat icons to indicate the pitch and roll of the vessel. The average angle of pitch and the average angle of roll is displayed digitally in degrees.

Note: For pitch and roll values to be completely accurate, the sensor would need to be installed at the vessel's center of gravity—at the waterline. This is not recommended, because it would interfere with weather readings. Note that the higher the WeatherStation is above the waterline, the greater the error in the pitch and roll readouts.

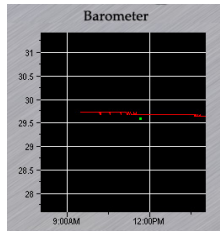
Compass



The Compass displays the true and the apparent wind direction along with vessel heading. No historical data is collected.

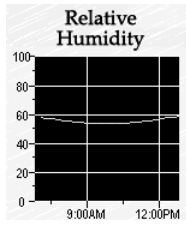
- Apparent wind direction is indicated by a black/white needle and a black/white digital readout on the left of the gauge.
- True wind direction is indicated by a red/green needle and a red digital readout on the right of the gauge.
- Vessel heading is displayed as a blue boat icon in the center of the gauge and indicates the direction in which the boat is traveling. The heading is also digitally displayed in the lower center in blue.
- Port and starboard Indicators appear when the Compass is orientated in the Bow Up mode. A letter “P” representing Port or an “S” representing Starboard will be displayed to the right of both the true wind direction and the apparent wind direction digits. The letters reference where the wind is coming from relative to the bow of the vessel. The image above shows the apparent wind at 175° port and the true wind at 30° starboard.

Barometer



The Barometer uses a black/white needle to indicate the current barometric pressure. A red needle is the reference marker. By aligning the red needle with the black/white needle, it is possible to see changes in barometric pressure over time. A digital readout of the current barometric pressure is found at the bottom of the gauge.

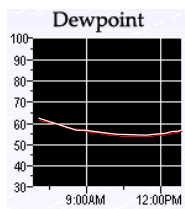
Click and hold the mouse over the red reference needle to align it with the black/white needle. To view historical barometric readings, double click the gauge. A graph will appear as shown. The red line indicates the barometric pressure over a period of time. The green dot indicates when the reference needle was set. To return to the Barometer, click the graph.



Relative Humidity Gauge

This gauge uses a needle to indicate the relative humidity as a percentage. There is also a digital readout at the bottom.

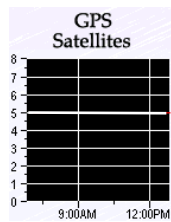
To view historical humidity data, click the gauge. A graph will appear as shown. To return to the Relative Humidity gauge, click the graph.



Dew Point Gauge

This gauge uses a needle to indicate the dew point temperature. There is also a digital readout at the bottom.

To view historical dew point data, click the gauge. A graph will appear as shown. To return to the Dew Point gauge, click the graph.

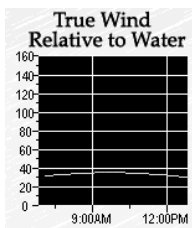


GPS Satellite Gauge

This gauge uses a long needle to indicate the number of satellites in view. There is also a digital readout at the bottom. The short needle indicates how many satellites are being used to determine current position.

Note: *Four or more satellites usually indicates a 3D fix.*

To view historical GPS data, click the gauge. A graph will appear as shown. To return to the GPS Satellite gauge, click the graph.

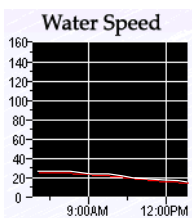


True Wind Speed Relative to Speed Through Water Gauge

This gauge will appear only if you have installed a paddlewheel sensor measuring boat speed through the water, and the sensor is connected to an optional Combiner. True wind speed relative to speed through water cannot be calculated using GPS readings.

The gauge uses needles to indicate true wind speed and direction relative to speed through water. The long needle points to the wind speed, and the short needle points to the wind direction. There is also a digital readout at the bottom.

To view historical data, click the gauge. A graph will appear as shown. To return to the True Wind Relative to Water gauge, click the graph.



Water Speed Gauge

This gauge will appear only if you have installed a paddlewheel sensor measuring boat speed through the water. And it is connected through an optional Combiner. The gauge uses a needle to indicate boat speed through the water. There is also a digital readout at the bottom.

To view historical water speed data, click the gauge. A graph will appear as shown. To return to the Water Speed gauge, click the graph.

The Large Compass and Digital Readout Screen

Click the Next arrow at the top right of the display to go to the Large Compass and Digital Display Screen. This screen shows a large compass on the left and readings in digital format on the right (see Figure 44). This screen does *not* display historical data.

