ColorDome Desktop Ganzfeld

Features

- Compact Size, weighs 7lb (3 Kg) without stand
- No mechanical parts for greater reliability
- All electronic control of color, luminance, flash duration
- 9 red Fixation/EOG LEDs with adjustable intensity. that span up to +/- 60 degrees horizontally
- Background and flash luminance created by Red, Green Blue and Amber LEDS. Luminance range from 30 cd.s/m^2 down to 0.0002 cd.s/m^2
- Integral Xenon flash tube for bright flashes with full electronic control of intensity. Luminance range from 3000cd.s/m^2 down to below 0.009 cd.s/m^2 in 100k steps
- Integrated monochrome camera with infrared LEDs for luminance even in total darkness
- Full color modulation of background LEDs using definable wavetable
- Built-in dark adaptometer (software not yet available)
- Xenon and LED flash auto-calibrating system
- Flexible positioning with optional mounts
- Built in speaker for feedback during EOG and ERG tests
- Integral xenon filter holder

Whats Supplied

- ColorDome head
- Power supply box
- Power cord extension cable
- USB cable
- Filter holder

Options

- Desktop stand with chin-rest
- Standalone controller with RS232 cable and power supply
- Patient Fan
- Dark adaptometer button box

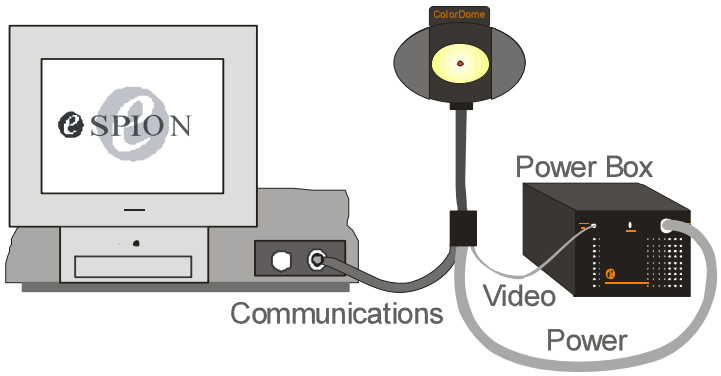
Software

Espion V3 software required. This is not supplied, and the latest version may be downloaded from the web-site including instructions on installing the software. You should be supplied with a calibration file containing all the calibration information for your ColorDome.

Installation

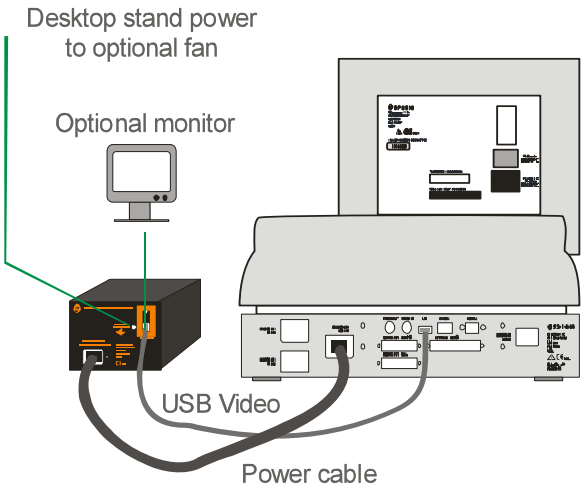
The ColorDome power box is designed to sit just to the right of the Espion console so that the main head cable can be plugged into both the power box and the console front stimulator connector simultaneously.

Front Connections



The three connections carry the camera video, low voltage power cables and communications from the Espion console.

Rear Connections



Rear connections from the power box to the PowerBloc include the mains power cord (Note: this must NOT be connected directly to a mains outlet as this compromises the ColorDome electrical isolation) and the USB video cable. The

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PowerBox also has a video output for connecting to a standard 0.75V P-P video monitor and a power outlet for an optional stand fan.

