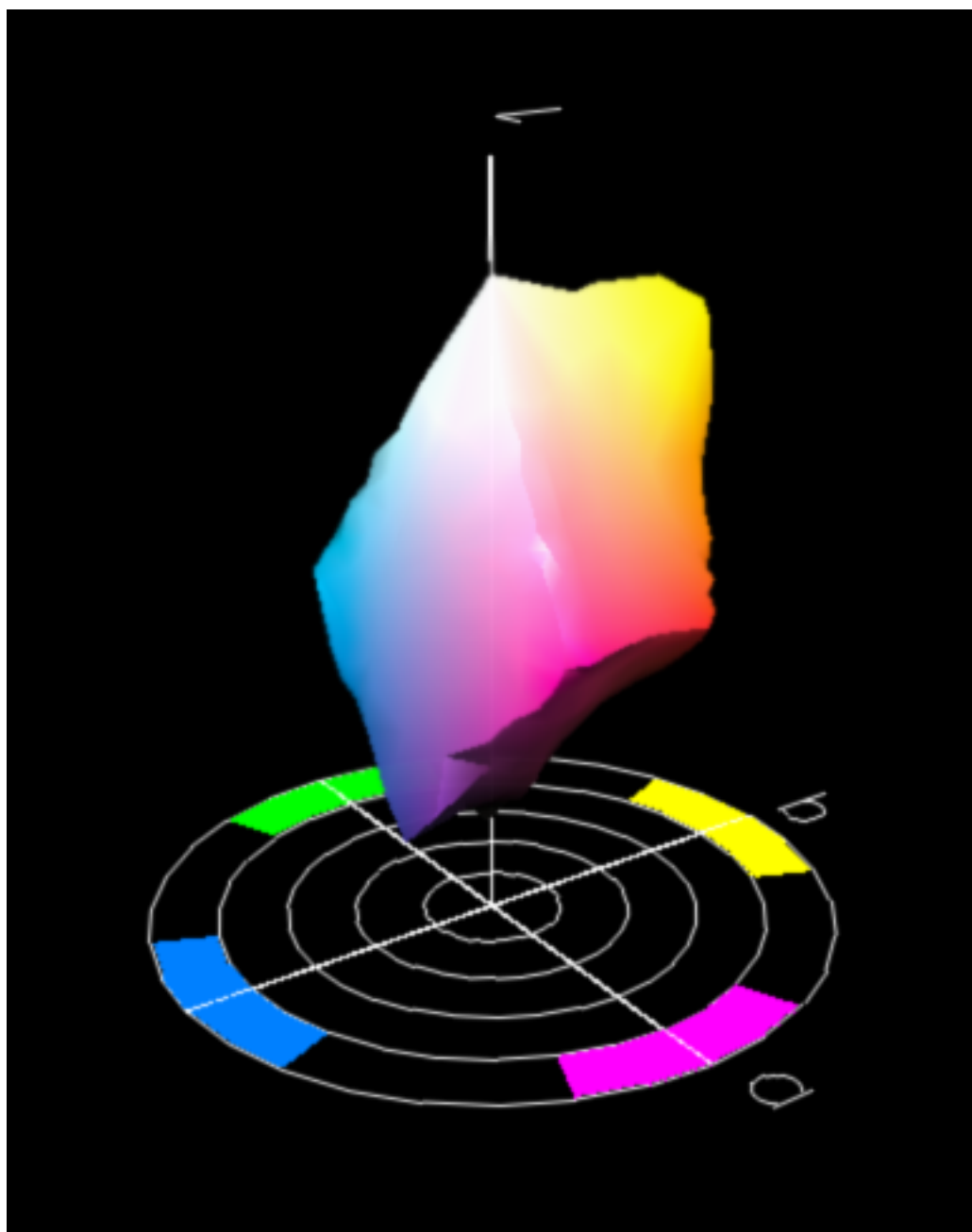


Gernot Hoffmann

# PostScript Color Management for OKI C9600



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# 1. Introduction

It is assumed that the reader has a printer OKI C 9600 or a similar machine, the OKI manuals and at least some basic knowledge about color management (CMS).

CMS by ICC profiles for OKI C9600 can be done *host based* or *printer based*. Printer based CMS is executed by the PostScript interpreter in the printer.

Printing PDFs by Acrobat (version 5.0) with host based CMS resulted in serious errors:

1. Black text and line art is printed by rich black CMYK.
2. Grayscale images are printed by rich black CMYK.
3. CMYK components are not directly printed as defined in the PDF.

This can be checked by printer test pages [1], [2]. All components are going through the ICC profile, which destroys the black generation. Even EPS components are affected.

The only solution is printer based PostScript CMS, which retains all features of PDFs, e.g. for the printer test pages (mainly pages 4,5 and 9).

The printer can apply one of three factory profiles. These are not perfect. They should be replaced by custom profiles. The factory profiles are built-in, but for tests they should be downloaded to the harddisk of the printer, like the custom profiles.

The access to these profiles is not defined by file names but by numbers.

A complete parameter set for a PageMaker printer style for PostScript CMS is shown.

Chapter 9 for printing by InDesign CS2 was added in May 2008.

An odd font problem for MathType MT-Symbol / MT-Extra was solved (the fonts could not be downloaded to the printer).

Title graphic by GMB ProfileEditor.

## Settings for Acrobat

Edit / Preferences / General / Page Display (since version 6)

Custom Resolution 72 dpi **and use zoom 100% for screenshots**

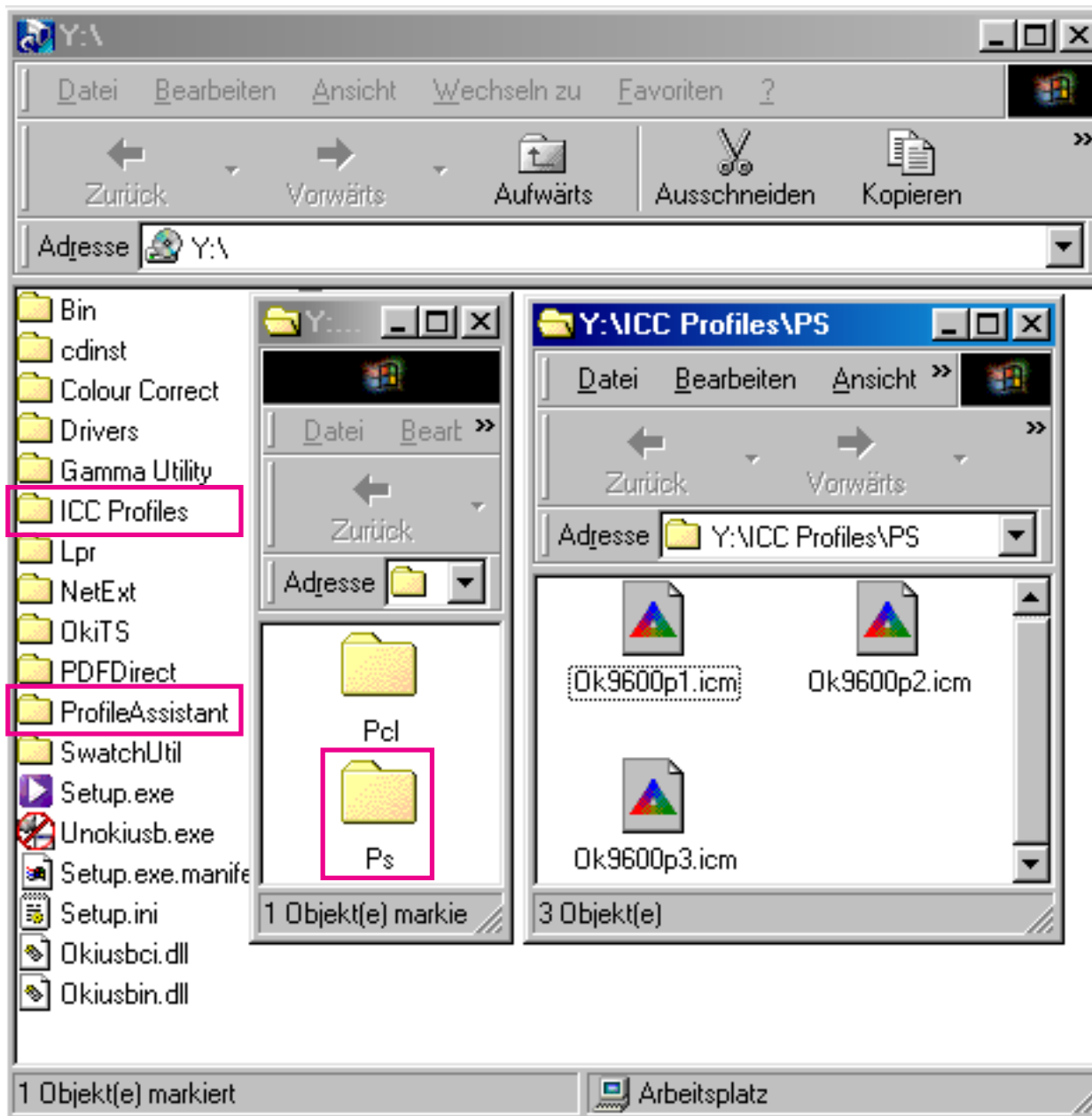
Edit / Preferences / General / Color Management (full version only)

sRGB

EuroscaleCoated or ISOCoated or SWOP

GrayGamma 2.2

## 2. Downloading profiles

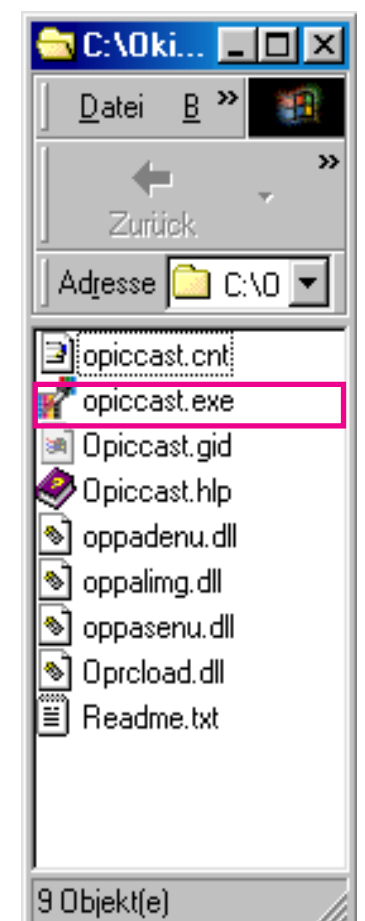
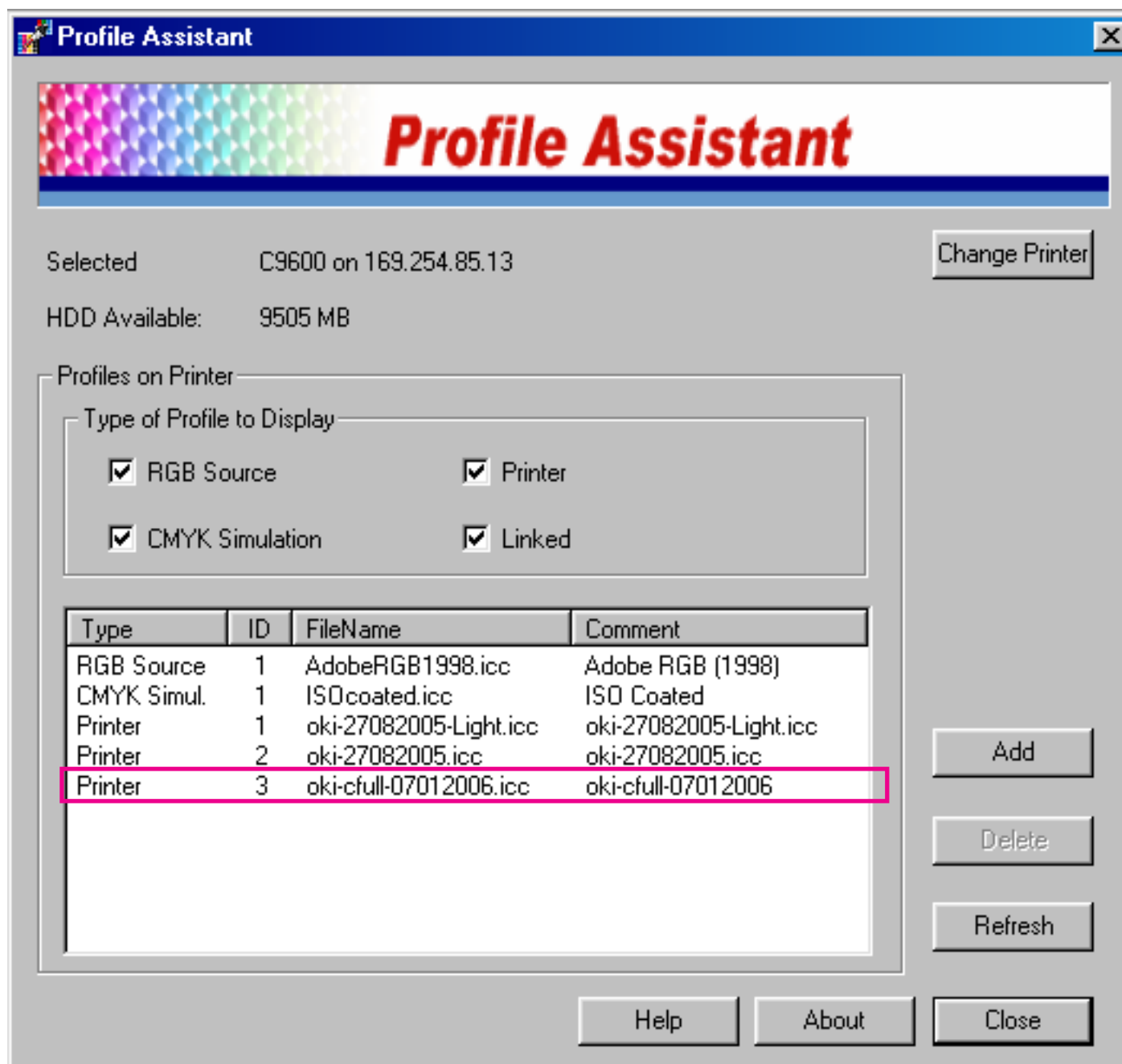


Copy from the CD 1 the factory profiles into the windows profile folder if required (left).  
Copy Profile Assistant opiccast.exe into a new folder.

