

Field Guide for the GER1500 - Single Beam Mode

Version 3.0 (2005), by Fran Fogwill

PC version: Panasonic Toughbook

Ownership: NERC FSF©

Original created by: Karen Anderson, EPFS Southampton, 2002

These tips provide reminders of the key processes involved in the setting up and use of the GER1500 spectrometer in single-beam mode. This mode is where the computer is used to control the scans collected by the spectrometer head. Operating the spectrometer in this mode offers advantages over stand-alone mode, since it is possible to view the spectra as they are collected, thus allowing for real-time visualisation of the data.

1. Power

Ensure all batteries (12V and 6V smartpack cells) are fully charged before departing into field. Ideally we recommend that you take a Voltmeter with you to check the charge of the 12V batteries, which should bear a charge of ~13V when fully charged.

2. Computer

Charge the Panasonic Toughbook on the mains computer prior to use in the field. This is best done overnight on mains power supply. When in use in the field, always use the Panasonic car charger with 12V battery converter to provide power to the computer, as the internal battery is only likely to last between 2 and 4 hours without an external source plugged into it. A fully charged 12V battery providing power to a fully charged computer should provide a full day's power.

3. Spectrometer Warmup

It is recommended that you "warm up" the GER1500 prior to use for spectral measurement collection. Ideally, we recommend at least 15 minutes. This means that you should attach the 12V battery/6V smartpack cell and switch the spectrometer on, so that the red light appears at least 15 minutes before use. This will minimise errors caused by warming of the spectrometer array inside.

4. Setup

To provide power to the spectrometers, use a power converter insert or 6V smartpack battery. If using the power converter connect a 12V gel cell using the cables provided. Switch the spectrometer on using the Power switch. The red power light will now switch on.

On the spectrometer head itself do the following:

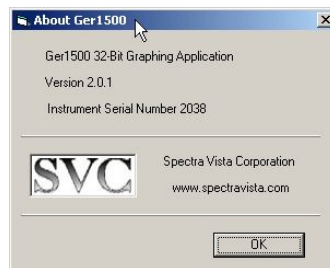
- ◆ Use the MENU button on the spectrometer's front panel to navigate through the various menu options. There are five options, repeatedly pressing the menu button will take you through all five options. For use in single-beam mode, you only need to adjust two of these options, the others will be set in the collection software.
- ◆ Press the MENU key until you reach a menu option called INTSP. This sets the integration speed for the spectrometer head, which is comparable to the shutter speed on a camera. The darker the surface, the longer integration speed should be used. We recommend that you leave this set to AUTOMATIC. This will enable the spectrometer to adjust the integration speed according to the surface being measured

without you having to adjust it every time yourself. If an "A" is displayed on the LCD screen, then it is set to automatic. Ignore the number displayed next to the "A", this is the integration speed used at the last scan and is not relevant at this stage. If an "A" is not displayed, you will need to set this. To do so, press the EDIT key followed by the MENU key. This should cause the "A" to be displayed on the screen. When this happens, press the EDIT key again to set this parameter.

- ◆ Press the MENU key again. You will now see a menu called "TRG". This sets the functioning for the red trigger button on the front of the spectrometer head. You can set this to "Laser", "Scan" or "Both". This is set using the EDIT key followed by the up or down arrow keys, followed by EDIT again to set the trigger function. For single-beam use, it is recommended that you use "Laser", as this will enable you to position the spectrometer head accurately using the laser pointer before collecting a scan.

The Panasonic Toughbook Computer - Setup Procedure

1. Connect the spectrometer to a power supply and switch on.
2. Take a serial cable and connect this to the spectrometer's **COM2** port
3. Attach the other end of the serial cable to the COM port at the back of the Panasonic Toughbook (underneath the strap).
4. Power up the computer (left hand side of PC marked "power"). See the Panasonic Toughbook General Instructions at the end of this document for more details.
5. Log on as "FSF User."
6. Open Windows Explorer. Using the touchpad or touchscreen pen, go to 'My computer, C-drive:\FSF\' and create a directory for yourself in the "USERS" folder.
7. Launch the GER1500.exe software
8. Check that the opening prompt box which appears on launch of the software displays the correct serial number for your spectrometer configuration. As an example, a pop-up box will appear which will display the following:



The serial number should appear below the version number of the software (e.g. 2038); as demonstrated above. If this is not the case, you will need to edit the program's initialisation file (ger.ini). Before doing this, you should contact FSF for instructions. At your training session, FSF staff will make sure that the ger.ini file is set to the correct configuration, so there should be no need to change this.

9. Assuming that the software has launched correctly, click the **OK** button on the prompt box, and then proceed to select the **FILE** menu and then **New**.
10. Choose the folder in which to save your data (i.e. the folder you just created in Windows Explorer) and give a root name for your spectra - click **OK**. The default directory is c:\Program Files\Spectra Vista\GER1500\data
11. Check **FILE, Data Options** - check that there is a tick next to the **Autosave** option.
12. On the same menu bar, check that **Format** is set to **Sig File**.
13. Click on the drop down menu called **CONTROL** and choose the option labelled **Setup**.
14. The computer will now communicate with the spectrometer and establish connection with the GER1500.

TIP - IF THE SETUP BOX DOES NOT APPEAR SOON AFTER SELECTING **Control, Setup** THEN THERE IS LIKELY TO BE A CONNECTION PROBLEM. AN ERROR MESSAGE WILL APPEAR SAYING "**COULD NOT OPEN PORT**" CHECK THE SERIAL CABLE CONNECTION, AND CHECK THAT THE RADIOMETER IS SWITCHED ON. YOU WILL ALSO NEED TO CHECK THAT COM1 IS SELECTED AS THE COMPUTER PORT IN THE **SETUP** WINDOW.

