



DOTS Troubleshooting Guide

Supporting natural observations using state-of-the-art technology



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Overview of DOTS Kit Components

Kestrel Handheld Weather Station

Meteorologist
Collects data about air temperature, wind speed, relative humidity, and wind chill

Lux Meter
Meteorologist
Measures the intensity of sunlight

Data Collection Worksheet

Digital Camera
Media Specialist
Captures the story of the team's discovery through photos

iPad
Microbiologist
Displays microscopic images from the digital microscope

Digital Microscope
Microbiologist
Uses microscope and iPad to capture microscopic snapshots of surroundings

Oakton Meter
Water Specialist
Measures several parameters of water quality including pH and dissolved solids

Infrared Thermometer
Thermal Investigator
Measures surface temperatures of surrounding objects and organisms



Thermal Imager
Thermal Imager
Takes images of thermal gradients at data collection sites

Garmin GPS
Navigator
Guides the team to sites and collects latitude, longitude, and altitude data

Wireless Microscope and iPad Instructions



- Turn on the microscope by sliding the switch to the 'on' position.
- Turn on the iPad by holding down the button on the top of the device.
- To connect the iPad to the microscope's wifi signal:
 - Open 'Settings' in the iPad and select the Wi-Fi icon
 - Select the Wi-Fi network associated with the microscope.
 - If prompted for a password, enter '12345678'.
- To view images from the microscope on the iPad:
 - Return to the main screen of the iPad by pressing the home button.
 - Open the app named **Wi-Viewer** or the app named **Micro Fi**. Either works.
 - Press the 'On' button on the lower left of the screen.
 - Point the microscope toward an object and the image will appear on the tablet.
- To focus the image
 - Adjust the magnification by turning the yellow dial on the microscope.
- To take a picture
 - Either press the camera button on the front of the microscope or on the iPad.
- Note:
 - You can freeze an image to study it more carefully by pressing the 'freeze' button on the iPad.
 - You can record videos on the iPad as well.



Trouble getting the microscope to connect to the iPad?

- Make sure you are connected to the correct Wi-Fi network. Each microscope has its own name. Most of the Wi-Fi network names correspond to the number on the bottom side of the microscope.
 - The microscope Wi-Fi password is: 12345678
- If the microscope is connected to the Wi-Fi but the app will not display an image, **try closing out of the application and restarting it.** Do this:



Thermal Imager Instruction



- Turn on the IR thermometer by holding down the menu button.
 - VT02A: Turn the dial on the back of the thermometer to open up the lenses.
- Experiment with pressing the **up and down arrows**. This will change the % visibility of the thermal overlay on the display screen: from 0% (image only), to 25%, 50%, 75% and 100% (thermal image only).
- **The side arrows** (left and right) select near and far. Near: objects within 6in, Far: objects farther than 6in away.
- **To record an image**, press the green button on the back of the thermometer.
- To save your image, press the select button (✓), if not press the menu button (X).
- **To look back at past images**, press the menu button and press select on the photo icon.
- **Turn off** the thermometer by holding down the menu button.
 - VT02: Turn the dial on the back of the thermometer to cover the lenses when not in use.
- VT04A Considerations: **Make sure to record images in .bmp format.**
- **Note** that the thermometer gives readings in Fahrenheit (°F). Colors closest to white represent the hottest temperatures and colors closest to black represent the coldest temperatures in the range of the display.

Thermal Imager FAQ



- How do I verify the VTo4A model imager is saving photos in .bmp format?
 - Push the 'MENU' button and navigate to [redacted] and make sure it is selected (✓)
- Can I get the digital artifacts (photos) onto my computer in order to share them with others or print them out?
 - Yes, using the micro-SD to SD adapter and SD card reader, you can open your file explorer on a Windows or Mac and copy your artifacts directly onto a computer.
- Where are the photos saved?
 - The photos are saved to a micro-SD card in the left side of the device
 - To remove, simply grasp micro-SD card and pull (there is not a spring loaded release mechanism)
 - Return micro-SD card to the device with the writing side of the micro-SD card facing the front of the tool.

Kestrel 2000 Pocket Weather Tracker



- **Turn on** the Kestrel 2000 Pocket Weather Tracker by pressing the power button located in the middle under the screen
- The first measurement should be Temperature in degrees Fahrenheit
- Press the arrows to begin seeing the different data. They are as follows (by pressing right):
 - **Chill** - Wind chill. This measures how cold it feels when the wind and the temperature are combined together. Measured in Fahrenheit (°F)
 - **Wind Speed** - measured in miles per hour (mph). Hold the Kestrel perpendicular to the wind.
 - **Max Wind Speed** – Measured in miles per hour (mph) for the amount of time the device has been turned on.
 - **Average Wind Speed** - Measured in miles per hour (mph) for the amount of time the device has been turned on.
- **Turn off** the instrument by holding the power button.