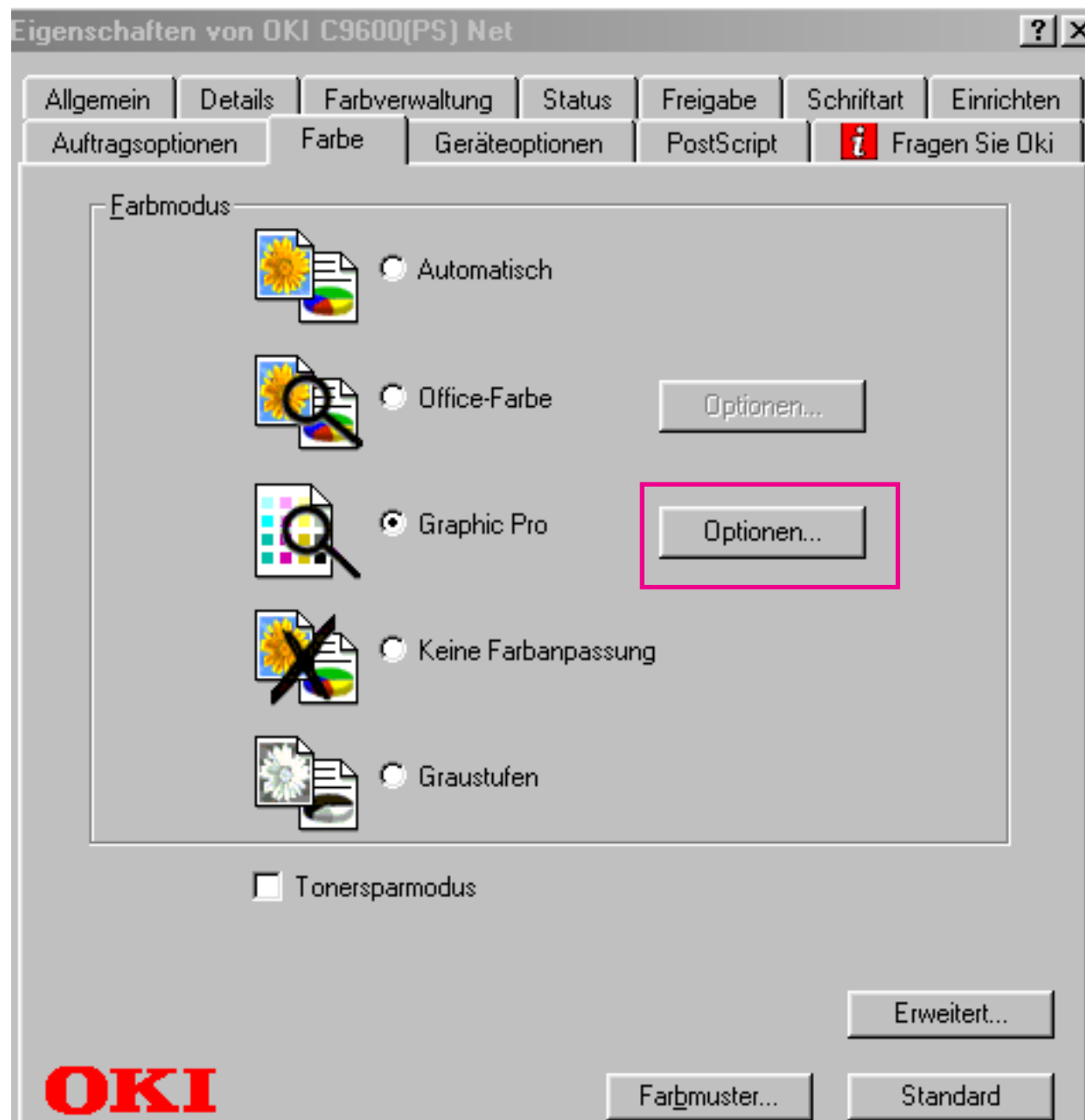
Make *Custom* ICC profiles by third party software.  
Run opiccast.exe and download the necessary profiles to the printer harddisk.  
Be sure to assign in future the same number to the same profile. Otherwise they are auto-numbered.

Example below:

RGB: AdobeRGB(98)  
CMYK Sim.: ISO Coated  
Printer 1: *Custom 1*  
Printer 2: *Custom 2*  
Printer 3: *Custom 3*



### 3. Setting PostScript color management



Check mode Graphic Pro.

Check ICC Color Management. This means printer based PostScript CMS.

Choose RGB input profile:

- sRGB  
As standard available
- Adobe RGB(98)  
Has to be downloaded

Choose CMYK profile:

- None  
For proof printing:
- Euroscale Coated  
As standard available
- ISO-Coated  
Has to be downloaded

Choose printer profile:

- *Custom 1 - 3*

Choose rendering intent:

- Perceptual  
As shown in example
- Relative Colorimetric  
This is mostly recommended for all applications

Choose black generation:

- Composite Black CMYK Standard
- K-only Black  
Pure gray, no color shift

Check

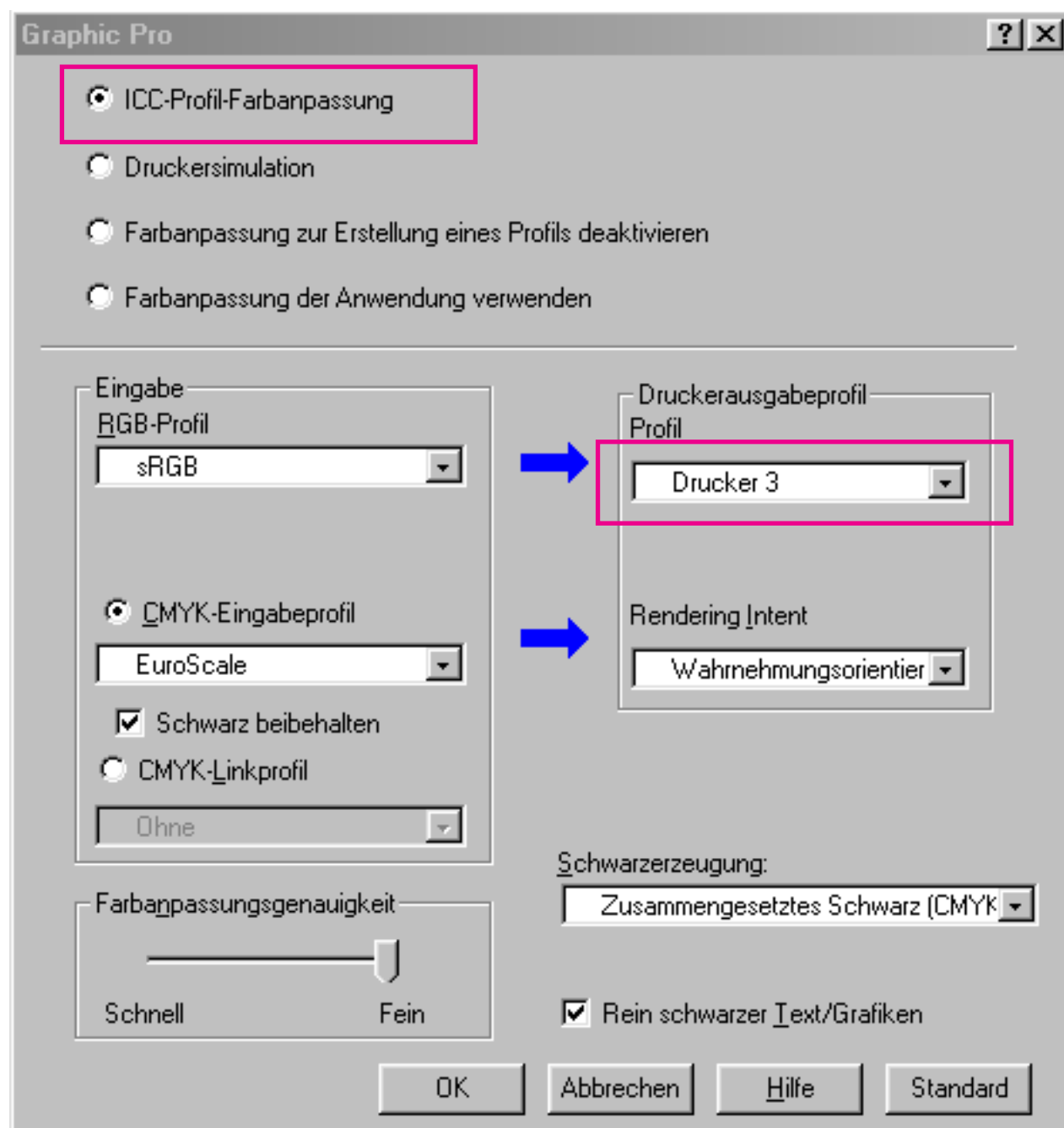
- Black text + line art K-only

About rendering intents:

Printer 3 (*Custom 3*) was optimized for Perceptual.

For proof printing use Relative Colorimetric or Absolute Colorimetric.

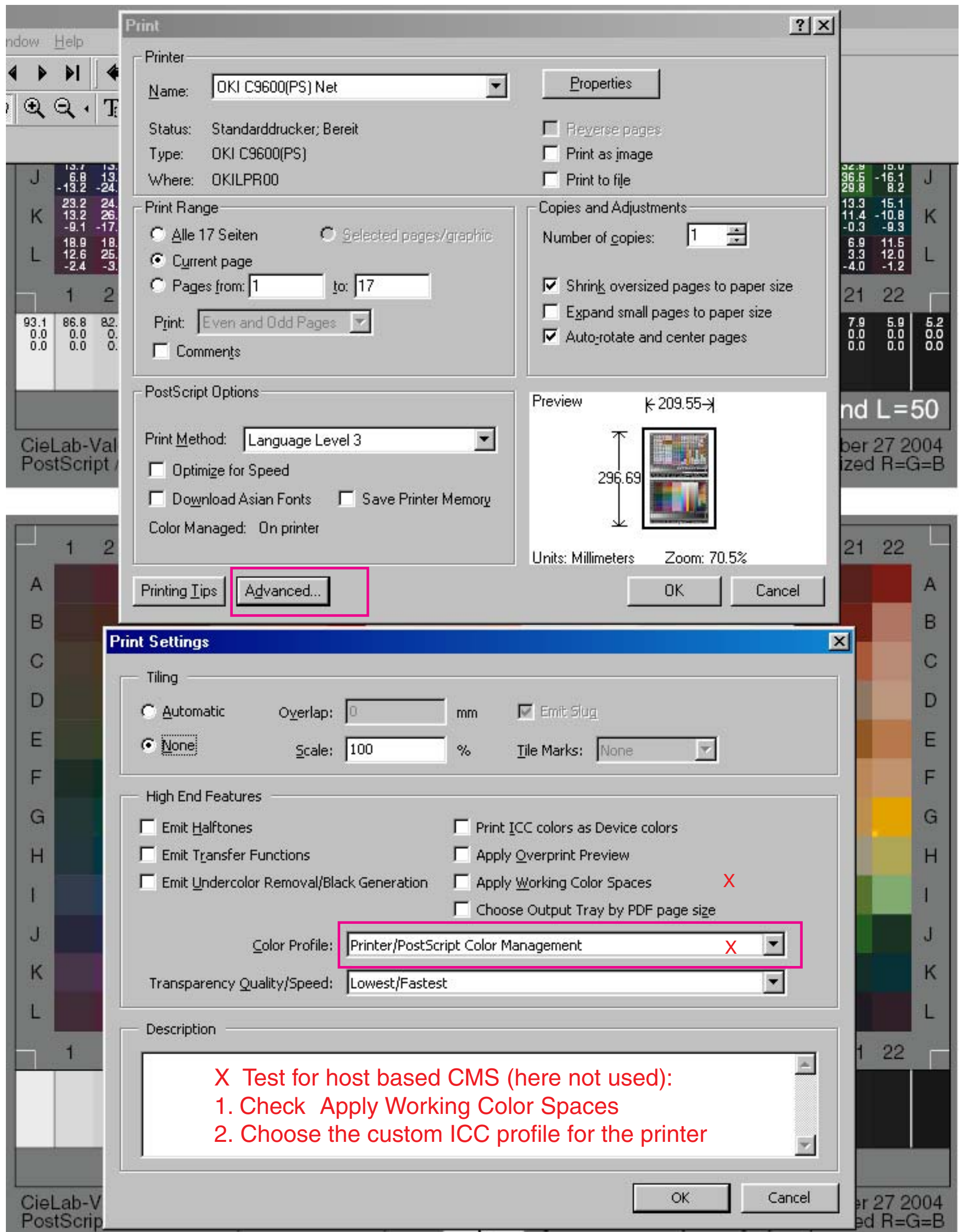
Absolute will put yellow ink on blue-ish paper.



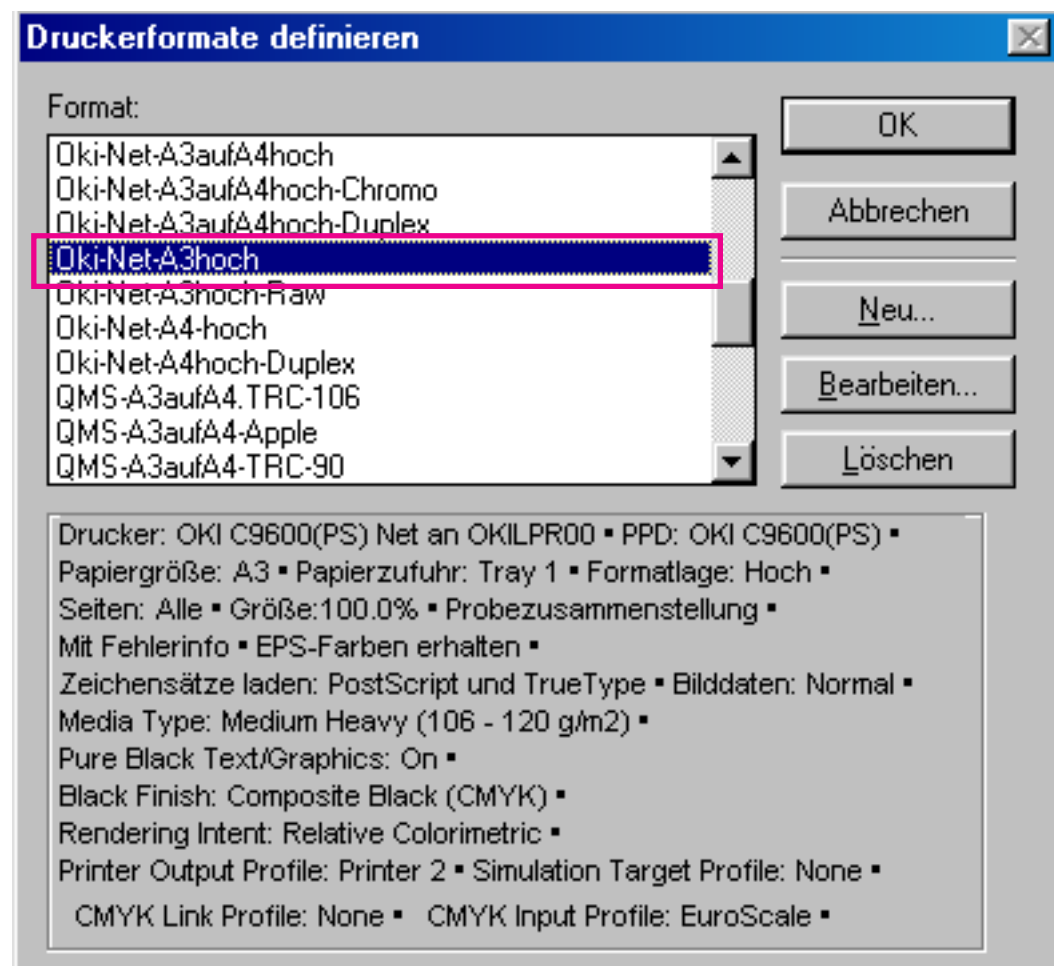
## 4. Settings for Acrobat

Choose Advanced.

Choose Printer / PostScript Color Management.