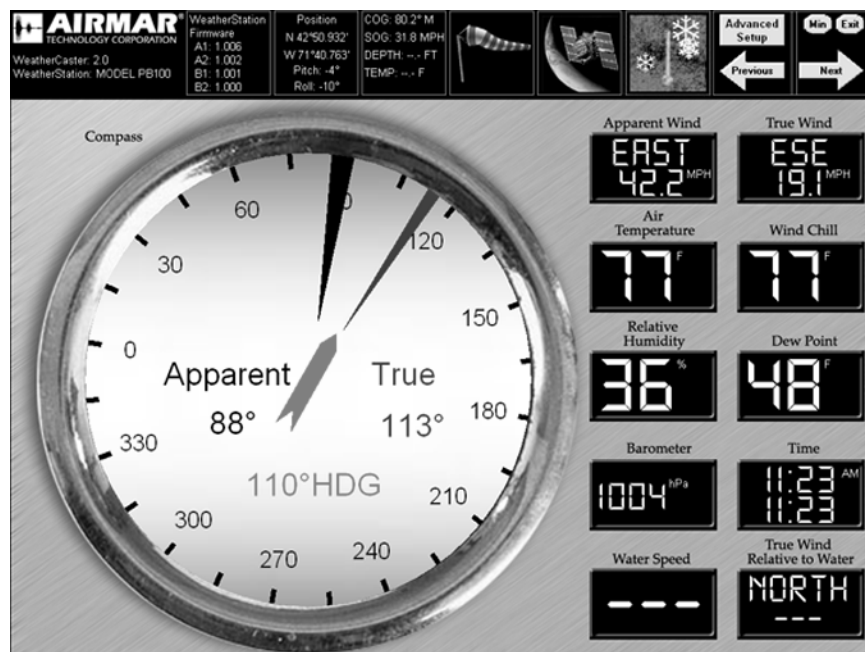


Figure 44. Large Compass and Digital Readout screen

Compass

The Compass displays the true and the apparent wind direction along with the vessel heading (see Figure 44).

- Apparent wind direction is indicated by a black needle and a black digital readout on the left of the gauge.
- True wind direction is indicated by a red needle and a red digital readout on the right of the gauge.
- Vessel heading is displayed as a blue boat icon in the center of the gauge and indicates the direction in which the boat is traveling. The heading is also digitally displayed in the lower center in blue.
- Port and starboard Indicators appear when the Compass is orientated in the Bow Up mode. A letter “P” representing Port or an “S” representing Starboard will be displayed to the right of both the true wind direction and the apparent wind direction digits. The letters reference where the wind is coming from relative to the bow of the vessel.

Digital Readings

The right side of the screen displays the following readings (see Figure 29):

- Apparent wind speed and direction
- True wind speed and direction
- Air temperature
- Wind chill temperature
- Relative humidity
- Dew point temperature
- Barometric pressure
- Time—Displayed in a 12 and a 24 hour format
- Water speed—It will appear only if you have installed a paddlewheel sensor measuring boat speed through the water, and it is connected through an optional Combiner.
- True wind relative to water— It will appear only if you have installed a paddlewheel sensor measuring boat speed through the water, and it is connected to a Combiner.

Data Boxes

There are seven Data Boxes at the top of each screen (see Figure 45).



Figure 45. Data Boxes

Box 1. WeatherCaster Software Version and WeatherStation Model Number

Box 2. WeatherStation Firmware

This box displays the firmware version of the software that is installed in the WeatherStation itself.

Box 3. Position

This box displays the vessel's current position on the globe in latitude and longitude as determined using GPS.

The average angle of pitch and the average angle of roll is displayed digitally in degrees.

Box 4.

This box displays the vessel's speed over ground (SOG) and course over ground (COG) which is calculated using the GPS. If you have an Airmar Smart Sensor connected through an optional Combiner, it will also display water depth and water temperature.

Box 5. Windsock True Speed Indicator

This box displays the wind-speed flag icon that relates to the actual wind speed. The flag will change as the wind speed increases or decreases (see Figure 46).

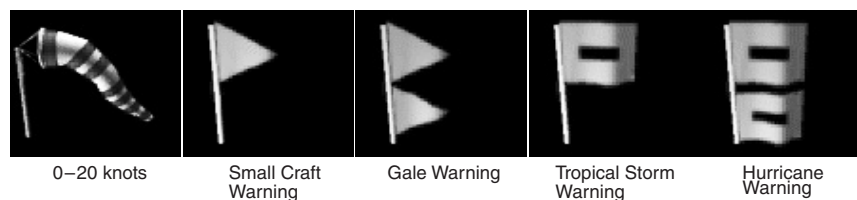


Figure 46. Wind-speed flags

Box 6. GPS Connection Indicator

This icon indicates if the GPS inside the WeatherStation has a satellite fix. When the icon is red, there is no GPS fix. When the icon is blue, there is a GPS fix.

