Guide for Microtops II with GPS Communication

Version 1 (2005)

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This guide explains how to take measurements using a Microtops II sun photometer, connected to a Garmin eTrex GPS. The Microtops II measures aerosol optical thickness and direct solar irradiance at 5 wavelengths: 440nm, 675nm, 870nm, 936nm, and 1020nm, it can also measure water vapour column at 3 wavelengths. The GPS is used to provide accurate time and location data to the Microtops II.

1. GPS and Microtops Setup

1. Turn the Microtops II ON (making sure that the sensor heads are covered with the black panel during the hardware setup and initialisation process).

2. Set the baud rate on the Microtops II to 4800 by pressing the **Menu/Enter** button once, then clicking the up arrow once. Press **Menu/Enter** again and use the ◄ and ► arrows to increase or decrease the baud rate until it is set to 4800. Press **Menu/Enter** to fix the baud rate, followed by the **Scan/Escape** button to return to the main menu.

3. Turn the GPS receiver ON. The On/Off button is the bottom button on the right hand side of the receiver

4. Check that the GPS baud rate is set to 4800. To do this, press the **page** button (uppermost button on the right hand side) 4 times to get to the main menu. Use the thumb stick on the front of the receiver to navigate to the **Setup** menu (or the **enter** button and **up** and **down** arrows on the left hand side of the yellow GPSs). Select this option by pressing the thumb stick button. Select the **Interface** menu - this will take you to the **Serial Data Format** page, check that this is set to **NMEA In/NMEA Out** (or in the case of the yellow etrexs – **NMEA out**) this automatically sets the baud rate to 4800**.** If it is not set to the above serial data format, highlight the available option (the default is **Garmin**) by moving the thumbstick ▼ (the text bar will have a black background when it is highlighted) and press the thumb stick button – scroll down and set to **NMEA In/NMEA Out**.

5. Connect the Microtops II and GPS receiver using the cable provided.

2. Establishing communication between GPS and Microtops

1. Press the **Page button** on the GPS until you are viewing the satellite signal strength display.

2. Position the GPS receiver so the view of the sky is not obstructed and the instrument can acquire the satellite information and obtain a positional fix.

3. As soon as a location fix is available the GPS receiver will communicate with the Microtops II via the serial cable. The Microtops II acknowledges receipt of valid latitude, longitude and time information by beeping 3 times. The on-board clock of the Microtops II is automatically synchronized with the accurate time broadcast by GPS satellites.

4. When the Microtops has received altitudinal information, it will beep twice. This will overwrite any altitude value which has been entered manually into the instrument through the menu functions.

5. If all components are received simultaneously (latitude, longitude, time and altitude) then the Microtops will beep 5 times (3 beeps immediately followed by 2). The data is then streamed continuously (every 2 seconds) to the Microtops. This means that while you still have good enough satellite coverage, the Microtops will continue to beep.

N.B. The Microtops II is equipped with an in-built pressure sensor and setting the **pressure** to 0000 mBar will enable a pressure measurement to be recorded automatically when a scan is taken. This is important as it affects the Absolute optical path and calculation of Aerosol optical thickness (AOT). If this is not done, the pre-set value will take precedence and the resulting measurements could be erroneous. For further information on pressure and altitude measurements please refer to page 20 of the Microtops manual.

3. Collecting a sun measurement

1. Make sure the Microtops is in 'Ready' mode then open the black cover on the front of the Sun Photometer, and point the unit at the sun. Look in the window labelled ***SUN TARGET*** on the front of the Microtops for a small bright white dot, which is actually the Solar disc focussed on the instrument. This dot must appear as close to the centre of the target as possible. Keep the instrument stable, and press ***SCAN.***

2. When you press the scan button the instrument will beep once and display a message saying:

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Scan X
Point at the sun
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… where X is the scan ID written to file.

When the measurement is finished the Microtops will beep twice. If however, the GPS is still streaming data to the microtops you will not hear the beeps. In this case you will have to look at the screen to see when the Microtops has finished taking a measurement. When it has finished scanning it will return to the 'Ready' menu. Make a note in your field notebook of the date and time of each scan (this will be saved, but it is advisable to keep a note), plus the ID of any other corresponding measurements you may be collecting simultaneously (i.e. spectra).

3. The most recent GPS positional fix recorded will automatically be appended to the Microtops data file when you take a scan

4. Downloading the data

Please refer to the 'Downloading data from the Microtops II Sun Photometer: Guide to using Windows Hyper Terminal' document which can be found on our website at: http://fsf.nerc.ac.uk/resources/guides/index.shtml

5. Deleting data from the on-board memory

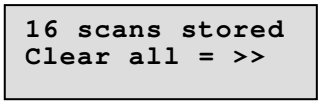
It is recommended that at the end of each day, after the data has been downloaded, data files are deleted from the on-board memory before the next day's data collection. To do this:

1. Turn the instrument on and press the **Menu/Enter** button

2. Press the 'down arrow' 3 times, and you come to the **Data logging** option.

3. Press the **Menu/Enter** button which gives you the option to **–Clear memory.**

4. Agree to this by pressing the **Menu/Enter** button again. You will then see a display that looks like this:



5. Press the 'right arrow' to confirm this. This will reset the value on the LCD display to '0'.

6. Press the escape button to return to the menu.

If you have any questions relating to the use of the Microtops II Sun Photometer, please do not hesitate to contact EPFS.

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