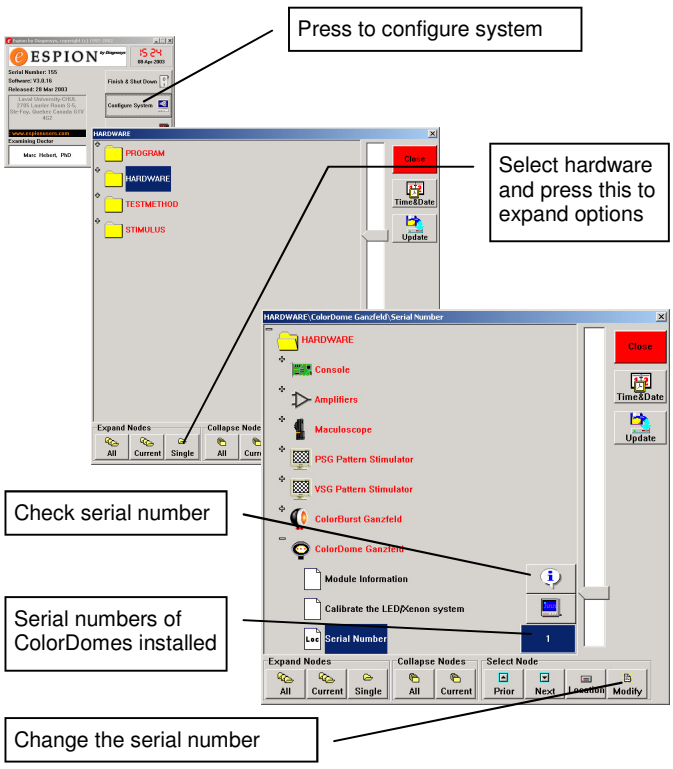
For the standalone version, the communications cable plugs into the front of the controller box, and the rear RS232 cable plugs into your PC serial port.

Calibration File

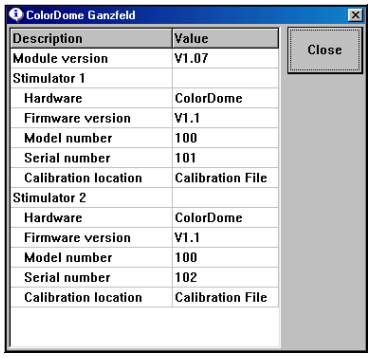
A calibration file for your ColorDome should be included which has the name: COLDXXX.CAL where XXX is the serial number of your device. This file should be copied into your Espion directory on the console.

Serial Number Configuration

Before use, you must register the ColorDome serial number with the Espion software and this requires you enter the "Configure System" menu, choose Hardware options and then ColorDome as shown below:



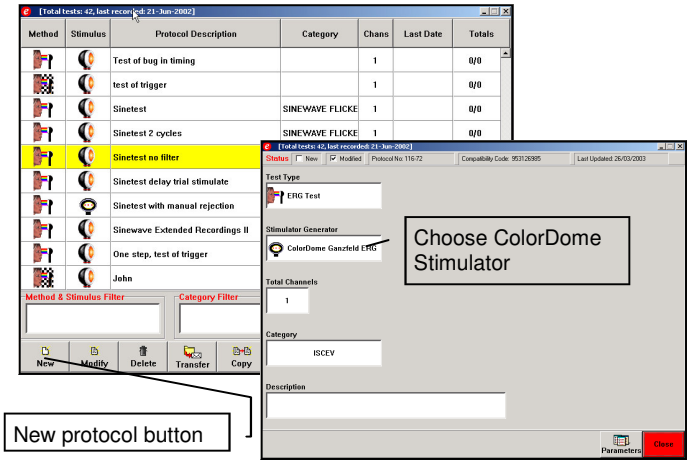
To change the serial number, select the serial number parameter in the ColorDome hardware section and press the modify button at the bottom of the screen. If you have two ColorDomes, then enter both serial numbers. Finally exit the menu by pressing the red Close button in the top right. To check that the calibration file has been correctly read, re-enter the configure system menu and press the "I" information button. This will produce the information menu which contains the serial number, model number, firmware version and calibration parameters location of the connected ColorDome. If you have installed two ColorDomes, then information about both ColorDomes will appear as shown below:



Description	Value
Module version	V1.07
Stimulator 1	
Hardware	ColorDome
Firmware version	V1.1
Model number	100
Serial number	101
Calibration location	Calibration File
Stimulator 2	
Hardware	ColorDome
Firmware version	V1.1
Model number	100
Serial number	102
Calibration location	Calibration File

Software Control

Once the calibration files and the serial number have been successfully installed, you can start using the ColorDome in your protocols. To configure a ColorDome protocol, start by



choosing the new protocol option from the protocol page and then select the ColorDome as the stimulus stimulator.

