

California Department of Pesticide Regulation
Environmental Hazards Assessment Program
830 K Street, Suite 200
Sacramento, California 95814

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STANDARD OPERATING PROCEDURE
Instructions for Setup of the MetOne® Meteorological Station

1.0 INTRODUCTION

1.1 Purpose

Environmental monitoring for pesticide residues often requires the use of a meteorological station and datalogger to measure and record weather conditions during a study. Weather data is an integral portion of analyzing results from monitoring studies, especially air monitoring studies. This document will define the set up and use of the MetOne® Meteorological Station and Campbell Scientific 21X Micrologger.

1.2 Scope

This document will provide specific instructions for the set up of the Met One® Meteorological Station and Campbell Scientific 21X Micrologger in the field.

2.0 MATERIALS

- 2.1 Support platform and telescoping mast for station (trailer) with metal box containing the mast support pin, triangle block, cement block and four wood tire blocks
- 2.2 Crossarm assembly
- 2.2 Met One® 020C Wind Direction Sensor
- 2.3 Met One® 010C Wind Speed Sensor
- 2.4 Radiation Shield containing the Vaisala Temperature and Relative Humidity Sensors
- 2.5 Sensor cables
- 2.6 Campbell Scientific 21X Micrologger
- 2.7 2 Campbell Scientific SM192/716 Storage Modules, and cables
- 2.8 External battery
- 2.9 Tape
- 2.10 Allen wrench set
- 2.11 Compass
- 2.12 Hand-held thermometer
- 2.13 Sling psychrometer
- 2.14 Anemometer

3.0 PROCEDURES

3.1 Platform, mast and micrologger set up

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- 3.1.1 Place trailer on a flat, level spot free and clear of obstacles that will directly affect measurements, such as nearby buildings and trees. Make sure the trailer is away from overhead electric wires. Place a cement block solidly below trailer hitch and lower post. Block tires.
 - 3.1.3 With at least two people, lift mast to upright position. Place locking pin through holes lined up at bottom of mast. Lower trailer hitch to lift back end of trailer and place triangular block under mast. Adjust trailer hitch post height to level horizontal length of trailer.
 - 3.1.3 Place micrologger in box on trailer. Run cables through notch at top of cabinet. Make sure micrologger is connected to the storage modules. Connect micrologger to battery with cables. If micrologger is not on turn on the power switch. If the storage module is connected, the micrologger will automatically download the operational program loaded in the storage module.
 - 3.1.4 Crank up mast until top of extension pole is above top rail of tower. Mount the Met One® Crossarm Assembly horizontally to top of extension pole and tighten the two set screws. Remove wind direction sensor and wind speed sensor from protective containers, one at a time, and mount on crossbar.

3.2 Wind direction sensor assembly and installation

- 3.2.1 The wind direction sensor is stored as two parts: the vane and the housing. Mount the vane of the wind direction sensor onto the sensor housing by supporting the rotating hub with one hand while placing the vane onto the hub with the other hand. Tighten the bottom of the two screws on the vane hub. Do not overtighten.
- 3.2.2 Check to see that the vane assembly rotates freely.
- 3.2.3 Mount the sensor in the pipe fitting at the end of the crossarm assembly.
- 3.2.4 Orient the crossarm assembly in a magnetic north direction with a compass. The orientation notch on the sensor should be aligned with the crossarm assembly.
- 3.2.5 Tighten screws in the pipe fitting to secure with allen wrench. Do not overtighten.
- 3.2.6 Connect the sensor cable to the bottom of the sensor and secure to mounting arm with tape.
- 3.2.7 Connect the other end of the sensor cable to the micrologger, and check the sensor set up by orienting the sensor with the crossarm so that the counter weight is pointing north. The orientation notches on the sensor should line up. Press the *1 key on the 21X keyboard and then the **A** key until the readout for wind direction is presented. The readout on the micrologger should show a 0° for the sensor.

3.3 Wind speed sensor installation

3.3.1 The wind speed sensor is stored as two parts: the cup and the transmitter shaft. Carefully mount the cup assembly onto the transmitter shaft. Tighten the screws in the cup mount to secure. Do not overtighten.

3.3.2 Check to see that the cup assembly rotates freely.

3.3.3 Install the sensor in the middle pipe fitting on the crossarm assembly.

3.3.4 Tighten the screws in the pipe fitting to secure. Do not overtighten.

3.3.5 Connect the sensor cable to the bottom of the sensor and secure to mounting arm with tape.

3.3.6 Connect the other end of the sensor cable to the micrologger.

3.4 Radiation Shield with temperature and relative humidity sensors installation

3.4.1 Check to see that the shield rotates freely.

3.4.2 Install the shield in the pipe fitting on the remaining end of the crossarm assembly.

3.4.3 Tighten the screws in the pipe fitting to secure. Do not overtighten.

3.4.4 Connect the sensor cable to the bottom of the sensor and secure to mounting arm with tape.

3.4.5 Connect the other end of sensor cable to the micrologger.

3.5 Checking sensors and final set-up

3.5.1 Check sensor's reading on the 21X micrologger. Press the *6 key on keyboard to display program instructions. Press the **A** key to advance through the program. As you go through the sensor readings, check the readings to see if they are appropriate for the present weather conditions. If the readings are not appropriate, check the sensors to make sure they are working properly and are set up correctly.

3.5.2 Raise tower to full height. Secure sensor cables to tower with tape.

3.6 Routine service checks

3.6.1 Daily checks

- a. Review datalogger data for correct operation of the sensors.
- b. Perform a visual inspection of the sensors to assure that the sensors have not been

damaged and are operating properly.

- c. Use a hand-held thermometer, sling-psychrometer and anemometer to check readings from the temperature, relative humidity, and wind speed sensor. Readings may be slightly off due to difference in height of measurement.

3.6.2 Calibrate the MetOne® meteorological station periodically by returning the sensors to the manufacturer.

4.0 TROUBLESHOOTING

4.0.1 Before starting any troubleshooting procedure, refer to the sensor operating manual for specific information pertaining to troubleshooting. Record malfunctions and repairs in study field notebook.

4.0.2 Troubleshooting should attempt to isolate the source of the malfunction. The following should be checked if a problem exists:

- a. Inspect sensor by checking for signs of damage and verifying that the sensor assembly is turning freely.
- b. Check for loss of the 12 volt power source.
- c. Check for proper operation of the sensor bearings. Bad bearings may affect the starting threshold.
- d. Verify that the cable connections are secure.
- e. Verify proper micrologger initialization.

5.0 DISASSEMBLING THE METEOROLOGICAL STATION

5.0.1 Remove tape used to secure the cables to the tower.

5.0.2 Lower extension pole to a level just above the railing on the mast.

5.0.3 Remove tape securing cables to mast and disconnect cables from sensors.

5.0.4 Carefully remove each sensor, disassemble as necessary and place in protective box.

5.0.5 Remove micrologger from metal box on trailer and place in secure place.

5.0.6 Remove crossarm assembly from extension pole.

5.0.7 Lower mast the rest of the way down.

5.0.8 Remove safety pin at base of mast and with at least one other person assisting, lower mast down from a vertical position to a horizontal position resting on the support bar.

5.0.9 After hook-up to vehicle, place mast support pin, triangle block, cement block, and wood tire blocks in the metal box on trailer and lock.