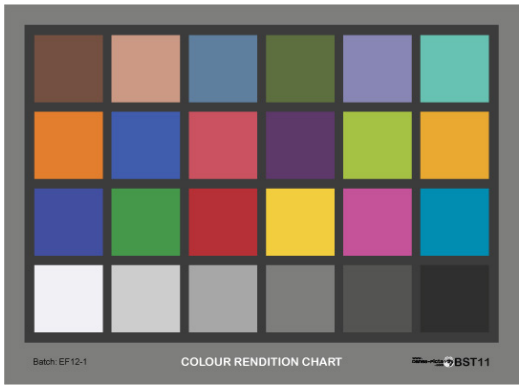
Part Codes
BST11

COLOUR CHECK CHART

with data on CD

INSTRUCTION PAPER



BST11 is a matt chart, with colorimetric reference data, colour comparator and digital charts on CD. The chart is used to judge colour rendition of any image processing, namely photography, video, softproof, projecting and print. By comparison of original chart with its reproduction, it is easy to evaluate colour authenticity. The chart is precise control tool with delicate surface. Please, protect it from moisture, dust, unnecessary lighting, high temperature and mechanical damage. Replace your chart regulary. The chart is produced in two sizes: 140x190 mm and 203x292 mm.

COLOUR CHART & CD IS DESIGNED FOR

- testing colour rendition in photography: photomaterials and their processing, lenses, light sources,
- determining filtration and exposure in colour photo-reproduction processes (enlarging, copying),
- verifying colour rendition in video and TV (comparing various cameras and recording media),
- verifying colour rendition in print (comparing various papers, inks, printers),
- colour balancing and tone evaluation in digital image processing (digital photo, scanning, computer adjustment),
- characterisation and colour control in digital photography: monitor setup, camera profiling and colour rendition check, printer adjustement,

THE CHART CONTAINS

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6

- Twenty four colour and grey patches, inkjet printed with matt surface.
- The colours are very near to Macbeth/Gretag/XRite colour checker chart. They represents principal hues for visual judgement of image (Dark Skin, Light Skin, Foliage, Sky), basic aditive and subtractive primaries (Red, Green, Blue, Cyan, Magenta, Yellow), samples of colours covering all colour space (Orange, Purplish Blue, Moderate Red, Purple, Yellow Green, Orange Yellow) with emphasis on heavily reproducible colours (Blue Flower, Bluish Green).
- Six-step grey scale covers basic gradation range of scene. White patch (88% reflectancy) represents superb white paper, black patch is darker than plain offset printed matt black. Entire contrast is 30:1.
- CD contains

  1) instructions for use (*Instruction Paper.pdf*),

  2) correct images of the chart in spaces sRGB and Adobe RGB (1998) - without ambedded profiles (*DigitalChart sRGB.tiff*, *DigitalChart aRGB.tiff*)

  3) reference data for camera profiling (*GretagCIE.txt*, *MonacoDC.txt*, *CoCaArgyll.txt*),

  4) colour comparator of 6 basic colour spaces (*ComparatorEN.xls*),

  5) ICC profiling software *CoCa setup 1.9.7.3* (open source programm available on http://www.dohm.com.au)

Target colorimetric coordinates of individual patches of the colour chart are identical with original X-Rite data. For common daylights (D65 and D50), are given in following data chart (L*a*b* = CIE 1976 coordinates).

		D65			D50		
Patch	**Colour**	**L***	**a***	**b***	**L***	**a***	**b***
A 1	**Dark Skin**	37,3	13,4	14,6	37,5	14,4	14,9
A 2	**Light Skin**	64,4	18,1	17,1	64,7	19,3	17,5
A 3	**Blue Sky**	49,6	-1,2	-22,2	49,3	-3,8	-22,5
A 4	**Foliage**	43,4	-14,6	22,9	43,5	-12,7	22,7
A 5	**Blue Flower**	55,2	12,2	-24,6	54,9	9,6	-24,8
A 6	**Bluish Green**	70,7	-31,9	0,1	70,5	-32,3	-0,4
B 1	**Orange**	62,1	33,4	55,8	62,7	35,8	56,5
B 2	**Purplish Blue**	40,1	16,3	-44,4	39,4	10,8	-45,2
B 3	**Moderate Red**	50,1	48,1	15,6	50,6	48,6	16,7
B 4	**Purple**	30,2	24,4	-20,9	30,1	22,5	-20,9
B 5	**Yellow Green**	71,5	-28,4	58,9	71,8	-24,1	58,2
B 6	**Orange Yellow**	71,0	14,8	67,3	71,5	18,2	67,4
C 1	**Blue**	29,2	21,7	-48,7	28,4	15,4	-49,8
C 2	**Green**	54,4	-42,7	32,9	54,4	-39,7	32,3
C 3	**Red**	41,8	50,3	27,4	42,4	51,1	28,6
C 4	**Yellow**	81,3	-1,8	80,9	81,8	2,7	80,4
C 5	**Magenta**	50,4	52,5	-14,8	50,6	51,3	-14,1
C 6	**Cyan**	50,1	-25,0	-27,5	49,6	-29,7	-28,3
D 1	**White**	95,2	-1,3	2,9	95,2	-1,0	2,9
D 2	**Neutral 8**	81,3	-0,6	0,5	81,3	-0,6	0,4
D 3	**Neutral 6.5**	66,9	-0,7	0,0	66,9	-0,8	-0,1
D 4	**Neutral 5**	50,8	-0,1	0,1	50,8	-0,1	0,1
D 5	**Neutral 3.5**	35,6	-0,4	-0,5	35,6	-0,5	-0,5
D 6	**Black**	20,6	0,1	-0,5	20,6	0,1	-0,5