Kestrel 4000 Pocket Weather Tracker



- Turn on the Kestrel 4000 Pocket Weather Tracker by holding the red power button in the lower left.
- The home screen should appear. Tell the Recorder the time of your observation.
- Press the down arrow to begin seeing the data (detailed on the next slide).
- When finished, remember to turn off the instrument by holding the power button.
- If it is too dark to read the screen, press the button with a half colored-in circle in the upper right. That will turn the screen light on.
- To turn the light off, press the same button again.
- If at any point the screen shows the same name (for example “Wind”), but the maximum (Max) and average (Avg) readings, or a screen with a line that says “for data” at the bottom, that means one of the sideways arrows was pressed. Continue pressing one of the side arrows until the main screen reappears.

Kestrel 4000 Pocket Weather Tracker



Kestrel 4000 Data Displayed:

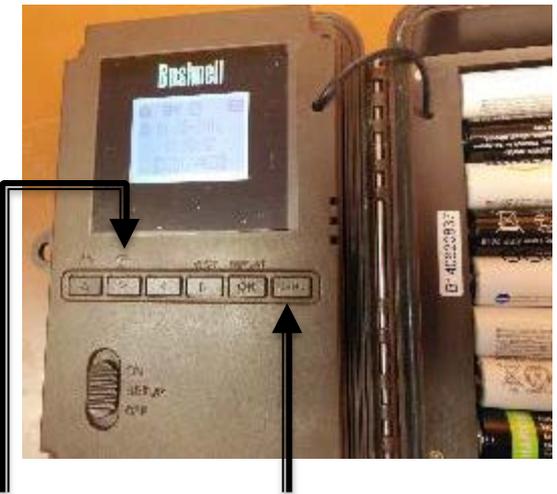
- **Wind** - measured in miles per hour (mph). Make sure to open the plastic cap from the (fan blade) anemometer so the wind can blow through it.
- **Temperature** - given in Fahrenheit (°F).
- **Chill** - Wind chill. This measures how cold it feels when the wind and the temperature are combined together. Measured in Fahrenheit (°F).
- **Humidity** - the amount of moisture in the air. Measured in a percentage (%).
- **Heat Index** - a combination of the air temperature and the humidity to describe how hot a person feels. Measured in Fahrenheit (°F).
- **Dew Point** – the temperature at which the water in the air would be condensed and come down as rain. Measured in Fahrenheit (°F).
- **Wet bulb** – wet bulb temperature. This refers to the lowest temperature that can be reached by evaporating water into the air. It will always be equal to or less than the air temperature. Measured in Fahrenheit (°F).
- **Baro** – barometric pressure. This is the force exerted on you by the tiny particles in the air. Measured in inches of Mercury (inHg).
- **Altitude** – the height of a location above sea level. Measured in feet (ft).
- **Dens Alt**- density altitude. Pressure altitude corrected for non-standard temperature. Measured in feet (ft).
- *After all of the screens, the down arrow will lead you to User Screens 1, 2, and 3. This will show each measurement in order, using just a symbol. User Screen 1 has the three measurements that need to be recorded*

Trail Camera – Setup



We setup the trail camera for capturing still photos. If the batteries fall out, or you have to change the batteries, follow the instructions below.

- Open the unit and slide on/off switch to the setup position.
- Press the 'MENU' button and navigate to Set Clock using the '>' followed by 'OK' . Set clock to current time in order to accurately timestamp the photos.
- Exit the menu and press the camera button to switch to still photo mode.
- Attach the trail camera to a tree using the provided strap.
- Slide the on/off switch to ON and close the unit
- Make sure the cable lock secures the unit to the tree and properly locks while staying out of the range of the motion sensor and camera.



Camera Button

Menu Button

Trail Camera – Field Use



- Use the combination lock to unlock the camera. The combination is 1941 or 194, depending on the lock.
- Remove the SD card from the trail camera.
- Hold the iPad with the charging/adapter port upright. This reduces the chance of malfunction and protects the adapter from being pressed into the operator's torso.
- Fully insert the SD card into the adapter (card reader).
- Carefully plug the adapter (card reader) into the iPad. This may require some pulling/tugging of the case. **Please aid youth in this step – the adapters are easily broken.**
- The 'Import' tab on the iPad Photos app should open.
 - If this does not pop up, open the Photos app on iPad to view.
 - The 'Import' tab should display on the bottom right of the screen
- Select which images you would like to download onto the iPad and press import.
 - Select only the images within the past 10 days
- **Do not delete the images.**
- Return the SD card to the trail camera and relock the device.

