A COLOR IMAGE SCANNER USING HYPERSPECTRAL ILLUMINATION

nanoPAINTER Model 5vm

SPECTRAL MASTERING

With the adoption of software-based color management systems such as ColorSync on the MAC, Integrated Color Management (ICM) on PCs, and the wide use of the International Color Consortium's (ICC) "profile" data and file formats, color as defined by internationally accepted scientific standards is now an inherent element of mainstream operating systems.

To take full advantage of this exciting new level of precision and accuracy, color data must be traceable to the Commission Internationale de l'Eclairage's (CIE) methodology and colorimetric information base. As is well known, to comply with CIE standards, color specimens must be reduced to one or five nanometer wide *Hyperspectral* bands of light by a *spectrophotometer*, a scientific instrument for measuring light intensity. Furthermore, the data that results from this spectral analysis must be transformed using CIE provided tables and formulas. When this exacting and demanding *Spectral Mastering* process is applied to graphical imaging, the resulting file is known as a *Spectral Master* and the device that employs this process is known as a *Spectral Scanner*.

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5vm is the world's first desktop spectral scanner. It "paints," or illuminates images with five nanometer wide bands of light between the wavelengths of 360nm and 830nm, thereby building a *Spectral Trace* for each image pixel using the *Visible Light* portion of the Electro-Magnetic Spectrum. The colorimetric *Characteristic Curve* represented by the trace can be saved or immediately transformed into any of the standard CIE color spaces, including XYZ, xyY or LAB. Using the XYZ Tristimulus values, pixels can also be transformed into virtually any Device-Dependent RGB or CMYK color space.

Features As the device specification to the right shows, the system exhibits excellent spatial, photo-dynamic and colorimetric characteristics and repeatability. The user may select or specify a wide variety of spatial and colorimetric measurement conditions. Final output includes the raw spectral trace, any of the CIE color spaces, CIELAB encoded TIFF image files, or files encoded for the specific device-dependent color space of any printer or monitor that has been correctly profiled. An integrated Pentium-based computer acts as system host and, through a graphical user interface, automates or greatly simplifies system setup, routine measurement procedures, device calibration and communications with network-connected systems.

Benefits 5vm allows the graphical supplier to offer a new and unique high value product, *spectral masters.* 5vm is the first desktop imaging system to cross the significant technical threshold of complying with CIE measurement standards. This separates 5vm from all other conventional image capture systems or methods. CIE-traceable data opens new markets like image archiving and preservation. 5vm colorimetric output is also compatible with and greatly enhances the performance of all color management systems.

5vm SPECIFICATIONS

Spectral range	360nm to 830nm
Spectral resolution	5nm
Photodynamic range	3.85 [log10(S/N)]
Photodynamic resolution	14 bits
Dmax	3.9
Light source	Xenon
Illuminating/viewing system	Transmissive: 0/0 (0º illumination/0º viewing angle)
Repeatability	Spectral transmittance: within .1%
(white point measure)	Colorimetric values: within ΔE*ab 0.1
Spatial resolution	Pixel optical measurement area: 5µm or 3µm
Mechanical repeatability	±.001" over area measured
Pixel resolution	up to 8,232 ppi
Effective measuring area	.92" x 1.37"
International standards	CIE: Publication 15.2 ISO: 10526, 10527 ASTM: E 308, E 1164 ANSI: CGATS.5-1993, IT8.8-1993 ICC: 1:2003-09
Trade standards	ColorSync, ICM, TIFF
OS compatibility	PC, MAC, Unix, Linux
Measuring mode	Single measurement/pixel Optional: multiple measurements/pixel
Measuring rate	209,101 pixels/second in portrait mode and 78,020 pixel/sec in landscape mode
Data format	1,330 bits/pixel in uncompressed spectral trace mode or 24, 42 or 48 bits/pixel in tristimulus mode, or CIELAB-encoded TIFF
Data presentation	Spectral trace or tristimulus value Single pixel colorimetric values: L*a*b*, XYZ, xyY Image preview: sRGB Other transformations available: L*U*V*, Device RGB
Measurement conditions	Illuminants: CIE Standard Illuminants A, B, C, D_{65} also D_{50}, D_{55}, D_{75}, F_1 through F_{12} Observers: CIE 2º or 10º Standard Observers
Environmental	Temperature: 60º - 80º F (15º - 26º C) Relative humidity: 20 - 80%
Electrical draw	110V - 60 Hz (optional: 220V – 50 Hz) 4.5 amps 540 watts
Physical	Length: 18" (457 mm) Height: 9" (229 mm) Width: 15" (381 mm) Weight: 15.4 lbs (7 kg)
Integrated host	Pentium processor with OS & network card

Specifications subject to change without notice.

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