The final stage is to setup the ColorDome stimulus parameters for each step in the protocol. Select any stimulus parameter from any step and the stimulus configuration menu will appear. From here you can select flash color, temporal frequency, intensity, background etc.

Xenon Flash

To flash the xenon tube rather than the LEDs, simply select the "Xenon" color as the stimulus flash color parameter.

Xenon Filter

If you have installed an optional xenon filter into the ColorDome head, then you must enter the filter reduction factor

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into the attenuation box. The program will adjust the maximum luminance available to compensate.

Custom Wavetable Files

New in V3 of the Espion software is the ability to create custom wavetable files which can be written to arbitrarily specify color, luminance, duration, and trigger points on a ms by ms basis. Files can be created in any text editor or spreadsheet and up to 4 user defined variables may be included which allow control from the main stimulus menu without having to re-write the file. For information about writing these files, and examples, see the web-site.

Bright and Dual Flash Stimuli

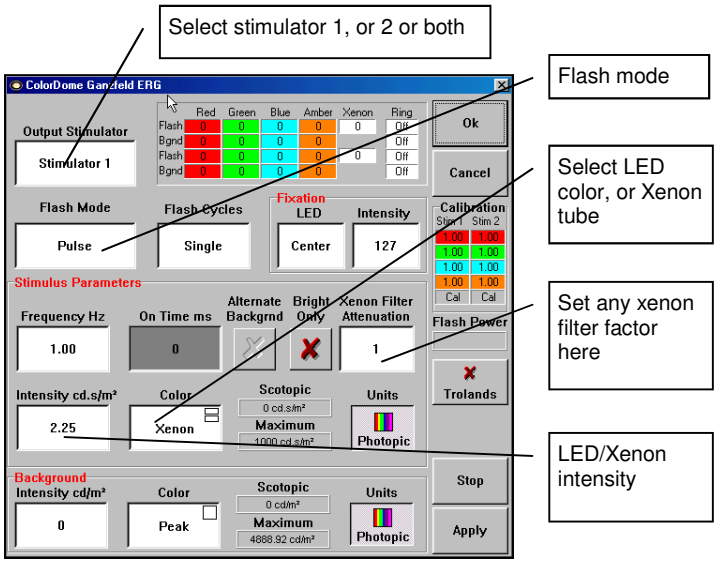
Bright flashes greater than approx 10cd.s/m^2 must be performed using the xenon flash tubes. Dual flash stimuli require custom wavetable programming. An example file is included with the Espion software.

Dual Stimulators

If you have a dual ColorBurst or Dual ColorDome system, then you can perform the following actions:

- Flash one stimulator, whilst displaying the background on the other
- Flash identically both stimulators simultaneously
- Create a user defined wavetable file to flash each stimulator independently