Precise actual measured reference data (Yxy and Lab for D50 and D65) are given in *Comparator.xls* file on CD.

Use the chart as a colour rendition tester for any image reproduction process.

The chart helps you to diagnose and evaluate many factors that affect color rendition. Change only one parameter of your reproduction process and compare chart copy (photocopy, TV visualisation, printout) with the original. Maintain all other parameters constant.

You can compare original chart with its hard copy, either visually or numerically.

Numerical values of individual pathes might be: optical densities, CIE Lab colorimetric coordinates or RGB levels. You can easily evaluate an influence of:

- spectral distribution of light sources, light reflection from coloured objects near the chart,
- light scattering and other parameters of camera lens and camera body,
- image processing (duplicating, copying, printing, software adjustement, …),
- recording medium quality (film, magnetic tape, photo paper, ink-jet paper, ink-jet inks).

HOW TO OPERATE THE CHART WITHOUT CD

Photo application examples.

Light influence: Photograph the chart with two various light sources. Make prints balanced according to the grey row. Compare influence of light source using various colour filtres.

Photomaterial and photolab influence: Photograph the chart on two various film stocks, several exposure rows on each film. Cut films to pieces, develop each exposure row in different laboratory. Compare slides (or prints) with the chart. Use appropriate light source: tungsten light (3200 K) for slides, daylight (5000 K) for prints. The chart itself must be illuminated by the same light source as its photocopy.

Video application examples.

Monitor influence: Shoot the chart framed to entire format. Compare images on two monitors/TV recievers. Set white point of the monitors to D65. Setup the monitors to identical chart representation.

Cameras comparison: Shoot the chart by several cameras simultaneously from nearly the same angle. Edit images alternately on the same monitor. Try to find twin cameras which are able co-operate.

Videotapes comparison: Shoot the chart by selected camera. Record the image on various cesettes. Play simultaneously these recordings on set of balanced monitors. Compare images with original chart using D65.

Digital imaging application examples.

Camera setup: Photograph the chart and save raw file. Print the image with basic settings ("0") of your printer. Tune your camera utility software to reach authentic print. Try to apply default camera ICC profile. Compare differences.

Scanner setup for reproduction of printed matter and other originals: Scan the chart, print image with basic settings ("0") of your printer. Tune your scanner driver to reach authentic print. Try to apply your ICC profile. Compare differences.

Scanner setup for reproduction of photographs: Make photography of the chart. Scan the photograph with driver settings optimized for scanning printed matter. Print image with basic settings ("0") of your printer. Compare differences between prints (scan of the chart vs. scan of the photography of chart). Change driver settings to reach the same printout as for scanned original chart.

APPLICATION OF THE CHART WITH CD IN DIGITAL PHOTOGRAPHY

Goal for application procedure is to tune images on monitor and on print so, that your visual perception of original chart **AND** DigitalChart.jpg image on Monitor **AND** photography of original chart on monitor **AND** print of photographed chart
must be near.

Monitor set-up and profiling

First set contrast, brightness and gamma of your monitor to desired values.
There are 2 ways how to set-up your monitor:
1) Calibrate your monitor by colorimeter and adequate software (Monaco Optix, EyeOne Display and many others).
2) Create your own monitor profile using visual set-up (programs that change LUT tables: Adobe Gamma, http://quickgamma.de/index.html, http://quickgamma.de/QuickMonitorProfile/ and others).
All what you need to know about setting-up monitor are on Norman Koren´s web pages (perhaps one of the best explanatory and teaching web projects for advanced digital photographers)
http://normankoren.com/makingfineprints1A.html#gammachart .

