

Field Guide for the GER3700

Version 3.0 (2005) by Fran Fogwill

PC version: Amrel Rocky

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Original Created by: Karen Anderson, EPFS Southampton, 2002

This field guide provides reminders of the key processes involved in the setting up and use of the GER3700 spectrometer in single-beam mode. The Rocky notebook is used to control the scans collected by the spectrometer head.

1. Power

Ensure all batteries are fully charged before departing into field. You should take 3 x 12V batteries: one for the computer and two for the spectrometer. Ideally we recommend that you take a Voltmeter with you to check the charge of the batteries. These should bear a charge of ~13V when fully charged.

2. Computer

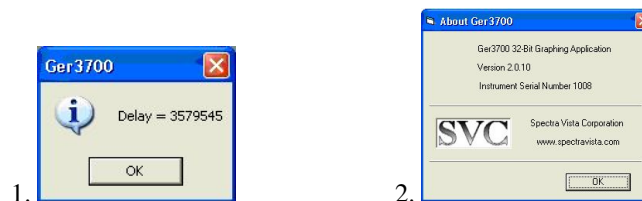
The dedicated PC for the GER3700 is an Amrel Rocky notebook. Always make sure you charge the computer prior to use in the field. This is best done overnight on mains power supply. The internal battery on the Rocky PC should last for 4 hours in the field. When the battery is nearly exhausted the computer gives a "battery low" warning. If this occurs save your work and turn off the computer. The internal battery will then need to be recharged on the mains. There is also an interface problem with the GER3700 and windows XP. Please refer to section 6 where this is described in greater detail.

3. Spectrometer Warm-up

It is recommended that you "warm up" the GER3700 prior to use for spectral measurement collection. Ideally, we recommend at least 30 minutes. This means that you should attach the 12V battery and switch the spectrometer on, so that the red light appears at least 30 mins before use. This will minimise errors caused by differential warming of the 3 spectrometer arrays inside.

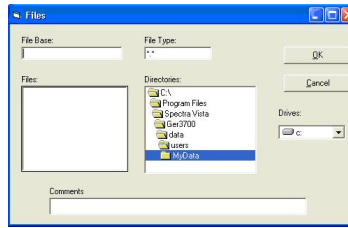
4. Setup

- 4.1 Connect the spectrometer to the computer via the parallel cable. Always do this BEFORE you turn on the computer
- 4.2 Turn the GER3700 on – the switch is on the side of the instrument below the parallel cable socket.
- 4.3 Turn the Rocky notebook PC on
- 4.4 Go to Windows Explorer. Create a directory for yourself in the "Users" folder. The pathway for this is:
My computer C:\program files\spectra vista\ger3700\data\users
- 4.5 Launch the GER3700 software. The following windows will appear. Click OK to both.



- 4.6 Go to the **FILE** menu and then choose **New**
- 4.7 Save your data in the new directory you created. This will be 2 directories below the default directory tree. Also in this window, create a base filename – this must be no

more than 8 characters long. The software will automatically append a file number to the base file for each reflectance measurement taken.



- 4.8 Check **FILE, Data Options** - check that there is a tick next to the **Autosave** option. On the same menu bar, check that **Format...** is set to **Sig File**.
- 4.9 Click **CONTROL, Setup**.
- 4.10 Ensure that **Optic** is set to **Unity Function**. This will save data as Raw Digital Numbers (DN), which is the required input for all of the EPFS post-processing software programs.
- 4.11 Choose the **Averaging** required. Remember that the averaging is actually 2^{x-1} where x is the averaging setting selected (i.e. a setting of 5 is equal to an averaging of 16 scans). It is recommended that you use an averaging of 5 or 6 under field conditions and 3 or 4 in the lab. Increasing the averaging, increases the signal to noise ratio. However, the trade-off is that the measurements take a lot longer to collect. 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

- 4.12 Leave the SI integration and PbS integration set to the defaults. Note that you can also do timed measurements if required but these are **not recommended** for reflectance measurements.
- 4.13 In the same menu box, leave the **MATCHING** set to **None** and leave the **DETECTOR TRANSITION** settings to the defaults. Note that you can also do timed measurements if required but these are **not recommended** for reflectance measurements. Click OK when finished here.

