

# ATOC Meteorological Tower (6 meter-4 level) Guide

## SETUP

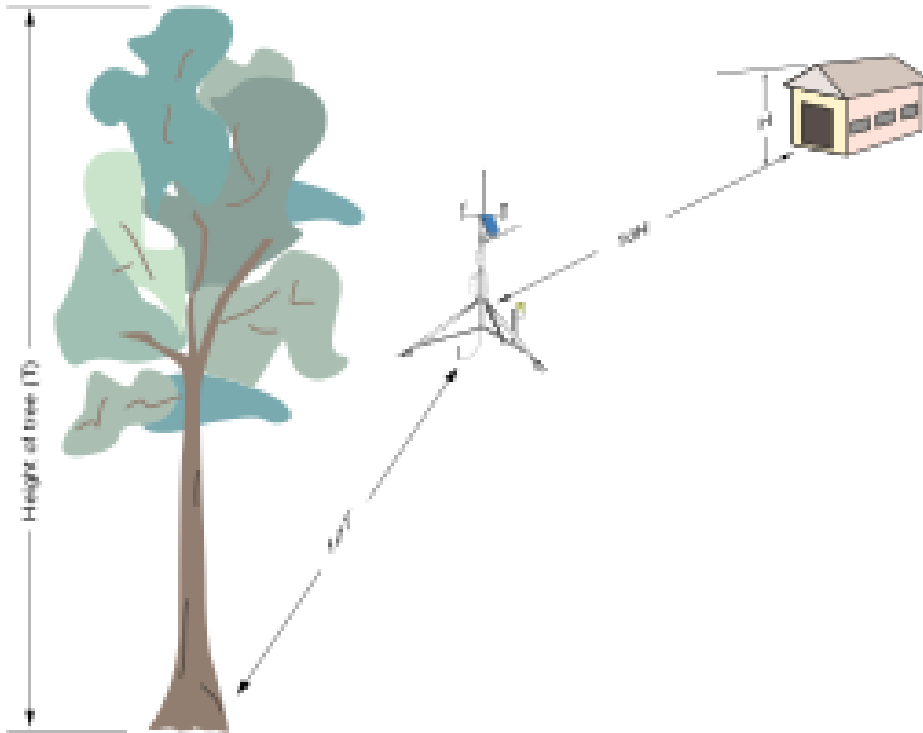
### Outline

1. Siting
2. Components
3. Transportation
4. The Tower
5. The Cables and Data Logger

### Siting

Selecting an appropriate site for the weather station is critical for obtaining accurate meteorological data. Typically, the site should represent the general area of interest, and be away from obstructions such as buildings and trees. An idea of the prevailing wind will help with the siting.

When objects are in the vicinity, use the following guidelines:



-Wind Sensors: distance of at least ten times (10x) the height of nearby buildings, trees, or other obstructions.

-Temperature Sensors: the sensors are no closer than four times (4x) an obstruction's height, at least 30 meters from large paved areas, and located in an open level area that's at least 9 meters in diameter. The open areas should be covered by short grass, or where grass does not grow, the natural earth.

Avoid these:

- large industrial heat sources
- rooftops
- steep slopes
- sheltered hollows
- high vegetation
- shaded areas
- swamps
- areas where snow drifts occur
- low places holding standing water after rains

## Components

The observation system is made up of several individual components. The main parts are (1) the met tower, (2) the cables, and (3) the data logger.

