



CALIBRATING DEVICES WITHOUT DIRECT COLORANT AMOUNT CONTROL

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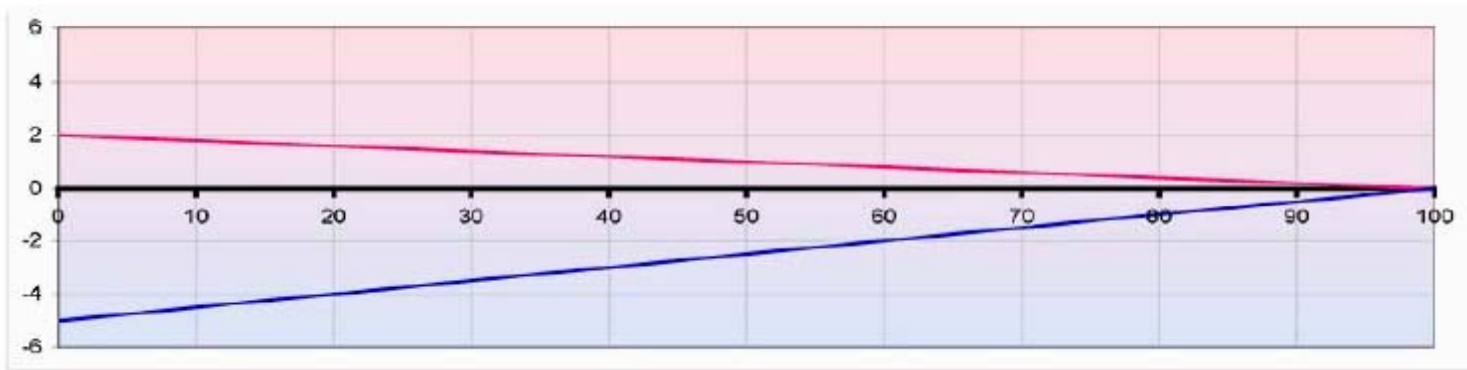


Calibration and characterization

- Adjusting device behavior
- Describing device behavior
- Uncalibrated devices have color cast in grays
- Calibration improves characterization accuracy

G7 Specification

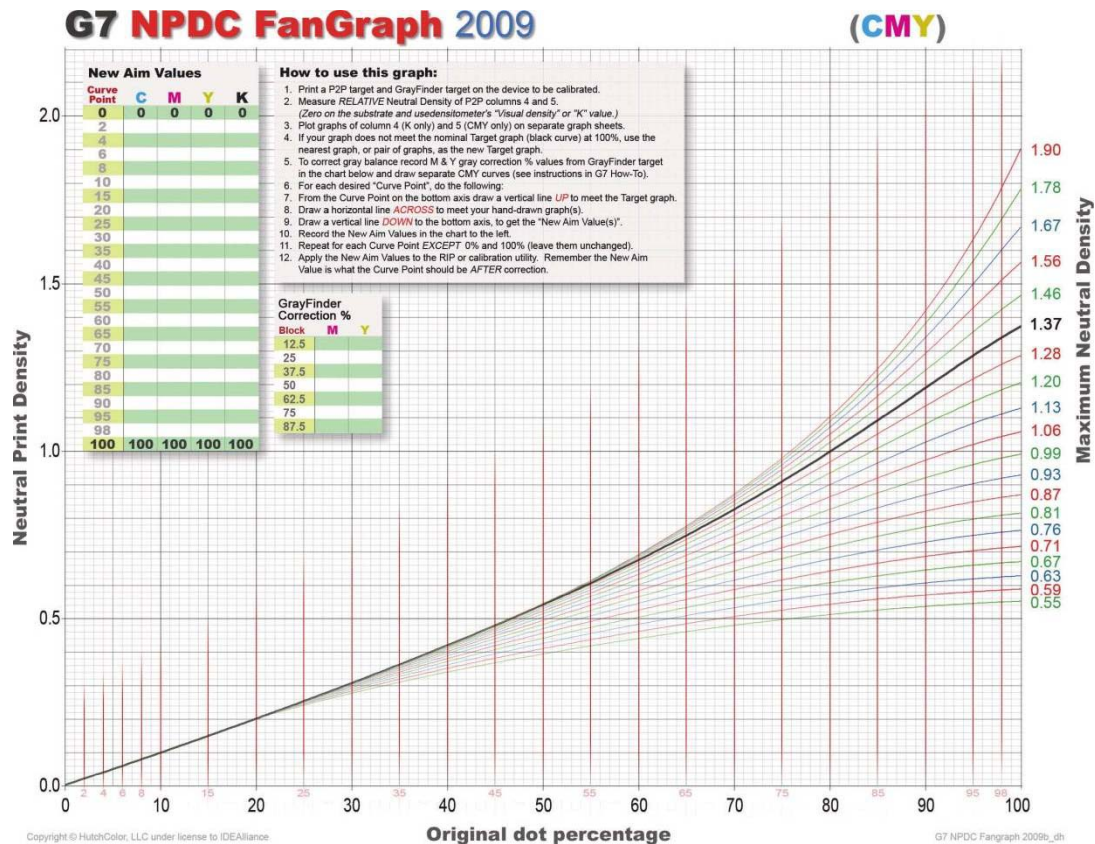
- Defines gray as a function of substrate color