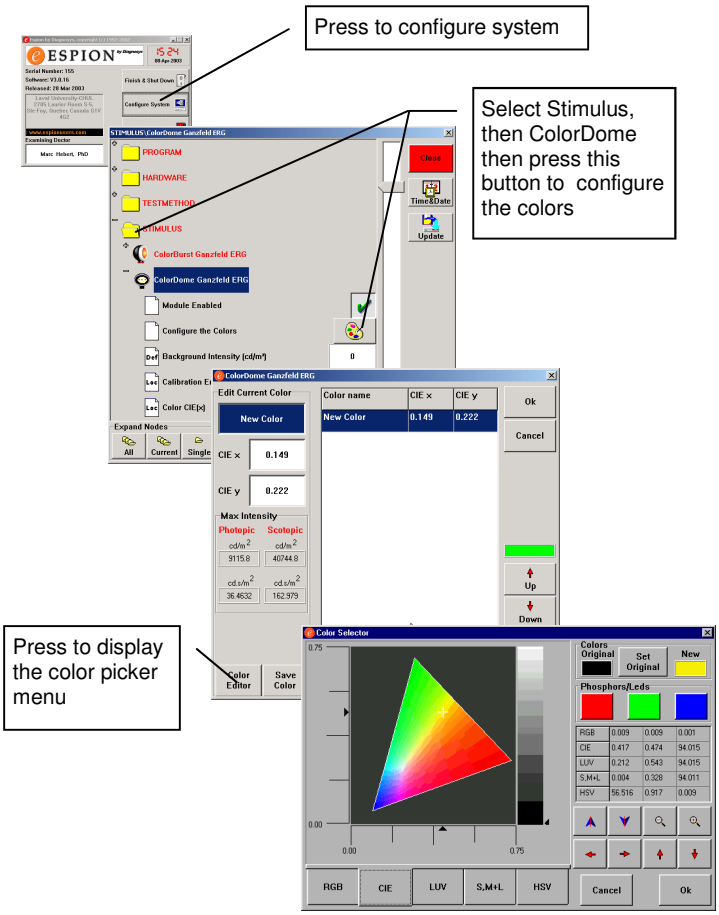
Select the flash stimulator output and the flash mode to determine the correct output action.



The stimulus menu allows intensity to be selected in photopic or scotopic units and always displays the maximum intensity value of the flash and background colors for the currently selected units as well as equivalent value in the opposite units.

Configuring LED Colors

The LED colors for flash and background may be selected from a predetermined list of colors which can be configured from the “Configure System” menu. Select the “Stimulus” folder and then the ColorDome module.



Calibration

The ColorDome is supplied already calibrated, and the parameters are stored in a calibration file located in the Espion directory.

LED

Calibration of the LED system is fully supported by the system with an integrated calibration routine which when interfaced to the recommended Diagnosys photometer will automatically measure the maximum intensity and linearity of all three ranges for each color LED. As LEDs are very stable over time, re-calibration should not be required for some period of time and the color coordinates of the LEDs which are measured at time of manufacturer should not require further calibration. The system also includes a built in auto-calibration system which compensates for changes of room temperature on LED output for even more accuracy.

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Xenon

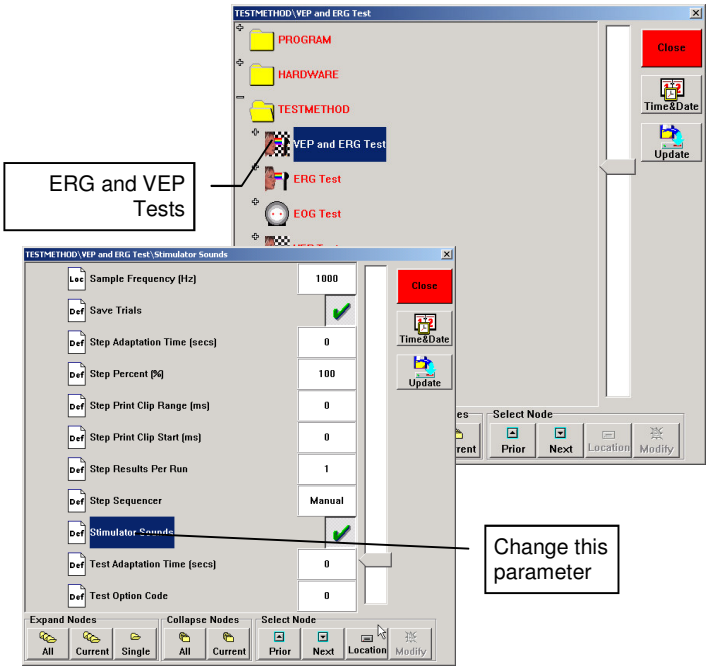
Calibration of the xenon system is performed every flash. The system integrates the light produced by the xenon tube in real-time and terminates it when the correct amount has been measured. This compensates for xenon output changes with time and improves linearity dramatically. You need of course to absolutely calibrate every so often, and this again can be done automatically by the system provided you have a suitable photometer.