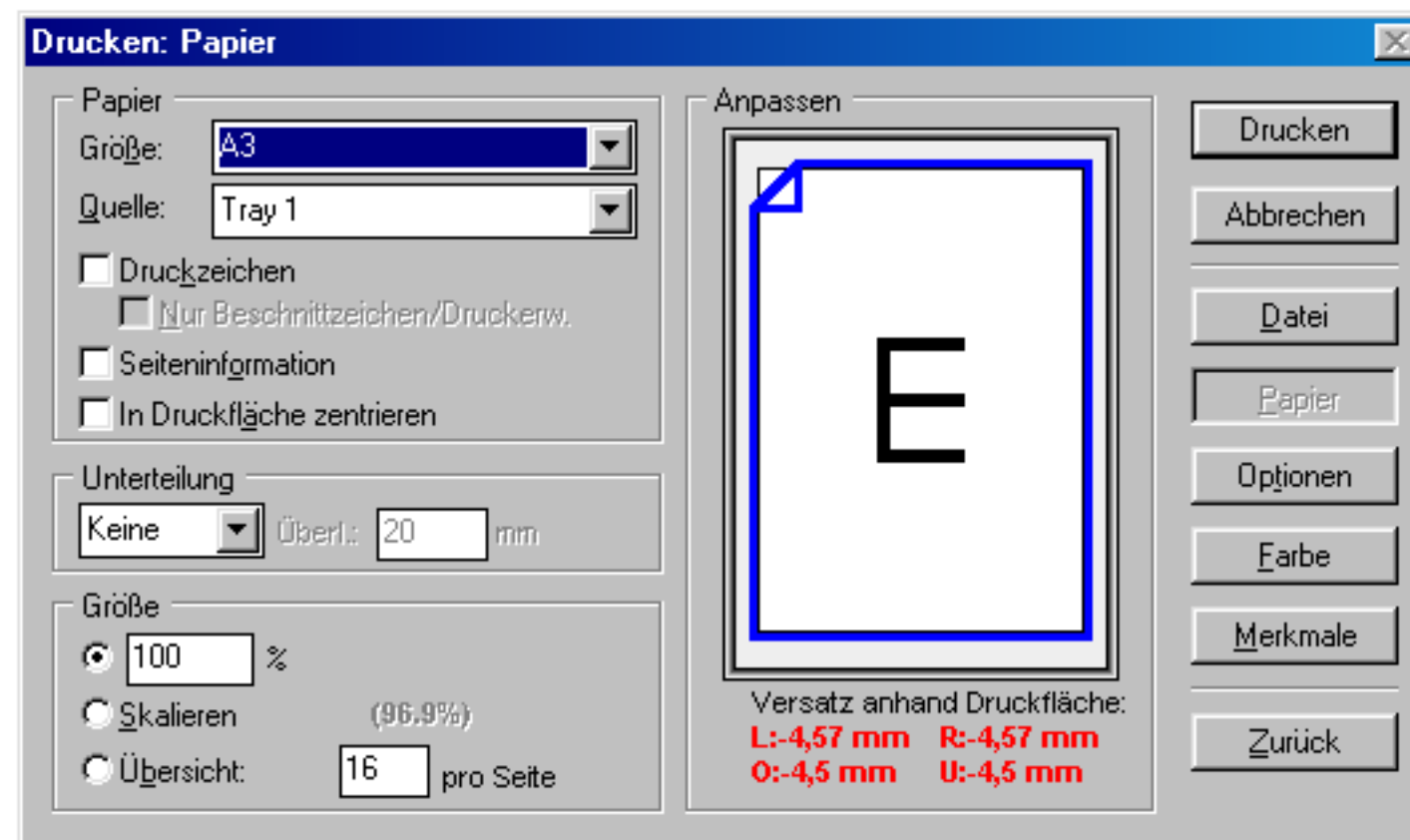
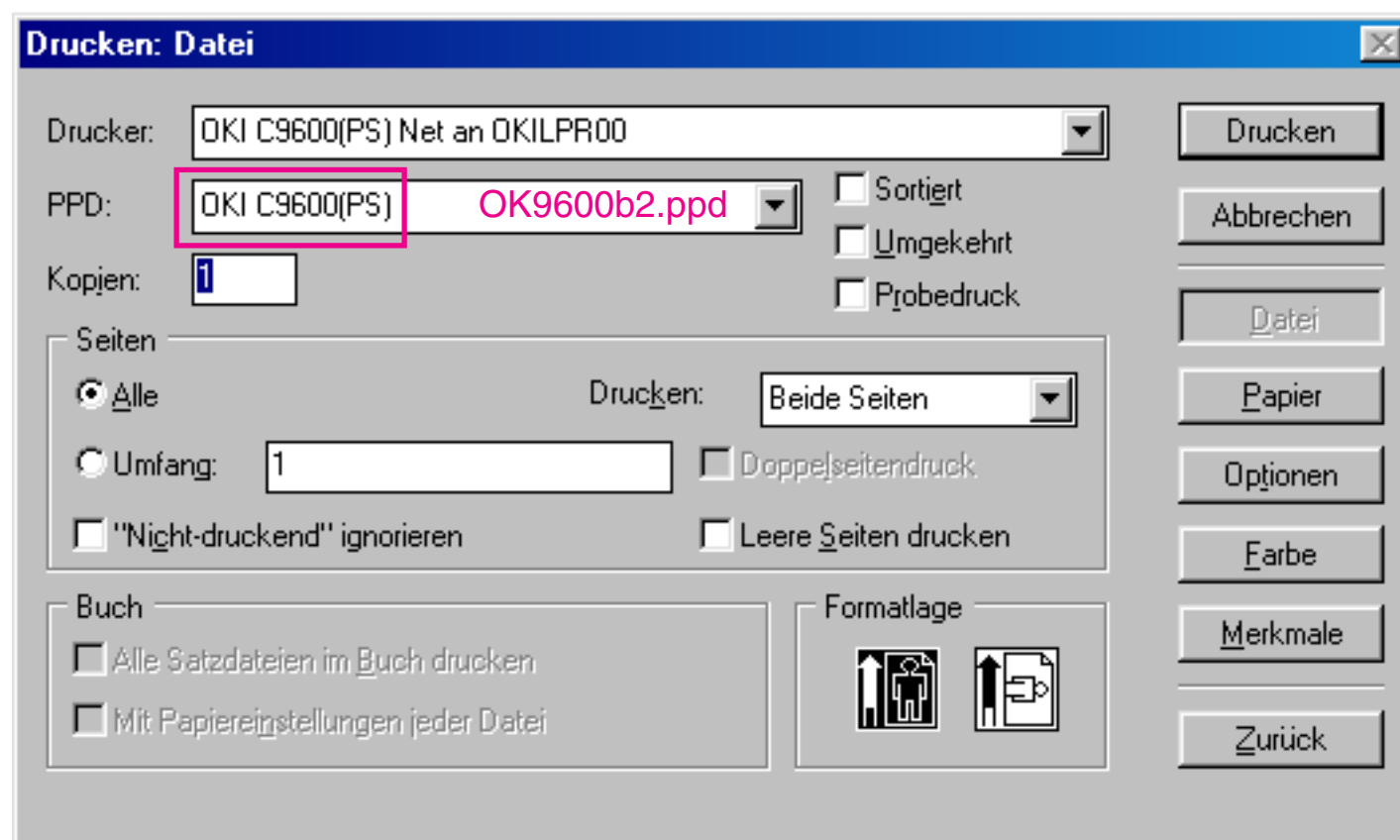
# 5.1 PageMaker printer style



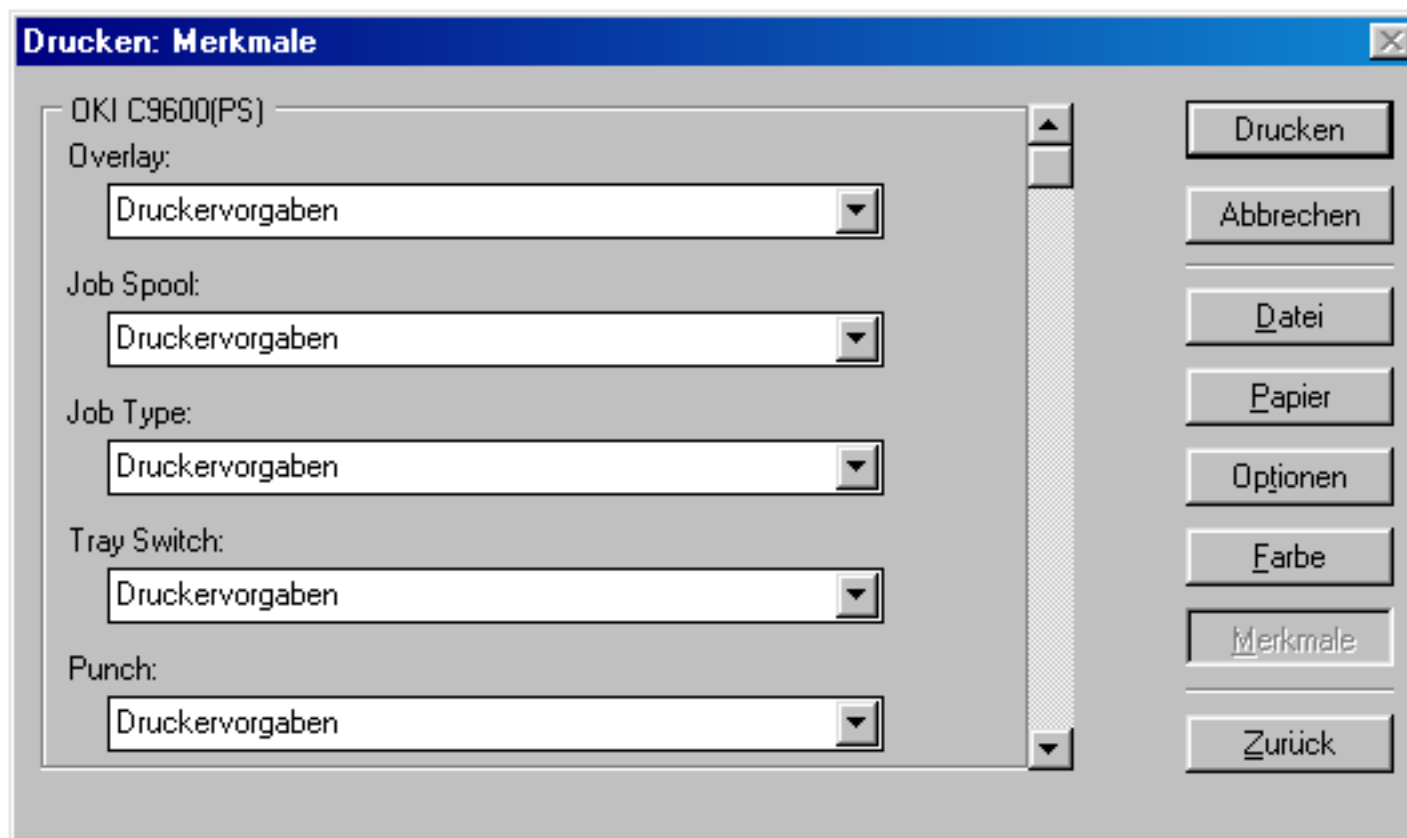
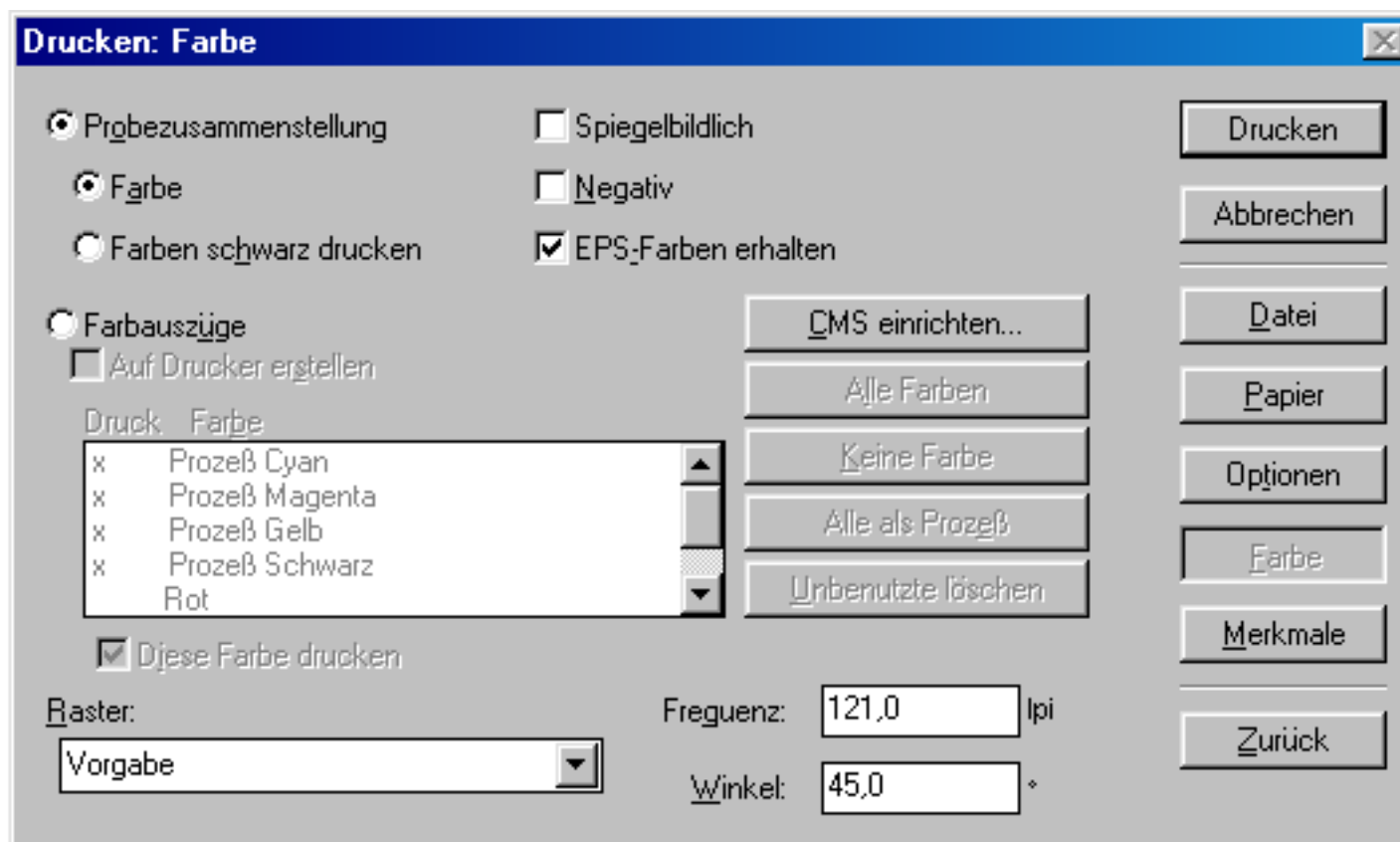
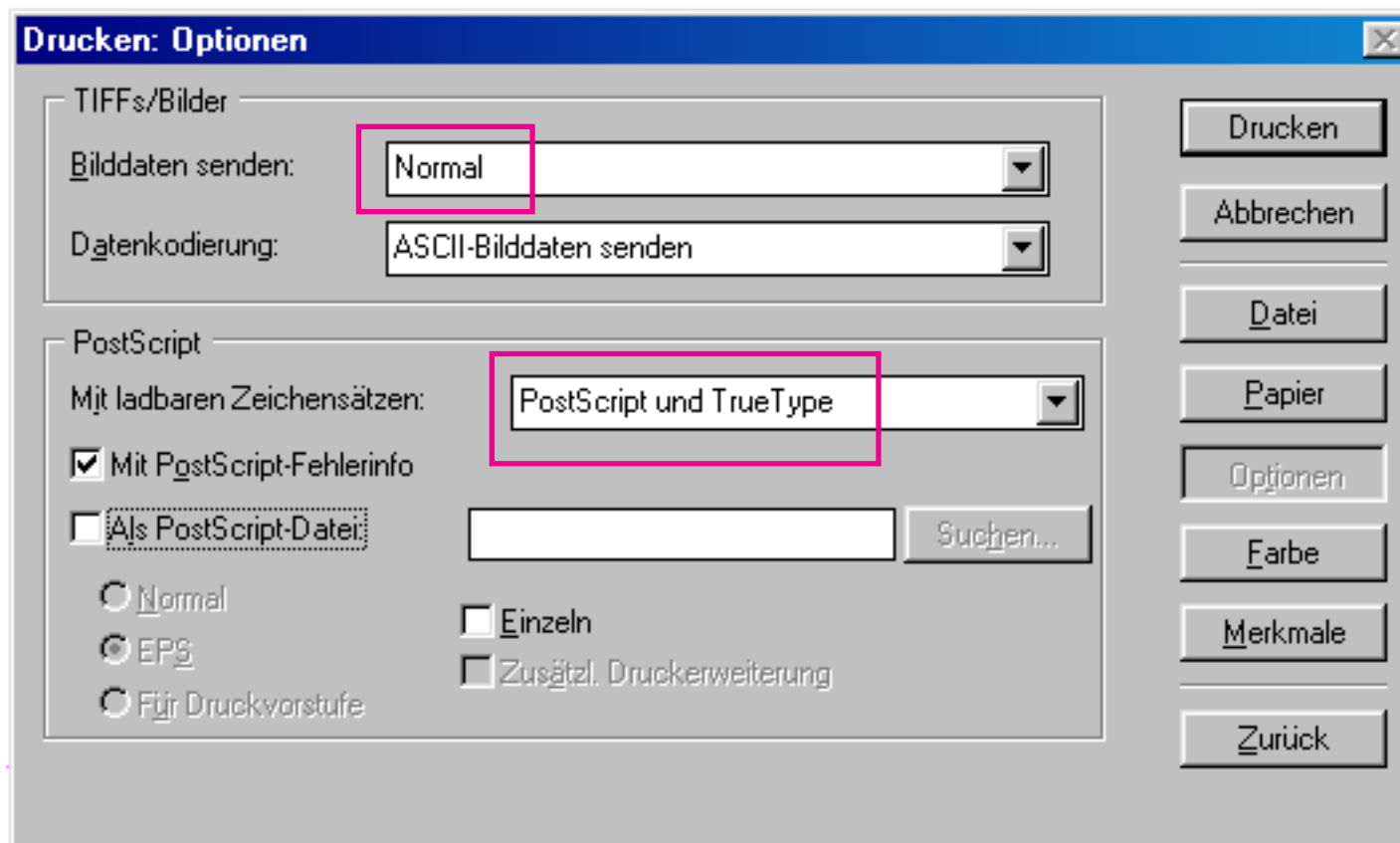
This chapter shows the installation of a PageMaker printer style.