Aim a^* , b^* values for a given substrate

G7 Specification

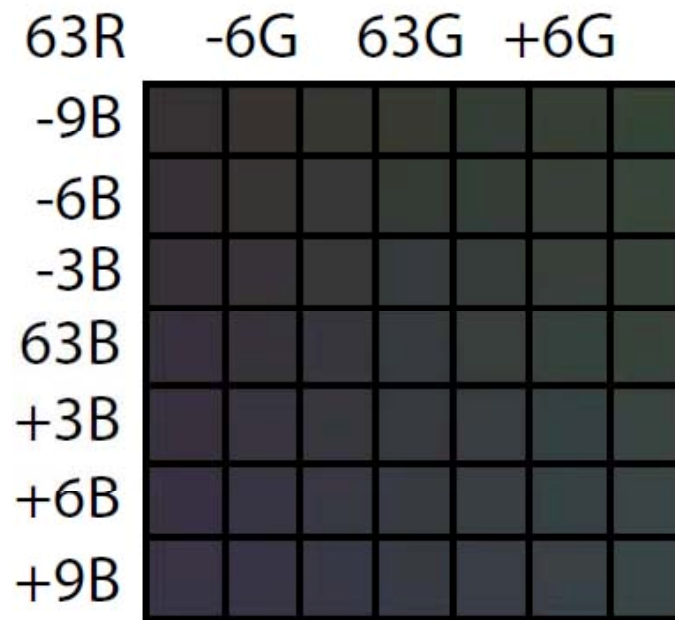
- Specifies a set of correction curves



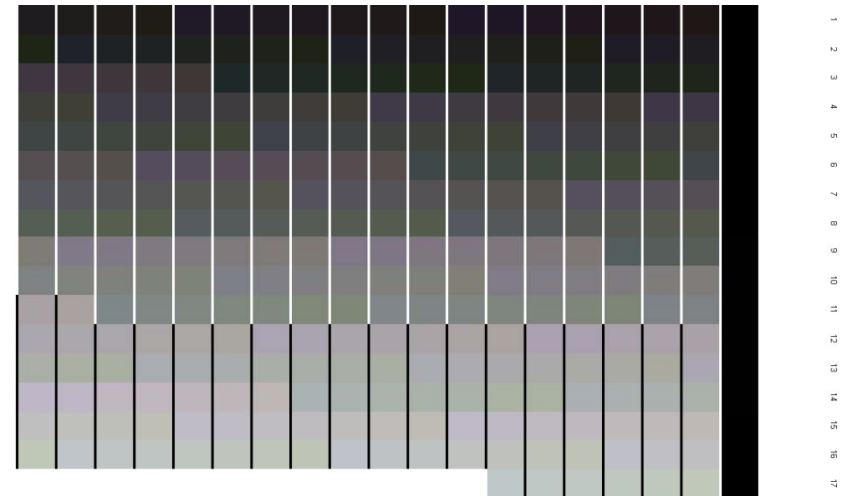
RGB devices

- No direct control over device's colorants
- Driver takes RGB inputs and converts them to device's colorant values

Tools



One of the six groups of patches



Generated By: Date: Color Space: Media Size: Target: Page: 1 of 1
ColorPort 2.0.3 6.3.2012 16:28 RGB 210 x 297 mm RGB gray finder (D50)