Garmin Dakota 10



- **Turn on** the Garmin DAKOTA 10 by holding down the button on the right side with the power symbol.
- **Navigate to a waypoint** by pressing the 'Where to?' square. (Magnifying glass)
(It might take a little while for the satellites to acquire a signal.)
 - Select "Waypoints" (Flag)
 - Scroll through the waypoints and select the one your instructor tells you (A,B,C....).
 - Once selected, a map will appear. Click the green "GO" button in the bottom right corner.
- **To zoom in and out**, use the + and – buttons. The max accuracy is 20 feet.
- **To follow a compass** instead, press the back button in the lower left.
 - Then the X.
 - Select the 'Compass' button on the main screen. Keeping the GPS screen level, line up the red arrow and the vertical line at the top of the dial to get your direction of travel.
 - This screen also tells you how far away you are.
- Using both the GPS and the map, guide your group to the correct location. Remember to stay on the trails.
- Once you are at the correct location, identify its latitude and longitude. Do this by pressing the name of the waypoint (A,B,C...) on the top of the screen in the Map function. The information will appear on the screen, including elevation and location. Make sure to tell the recorder these numbers
- **Turn off** the DAKOTA 10 when not in use by holding on the on button.

Garmin Oregon 600



- Turn on the Garmin OREGON 600 by holding down the button on the right side with the power symbol. (Press same button for off)
- Once on, use your finger to pull up from the bottom of the screen to access the full menu.
- Find and touch the satellite icon.
- It might take a little while for the satellites to acquire a signal.
 - If you can't get satellites right away use the map to figure out where to go.
- Once the satellites have acquired signal, the coordinates should be displayed.
 - The screen will also display accuracy in the upper right corner in feet.
 - The screen will also display altitude as well to the right of the satellite.
- To follow a compass instead, press the back button in the lower left. Then the X. Select the 'Compass' button on the main screen. Keeping the GPS screen level, line up the red arrow and the vertical line at the top of the dial to get your direction of travel.

Infrared Thermometer



- **Turn on** the Infrared Thermometer by pressing the center button labelled '°C/°F'.
- Aim the thermometer at an object and hold down the button on the back, **underneath your index finger**.
- **NEVER point the red light at anyone's head.**
- A red light will appear on the object you are measuring.
- Note the temperature that appears on the screen.
- Report your findings to the Recorder.
 - Include the object and the units.
- The center button toggles temperature scale from Celsius to Fahrenheit and back again
- After you're done put the tool back in the case.
- The thermometer **turns off automatically**.

Lux Meter



- Remove the cap from the opto-sensor at the top of the meter.
- Turn on the Lux Meter by pressing the power button.
- The opto-sensor of the meter should be exposed to light for 1-2 minutes before measurement.
- After 1-2 minutes have passed, begin pointing the meter where you would like to measure the light output of the given area.
- Be sure to keep the user's shadow out of the opto-sensor's detection.
- The measurement will stabilize after holding the meter as still as possible with the top of the opto-sensor sphere directly under the light source.
- Push the hold/zero button briefly to freeze the reading to be recorded. Holding the zero button for too long will cause the meter to calibrate, which should only be done with the opto-sensor cover on. If the meter is zeroed accidentally, turn off and turn back on.
- The max/min key can assist the user reading the maximum and minimum values during inquiry. Press this key once to toggle between max/min. Press and hold max/min for one second and the max/min value inquiry mode will exit.
- To turn off the Lux Meter, press and hold the power button.

Oakton Multi-parameter Tester



- Turn on the Oakton Meter by pressing the ON/OFF button.
- Toggle through the measurement options by pressing the MODE button. The top number on the display screen shows your measurement option; the bottom number shows the water temperature and unit (°C or °F).
- To measure pH, select the pH measurement option and hold the Oakton Meter above the surface of your water source.
- Submerge the tip of the Oakton Meter's sensor end in the water: only the small portion with the glass bulb should be submerged.
- Wait until the pH reading stops fluctuating to record your measurement.
- To measure water temperature, submerge the entire sensor end of the Oakton Meter in your water source and read the bottom number on the display screen. Ensure the unit is your desired unit (°C or °F).
- To measure total dissolved solids, salinity, or conductivity, navigate to your desired parameter on the display screen and submerge the sensor end of the Oakton meter in the water. Wait until the number stops fluctuating, then, record your measurement and its units (ppm for total dissolved solids/salinity and uS for conductivity).

We're here to help!

If you experience any other problems you can contact a research naturalist via email at marc.nutter@ces.uwex.edu, Justin Hougham at justin.hougham@ces.uwex.edu, or call 608-254-6461 and ask for a research naturalist. We would like to keep this document up to date and relevant, so if you experience problems please call and share that with us. Thanks!



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