Important features (sources of errors) are marked by magenta.

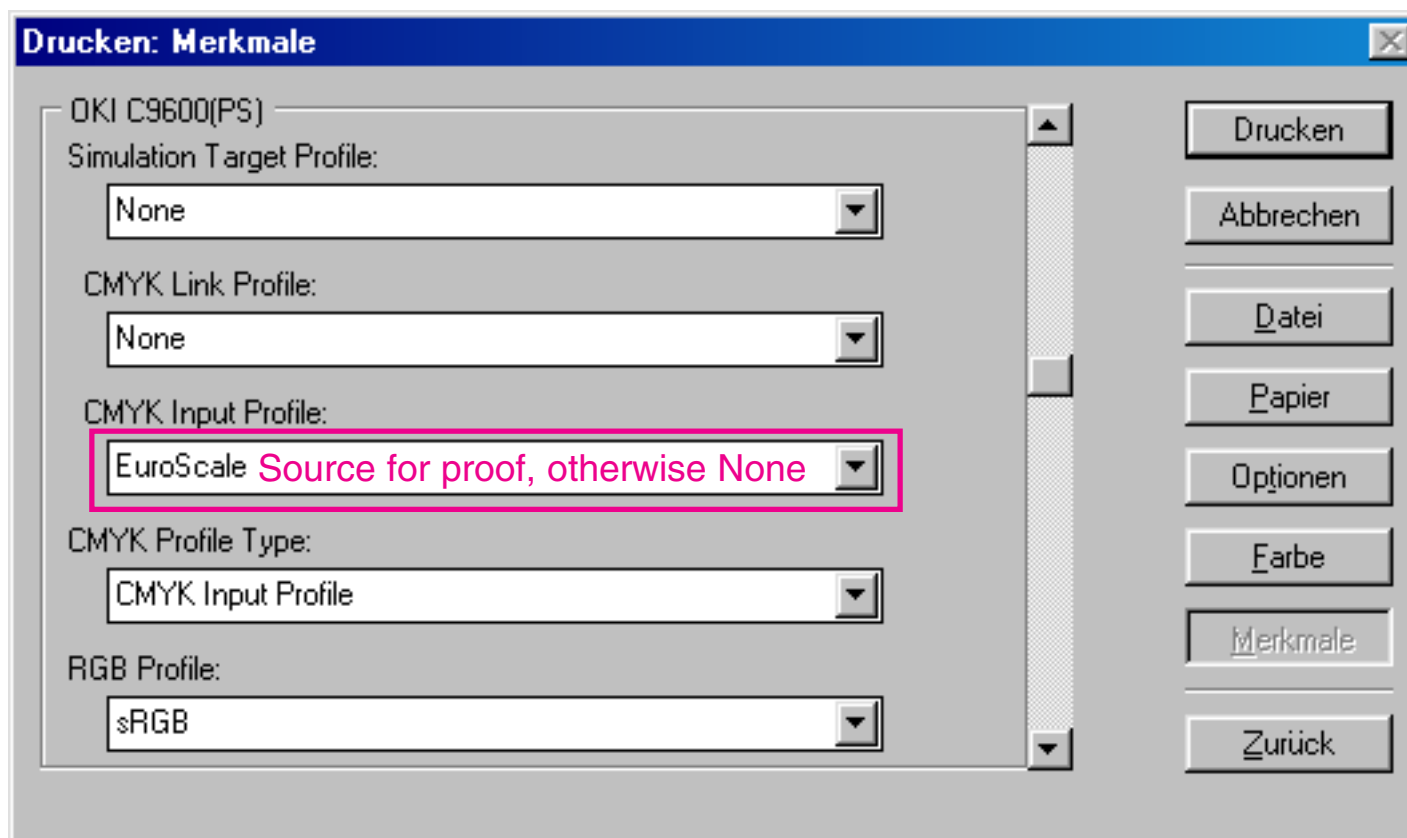
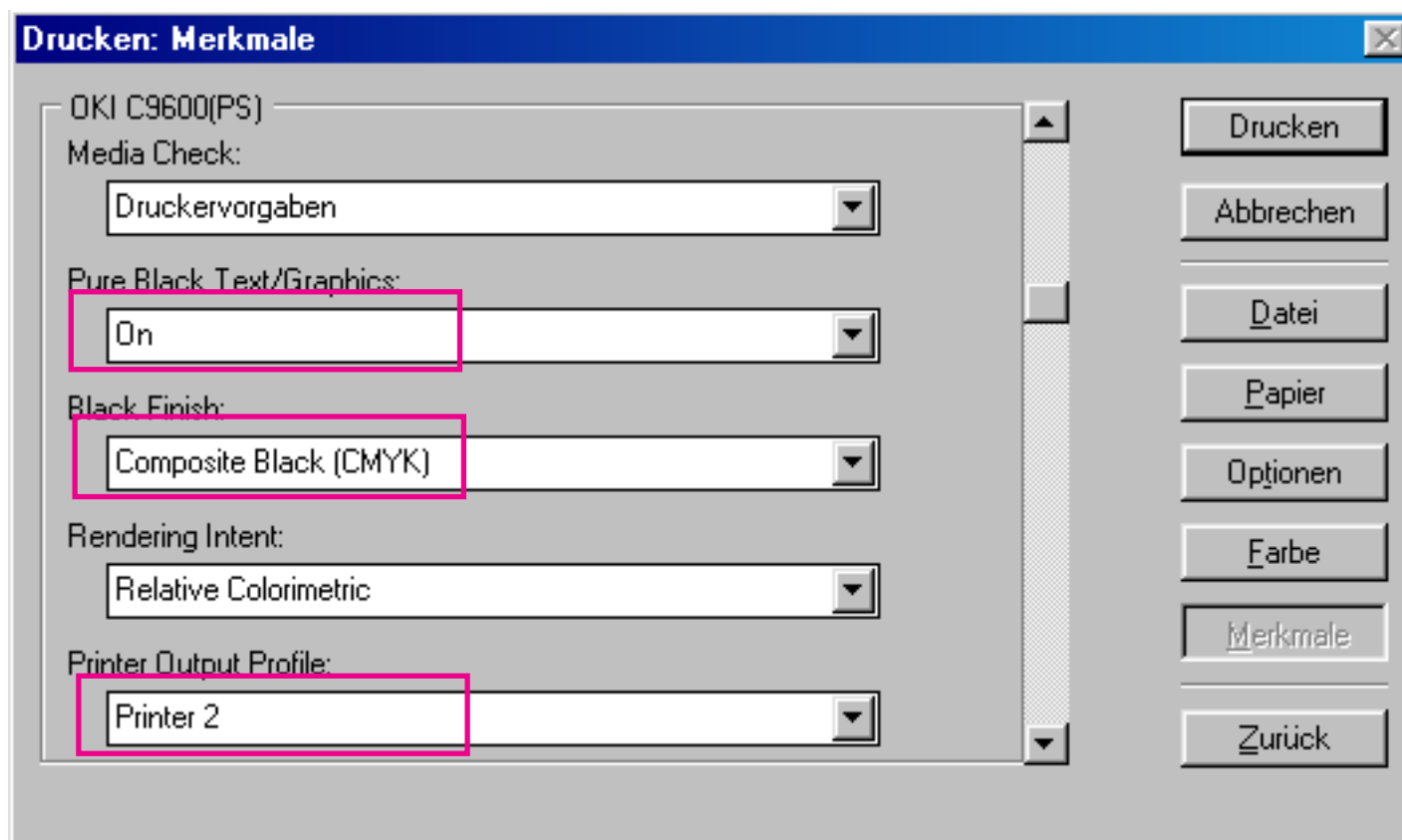
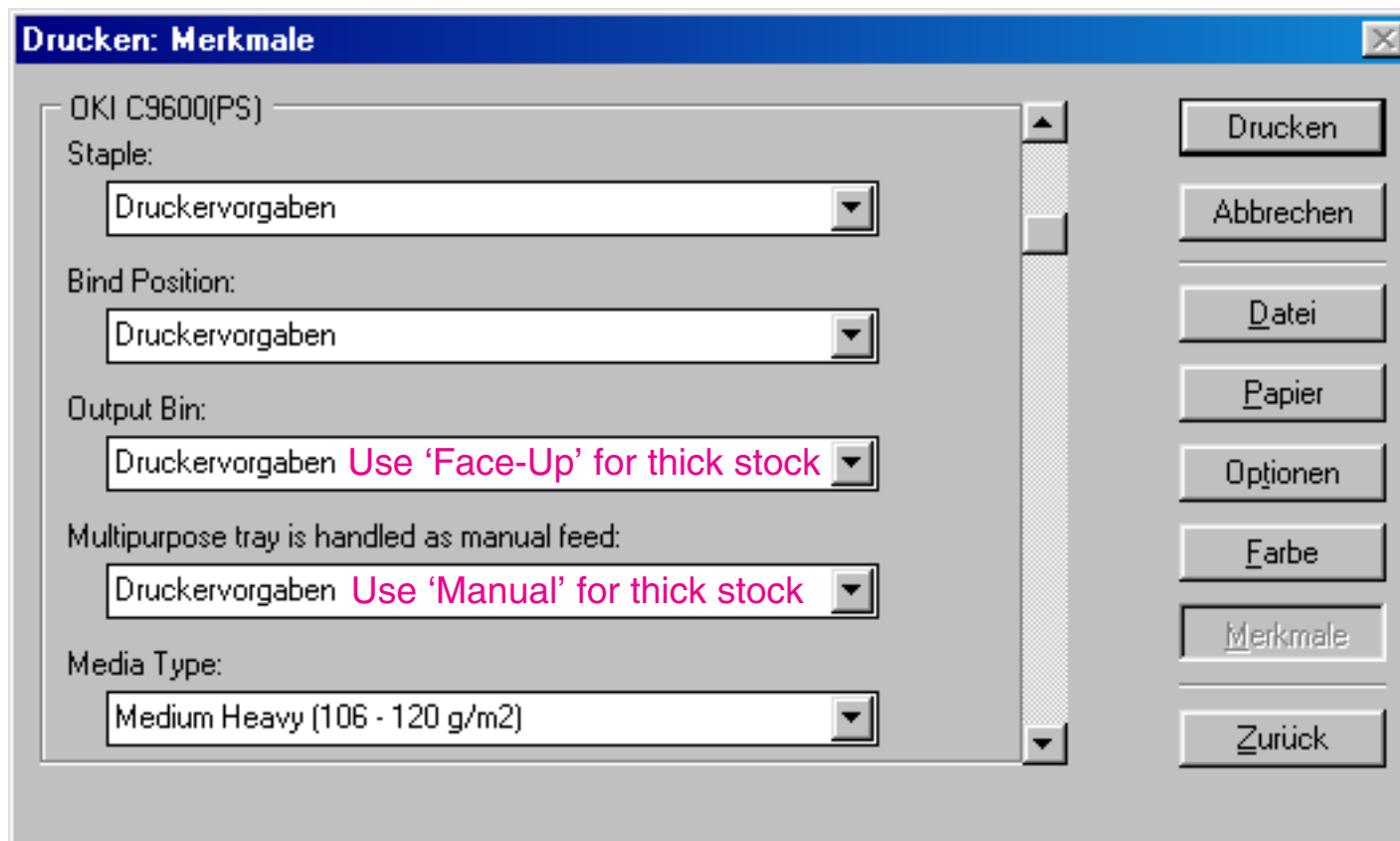
Copy OK9600b2.ppd into the folder PageMaker\...\PPD4



