

YELLOW SLIDE SCANNER MINI-SHOOT-OUT CONDUCTED BY SPECTRAL MASTERS, INC.

SHOOT-OUT EXPERIMENT

Use standard ΔE calculations to objectively determine differences in color measuring accuracy exhibited by a group of scanners and rank devices from most accurate to least accurate.

SPECIMEN: A yellow-colored transparency in a 35mm slide mount, from Edmund Scientific Filter Set #34,517.

DATA CAPTURE: Conducted by vendor technicians using best setup for system under test and for conditions at the time of the test.

DATA FORMAT: Measurements presented in the XYZ, RGB and/or CIELAB color space.

DATA TRANSFORMATION SYSTEM: Light Source Inc.'s Colortron Colorshop software colorimeter.

SPECIMEN COMPARISON PRINTOUT: Epson Stylus Pro color ink jet printer set at 720 x 720 dpi resolution, on Hammermill Jet Print Ultra paper stock.

ΔE BASELINE MEASUREMENT SPECIFICATION: Spectrophotometer with an 1nm spectral bandpass, 3.6 OD range, with colorimetric calculations based upon the CIE D50 Illuminant and 2° Observer Tables. When measuring the Macbeth "ColorChecker" Test Pattern, the baseline device averaged an ΔE of 1.8.

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INTERPRETING THE SHOOT-OUT EXPERIMENT DATA

The Experiment is a simple, accurate and repeatable test of the systems sampled and demonstrates the ability of the systems to correctly capture transmitted color.

ACCURACY RANKING: Results ordered by lowest ΔE and listed by vendor and device.

VENDOR	DEVICE	ΔE
1) Spectral Masters	XYZ Observer	0
2) Linotype-Hell	Topaz	24.6
3) Eastman Kodak	PCD 1000	24.7
4) Agfa	SelectScan Plus	27.0
5) PixelCraft	Pro Imager 8200	31.3
6) UMAX	Mirage II	33.9
7) Polaroid	SprintScan 35 Plus	35.6
8) Scitex	Eversmart	40.0
9) Sakata Inx USA	PS4800pro	45.5
10) Howtek	Scanmaster 2500	46.0
11) Nikon	LS1000	47.8
12) Screen	DT-S1045AI	64.6

AVERAGE ΔE : An average ΔE of 38.2 was found between the tested devices and the baseline measurement made by the Spectral Masters Spectral Scanner. The greater the ΔE , the less accurate the measurement. For most commercial graphic arts applications, an ΔE greater than 2 implies a visually meaningful difference. An ΔE of 1 is usually defined as a “Just Noticeable Difference.”

PRINTOUT: The provided color printout visually approximates the actual variations in measurement accuracy exhibited by the tested devices when measuring an identical specimen. The printout represents how accurately a device is able to determine what color it captured. The printout is not a test of what is the “most visually pleasing” specimen.

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**YELLOW SLIDE SCANNER MINI-SHOOT-OUT
RESULTS LISTED BY VENDOR**

Vendor	Product	Price	L*	a*	b*	R	G	B	X	Y	Z	x	y	Y	ΔE
Agfa	SelectScan Plus	~29K	78	15	83	231	160	0	57.22	53.21	5.10	.4953	.4606	53.21	27.0
Agfa	SelectScan Plus		81.39	16.10	74.62	245	170	0	63.89	59.18	8.38	.4860	.4502	59.18	33.9
Eastman Kodak	PCD 1000	~40K	64	5	98	163	126	0	33.02	32.80	.65	.4968	.4934	32.80	24.7
Howtek	Scanmaster 2500	~17K	87	-5	60	224	209	62	65.27	70.01	16.77	.4292	.4605	70.01	46.0
Howtek	Scanmaster 2500		89.34	-5.37	55.60	231	218	79	69.67	74.89	20.65	.4217	.4533	74.89	50.5
Linotype-Hell	Topaz	~50K	96	-18.3	96.7	241	254	0	77.29	90.01	9.24	.4378	.5099	90.01	24.6
Nikon	LS1000	~1.8K	93	-11	60	235	237	77	74.51	82.97	21.60	.4161	.4633	82.97	47.8
Nikon	LS1000		95.48	-8.75	58.45	249	244	88	81.00	88.77	24.69	.4165	.4565	88.77	49.0
PixelCraft	Pro Imager 8200	~12K	94	-23	87	221	250	0	70.83	85.27	11.16	.4235	.5098	85.27	32.5
PixelCraft	Pro Imager 8200		95.23	-8.01	77.10	255	242	34	80.81	88.15	15.55	.4380	.4778	88.15	31.3
Polaroid	SprintScan 35 Plus	~2K	87	-27	83	186	227	0	55.92	70.01	8.73	.4153	.5199	70.01	37.5
Polaroid	SprintScan 35 Plus		88.76	-12.81	73.53	219	222	26	65.15	73.66	12.67	.4301	.4863	73.66	35.6
Sakata Inc USA	PS4800pro	~1.9K	92	-10	62	254	232	69	72.91	80.70	19.77	.4205	.4655	80.70	45.5
Sakata Inc USA	PS4800pro		91.82	-3.09	57.97	246	225	80	75.88	80.29	21.59	.4269	.4517	80.29	47.9
Scitex	Eversmart	~29K	88.64	4.74	65.38	251	206	54	73.03	73.41	15.7	.4504	.4527	73.41	40.0
Screen	DT-S1045AI	~49K	94.63	-2.12	41.31	253	235	129	82.53	86.74	34.42	.4052	.4259	86.74	64.6
Spectral Masters	XYZ Observer		87.52	3.14	105.4	250	203	0	69.99	71.07	4.03	.4824	.4898	71.07	0
UMAX	Mirage II	~9K	86.03	0.04	71.60	233	201	28	65.62	68.04	11.71	.4514	.4680	68.04	33.9