⇒ The Tower

- One (1) tripod base with pivoting mechanism
- Three (3) mast sections
- Four (4) 48 inch cross-arms with mounting brackets
- Four (4) radiation shields
- Four (4) anemometer mounting posts
- Three (3) guy wires and stakes
- Three (3) stakes for tripod feet

⇒ Sensors

- Four (4) 107-L temperature probes
- Three (3) 03101 3-cup anemometer
- One (1) 03001 Wind Vain and 3-cup anemometer combo

⇒ Cables

- Two (2) pairs of 30 foot wind and temperature cables
- One (1) pair of 40 foot wind and temperature cables
- One (1) triple 40 foot cable set for top level (temperature, wind direction, wind speed)

⇒ Data Logger and Laptop computer

- One (1) CR3000 data logger
- One (1) AC adapter for CR3000
- One (1) RS-232 cable for transfer to computer
- One (1) Dell laptop computer and power adapter (password is Adiabatic)

## Transportation

The system breaks down into several parts to facilitate in the transportation of the system to remote observing sites. Improvement of the portability of the mast sections and cross-arms is under development.

## Tower Setup

The step-by-step setup of the 6 meter tower is as follows. Read through first! Be sure the data logger's *internal battery is sufficiently charge*.

Prepare the following tools: at least two (2) ½” wrenches, small and large sized flathead screwdriver, medium sized Phillips-head screwdriver, mallet, allen wrench.

- (1) Site the tripod base, leaving enough room for the height of the mast
- (2) Extend the 3 legs, place the tripod base such that the arrow on the leg points East, 90 degrees



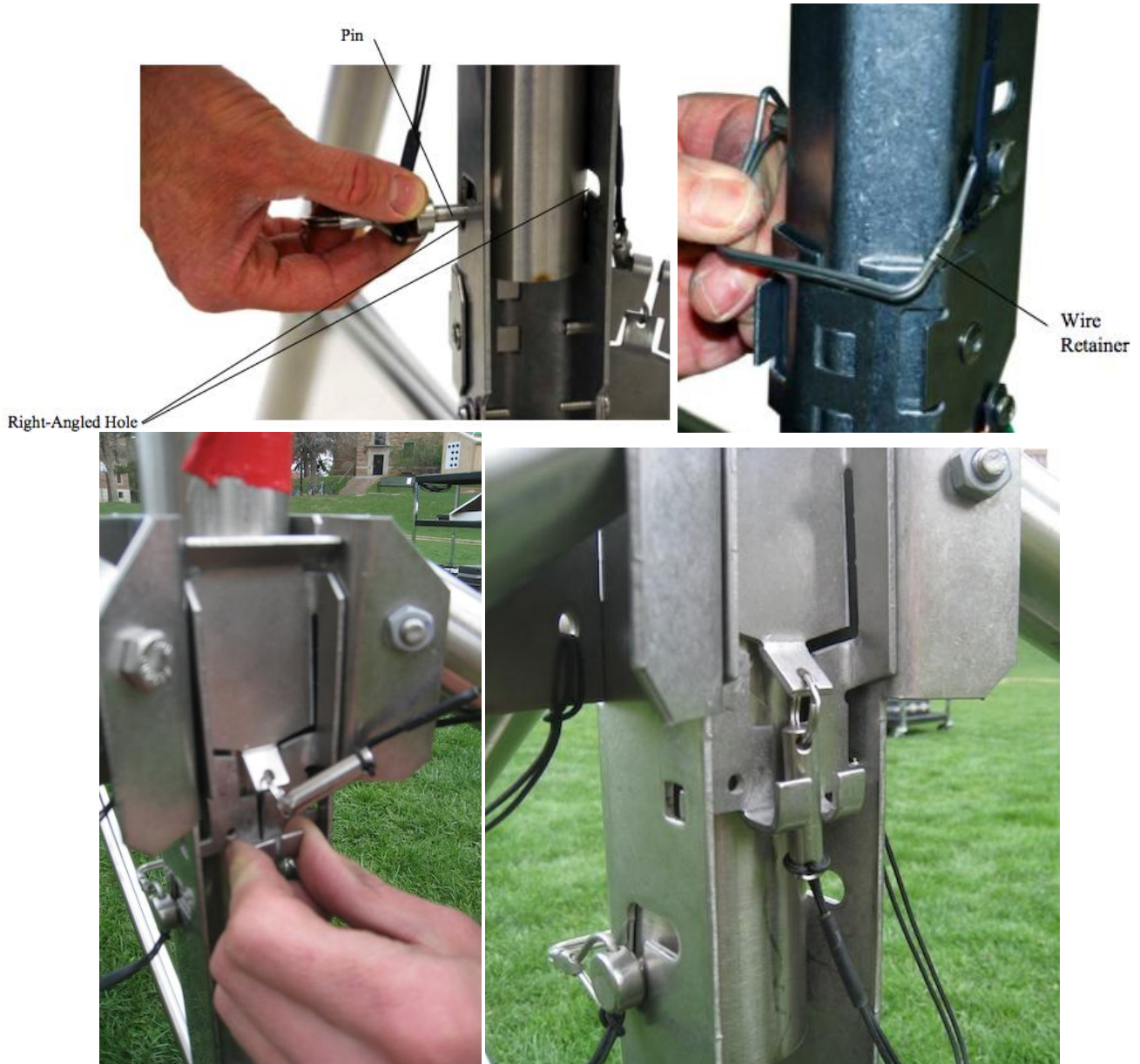
- (3) Remove pin and safety plate.