## 5.2 PageMaker printer style



## 5.3 PageMaker printer style



For proof printing use the source CMYK profile

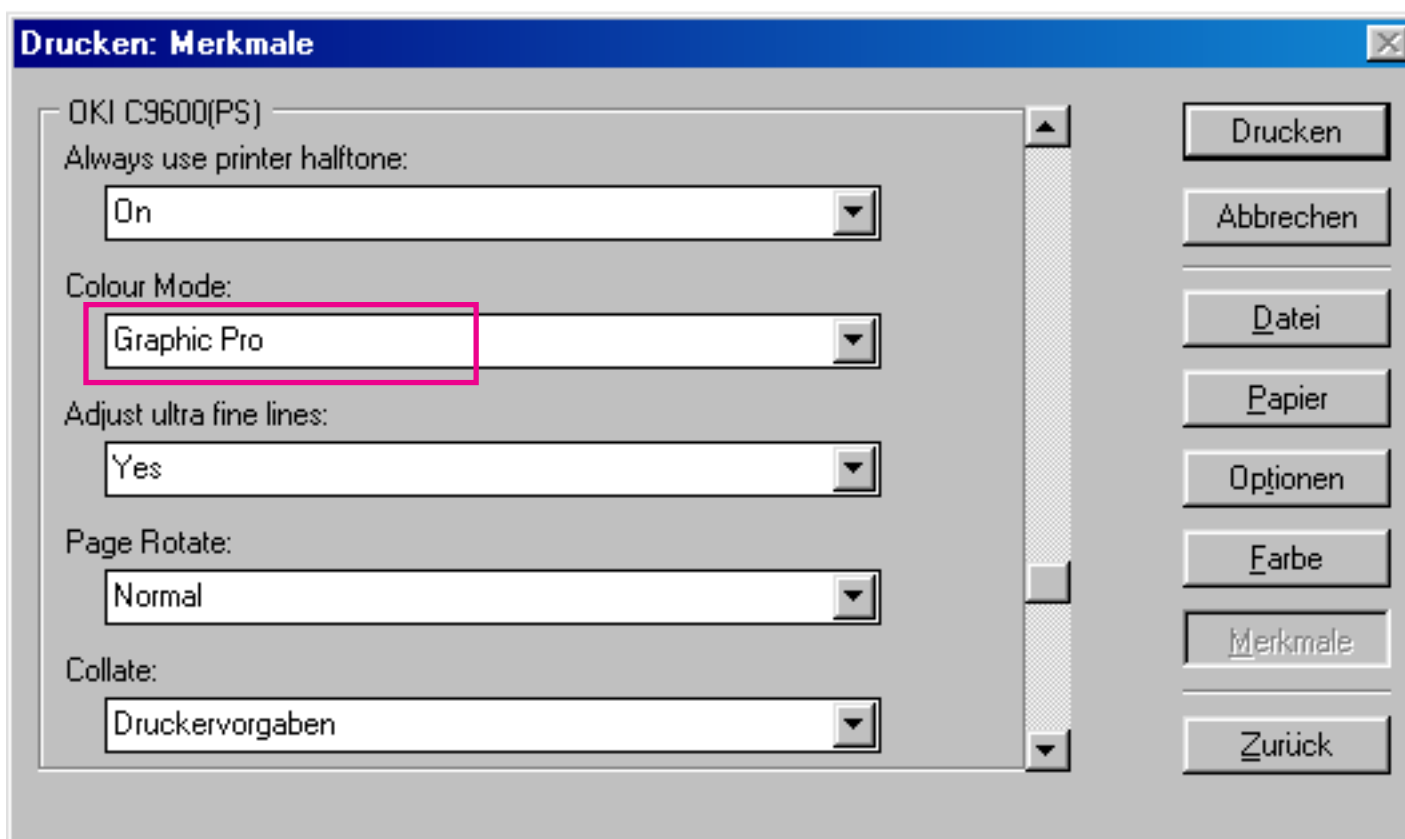
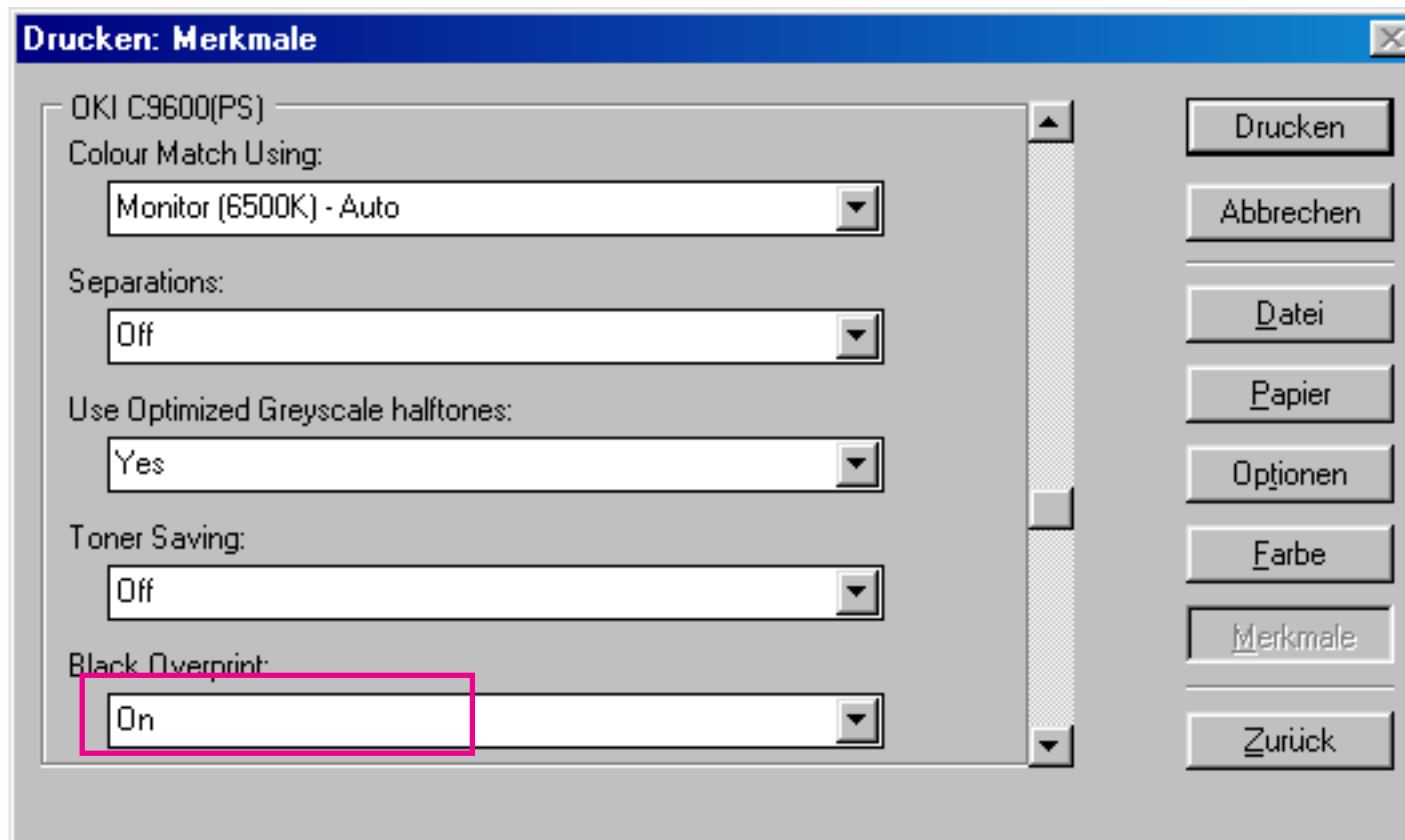
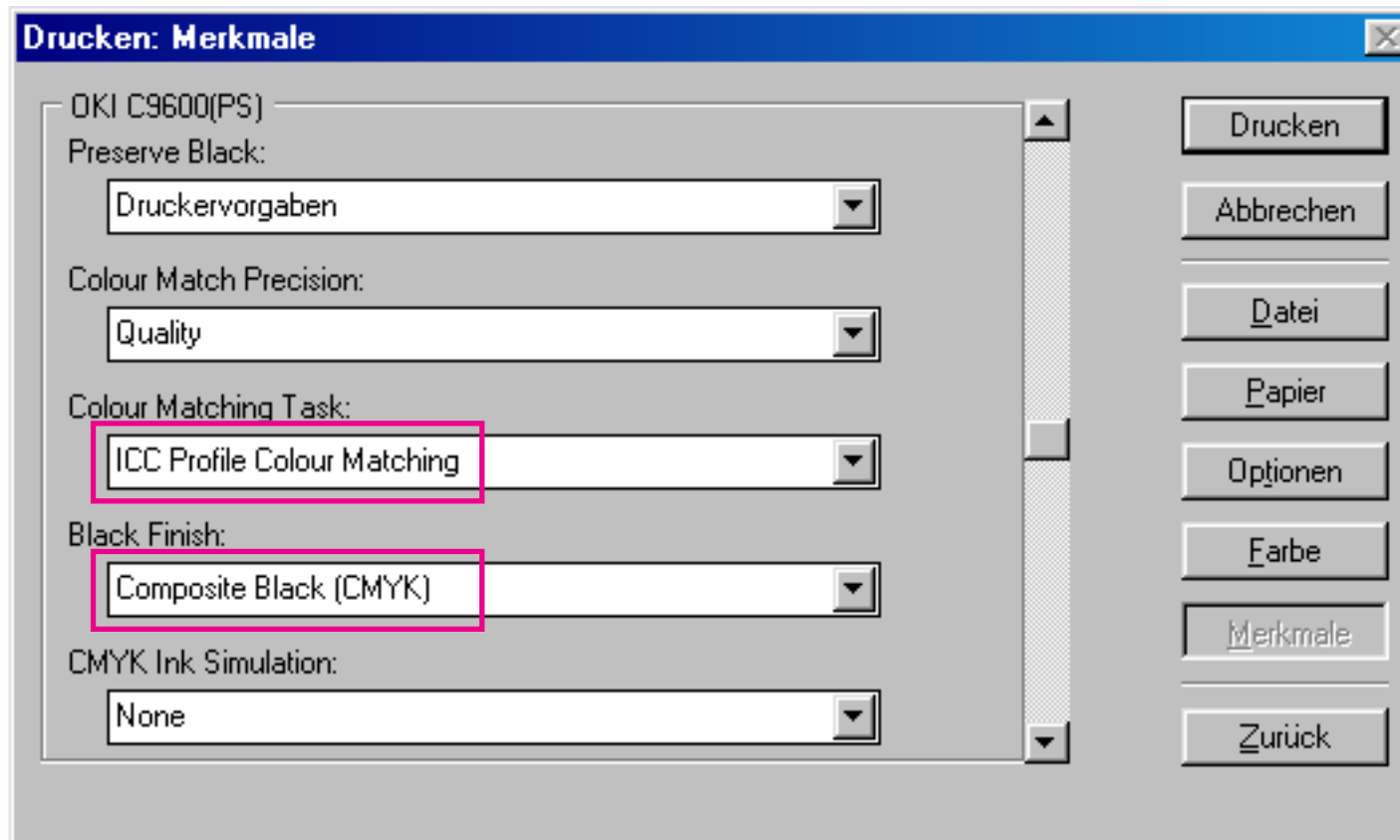
- Euroscale Coated
- ISO Coated

For printer tests use

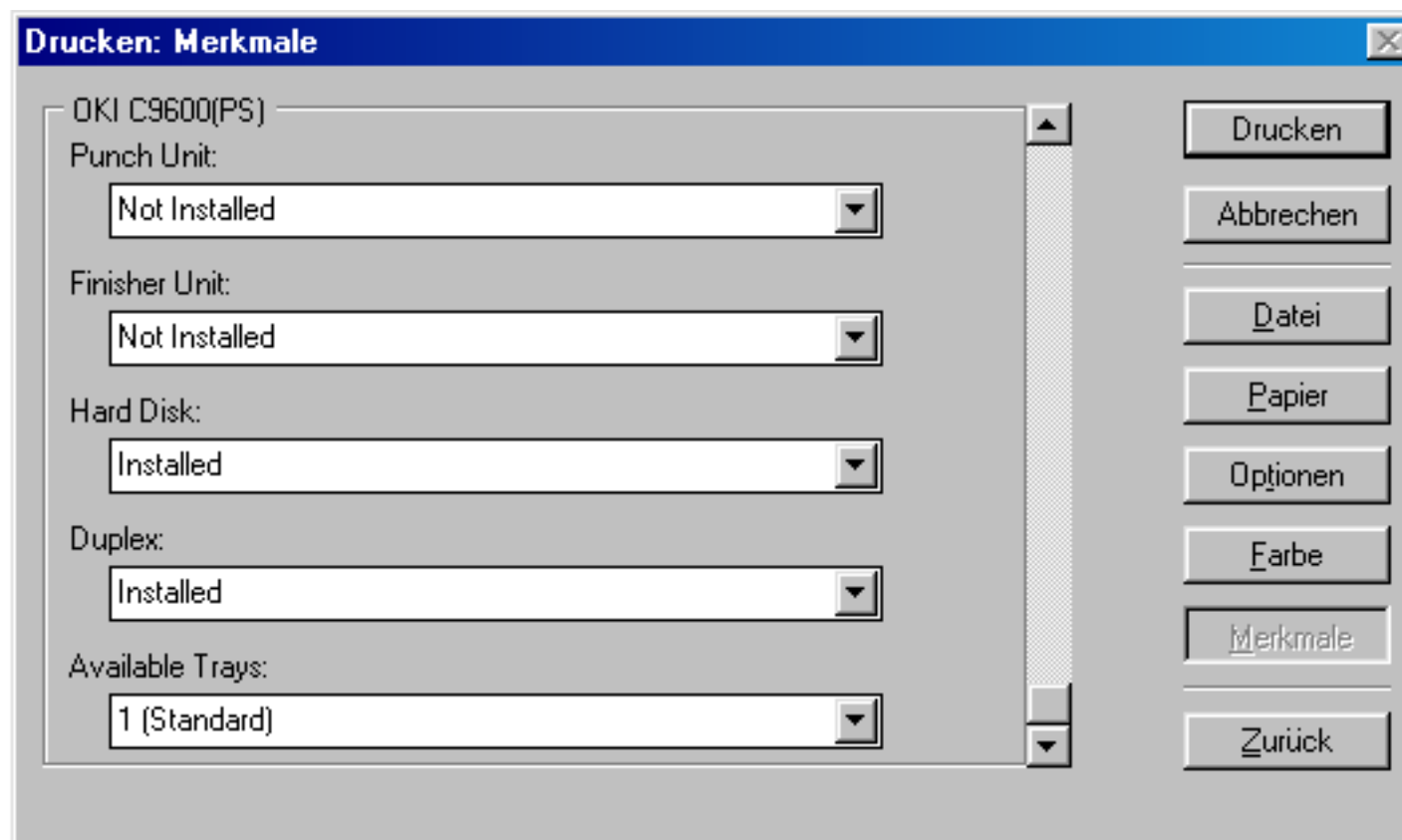
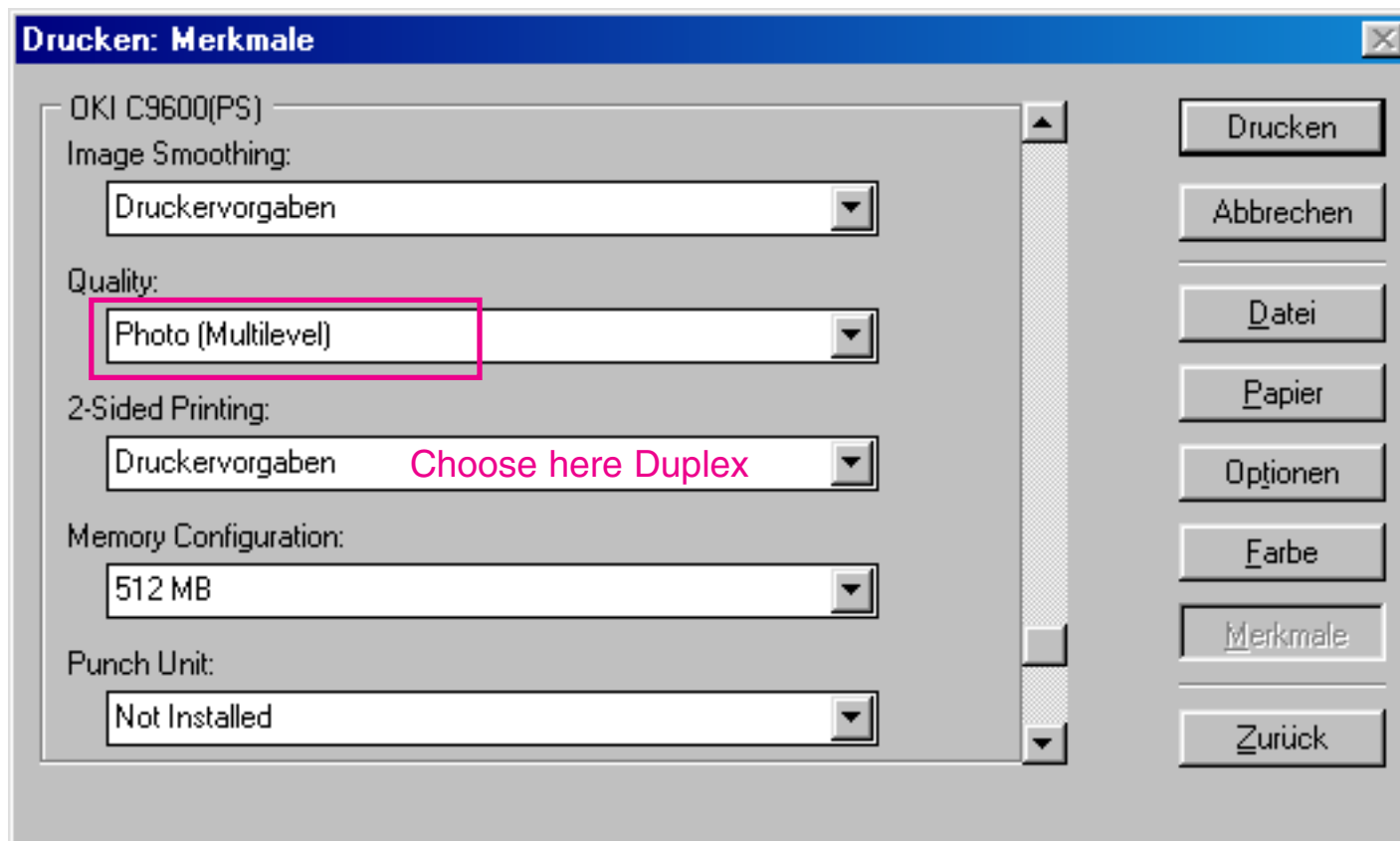
- None

This will show CMY wedges printed by pure inks.

## 5.4 PageMaker printer style



## 5.5 PageMaker printer style



# 6. Proof printing

Left: Offset print  
 Middle: OKI C9600 print  
 Right: Mutoh 6100 inkjet print

The CMYK input profile (chapter 3) is in this case ISO Coated.

The three samples were simultaneously scanned by 600 dpi/48 bit, placed in Photoshop using the scanner profile, converted to sRGB, descreened by Gaussian blur, downsampled for 144 dpi, sharpened by USM and converted to 24 bit. No manual color corrections were applied. 144dpi means synchronized pixels for zoom 200% in Acrobat.

The visual match between the three printed samples is fairly good, but because of different papers and printing modes the scanner profile is not accurately valid. Especially the scan of the Mutoh inkjet proof looks far too blue-ish in the face.

The background of the spectrophotometer top left is in all prints near to neutral (here rounded).

Offset: Lab = 90/-1/-3

OKI: Lab = 90/-1/-3

Mutoh: Lab = 90/0/0

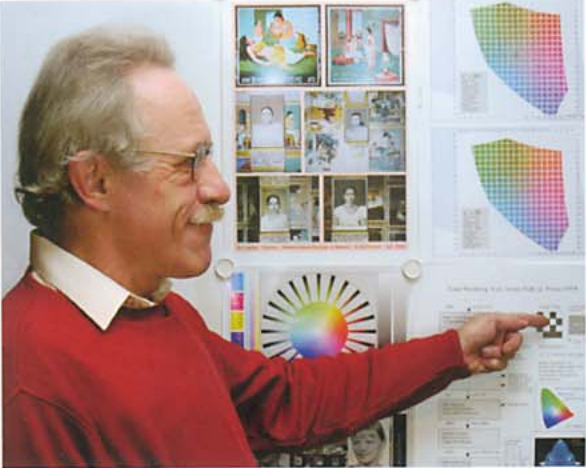
This shows once more that scanner calibration is highly doubtful. A scanner calibration is valid if the target and the samples were made exactly by the same process.

