Part 1. FS-250A Enhanced LED Ganzfeld with Dedicated Software Control

The FS-250A LED Ganzfeld is a powerful R&D tool, highly recommended for University departments and research institutes studying the fundamentals of vision. The system is designed to work with EEG reading equipment such as the ADI PowerLab.

Figure 1: The FS-250A

Scope of Supply

The FS-250A consists of:

- A 200 mm diameter Ganzfeld;
- Illumination provided by internal arrays of white LEDs;
- A dedicated power supply with software-based range control;
- A stage with warming facilities for holding the animal;
- A USB PC interface;
- Dedicated Windows-based control software.

Ganzfeld

The Ganzfeld is a 200 mm diameter sphere internally coated with a high-reflectance diffuse white paint. The sphere has a port in one side which is used as the location of the test subject's visual plane. The subject's field of view is then limited to the far wall of the sphere. There is an internal LED module for illumination, which is outside the direct field-of-view of the subject.

LED Module

The LED module in the Ganzfeld has three separate banks of LEDs:

- A "background" bank to provide a continuous background illumination;
- A "high intensity pulse" bank with high intensity LEDs to provide high luminance pulses; and
- A "low intensity pulse" bank with a single, smaller wattage LED to provide very low luminance pulses.

The high intensity pulse bank has three software-selectable ranges: low, medium and high output. The background bank has two software-selectable ranges: low and high output.

There is a continuous dynamic range of around 9 orders of magnitude, from the peak output of the high intensity pulse bank to the lowest stimulus from the low intensity pulse bank.

For the high range of the high intensity pulse bank, there is a pulse length limitation of 350 ms to protect the LEDs from overheating. However, in our experience, most operators use pulse durations of less than 5 ms, so this is not a significant constraint.

Dedicated Power Supply

The dedicated power supply has three BNC terminals for inputting the voltages to drive the three LED banks. There is a further BNC output to connect to the digital trigger input of the ADI to coordinate the data acquisition with the stimulus onset.

Heated Animal Platform

The animal platform features:

- A sturdy base;
- A platform attached to the base with four legs;
- A gutter around the platform to contain spillages;
- A tube built into the platform with inlet and outlet for running warm water through to provide heating for the platform;
- Two posts and blocks for holding other items in place;
- All parts are anodised black.

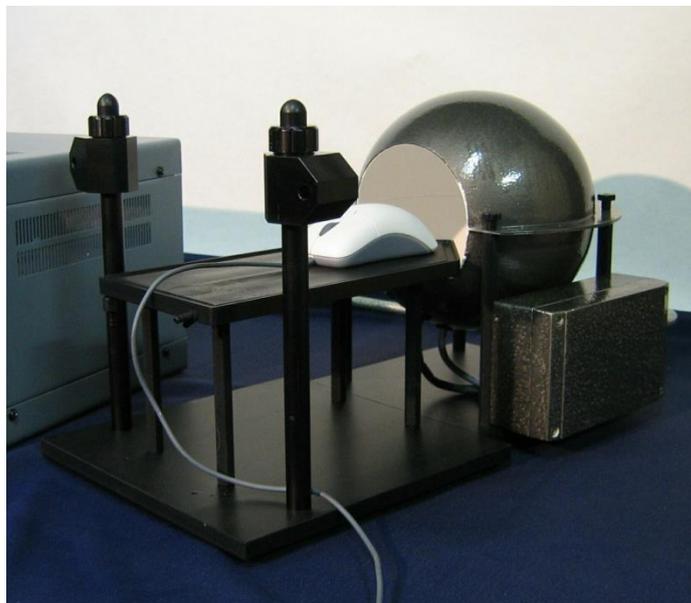A picture of the platform is shown in Figure 2.

Figure 2: Animal Platform (mouse not included!)

PC Interface

The hardware consists of a USB Analogue Output Card with an interface to connect to the dedicated power supply to drive the three LED banks and the digital trigger. The card also has digital outputs, which are used to switch the ranges on the high intensity pulse bank and background bank of LEDs.

Software

Also supplied is Windows-based computer software to allow the user to programme the three LED banks and trigger the ADI. The user can programme a stimulus with a range of functions including:

- Constant backgrounds;
- Individual square pulses;
- Square waves;
- Sine waves;
- Ramp functions.