Monitor check

Compare original of the chart with *DigitalChart sRGB.tiff* file on CD (= pure digital file of the chart in sRGB space, without embedded profile) in your editing software:
1) Illuminate your chart by daylight (either natural or by special fluorescent tube). Never light up your chart by monitor!.
2) Place your calibrated monitor near the chart. Monitor itself must be in a shadow, blocked out from light illuminating the chart.
Compare image on your monitor with actual chart. If there are unacceptable differences, then change profile of your monitor in CMS Windows system. There are many profiles in Windows offer, you must use trial+error method. Choose a profile, that correspondes to the best image-chart fit.

Camera set-up and ICC profiling

Fix your chart in vertical position and iIlluminate it uniformly by daylight. Fasten your camera to tripod and arrange it in axis of the chart.
Set white balance and exposure level using our Grey Card. Photograph the chart carefully, save the photograph as best quality jpg (or RAW if available).
Open the photograph in your editing software (your camera software, Photoshop Elements, ...) and check the image. Adjust black and white levels using eyeproppers, ONLY if necessary (for setting up the eyeproppers, apply D65 L*a*b* values of white and black patches from data table above).

Open your profiling program that supports X-Rite ColorChecker 24 ("Classic") chart. BST11 is applicable in all such profiling softwares (DCcolor, inCamera, i1Profiler, ColorCruiser, Input, CoCa, ...), but actual reference data must be imported to the software. Respective data of your chart are saved on the CD in 3 formats (*GretagCIE.txt*, *MonacoDC.txt*, *CoCaArgyll.txt*).

Apply the photograph, together with reference data, to your profiling program (you must select the reference data format that fits to your software, by trial and error method).

If you do not have your own profiling software, you can use open source application *CoCa_setup_1.9.7.3.exe* together with *CoCaArgyll.txt*. data file (both saved on CD).

Please look at http://www.dohm.com.au/coca/index.html for more details and demonstration videos.

Create ICC profile **.icm* and assign it to your photograph in an image manipulation program like Photoshop Elements, GIMP, … .

Compare original chart (daylight illuminated!) with its profiled image (on calibrated monitor!).

If the result is not acceptable, repeat camera profiling. Creating good profile requires practise in taking correct photograph of the chart.

(Only for advanced fans: Open your photograph without embedded profile and try to change your working space in editing software (Photoshop), to reach better image.)

Camera colour rendition check using comparator

Open simultaneously 1)photographed chart in Photoshop and 2)*ComparatorEN.xls* Excel file The Comparator enables you to select colour space that best matches your camera colour space.

Read RGB levels in Photoshop for each of 24 patches. Insert the values to grey cells of the first sheet of *ComparatorEN.xls*. In next sheets, your data are recalculated into L*a*b* coordinates of 6 most frequent colour spaces. Colour deviations "dEab" (colour distances between"original" colours and its "photocopies") are given in right-hand columns of individual colour spaces.

Compare colour deviations for individual spaces and select the best matching space. Assign corresponding profile to your photographs in CMS. Average colour deviation 5 to 10 dEab is "good" result. Compare deviations on individual patches for selected space. The closer are deviations each other, the better is colour rendering of camera.

dEab=1 corresponds to "just noticeable difference" between colours, dEab=4 corresponds to professional proof prints of photographs.

Printer driver setup

It is somewhat complicated (and expensive) to create ICC profile for printer. We offer you well-tried process how to set-up your inkjet printer, by controlled balancing of driver settings.

Work in cycles:

printing the DigitalChart.jpg file – comparison original chart with the print – changing of driver settings – new printout.

Balance entire image perception first, then look attentively at details:

1. Set your printer according to the producer´s recommendations. Set driver sliders to "0" setting.
2. Print DigitalChart.jpg file.
3. First evaluate and correct entire lightness of the image. Use **Lightness** slider of printer driver for tuning.
4. Compare grey balance of bottom scale. Use **Balance** sliders (R,G,B, C,M,Y, Hue, Balance or others).
5. Focus your attention on grey patches. Set up gradation by **Contrast** slider.
6. Evaluate primaries (row C). In a fact, there is not many possibilities how to setup precisely these colours, but printed hues would match the original.
7. Check individual hues in rows A and B. Differences in saturation and brightness must be adequate reproduced on print.
8. Compare saturation of medium saturated colours (rows A and B). You can improve colours purity using **Saturation** slider of your driver.
9. Check white point (D1 patch). If it is not clear enough, lower Contrast or Saturation and simultaneously higher the Ligtness level.
10. Investigate pastel colours (A2, A6, B2, B6). **Pastels** are very difficult to reproduce, but they are significant in image perception. Only slight modifications of driver settings (Balance and Saturation) are recommended with respect to predominating tint and light flesh tone patch.
11. **Repeat steps** 5 to 10 if necessary.
12. When you have achieved good match, **save your final settings** on disk (if it is possible) and make a record of the settings on final print. Use the same settings whenever you use the same paper/ink couple.