OFFSET

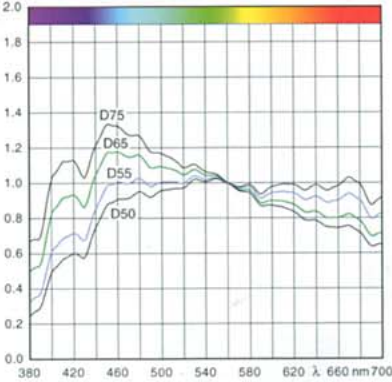

OKI

Mutoh

Wissenschaft und Praxis in einer Hand




Normspektren für Tageslicht

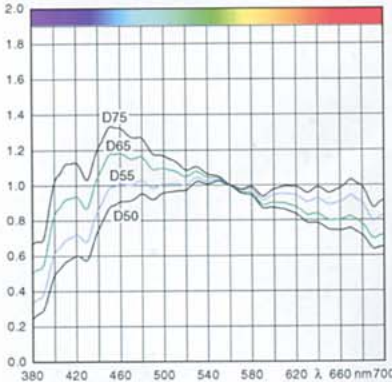




Spektrophotometer für die Drucker-Kalibrierung

Wissenschaft und Praxis in einer Hand




Normspektren für Tageslicht

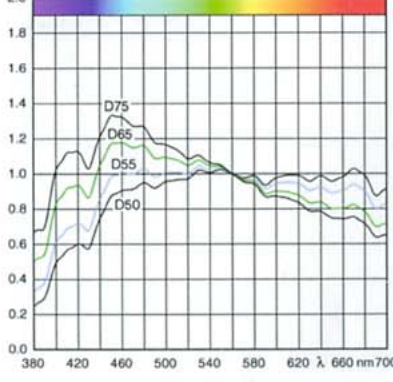




Spektrophotometer für die Drucker-Kalibrierung

Wissenschaft und Praxis in einer Hand

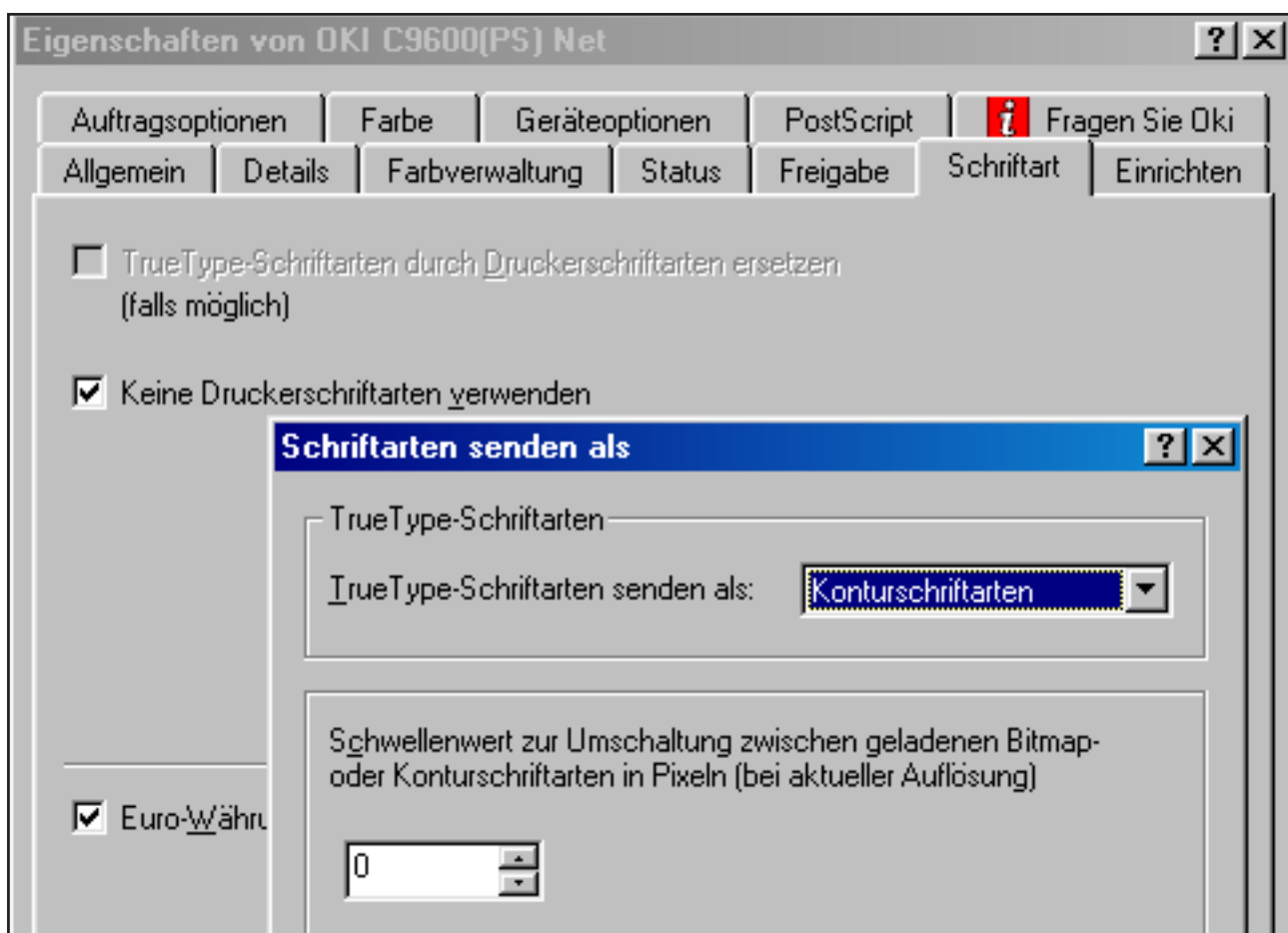
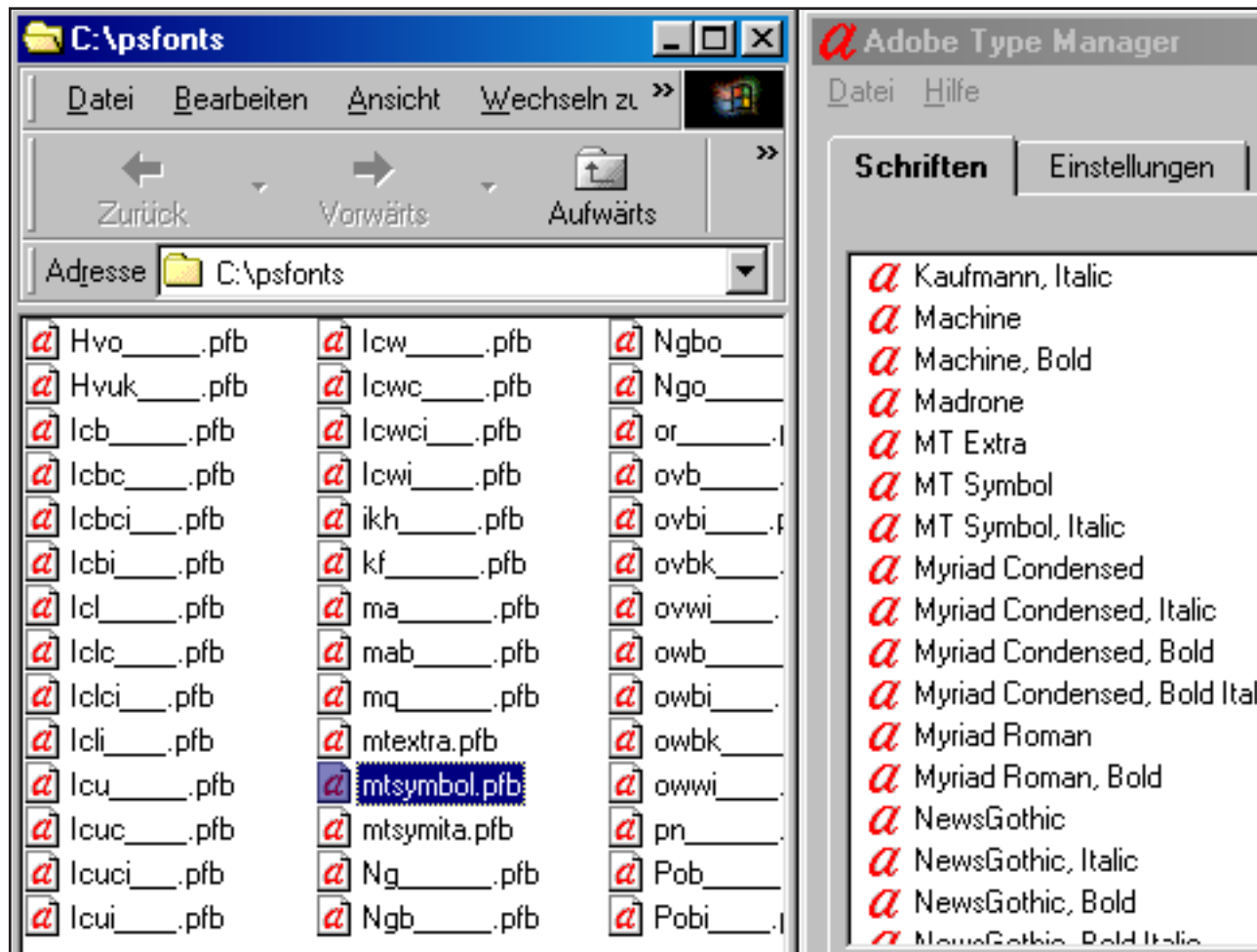


Normspektren für Tageslicht

Spektrophotometer für die Drucker-Kalibrierung

## 7.1 MathType 4 / MT-Symbol / MT-Extra



If MathType MT-Symbol or MT-Extra cannot be downloaded to the printer:

1. Delete *TrueType* MT-Symbol and MT-Extra in the Windows font folder.
2. Install *Type 1* MT-Symbol and MT-Extra from the MathType font folder into the PostScript folder C:\psfonts.
3. Search FontInfo.ini in the MathType font folder and add these lines (cyan).

```
; FontInfo.ini:
...
[Font1]
Name      = MT-Symbol
Encoding = Symbol
PSName1  = P,MT-SymbolP
PSName2  = I,MT-SymbolI
PSName3  = B,MT-SymbolB
```

```
[Font2]
Name      = MT-Extra
Encoding = MTExtra
PSName1  = P,MT-ExtraP
```

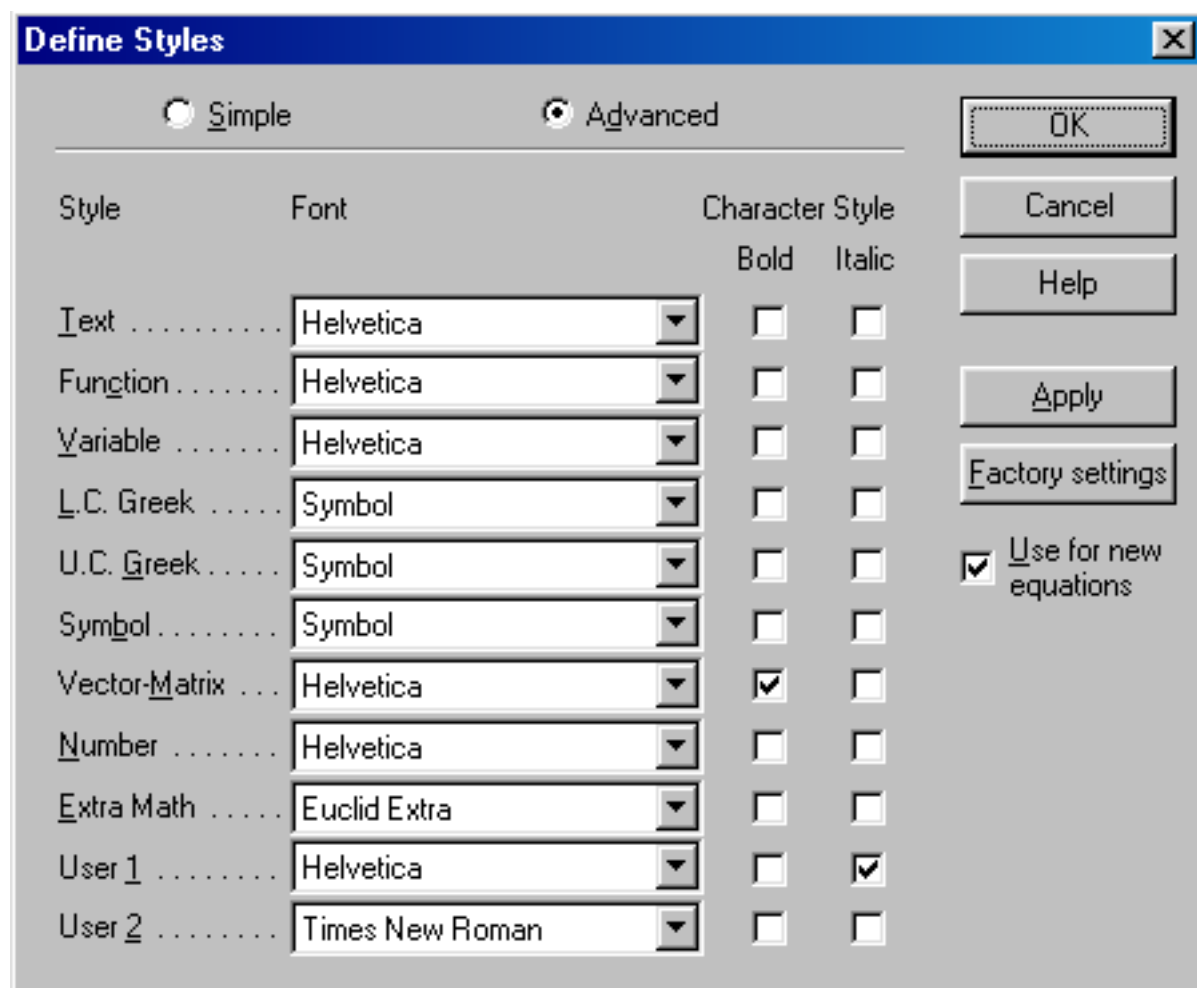
4. Re-boot.
5. Use MT-Symbol in MathType for Greek characters. This is now PostScript Type 1.
6. Use MT-Extra for Extra Math (e.g. for  $\dot{x}$ ,  $\ddot{y}$ ,  $\hat{=}$ ).
7. Save formula as EPS with TIFF preview and place in application program.

General font handling:

1. Do not use printer fonts.
2. Sent TrueType as outlines.

## 7.2 MathType 5 / Symbol

In MathType 5 everything is different. MT-Symbol is no more used. Instead of MT-Symbol plain Symbol is recommended.



This is no problem for new docs, but how can we handle old docs with MT-Symbol ?

Do not add anything to the manufacturer's file FontInfo.ini.

1. Convert all formulas to Symbol as above. This is really annoying.
2. If MT-Symbol is still installed in C:\psfonts, then we can distill old docs as usual. The warning 'either embedded in the EPS or not installed' can be ignored. The PDF is correct and will be printed correctly.

But it is not possible to print such an old doc directly by PageMaker - formulas are garbled.

# 8.1 Printing the calibration target

Be sure that Color Management is Off in both systems:

**Oki**  
Printer Settings

**Photoshop**  
Print with Preview

Define here CMS=Off for the printer !

The image shows two overlapping windows. The top window is titled "Eigenschaften von OKI C9600(PS) Net" and has tabs for "Allgemein", "Details", "Farbverwaltung", "Status", "Freigabe", "Schriftart", "Einrichten", "Auftragsoptionen", "Farbe", "Geräteoptionen", "PostScript", and "Fragen Sie Oki". The "Farbmodus" section contains four radio button options: "Automatisch", "Office-Farbe", "Graphic Pro", and "Keine Farbanpassung". The "Keine Farbanpassung" option is selected and highlighted with a pink box. Below this is a color calibration target chart with 5 rows and 24 columns of color patches.