- (4) Locate the lowest mast section, labeled as “one”, which contains 2 cross-arms. Rotate the lowest, pivoting cross-arm up towards level 2 cross-arm (this is to gain clearance when lowering mast)

**PICTURE**

(5) Have one person hold mast section “One” in the vertical position inside the tripod base, aligning the mast’s hole with either the upper or lower hole in the base. A second person will insert the pin through the holes, securing the pin with the square clip. Slide safety plate into notches at top of tripod base, concave side out. Press firmly on the bottom two hooks until they lock into the notches of the base, and secure by placing the hanging pin with an o-ring between the 2 hooks.



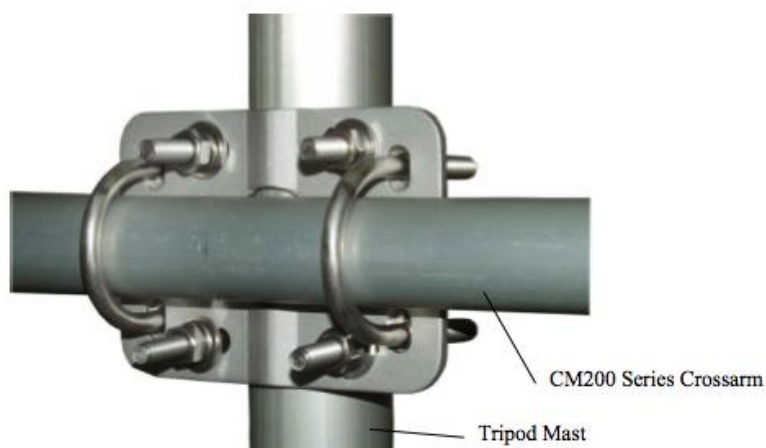
(6) At this point, remove the safety plate ONLY, lift up the mast section in order to slide the pin to upper section of the slot in the tripod base, and pivot the mast level “One” down to the ground. From this point, the pin will continue to secure the mast to the base, while the safety plate is used to retain the mast in the vertical position.

(7) Attach the remaining mast section in increasing number order (“one”, “two”, “three”) using the ½” nuts and bolts to secure each section to the inside sleeve. *With each level, use the block to keep mast*

*elevated and protect cup anemometers.* As each level is added, attach cups to anemometer, securing lightly with allen wrench. To gain the final height at mast level “Three”, extend the full-length inner sleeve to the marked hole.