Dark Adaptometer

The ColorDome contains dark adaptometer hardware comprising a blue and a white LED with a precision designed diffuser. Each LED has two luminance ranges; bright and dim to cover the whole luminance range required. The ColorDome also has a special button box input connector located on the cable mount at the bottom of the head for recording user responses and adjusting luminance. Currently, the software needed to perform this test is still in the development stage, and therefore not yet available. Check the web-site for latest details.

Audible Feedback

The built in speaker can be used to give an audible cue along with the LED cycle for EOG tests and also give an audible run up during ERG tests to help the patient prepare for the next flash.

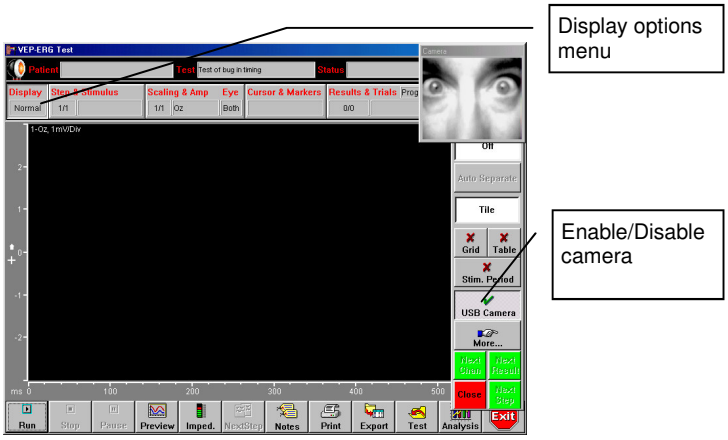


This audible output can be enabled and disabled from the "Configure System" menu, by changing the "Stimulator Sounds" parameter of the relevant "Testmethod" module.

Enabling the Camera

The ColorDome is equipped with an infra-red sensitive monochrome camera and two infra-red LEDs for luminance in any light level. The output of this camera is passed through the PowerBox where it is split into USB digitized data and standard video signal. The USB signal is fed into the Espion via the USB port on the back of the PowerBloc.

The camera output can be viewed on the Espion screen during test times as a small image displayed in the upper right hand corner of the display. Turning the camera on also turns on the IR LEDs. An external video monitor may be connected to the video output connection on the PowerBox for real-time display.



Note: The frame update timing of the image displayed on the Espion screen is refresh limited by many factors to no more than a few Hertz which is normally too slow to catch patient blinks. For real-time display, you must attach an external monitor.

Xenon Hardware

The Xenon flash unit is something we at Diagnosys are particularly proud of. Fully electronic, and using two flash tubes, it covers a vast range of luminance (approx. 10^6 cd.s/m^2) and is highly linear over the entire range. It uses a novel feedback system which monitors the light output and terminates the flash at the appropriate time. This technique creates flash durations automatically in the range 5us to 2ms and acts as a built in auto calibration system which will produce the same light regardless of tube wear.

The two tubes are labelled bright and dim, and cover the approximate ranges 5-3000cd.s/m^2 and 0-6cd.s/m^2 (slight variations from machine to machine). The feedback system only operates correctly on the bright tube, if no external filter is fitted, as it measures the light off the inside of the dome. The dim tube is unaffected by filters as the feedback system is internal to the xenon flash system.

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However, like all systems certain compromises have to be made, and one of them is that it does not support 30Hz flicker at light levels above 1 standard flash (approx. 1.5-2cd.s/m^2). Also, due to the nature of flash tubes and their discharge patterns, flash to flash variability is worse than that for LEDs and varies with flash intensity.