NOTES:

- 1) Tinted cells indicate value measured from scanned 35mm *Yellow Slide Specimen* and used to calculate other values in the row. When two values (ie: a LAB value and an RGB value) were available from a single device, each value was used as a master to calculate the remaining values in the row, thereby producing two rows of values for the device.
- 2) All values assume D50 Illuminant and a Two Degree Observer.
- 3) ΔE Baseline Measurement - Spectral Resolution: 1nm, Dynamic Range: 2¹²
- 4) All measurements were of the same image and made by vendor staff members using best available setups.
- 5) ΔE values calculated from LAB values. $\Delta E^*_{ab} = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$
- 6) All derived values (ie: non-tinted cells) calculated using the Colortron colorimeter software system. No actual measurements were made with a Colortron spectrophotometer.

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NOTES:

- 1) Lower ΔE indicates greater color measurement accuracy
- 2) Different ΔE s for the same device indicate differences in how a particular system handles presenting data it has captured.

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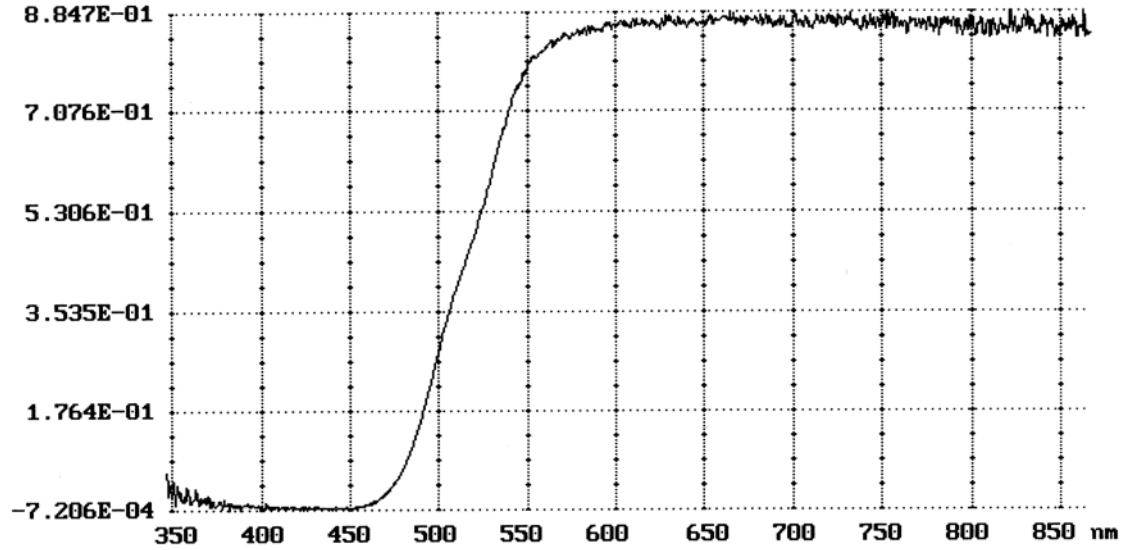
**ΔE of 1nm Monochromator, Colortron and Spectral Masters Spectral Component
Compared Against MacBeth Color Checker Chart Published Values**