Box 7. Freezing Point Indicator

This icon will display how close the actual temperature is relative to the freezing point.

Maintenance & Updates

WeatherCaster Updates

Periodically, Airmar will release updated versions of both the WeatherCaster software and WeatherStation firmware. Updates can be downloaded from Airmar's web site, www.airmar.com, or contact Airmar's technical support personnel for a CD.

Calibration

The WeatherStation is calibrated at the factory and does not require any calibration after purchase.

Maintenance

Since the WeatherStation has no moving parts, it requires minimal maintenance.

Caution: *The blue metal plate and the blue waterproof film found in the wind channel of the WeatherStation are essential to its operation (see Figure 47). Be careful not to scratch the plate, puncture the film, or damage them in any way.*



Figure 47. Wind channel

Keep the wind channel free of *SPIDER WEBS*, insects, dirt, and other debris. Since the blue waterproof film in the wind channel protects the transducers, *be careful* to keep it intact.

Where to Purchase Parts

Obtain parts from your marine dealer.

Gemeco (USA)

Tel: 843.394.3565

Fax: 843.394.3736

email: sales@gemeco.com

Airmar Europe

Tel: 45.45.81.04.18

Fax: 45.45.81.04.93

email: sales@airmareurope.com

Troubleshooting

- Is there power to the WeatherStation?
- Are all the connections tight?
- Is the cable-run free of kinks?
- Is the wiring correct?
- Are there any obstructions in the wind channel of the WeatherStation? Keep it free of *spider webs*, insects, dirt, and other debris. *Be careful not to puncture the blue waterproof film or scratch the blue plate.*
- Is there ice on the WeatherStation?
- For a GPS fix, does the WeatherStation have a clear view of the sky?

Combiner Problems

The LED light on the Combiner indicates its current operating mode and if an error is detected during the self-test process. See the table below.

Color and Flash Count	Mode and Error Condition	Description of Mode and Required User Action
Red No flashing	Start-up mode No error	Normal operation mode that should last for no more than 1.5 seconds. Any longer indicates an error with the program. No action required.
Red No flashing	Flash Updating mode No error	The LED will stay red for the duration of the flash update operation. When the operation is complete, the Combiner will automatically reset. No action required.
Amber No flashing	Initialize & Self-test mode No error	Normal operation mode that follows the start-up mode and should last for approximately 1 second. No action required.
Green No flashing	Normal & No Data mode No error	Normal operation mode that follows the Initialize & Self-test mode. Indicates that no error was detected during self-test. Also, no data is currently being received by the Combiner. No action required.
Green Flashing (1–10 per sec.)	Normal & Data Receive mode No error	Normal operation mode that indicates data is being received by the Combiner. The flash rate is proportional to the Baud rate. No action required.
Amber Flashing (1 every 4 sec.)	Error Trap mode EEPROM memory error	An error with the EEPROM memory has been detected during the self-test mode. Reset the Combiner by powering down, waiting 60 sec., then restarting the Combiner.

PC Problems

If you are uncertain of the COM port on your PC, follow the steps below.

1. From the Start menu, select Control Panels.
2. Select the System option.
3. Select the Hardware tab.
4. Select Device Manager.
5. Select Ports.
6. Select Airmar NMEA 0183 – USB Converter.

The Converter is powered when it is connected to the USB port on the PC.

WeatherCaster Software Problems

Identify the WeatherCaster Version

The WeatherCaster version number is located on the top left corner of each WeatherCaster screen. The latest version of WeatherCaster is available for download at www.airmar.com.

Setting the Display Resolution to 1024 X 768

When using WeatherCaster on a computer with a display resolution less than 1024 x 768 (e.g. 800x600), the window will be truncated on the right side and bottom edges. The EXIT controls will therefore be hidden from view. If this happens, you can exit WeatherCaster by pressing the key combination <alt>-F4 (i.e. while pressing and holding the Alt key, press and release the F4 key). If the display resolution is greater than 1024 X 768 (e.g. 1280 x 1024), WeatherCaster will not fill the entire PC screen. You will need to set your monitor resolution to 1024 x 768 in order to use WeatherCaster.