These can be programmed with variable periods between stimuli. Furthermore, the stimulus programme may be repeated at a regular interval with the ADI being triggered at the start of each sequence for multiple acquisitions. The number of repetitions and the interval between repetitions will be saved with each stimulus programme. Figure 3 shows the main software window.
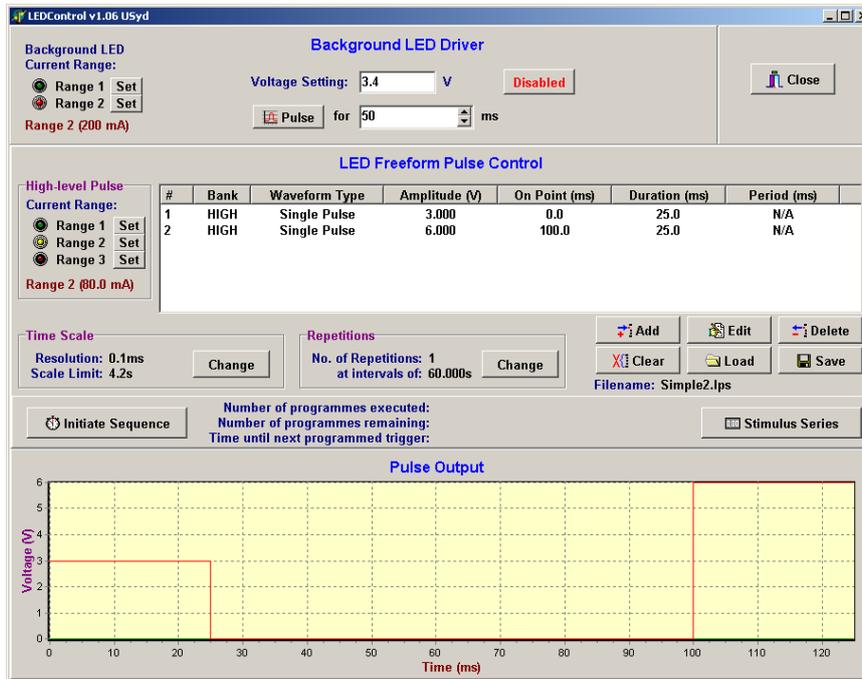
Figure 3: Main Software Window

There is an additional "Stimulus Series" function, as shown in Figure 4, whereby the operator can select multiple saved stimulus programmes to be executed in sequence. This may be the same stimulus programme repeated multiple times, or there may be different stimulus programmes to be executed one after the other. For each stimulus in the series, the operator can specify the time from the start of the series that the stimulus is executed. For example, when you start the series stimulus A is executed, then after one minute stimulus B is executed, then after two minutes stimulus C is executed, etc. Each stimulus program execution will be accompanied by a digital trigger output to initiate a data acquisition on the ADI. This Stimulus Series can then also be saved and loaded at a later date.

This function is useful for providing repeat measurements on the one animal for averaging purposes or to gradually change a stimulus. They can be programmed with a suitable delay between stimuli to allow time for recovery.
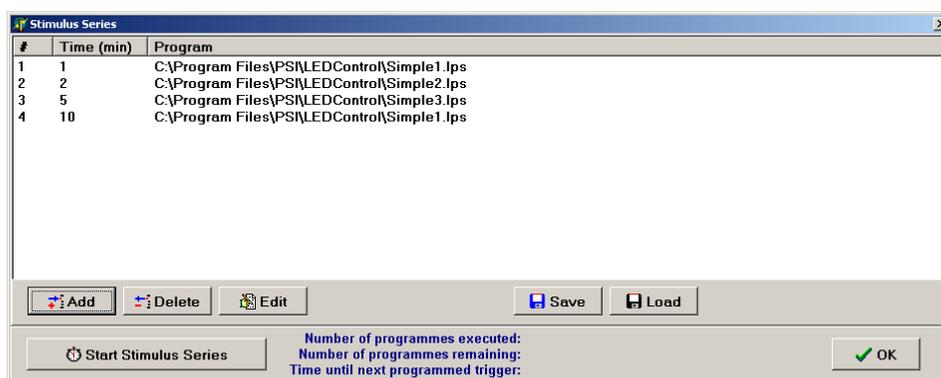

Figure 4: Stimulus Series Window

PC

The client is to supply a PC or Laptop running Windows 7/8/10 and with at least one free USB port. The most common problems encountered are usually computer related, hence we prefer that the client supply a PC so that any problems can be serviced locally.

Documentation

The equipment and software provided comes with a User Manual (in English) which details the procedures for using the system in easy to follow instructions. The manual also contains connection diagrams and troubleshooting guides to the various components of the system.

Calibrations

The three banks of LEDs and all of their ranges are calibrated by our in-house ISO 17025 accredited laboratory. For each range on each bank a table is given that relates the programmed voltage with the output luminance.

Installation and Training

The equipment comes with a manual that includes instructions for connecting the equipment and installing and using the software. However, for a best introduction to installing and using the equipment we offer installation and training as an optional extra.

Warranty

PSI provides an unconditional warranty on all of the photometric equipment supplied for 12 months from the date of installation, or according to the limitations of the warranty of the manufacturer of any individual component. During the warranty period, PSI will repair or replace any faulty equipment at no charge to the client other than freight costs. The client is responsible for fixing hardware failures in the PC system, however PSI will actively assist the client in determining the nature of and resolving any such problem that may occur.

This warranty does not cover misuse, abuse or accidental damage to the equipment. In such a case, all repairs and travel and accommodation expenses will be borne by the Client.

Additional Options

We also manufacture faraday cages to suit the FS-250A. These assist in reducing the amount of electrical noise being picked up by the EEG and have been shown to increase the signal-to-noise ratio by over a decade. Please contact us for more details if you are interested in this option.