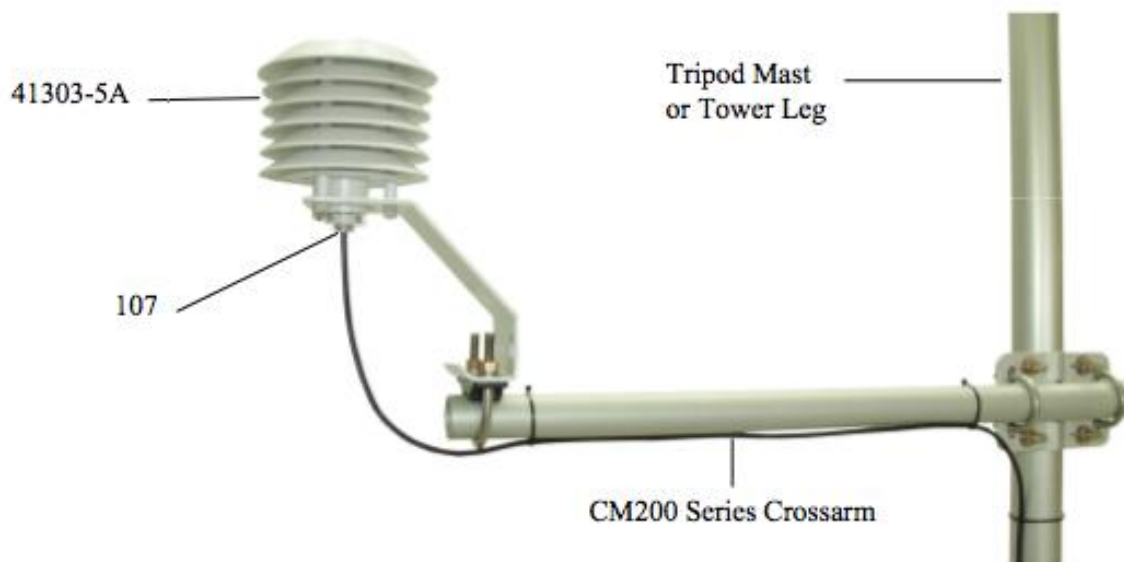
(8) Adjust the crossarms to the desired level, noting that the anemometers and temperature probes sit 8 inches above each crossarm. Double check that each level will be the desired height off the ground (**logarithmic heights of 0.75m, 1.5m, 3m, 6m will be marked**)



(9) For the Direction/Speed instrument on level “three”, the arrows on the black plastic must be parallel with the cross-arm, eventually pointing North (0 or 360 degrees) when the mast is raised.

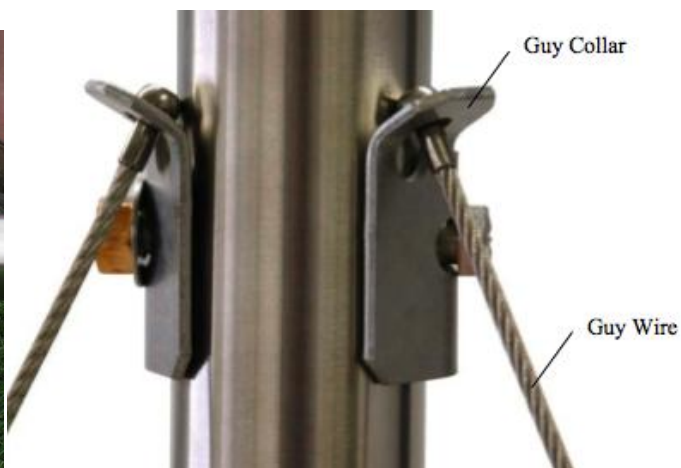
**PICTURE**

(10) At this point, the cords should be attached to the instruments. Unwind each level of chord separately. “1” is the lowest levels and “4” is the highest. As you go, run each set of chords underneath marked leg to prevent pinching in the tripod pivot point. For temperature probes, insert probe into radiation shield as far as possible, keeping the friction-clip on the black housing.



(11) Use supplied Velcro straps to secure each level of chords, and any chords from higher levels, just below cross-arms. Also secure them to each other between the base and the end of the chords (this is where they connect to the datalogger later).

(12) Attach the guy lines. Undo the collar at the top of the extended sleeve on mast level “three” by loosening the ½” nut and bolt. Insert the pin side of each guy line into the sleeve from below. Lower the sleeve and re-tighten the bolt. Check that the pins are secure to a downward force. Position the lines so that they match the tripod legs.