1. From the Start menu, select Control Panels.
2. Select Display Properties.



3. Select the Settings tab.
4. Slide the Screen Resolution indicator until 1024 X 768 is selected.
5. Click Apply, then click Yes.

Auto-Detecting COM Ports

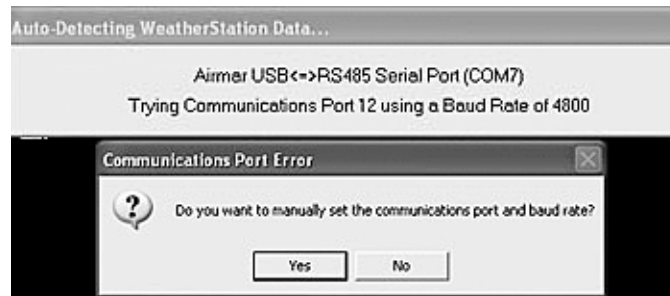
If you install more than one instance of the drivers for the Combiner or Converter, WeatherCaster may not automatically detect the appropriate COM port. In this case, you will need to manually select the COM port and the baud rate upon launching WeatherCaster.

Manually selecting the COM port and baud rate

1. After launching WeatherCaster, you will see the screen below. Click Cancel.

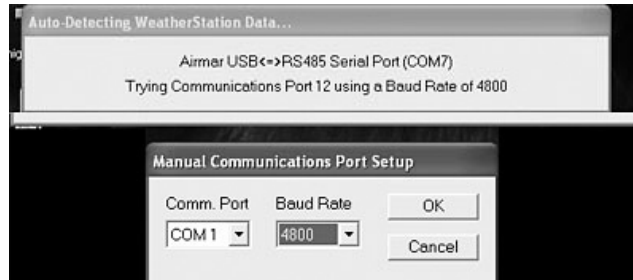


2. You will then see the screen below. Click Yes to manually set the COM port and baud rate.



3. In the Manual Communications Port Setup window, select the appropriate COM port from the Comm. Port drop-down menu. *Be sure* to select the Comm. Port

that matches the COM port shown in brackets on the Auto-Detecting WeatherStation Data window.



4. Select the appropriate baud rate from the drop-down menu.
 - If you have a USB Converter, set the baud rate to 4800.
 - If you have a Combiner, set the baud rate to 38400.

5. Click OK, and WeatherCaster will start.

6. Exit WeatherCaster, then start the application again.

The next time WeatherCaster runs, it will automatically select the proper COM port.

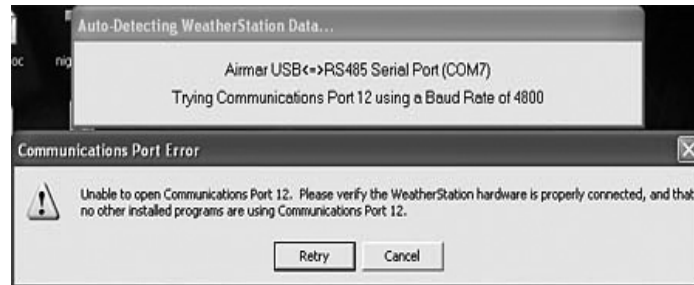
Double Digit COM Ports

If there are more than nine COM ports assigned to your computer, the WeatherStation may not auto-detect WeatherCaster.

Manually select a specific COM port.

1. From the Start menu, select Control Panel.
2. Select the System option.
3. Select the Hardware tab.
4. Select Device Manager.
5. Select Ports.
6. Right click Airmar Port and select Properties.
7. Select the Port Settings tab.
8. Select the Advanced button.
9. From the COM Ports drop-down menu, select a single digit COM port that is not in use and click OK.
10. Close all open windows.

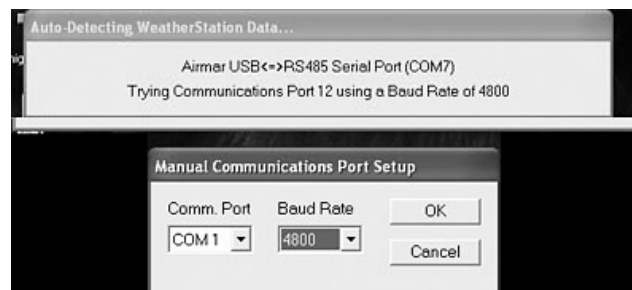
1. Launch WeatherCaster again. You will see the screen below. Click Cancel.



2. You will then see the screen below. Click Yes to manually set the COM port and baud rate.



3. In the Manual Communications Port Setup window, select the appropriate COM port from the Comm. Port drop-down menu. *Be sure* to select the Comm. Port that matches the COM port shown in brackets on the Auto-Detecting WeatherStation Data window.