Complete chart

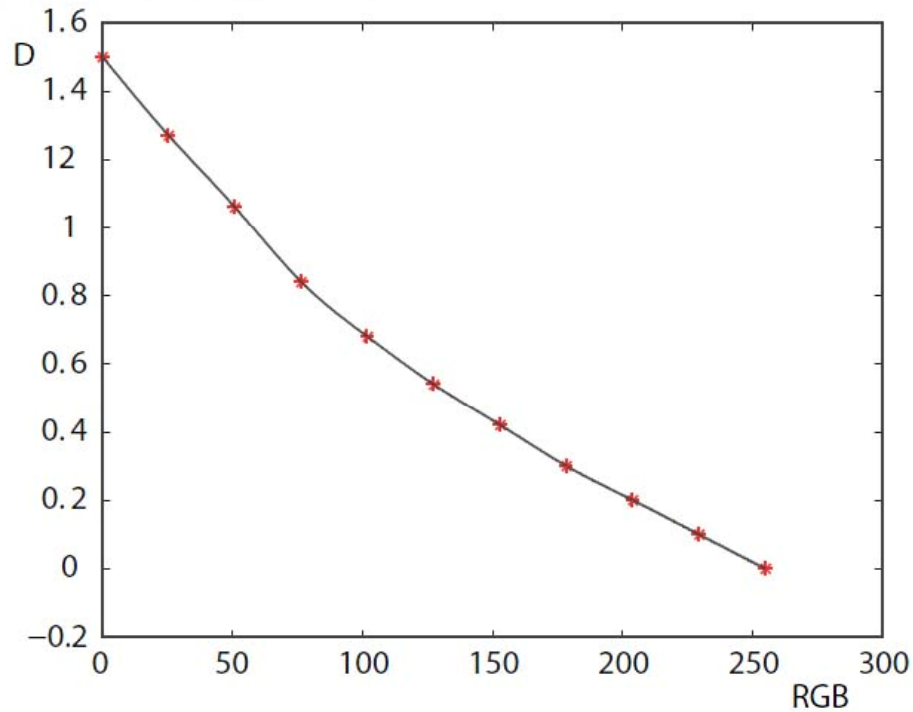
Methods

- $$\begin{bmatrix} L^* & a^* & b^* \end{bmatrix} = \begin{bmatrix} 1 & R & G & B & RG & RB & GB & R^2 & G^2 & B^2 & R^2G \\ R^2B & G^2B & G^2R & B^2R & B^2G & RGB & R^3 & G^3 & B^3 \end{bmatrix} A$$

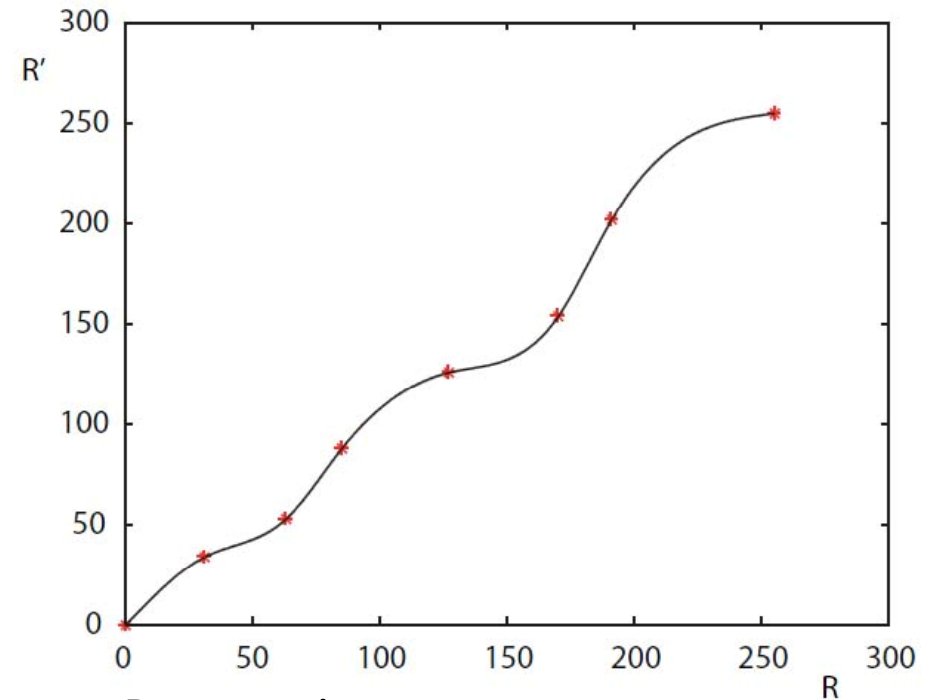
Aimed output and predicted input values

	AIM				PREDICTED		
R	a*	b*	D	L*	R	G	B
0	0,00	0,00	1,50	21,00	0	0	0
31	0,40	-1,42	1,22	29,62	34	36	41
63	0,82	-2,89	0,95	34,18	53	53	58
85	1,01	-3,90	0,78	44,32	88	88	88
127	1,64	-5,83	0,54	56,49	126	125	124
170	2,20	-7,80	0,34	65,11	154	151	153
191	2,47	-8,76	0,25	78,80	202	200	201
255	3,30	-11,70	0,08	93,00	255	255	255

Methods



Densities curve



R correction curve

Model evaluation

Model	Min ΔE	Mean ΔE	Median ΔE	Max ΔE
RGB->L*a*b*	0,14	0,67	0,64	1,79

Results

Aimed and measured output values

AIM				MEASURED				DIFF.
D	L*	a*	b*	D	L*	a*	b*	ΔE
1,22	29,62	0,4	-1,42	1,14	32,30	0,30	-2,10	2,766
0,95	34,18	0,82	-2,89	1,04	36,20	1,70	-4,90	2,982
0,78	44,32	1,01	-3,9	0,82	46,00	0,30	-4,60	1,953
0,54	56,49	1,64	-5,83	0,61	56,80	-0,10	-4,10	2,473
0,34	65,11	2,2	-7,8	0,45	66,20	0,20	-5,00	3,609
0,25	78,8	2,47	-8,76	0,26	79,40	2,40	-7,70	1,220

Results



Original image



Corrected image

Conclusions

- Successful gray balancing
- Unfulfilled aim of preserving light at the expense of dark tones
- Preservation of aimed tonal range can be achieved with proper sampling
- Further gray balance improvement can be achieved with local models