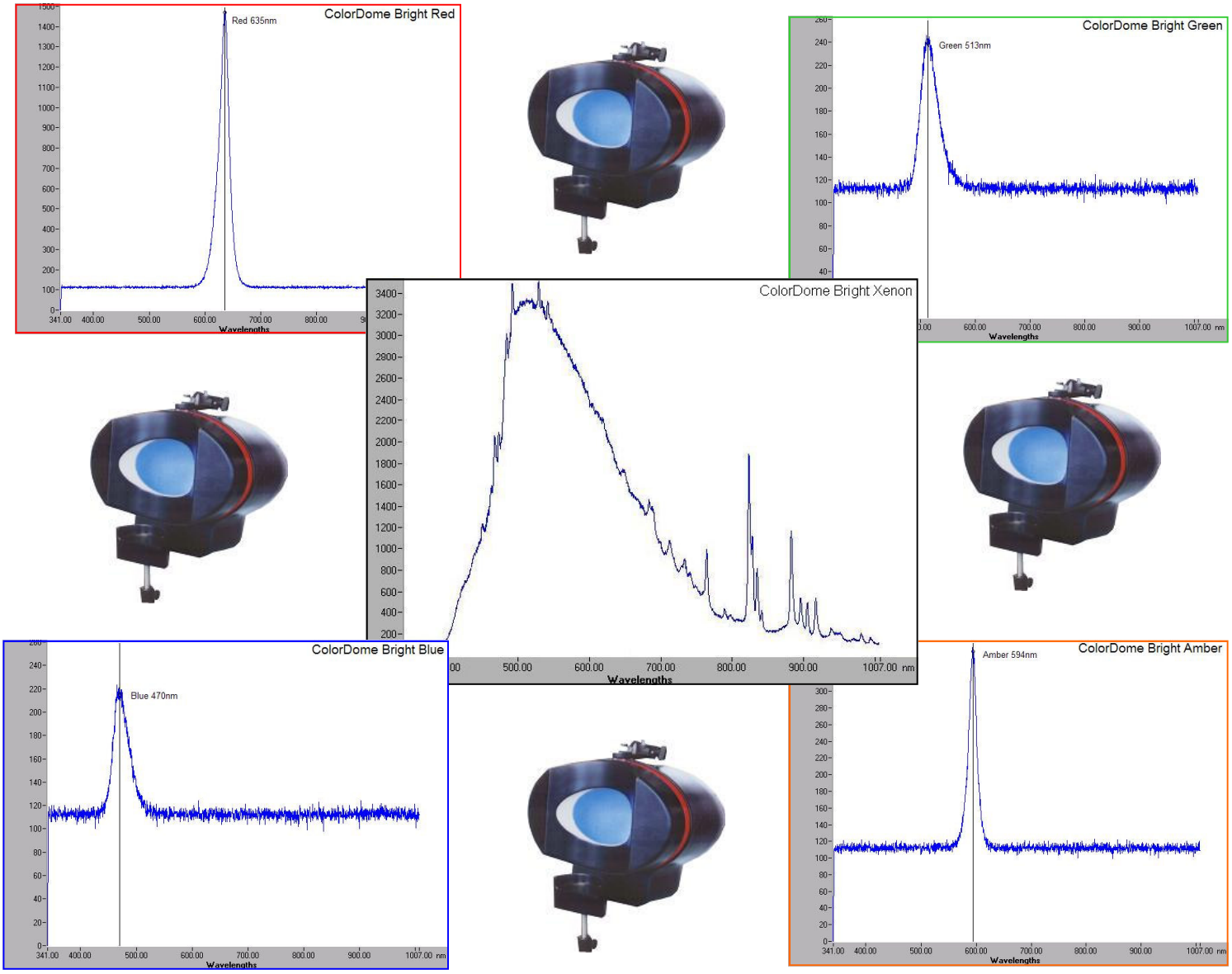
LED Hardware

The system has two LED units, one mounted either side of the front port hole, both of which contain RED, GREEN, BLUE and AMBER LEDs. These can be adjusted for both duration and color electronically and cover a luminance range of approx. 10^7 producing flashes up to 10cd.s/m^2, or steady state backgrounds of 500cd/m^2.

Control is provided by a constant current PWM circuit which keeps color changes with luminance intensity down to a minimum and provides a resolution of 16ns. The circuit contains three rings of LEDs, a bright ring, a dim ring, and a low dim ring to achieve the vast luminance range. Bright and dim rings are color calibrated.

8th April 2003

LED and Xenon Spectral Curves



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