4. Select the appropriate baud rate from the drop-down menu.
 - If you have a USB Converter, set the baud rate to 4800.
 - If you have a Combiner, set the baud rate to 38400.
 5. Click OK, and WeatherCaster will start.
 6. Exit WeatherCaster, then start the application again.
- The next time WeatherCaster runs, it will automatically select the proper COM port.

Troubleshooting WeatherStation Data Using Windows HyperTerminal

IMPORTANT: Before starting HyperTerminal, note the COM Port number that the WeatherStation is connected to. The COM Port number is found on the Auto-Detecting WeatherStation Data window when WeatherCaster begins.

IMPORTANT: You must close WeatherCaster to use HyperTerminal with the WeatherStation.

1. From the Start menu, select All Programs, Accessories, Communications. Click HyperTerminal.
2. Enter an area code if prompted.
3. Select File, then New Connection.
4. Name the connection, then click OK.
5. Select the particular COM port that the WeatherStation is connected to, then click OK.



6. Set the bits-per-second to 4800. *Do not* change any other selection. Click OK. You will see the data sentences from the WeatherStation scrolling on the screen, similar to the example below.

```

$PAMTT,weather station model PB100
$PAMTT,Copyright (C) 2005 AIRMAR Technology, Inc.
$PAMTT,POST,0,0,0,0,0,0,0,0,0,0,*44
$PAMTT,QV,44-800-1,2,0,051204022,1.001,1.003,1.000,:
$WIMWV,191.0,R,1.8,N,A*23
$WIMWV,200.6,R,1.9,N,A*2F
$GPRMC,,V,,,,,,,,,N*53
$WIMDA,29.854,I,1.011,B,7.7,C,,,61.6,,0.7,C,,,,,
$WIMWD,,,,,,,,*40
$WIMWV,,T,,,V*7C
$WIMWV,209.1,R,2.3,N,A*28
$WIMWV,212.5,R,2.5,N,A*20
$GPRMC,,V,,,,,,,,,N*53
$WIMDA,29.854,I,1.011,B,7.7,C,,,51.4,,-1.6,C,,,,,
$WIMWD,,,,,,,,*40
$WIMWV,,T,,,V*7C
$WIMWV,214.3,R,2.6,N,A*23
$WIMWV,215.8,R,2.8,N,A*27
$GPRMC,,V,,,,,,,,,N*53
$WIMDA,29.854,I,1.011,B,7.7,C,,,43.9,,-3.8,C,,,,,
$WIMWD,,,,,,,,*40
$WIMWV,,T,,,V*7C
$WIMWV,214.8,R,3.0,N,A*2F
$WIMWV,211.3,R,3.1,N,A*20
$GPRMC,,V,,,,,,,,,N*53

```

To identify the sentence commands, refer to the Technical Manual on the WeatherStation CD.

The data can be saved by going to the File drop-down menu and selecting Save As.

Notes

Appendix A—How the WeatherStation Works

About the Ultrasonic Wind Sensor

The ultrasonic wind sensor (an ultrasonic anemometer) measures apparent wind speed and direction. The WeatherStation contains four ultrasonic transducers, visible through the four holes in the top of the sensor's wind channel (see Figure 48). These transducers operate in pairs—one transducer injects a pulse into the air, and the other (directly opposite to it) listens for the arrival of that pulse. Each pulse bounces off the metal plate at the bottom of the wind channel and is carried by the wind to arrive at the opposing transducer a short time later.

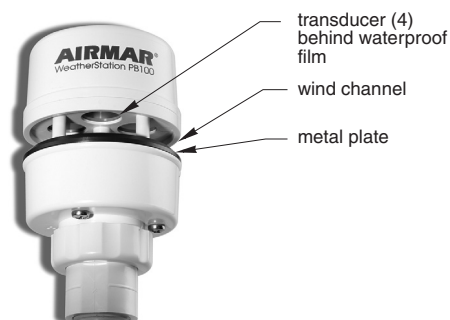


Figure 48. WeatherStation ultrasonic wind sensor

When there is no wind, the pulse travels at the speed of sound from the sender to the receiver. Whenever the wind is blowing in that direction, the pulse will arrive sooner than if the air is still. Similarly, whenever the wind is blowing in the opposite direction, the pulse will arrive later than if the air is still. The four transducers take turns in sending and receiving pulses to cover all eventualities of wind direction.

A microprocessor within the WeatherStation then combines the measurements from all four transducers to calculate the resultant wind speed and direction. Throughout this process, the sensor monitors the air temperature, to compensate for the fact that the speed of sound in air changes with temperature.