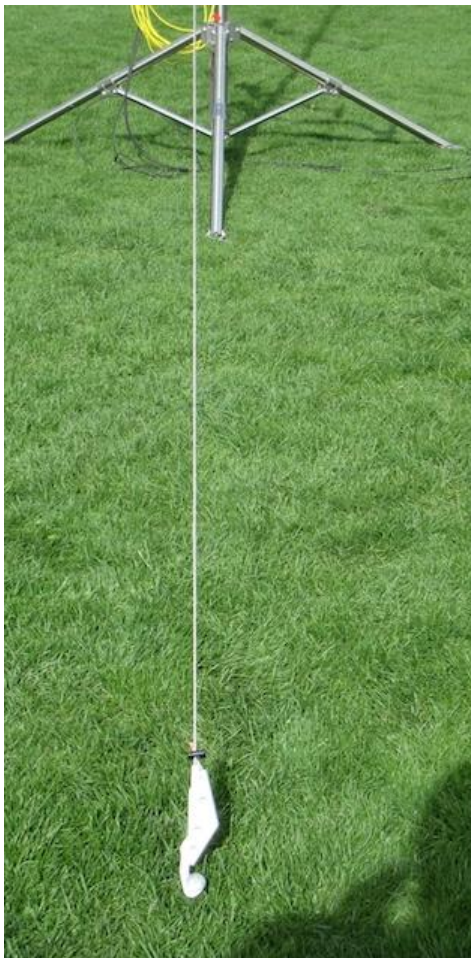


(13) At this point, the mast is ready to stand vertical. This requires at least 2 people, one to stand near the top of mast level “one”, and the other to start at the top of the mast and walk towards the base while lifting the mast to vertical. Take this slow, as the mast is heavy. Watch so that the cables are not pinched or snagged.



(14) When in the upright position, have the second person insert the safety plate and o-ring pin while the first person steadies the mast. The pin at the base will have dropped into the lower section of the angled slot.

(15) Use supplied string to measure the correct distance for guy line stakes, inserting peg into the hole in the leg, and then extending the string straight out from each leg. This is where the stakes will be hammered in. Close each hook (at the end of the guy line) around the stake. If ground is not suitable for stakes, shorten guy lines and attach hook end to the hole in the tripod foot.



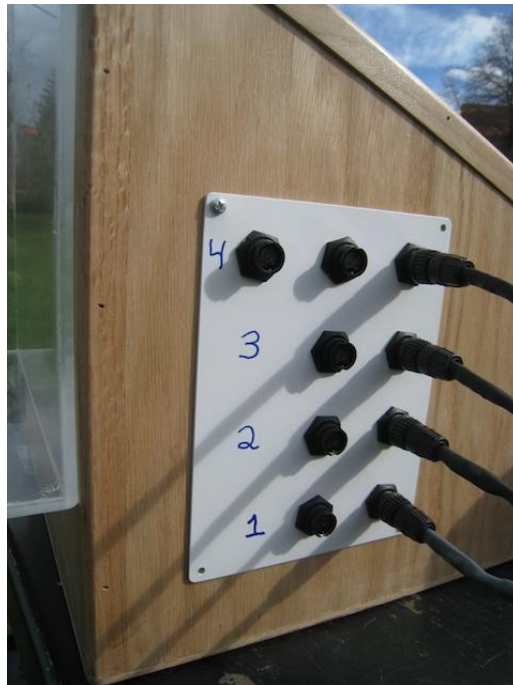
If the tower appears stable, move on to the next step, setting up the data logger. **Take down** of the tower will occur in the reverse order of the above directions.