MacBeth Color Checker Chart Cell	ΔE of Monochromator	ΔE of Colortron	ΔE of Spectral Masters
1 Dark Skin	3.948	3.229	1.428
2 Light Skin	1.874	0.794	1.909
3 Blue Sky	1.164	0.802	1.257
4 Foliage	0.694	3.4	0.523
5 Blue Flower	0.659	1.218	1.597
6 Bluish Green	2.458	3.429	3.067
7 Orange	2.461	6.005	1.505
8 Purplish Blue	2.245	1.75	2.049
9 Moderate Red	1.533	3.785	1.472
10 Purple	1.843	2.86	1.549
11 Yellow Green	2.281	1.997	1.194
12 Orange Yellow	3.014	4.722	3.384
13 Blue	2.257	2.539	2.573
14 Green	3.488	1.931	2.382
15 Red	1.156	6.673	4.937
16 Yellow	2.499	2.653	1.27
17 Magenta	1.03	3.497	0.889
18 Cyan	2.216	2.964	2.112
19 White	1.587	1.708	1.731
20 Neutral 8	0.998	0.675	1.193
21 Neutral 6.5	1.184	1.059	1.295
22 Neutral 5	2.336	1.158	1.111
23 Neutral 3.5	1.33	1.402	0.345
24 Black	4.177	1.748	2.462
Total Delta E	2.018	2.583	1.801
ΔE Hue Component	2.045	3.013	1.949
ΔE Neutral Component	1.935	1.291	1.356

All Values Truncated to Three decimal Places

Color Checker Comparison Chart
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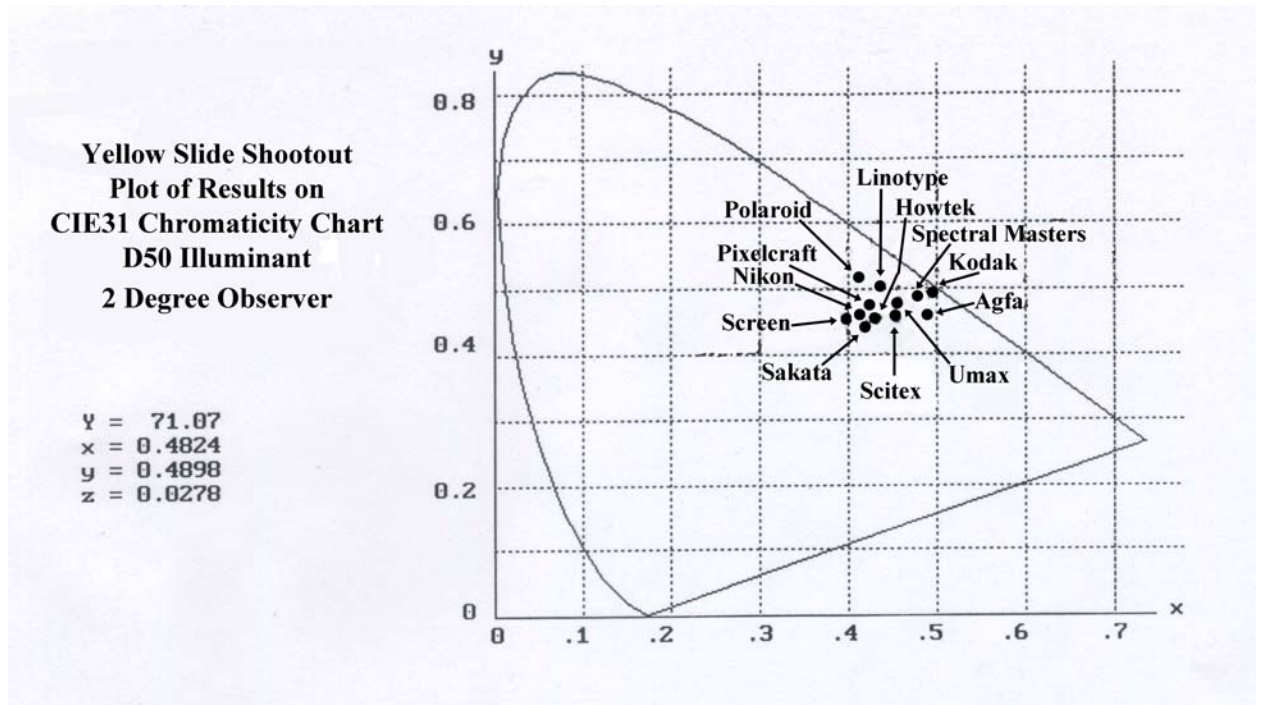
Yellow Slide Scanner Mini-Shootout
Specimen Trace



Yellow Slide Shootout Specimen Trace
Edmund Scientific Filter Set #34,517
Yellow

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Yellow Slide Scanner Mini-Shootout
Results Plot



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Yellow Slide Scanner Mini-Shootout
Visual Chips Comparison