SETUP Menu

15. Check that the computer port setting is **com 1** (this is the default)
16. The first option that you need to select is labelled as **Entrance Optic**. This does not refer to the optic that you have attached to the front of the spectrometer, as one might suggest. It is actually asking the user to set the format in which you wish to save your data. Here, we require an option known as "Unity Function", which means that we wish to save the data as raw Digital Numbers (DN). Choose this option from the drop down menu. The reason for using a DN save option is because all of the FSF post-processing software is designed to work on raw DN GER Sig files.
17. The second option that you will need to set is called **Averaging** and this sets the spectrum averaging for each scan. Increasing the averaging improves the signal:noise ratio of your spectra, but be aware that more averaging means longer scan times. Remember that the averaging is actually 2^{x-1} where x is the averaging setting selected. So a setting of 5 here is actually averaging 16, and 6 is actually averaging 32 scans. It is recommended that you use an averaging of 5 or 6 under field conditions. Change the setting by choosing an option from the drop down menu. A conversion table for converting the averaging settings is provided below.

Computer averaging setting	Actual number of scans averaged
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128
9	256

18. In the same menu box, you can set the date and time of the GER1500 internal clock. This information appears in the header file of the data you collect. You can view the date and time settings on the instrument itself, but only for a few seconds when you switch the instrument on. There is no way to alter the time or date in stand alone mode. Note that the date and time settings will not necessarily be the same as those on the computer clock as there is no communication between the two. If you want them to say the same time you will have to set this manually. However, all data files that are created will automatically receive the date and time of the computer clock, so to avoid confusion it is recommended that the instrument and computer are both set to the same time and date.
19. You can also do timed measurements if required but these are **not recommended** for single-beam reflectance measurements. Click **OK** when finished the above options have been set.
20. Finally go to the **OPTIONS** menu and turn off **multigraph**, leave only a tick next to **single graph**.
21. The spectrometer is now set up ready for data collection.

5. Data collection

To collect a scan with the GER1500 head, you must position the head over the target of interest. The head can be stabilised on a tripod, or hand held.

When you are positioned over the surface that you wish to measure, press the red trigger button on the front of the spectrometer. If you set the trigger function (TRG) to "laser", pressing the red button will result in the laser pointer being activated. Use this to position the radiometer over your desired surface for measurement.

5.4 Mounting

The spectroradiometer should be mounted securely during field deployment, and this can be performed using a tripod arrangement. Try to mount the radiometer so that it is viewing from nadir. The levelling device on the radiometer head will allow you to do this. You can also hand-hold the radiometer with the carrying handle, but this is not likely to be so stable.

5.5 Field Of View

It is VERY important to accurately define the Instantaneous field-of-view (IFOV) of the sensor before going into the field. You need to make sure that the size of the area you wish to measure is LARGE relative to the IFOV of the sensor. The FOV for the standard lens is approximately circular and is 4 degrees. You should work out the range of heights you intend to use for the radiometer mounting and then work out the diameter of the area to be measured. The reason that this is important is that if you measure an area which is infringed by an area of contrasting reflectance, it can lead to confusing spectra which are very difficult to analyse and correct after the event.

5.6 Log Sheets

It is hugely important to keep accurate log sheets when in the field. Document any changes in solar irradiance and also make a note of every filename and the corresponding surface.

5.7 Processing

If you are out in the field for more than 1 day, it is recommended that you process a couple of spectra of each measurement sequence in the evening (FSF Post Processing Templates can be downloaded from <http://fsf.nerc.ac.uk/resources/post-processing>). At least if you spot problems which might indicate a problem in data collection you will have a chance to rectify these on succeeding days. If you don't understand something, please contact FSF to discuss the problem, so that mistakes can be rectified quickly and easily.

It is always easier to resolve problems before you collect spectra, rather than trying to make sense of spectra collected using incorrect methods.

6. General notes on the Panasonic Toughbook

1. Always charge the internal battery from the mains overnight before use.
2. Take care when using the pen, as it takes a while to get used to the way that it operates. Watch out when using it within Windows Explorer as it is very easy to move files around that are critical to the operating system, which may cause major problems with the computer.
3. DO NOT INSTALL ANY SOFTWARE OR EXTRA DEVICES ONTO THE PC.
4. Perform all data post-processing on your own PC not on the FSF notebook.
5. In case of a major technical difficulty with the Panasonic toughbook, you should always phone FSF to ask advice.

7. SUMMARY of key points to remember in field

1. Always connect 12V battery to computer using the car adapter and 12V converter, as the computer's internal batteries are not sufficient for a day in the field
2. Only work when solar conditions are optimal - 2/3 hours either side of Solar noon and when it is sunny and clear. Be extra careful about working in sub-optimal conditions.
3. Warm up the instrument prior to use (15 mins is ideal)
4. Take a reference scan of Spectralon for every target measurement
5. Keep accurate log sheets
6. Accurately determine the size of the IFOV at a given height before going into field.
7. Make sure that the IFOV is completely filled with the target of interest.
8. Collect more than 1 spectrum over each target to get an idea of the spectral variability of each surface.

9. Process and examine a few spectra each evening to check that they are correct and of good quality
10. Lack of power is actually one of the most common problems so...

MOST IMPORTANTLY - CHARGE YOUR BATTERIES EVERY NIGHT

FSF staff have experienced most technicalities with this system and will normally be able to offer advice over the telephone. So remember, if you are not sure about anything, ring FSF.

Tel: + 44 131 6505926