## Data Logger Setup and Use

**Follow these steps to setup the CR3000 for use with the tower.**

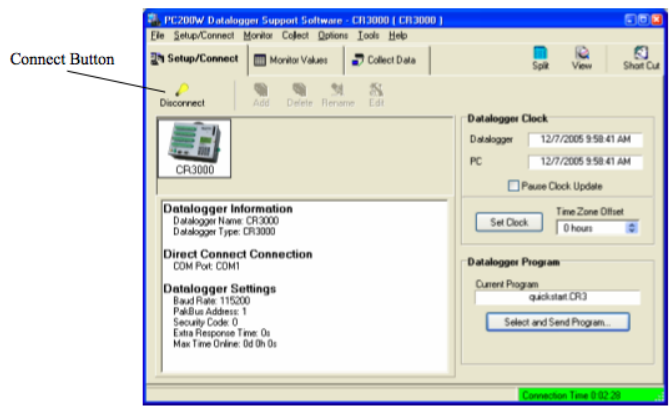
- (1) Make sure that the internal battery is well charged. To charge the battery, first screw the small clip end of the AC adapter into the logger, located in the case hole on the right hand side. Then plug the other end into a 120 Volt AC wall outlet. The red light in the case's hole will go on to indicate it is charging. Circuitry prevents over charging.
- (2) For normal operation, the CR3000 can be placed any safe distance from the tower. The length of the cables will limit this distance. A distance of 10-20 feet is recommended.
- (3) Currently, the base of the data logger case is wood, and can be damaged. Try to place the logger on a soft, level surface and is faced so operator can view both the screen and tower.
- (4) Attach the cables to the matching terminals on the side of the logger case. Row 1 corresponds to the lowest level, and Row 4 is the top level. Row 4 has an extra terminal, on the left, used for the wind vane.



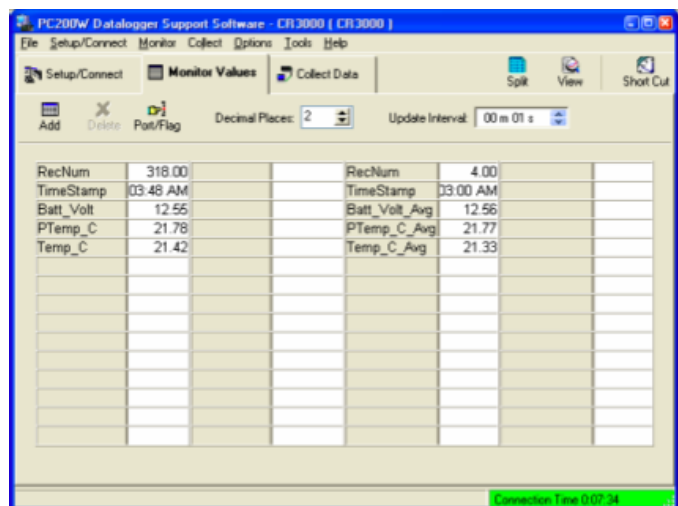
- (5) Turn the unit on by flipping the switch next to the power clip, inside the case's hole. The LCD screen will light up.
- (6) The previously used program will load on start up. At time of writing the appropriate program name is "Tower-4sensors". If you wish to use a different program, or restart and clear the data on the logger, follow the intuitive menu system of the logger by pressing "enter", then navigating to "Run/Stop" programs. In "Run/Stop", if "escape" is pressed, instead of execute and then enter, the logger will ask you to run a different program.
- (7) Under the "data" menu, both real-time and final tables, as well as scrolling graphs, can be viewed. Pressing the center graph button while highlighting any variable will graph that variable.