TIP - IF THE SETUP BOX DOES NOT APPEAR SOON AFTER SELECTING **Control, Setup** THEN THERE IS LIKELY TO BE A CONNECTION PROBLEM. CHECK THE PARALLEL CABLE, AND CHECK THAT THE RADIOMETER IS SWITCHED ON.

- 4.14 Go to the **OPTIONS** menu and turn off **multigraph**.
- 4.15 Finally go to the **WINDOW** menu and turn off **multigraph**, leave only a tick next to **single graph**.

5. Data collection

Reference and target measurements

In the field, you should always collect one reference scan of Spectralon for every target scan of your field spectra. The reference scan and target scan should be as close together in time as possible. This is essential in order to minimise the effects of the changing atmosphere on the resultant spectra. Therefore your data should resemble:

5.7 Log Sheets

It is immensely 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.

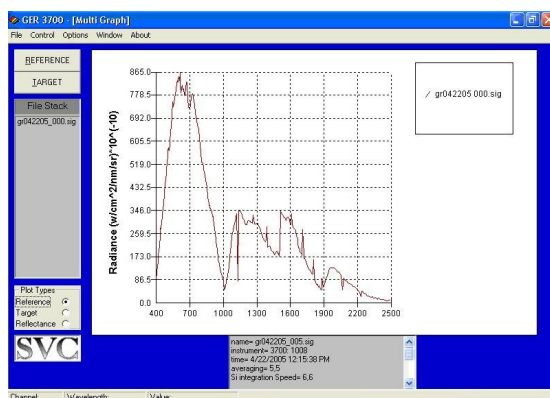
5.8 Processing

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.

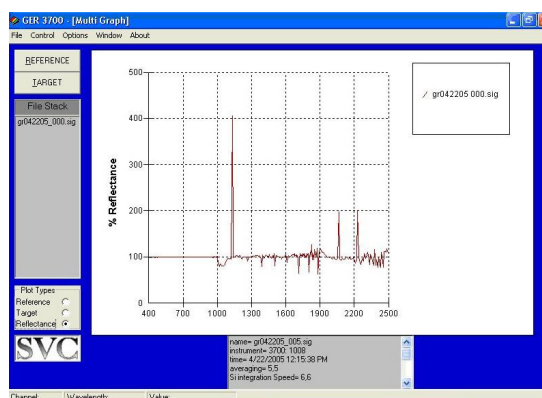
It is always easier to resolve problems before you collect spectra, rather than trying to make sense of spectra collected using incorrect methods.

6. Trouble shooting – interface problem

There is a slight software/hardware interface problem with the GER3700 that has arisen out of compatibility problems with Windows XP. The issue relates to the speed of newer, faster PCs. Occasionally, a reference or target scan will appear with many spikes in the data (see example below).



1. Example 'spiked' reference measurement



2. Example 'spiked' spectralon panel reflectance measurement

Solving the problem

1. This problem appears to be worse when 'averaging' is set above seven, so do not set 'averaging' to above seven or if you do be alert and watch for spikes in the data.
2. If this problem occurs repeat the target or reference measurement and check on the screen that the spikes have not reappeared.

7. SUMMARY of key points to remember in field

1. 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.
2. Warm up the instrument prior to use (30 mins is ideal)
3. Take a reference scan of Spectralon for every target measurement
4. Keep accurate log sheets
5. Accurately determine the size of the IFOV at a given height before going into field.
6. Make sure that the IFOV is completely filled with the target of interest.

7. Collect more than 1 spectrum over each target to get an idea of the spectral variability of each surface.
8. Don't be shocked to see atmospheric water absorption features in your spectra at 1400 and 1800nm
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.

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