Understanding True and Apparent Wind

The WeatherStation has the unique ability to display both *true* and *apparent* wind. *True* wind is the actual motion of the air relative to the earth. *Apparent* wind is the wind which an observer experiences while moving or on board a boat. It is the result of two motions—the actual motion of the air (the true wind) and the motion of the boat. If the vessel is not moving, then the true and apparent wind will be the same.

There are two components to any wind measurement: speed and direction. By convention, the wind direction is an angle representing the direction *from* which the wind is blowing. Sometimes this angle is referenced to true or magnetic north, and sometimes it is referenced to the bow of the vessel. Both true and apparent wind use these same references.

Consider the case of a vessel proceeding at a speed of 15 knots in calm air. An observer on board would experience a wind of 15 knots from dead ahead. This *apparent* wind would be due solely to the motion of the boat. If a *true* wind of 15 knots was blowing from the stern, an observer would experience dead calm—no *apparent* wind. That is because the boat is moving at the same speed and in the same direction as the surrounding air.

Now, consider the more complicated situation of a vessel proceeding at 15 knots with a *true* wind of 15 knots blowing from the side (see Figure 49). To an observer on board, the *apparent* wind would be 21.2 knots blowing from an angle 45° off the bow.

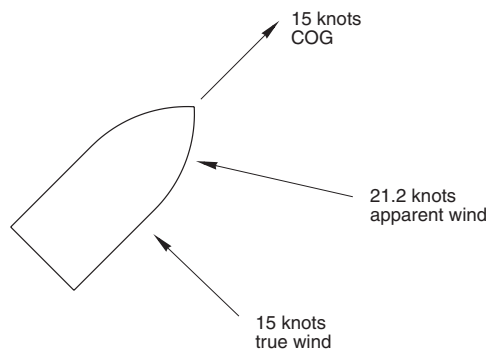


Figure 49. Apparent wind

In order to calculate the true wind speed and direction when on board a moving vessel, it is necessary to know the apparent wind speed and direction, the speed and course over ground of the vessel, the compass heading, and the local magnetic variation. Note that heading and course are not the same thing: heading is the direction the bow of the vessel is pointing, while course is the direction the vessel is traveling. Heading and course may differ due to the effects of wind and current. The WeatherStation can provide true wind speed and direction only if all of the data is available. The speed and course over ground must be provided by a GPS receiver—either built-in or networked. The heading may be provided by either the built-in electronic compass or by an external networked compass.

Because true wind is calculated using the data from several sensors, its accuracy depends on the accuracy of all the raw data used in the calculation. For instance, if the electronic compass is located near iron or a similar magnetic disturbance, the heading will be incorrect, and the true wind calculation will therefore be in error, perhaps by quite a bit. In another example, the speed and course over ground provided by the GPS receiver are averaged over time. If the boat is performing maneuvers, changing speed and/or direction, then it will take a few seconds for the SOG and COG values to "catch up". The reported true wind values will therefore also be incorrect until the vessel reaches a steady-state condition, traveling in a straight line at a constant speed.

About the Electronic Compass

The WeatherStation includes a pair of magnetoinductive sensors that measure magnetic field strength in two axes on the horizontal plane of the WeatherStation. From these measurements, it calculates the resultant magnetic heading angle, thereby providing a built-in electronic compass.

Like all magnetic compasses, the WeatherStation compass will be affected by any ferrous or magnetic materials in the vicinity, such as metal structures, motors, speakers, etc. It will also be affected by nearby electric fields, such as the wiring for navigation lights or radar domes. These nearby sources of magnetic interference will distort the magnetic field and produce errors in the compass heading. These errors are known as magnetic deviation.

Although the WeatherStation compass is a 2-axis device, the earth's magnetic field occurs in three dimensions. That is, part of the earth's magnetic field is oriented in the vertical direction. The closer one's location is to the north or south pole, the stronger this vertical component becomes in comparison to the horizontal components. The effect this has on the WeatherStation is to introduce an error in the compass reading if the WeatherStation is tilted from the horizontal plane. Therefore, it is important when installing the WeatherStation to ensure the support pole is mounted vertically, and not tilted to one side. Also, keep in mind that when your vessel experiences pitch and roll, the compass heading will be affected accordingly.

Because the compass heading is used in the calculations for true wind, any errors in the compass heading will also produce errors in the reported true wind speed and direction.