### **Connecting the CR3000 to the laptop.**

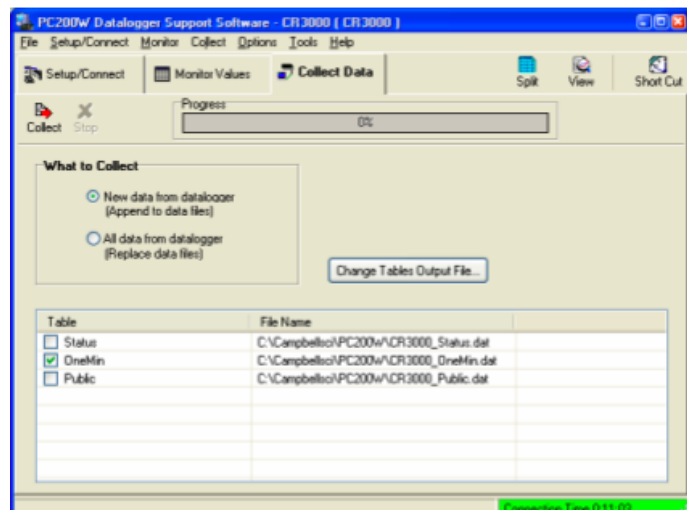
- (1) After collecting the data in the field, you will want to use the laptop to download data or setup the programs. The laptop can be used in the field for real-time monitoring of data.
- (2) Log in to computer. The password is "Weibull" (was "Adiabatic")
- (3) Connect the supplied RS-232 cable to the logger and the laptop
- (4) Start the PC200W software (icon on desktop)
- (5) Press Connect, in the upper left hand side of the program.



- (6) You can now browse the several handy function of the program. Here is a brief overview:
- Monitor Data – select elements from Real-Time table to display every update cycle

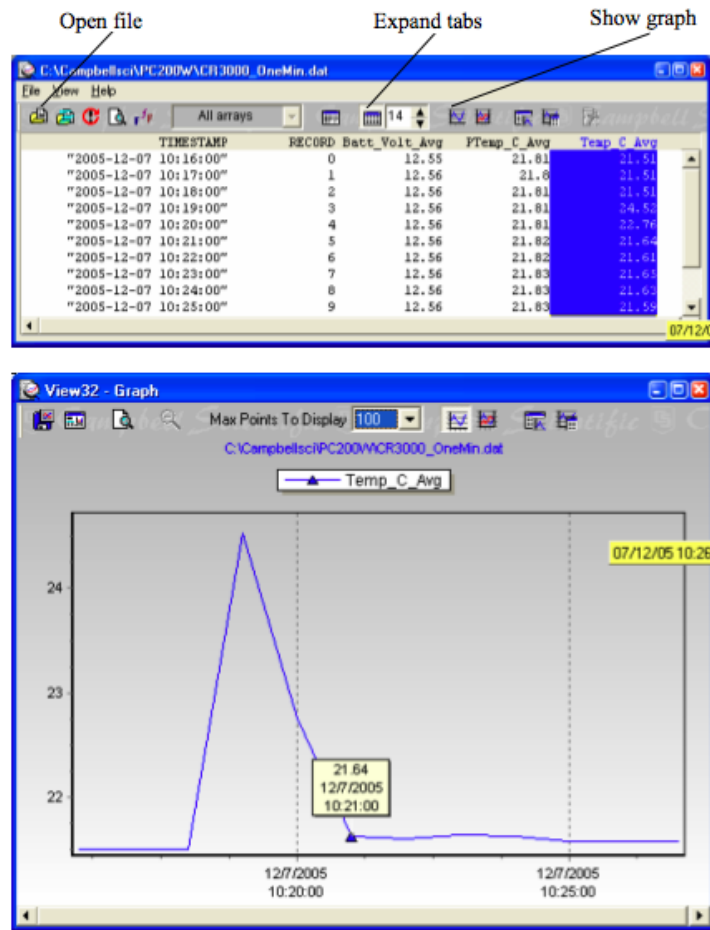


- File manager – Send or retrieve programs located on the logger, set startup program
- Collect data – download data from the logger, and save as several file types ( .dat, CSV, .txt)



- View data – load collected data (files must be on laptop) and view basic plots of variables

Wx.1516



- Write a new program – using Shortcut, edit sensor list or table store information/preferences

(7) Choose disconnect when finished. The program will continue to run after laptop disconnects. Think of PC200W as a more sophisticated and robust interface for the logger than the included LCD screen, instead of a controller or logger itself.