The bottom window is titled "Print" and shows a preview of the color calibration target. To the right of the preview are settings for "Position" (Top: 8,29 cm, Left: 1,23 cm, Center Image checked) and "Scaled Print Size" (Scale: 100%, Height: 24,483 cm, Width: 26,247 cm, Show Bounding Box checked, Print Selected Area unchecked). On the right side of the dialog are buttons for "Print...", "Cancel", "Done", and "Page Setup...".

At the bottom of the "Print" dialog, there is a "Color Management" section with a dropdown menu set to "Color Management". Below it are "Source Space" settings: "Document: Document: Untagged CMYK" and "Proof: Proof Setup: ISO Coated". The "Print Space" section has a "Profile" dropdown menu set to "Same As Source" (highlighted with a pink box) and an "Intent" dropdown menu set to "Relative Colorimetric". There is also a "Use Black Point Compensation" checkbox which is unchecked.

# 9.1 Printing by InDesign CS2 / General

The test image is a version of the GretagMacbeth ColorChecker (Registered Trademarks). Based on available CIE Lab data, a synthetic EPS version [6] was programmed by PostScript, loaded in Photoshop in mode Lab and converted into the CMYK space ISO Coated. By Soft Proofing and Gamut Warning it could be shown that the doc is entirely in gamut for ISO Coated. Color 18 is just a little out of gamut for sRGB. This is the EPS version, the CMYK version looks alike:

Number	Lab L*	Lab a*	Lab b*	sRGB R	sRGB G	sRGB B
1	37.99	13.56	14.06	115.52	80.92	67.37
2	65.71	18.13	17.81	198.57	147.21	128.68
3	49.93	-4.88	-21.93	90.59	122.38	155.79
4	43.14	-13.10	21.91	89.72	107.65	64.38
5	55.11	8.84	-25.40	129.55	127.99	176.08
6	70.72	-33.40	-0.20	92.40	189.92	172.02
7	62.66	36.07	57.10	224.27	123.73	46.69
8	40.02	10.41	-45.96	67.88	91.23	170.18
9	51.12	48.24	16.25	198.32	81.92	97.05
10	30.33	22.98	-21.59	93.64	58.00	105.60
11	72.53	-23.71	57.26	158.73	188.97	62.82
12	71.94	19.36	67.86	230.42	161.62	39.25
13	28.78	14.18	-50.30	35.37	63.33	147.11
14	55.26	-38.34	31.37	66.89	148.92	74.12
15	42.10	53.38	28.19	179.91	48.66	56.96
16	81.73	4.04	79.82	238.29	198.44	19.71
17	51.94	49.99	-14.57	193.07	83.98	150.57
18	51.04	-28.63	-28.64	0.00	136.21	169.71
19	96.54	-0.43	1.19	244.95	245.22	242.69
20	81.26	-0.64	-0.34	200.35	202.22	202.41
21	66.77	-0.73	-0.50	160.70	162.85	163.27
22	50.87	-0.15	-0.27	120.68	121.20	121.56
23	35.66	-0.42	-1.23	82.44	84.11	85.79
24	20.46	-0.08	-0.97	48.66	49.36	50.71

GMB ColorChecker (TM) / Template CIE Lab by G.Hoffmann / December 30 2006

Photoshop, InDesign, Illustrator and Acrobat were synchronized for these settings: RGB=sRGB, CMYK=ISO Coated, Gray=BlackInk-ISO Coated, Spot=DotGain20%.

The CMYK version was placed in InDesign CS2 (called ID). It is very important to assign ISO Coated explicitly. There seems to be no assignment just by defining the master color spaces.

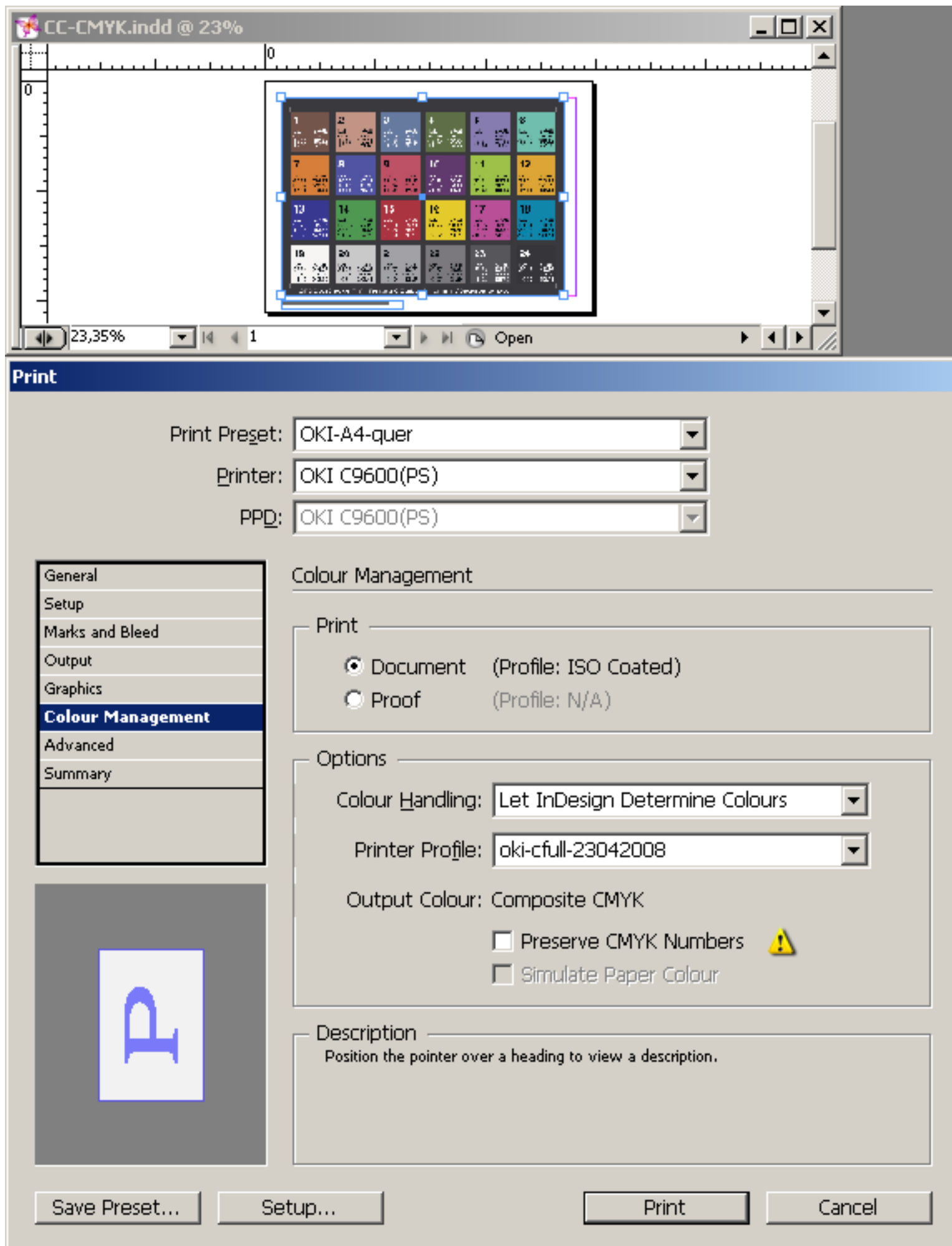
InDesign ignores Gray settings. Grayscales are shown as device gray. If the monitor is calibrated for Gamma=2.2, then only Grayscales with Gama=2.2 are shown correctly. This is here not relevant because the test image is defined in CMYK by ISO Coated.

The next images are scans from prints. Because the prints are screened, they were scanned with 600dpi, 24 bits, without corrections (,raw'). In Photoshop the scanner profile was assigned. The image was filtered by Gaussian blur until the dots were almost not perceivable, then downsampled for 300ppi. This PDF doc can contain further downsampling to 144ppi or 72ppi. Scanner profiles are valid only for images which were created by the same process as the target (a photographic target). Therefore the scanner calibration is of limited value.

## 9.2 Printing by ID CS2 / Document / Host based

The first mode is ,Document' with host based color management.

In the upper illustration the image was selected in order to assign ISOCoated. CMYK profiles are (here) generally not embedded, therefore one global assignment - even without selecting an image - should be sufficient.

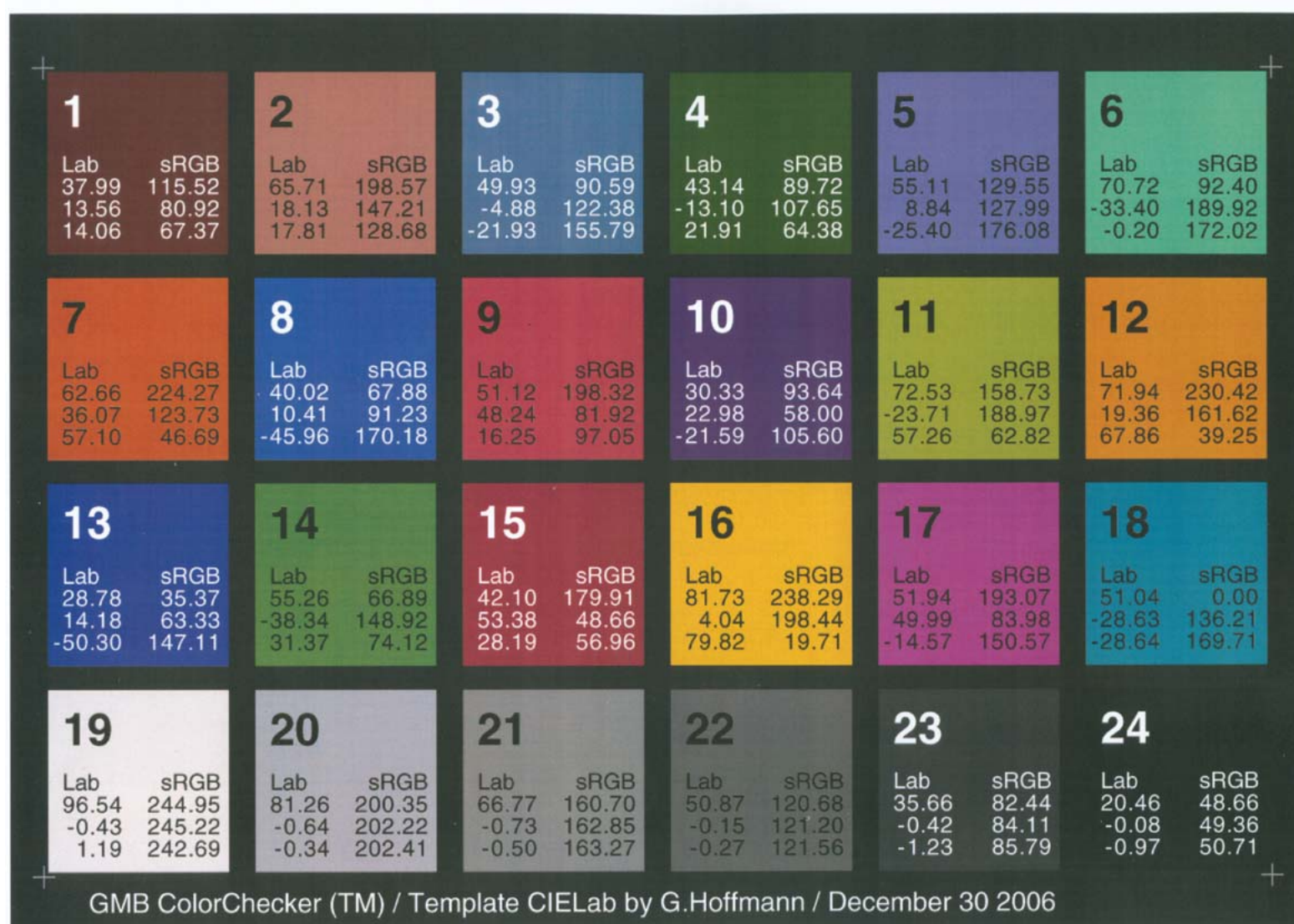


All settings are combined in a print preset, here called ,OKI-A4-quer' (landscape). Mode is ,Document'. ID knows the source color space ISOCoated, otherwise we have Profile: N/A. CMS is host based: ,Let InDesign Determine Colors'. A printer output profile is chosen, here oki-cfull-23042008.icc .

ISOCoated CMYK numbers are not preserved but converted into OKI numbers. These settings should disable any CMS in the printer. For safety CMS was disabled manually (no difference could be observed).

## 9.3 Printing by ID CS2 / Document / Host based

This is the scan of the print in sRGB. There is no choice of a rendering intent in ID. The output profile default is Perceptual. The quality is not convincing. Number 19 is too red, number 22 too green. Altogether the print is too dark.