If you have another electronic compass on board your vessel that is capable of providing the NMEA 0183 HDG sentence, you can connect the output from this external compass to the NMEA input on the WeatherStation (or to the optional Combiner), and the data from the external compass will override the data from the built-in compass for the purpose of calculating true wind speed and direction.

About Magnetic Variation and True Heading

The earth acts like a giant magnet, with a magnetic north pole and a magnetic south pole. The axis of the magnetic poles is offset approximately 11.5° from the axis of the earth's rotation. Therefore, the earth's magnetic north and south poles are in different locations than the earth's geographic north and south poles. In addition, the earth's magnetic field is non-uniform, and changes over time. Magnetic variation, also known as magnetic declination, is the angle between magnetic north and true (or geographic) north, at the observer's current location.

A magnetic compass measures heading with respect to magnetic north. To convert this magnetic heading to true heading (that is, heading with respect to true north), the magnetic variation must be added to the measured magnetic heading value.

Because magnetic variation changes with location and gradually over time, it is necessary to calculate the magnetic variation using the user's present position and the current date. Therefore it is necessary to have a GPS with a fix in order to provide magnetic variation and heading with respect to true north.

About the Air Temperature Sensor

The WeatherStation includes a built-in negative-temperature-coefficient thermistor that measures the ambient air temperature. This NTC thermistor is located in a thermally isolated region of the WeatherStation housing that is open to the outside air.

About the Relative Humidity Sensor

The WeatherStation contains a capacitive cell humidity sensor that measures the relative humidity of the air. Humidity refers to the amount of water vapor in the air. Relative humidity is the percentage of saturation of the water vapor in the air. It is the ratio of the moisture content of the air to the saturated moisture level at the same temperature and pressure.

About Dew Point

Dew point is the temperature at which the water vapor in the air begins to condense into a liquid. If the air were gradually cooled while maintaining constant moisture content, the relative humidity would rise until it reaches 100%. The air temperature at this point of saturation is called the dew point.

If the air is dry enough, it is possible to have a dew point that is below freezing. The dew point is then sometimes referred to as the frost point.

The WeatherStation calculates dew point from the measured air temperature and relative humidity sensor readings.

About Wind Chill Temperature

Wind Chill is a term that describes the heat loss on the human body resulting from the combined effects of low temperature and wind. As wind speed increases, heat is carried away from the body at a faster rate, causing a reduction in skin temperature. Because the face is the part of the human body that is most likely to be exposed, the wind-chill index is adjusted for the average adult face.

The concept of wind chill does not apply to inanimate objects, such as a boat. The only effect that wind chill has in this case is to shorten the time it takes the object to cool to the actual air temperature—wind chill does not cause an object to cool below that temperature. For example, fresh water freezes at 0°C (32°F) regardless of what the wind chill is.

The WeatherStation calculates two values for wind-chill temperature: one using the apparent wind-speed, and one using the true wind-speed. The *apparent* wind-chill temperature is relevant to what an observer is currently experiencing on the vessel. The *true* wind-chill temperature indicates what the wind chill would be if the vessel were not moving.

Wind chill temperature is only defined for temperatures at or below 10°C (50°F) and wind speeds above 2.6 knots (3MPH).

By default, transmission of wind-chill data is disabled by the WeatherStation. When used with WeatherCaster, the wind-chill data will be automatically enabled.

About the Barometric Pressure Sensor

The WeatherStation contains a temperature-compensated, silicon, piezoresistive, pressure sensor. It measures atmospheric pressure for use as a digital barometer. While a single measurement of air pressure at a given location has little value, the trend of changing pressure and wind over time can be a useful tool in performing basic weather forecasting.

About the GPS

Some WeatherStations have a built-in Global Positioning System with their own antenna, receiver, and position determining electronics. The GPS receiver receives radio signals from a constellation of orbiting satellites maintained by the U.S. government. By accurately measuring the time it takes for a transmission to travel from each satellite to the receiver, the unit is able to determine the distance between the satellite and the receiver. When the distance is known to three satellites, the unit is able to calculate the latitude and longitude of the receiver. This is known as a 2D fix. If the distance is known to four or more satellites, then the unit is additionally able to calculate the altitude of the receiver. This is known as a 3D fix.

The GPS receiver in the WeatherStation takes approximately one minute on average to achieve a position fix after power is first applied. This is known as the "time to first fix."

The GPS receiver synchronizes itself to the atomic clocks on board each satellite. This allows the GPS receiver to accurately determine the date and time as well.

If the GPS receiver is mounted on a moving vessel, its changing position over time allows the speed and course over ground to be calculated. The course reported by a GPS is always with respect to true north.