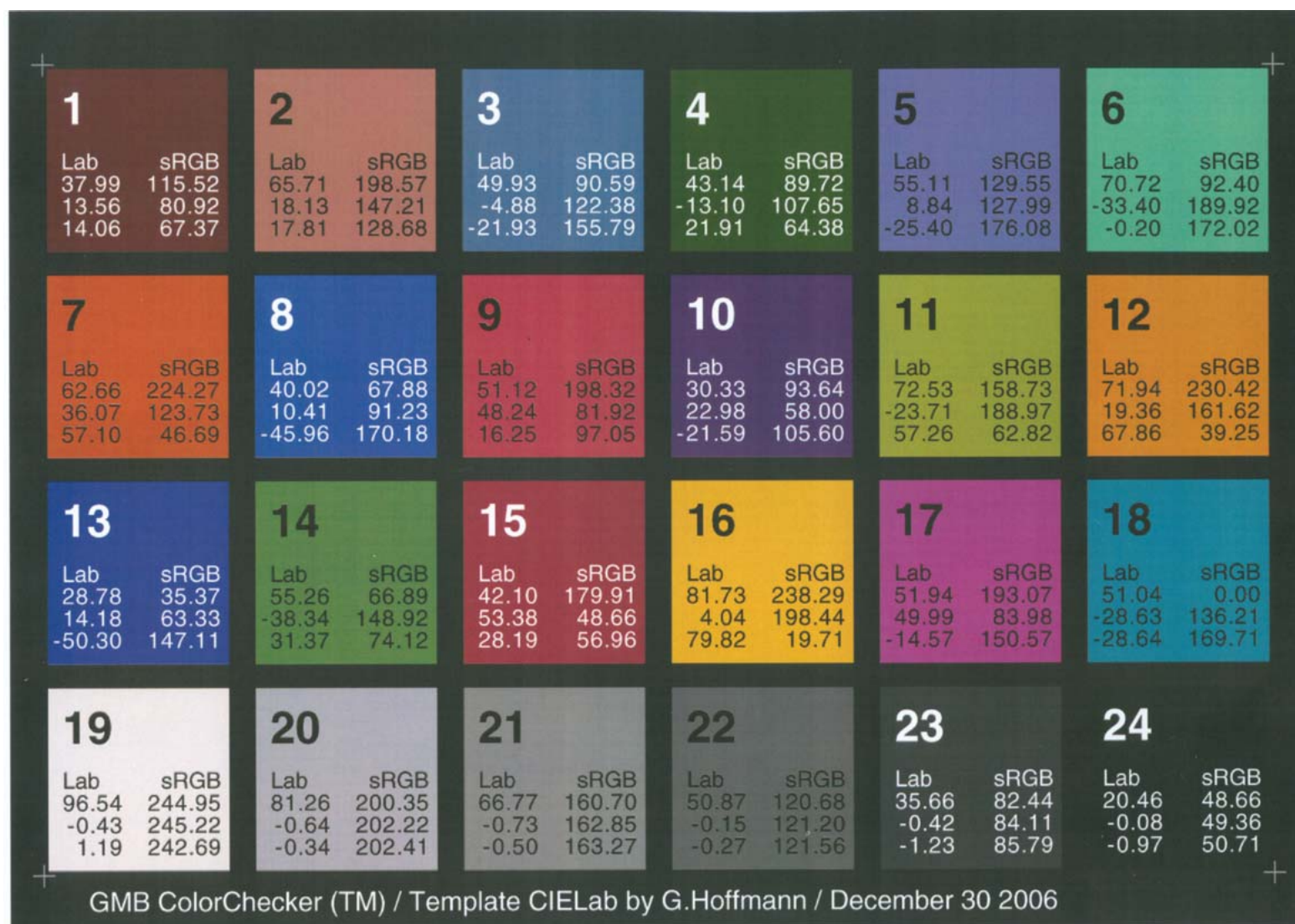
CMS by ID CS2 / Mode Document

## 9.4 Printing by ID CS2 / Document / Printer/PostScript

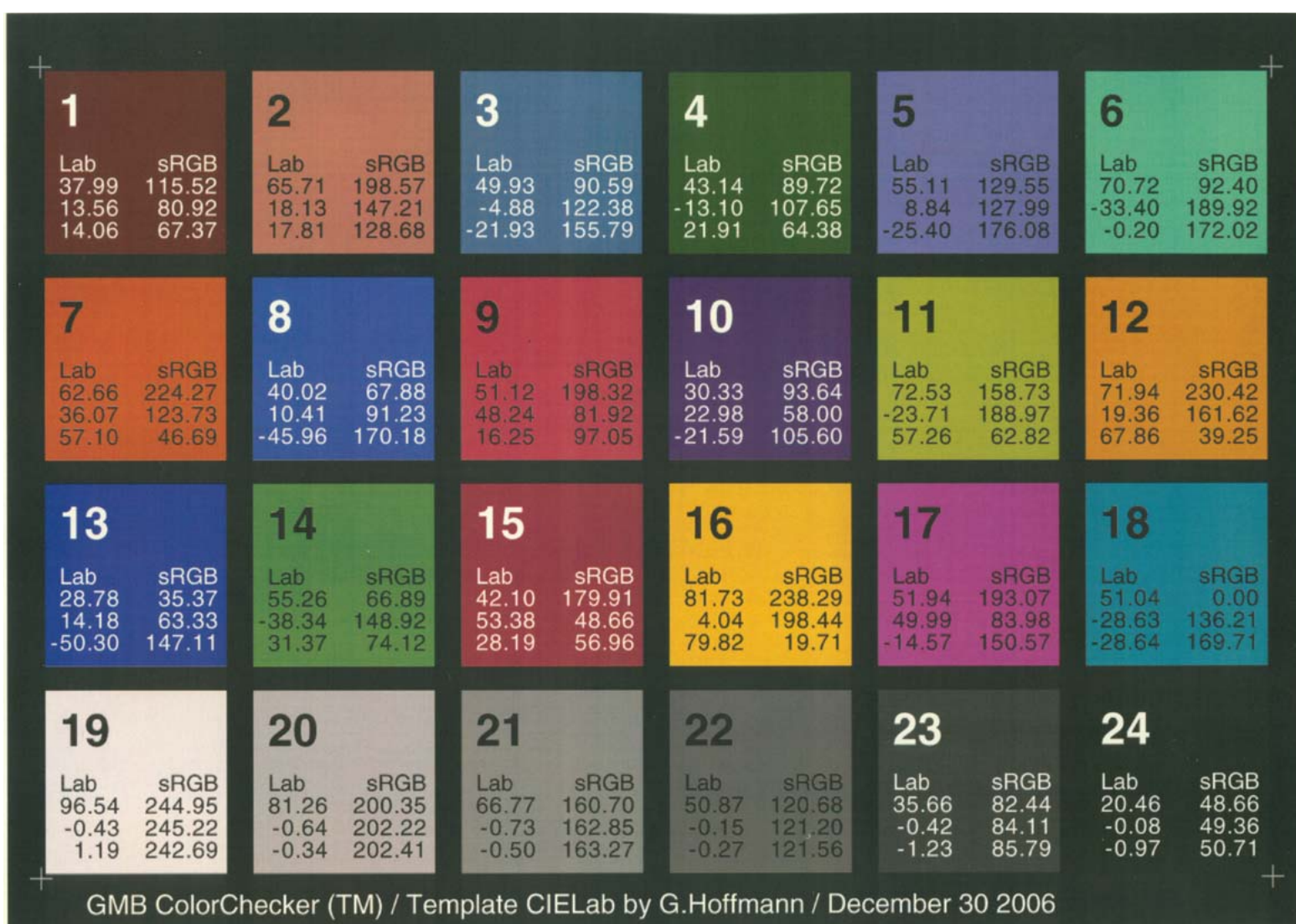
CMS by printer based PostScript fails entirely. The colors are chaotic. Chapter 3 shows the settings for the printer. But it is necessary to define the output profile in ID as well. A conflict could not be identified - the result is just wrong.

# 9.5 Printing by ID CS2 / Proof / Host based

Mode ,Proof' applies always the rendering intent AbsCol. The upper scan in sRGB shows the version ,Without Simulate Paper Color'. This is probably the same as RelCol. The lower scan shows the version ,With Simulate Paper Color'. Plain paper is tinted yellowish by printing (see bottom edge). ISO Coated has paper white at Lab=95.6/+0.5/-3.5. The paper Neusiedler ColorCopy has white at Lab=93.5/+2.5/-9.7. The yellow area has Lab=91.1/-1.2/4.1. This yellowish tint is far too strong. The value b\* should be -3.5. The proofing quality is not convincing.



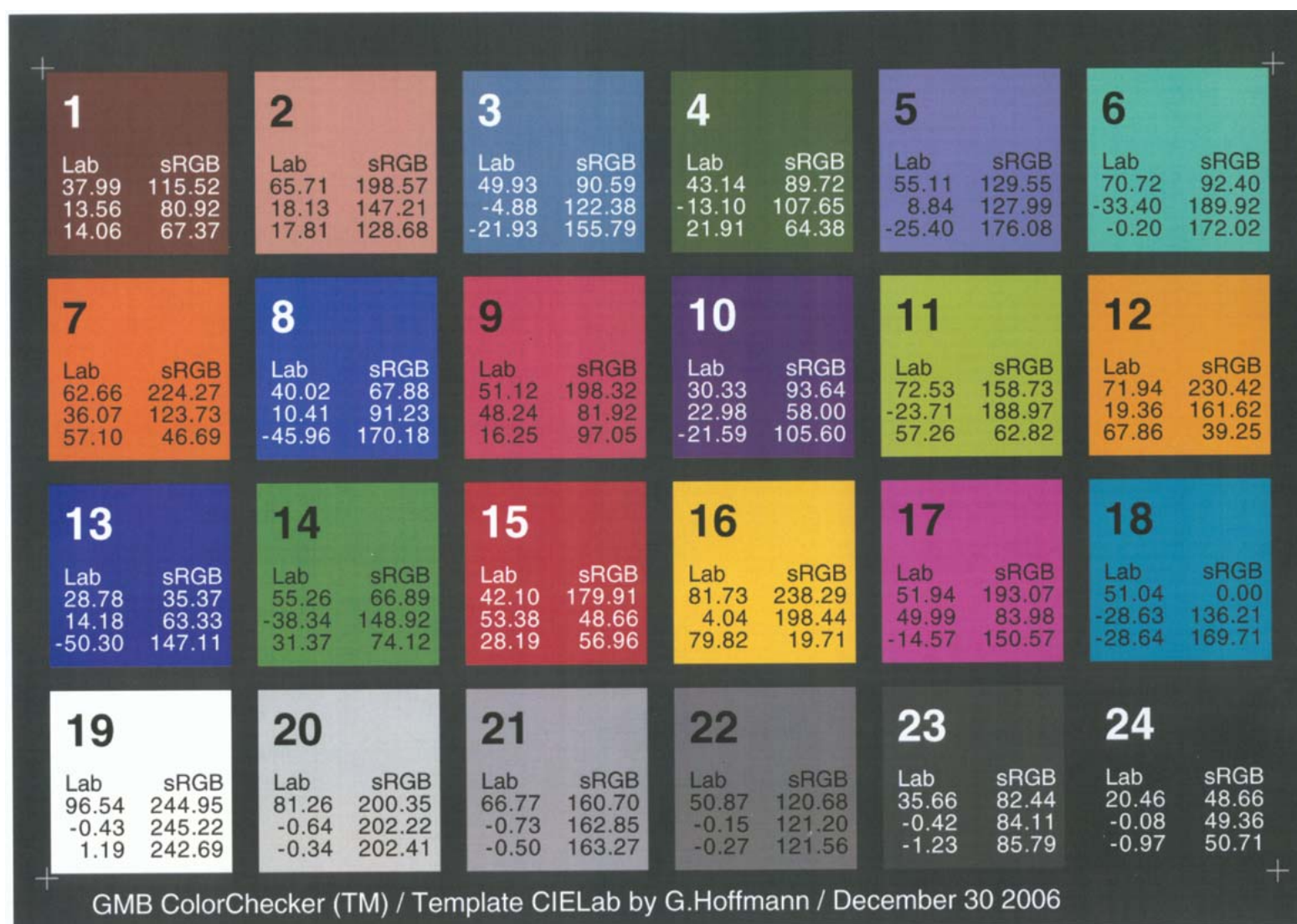
CMS by ID CS2 / Mode Proof / Don't simulate paper white



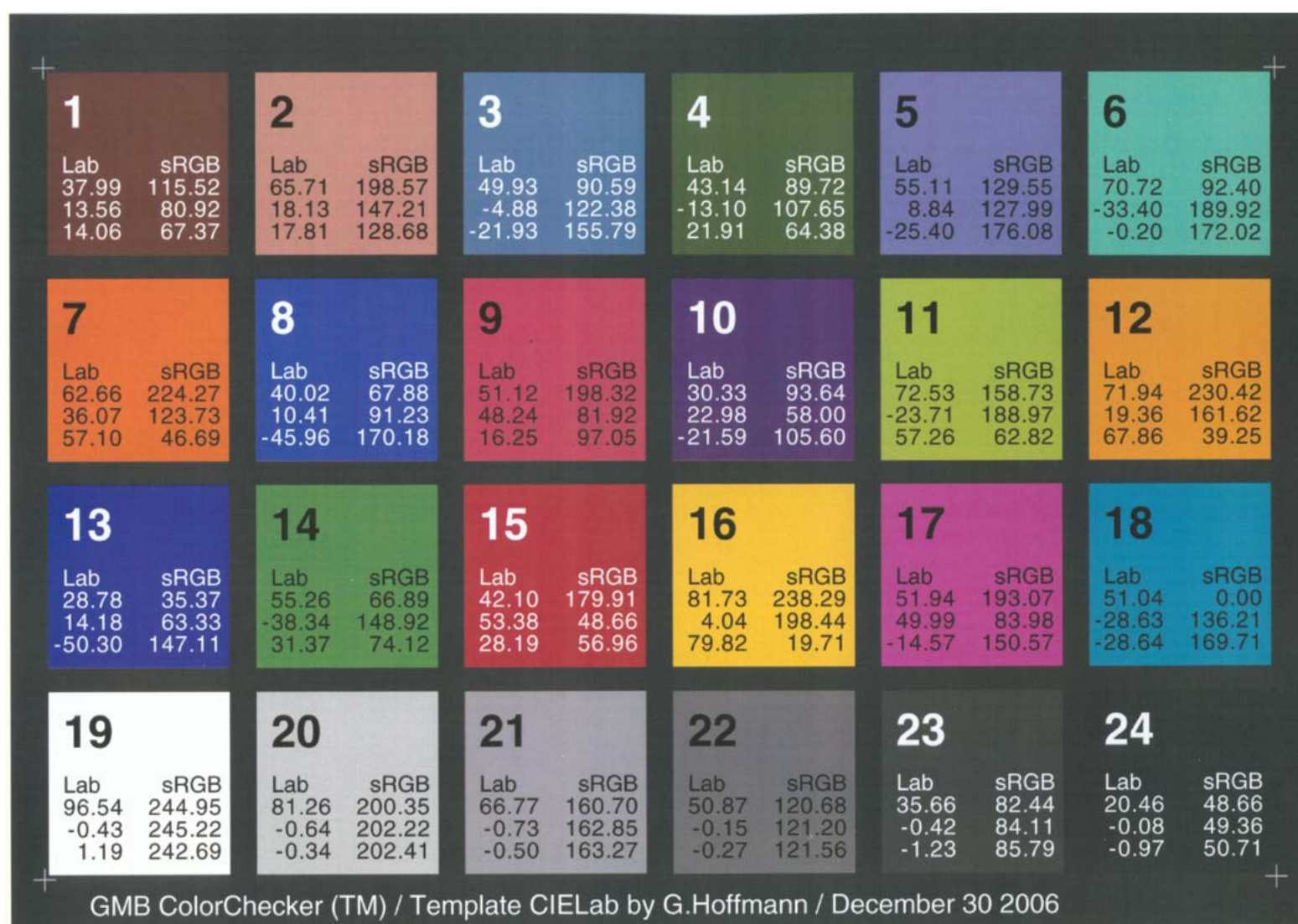
CMS by ID CS2 / Mode Proof / Simulate paper white

## 9.6 Printing by Acrobat / Printer/PostScript

These prints were made by Acrobat with printer based PostScript CMS. The upper scan in sRGB shows the version for RelCol. The lower scan shows the version for AbsCol. Plain paper is tinted yellowish by printing. ISOCoated has paper white at Lab=95.6/+0.5/-3.5. The paper Neusiedler ColorCopy has white at Lab=93.5/+2.5/-9.7. The yellow area has Lab=93.1/-0.1/-0.3. This yellowish tint is too strong. Perhaps CMS tries to neutralize the paper instead of simulating ISOCoated reference paper. The upper version by RelCol is already convincing.



Acrobat PDF / CMS by Printer/PostScript / Mode RelCol



Acrobat PDF / CMS by Printer/PostScript / Mode AbsCol

## 9.7 Printing by RIP / RIP/PostScript

This print has nothing to do with OKI or ID, besides the fact that the PDF was made by ID with unchanged color numbers. The RIP ColorGate ProductionServer uses an accurately defined output profile with rendering intent AbsCol for the large format inkjet Mutoh RJ6100.

ISOCoated has paper white at Lab=95.6/+0.5/-3.5. The proof paper Rauch 190S has white at Lab=96.1/+0.3/-0.6. The printable white paper area has Lab=96.1/+0.3/-0.5. There is no correction by putting blue ink onto in order to achieve the ISOCoated value  $b^* = -3.5$ . It seems, the program tries to neutralize, which leads to no ink because the paper is almost neutral.

The proofing quality is rather good. Actual proofs are compliant with FOGRA specifications (FOGRA Medienkeil). This paper looks under D50 somewhat yellowish though  $b^*$  is negative.

The color numbers in the top row are Lab values as measured by DTP-22 on the print.



# 10. References

- [1] Printer test pages / preview  
330 kBytes  
<http://www.fho-emden.de/~hoffmann/a3gencoloritest.pdf>
  
- [2] Printer test pages / print version  
2100 kBytes  
<http://www.fho-emden.de/~hoffmann/a3gencolorhigh.pdf>
  
- [3] F.Dolezalek  
Charakterisierungsdaten für den standardisierten Druck  
FOGRA 2004  
<http://www.fogra.org/products-de/icc/Readme04d.pdf>
  
- [4] A revision of [3]  
...
  
- [5] G.Hoffmann  
Camera Calibration  
with informations about ColorChecker  
<http://www.fho-emden.de/~hoffmann/camcal17122006.pdf>
  
- [6] G.Hoffmann  
Lab-version of ColorChecker as EPS  
<http://www.fho-emden.de/~hoffmann/cc-lab.txt>  
Rename \*.txt by \*.eps
  
- [7] G.Hoffmann  
sRGB-version of ColorChecker as EPS  
<http://www.fho-emden.de/~hoffmann/cc-srgb.txt>  
Rename \*.txt by \*.eps

GretagMacbeth and ColorChecker are Registered Trademarks

The EPS files were programmed by the author, based on original Lab data by GMB [5]

The sRGB-values were calculated according to rules which are valid in Photoshop

The GMB RGB-values are slightly different

The EPS files are not authorized by GMB

This document

<http://www.fho-emden.de/~hoffmann/oki-ps-28082005.pdf>

Gernot Hoffmann  
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