The ability of the WeatherStation to calculate true wind speed and direction depends on the presence of a GPS fix. If the GPS receiver is not tracking at least three satellites, then the WeatherStation will be unable to provide true wind data. (Apparent wind data should always be available, regardless of the status of the GPS receiver.)

Certain models of the WeatherStation do not include a built-in GPS receiver. In this case, if the true wind capabilities of the WeatherStation are desired, it will be necessary to connect the output from an external NMEA 0183-capable GPS to the NMEA input on the WeatherStation (or to the optional Combiner), in order to enable the true wind capabilities of the WeatherStation.

Even if your WeatherStation includes a built-in GPS receiver, you may wish to use a separate external GPS receiver instead, for the determination of true wind. If the WeatherStation receives speed over ground and course over ground (SOG and COG) data on its NMEA input from an external GPS, these data will override the data from the built-in GPS for the purpose of calculating true wind speed and direction. In addition, the WeatherStation will automatically suppress transmission of GPS messages from its own built-in GPS receiver.

About True Wind Relative to Water

If a fix from a GPS receiver is not available, it is still possible for the WeatherStation to determine a value for true wind, if the speed of the vessel through the water is known. In this case, it is necessary that a water-speed sensor with an NMEA output (such as an Airmar Smart™ Sensor) be connected to the NMEA input on the WeatherStation (or to the optional Combiner).

The WeatherStation's calculation for true wind relative to water makes the significant simplifying assumption that the vessel's course is the same as its heading. That is, the effects of wind and current on the motion of the boat are ignored. The direction of the true wind relative to water is referenced only to the bow of the vessel, not to true or magnetic north.

Appendix B—Technical Information

Specifications

Wind Speed Range	0.5 – 99.5 knots
Wind Speed Resolution	0.1 knot
Wind Direction Resolution	1°
Wind Direction Sensitivity	± 1.5°
Temperature Range	– 30°C – +50°C
Temperature Accuracy	±1.5°C
Compass Sensing	± 1° typically
Barometric Pressure Range	850 – 1150mb (25" – 34"Hg)
Barometric Pressure Accuracy	± 1.5%
Relative Humidity Range	10 – 95% RH
Relative Humidity Accuracy	± 5% RH
Supply Voltage	10 – 16VDC
Supply Current	0.5 amp
Weight	285 grams

Note: The WeatherStation's reading accuracy can degrade below 0° C.

Baud Rates

WeatherCaster needs to be set as follows:

If you have a USB Converter, set the baud rate to 4800.

If you have a Combiner, set the baud rate to 38400.

NMEA 0183 Sentence Commands

Wind Speed & Direction with respect to bow	\$WIMWV *
Wind Speed & Direction with respect to North	\$WIMWD *
Meteorological Composite	\$WIMDA *
Wind Chill Temperature	\$WIXDR
GPS Fix Data	\$GPGGA
Geographic Position L/L	\$GPGLL
Recommended Minimum GNSS	\$GPRMC *
Course Over Ground (COG) & Speed Over Ground (SOG)	\$GPVTG
Heading, Deviation, Variation	\$HCHDG
True Wind Speed Relative to Water (speed sensor needed)	\$WIVWT *
Standard GNSS DOP and Active Satellites	\$GPGSA
Standard GNSS Satellites in View	\$GPGSV
Apparent Wind Speed and Direction	\$WIVWR

* These sentences are enabled at the factory.

Additional Data Available from the WeatherStation

There are parameters that the WeatherStation can make available to the user. Usually, more data is available from the WeatherStation than can be displayed in a reasonable format on a screen. Also, if all the data was continuously transmitted to the display, the update rate would be too slow and could not keep up with WeatherStation measurements. Consequently, some parameters are transmitted while others are not, based on a pre-selected list (the NMEA 0183 sentences with an asterisk). Note that those parameters not transmitted are, nevertheless, retained in the WeatherStation. For more detailed information, see the "Technical Manual" on the WeatherStation CD.

Acronyms

CD	Compact Disk
COG	Course Over Ground
COM Port	Communications Port
DOP	Dilution Of Precision
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
LED	Light Emitting Diode
PC	Personal Computer
SOG	Speed Over Ground
USB	Universal Serial Bus
UTC	Universal Time Coordinated
2D	Two Dimensional
3D	Three dimensional

Glossary

Firmware	The software within the WeatherStation hardware
WeatherCaster	The user application program

Trademarks

Airmar® is a registered trademark of Airmar Technology Corporation.

Smart™ Sensor is a trademark of Airmar Technology Corporation.

Windows® is a registered trademark of Microsoft Corporation.

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