

Hello and Welcome!

With the small book you're now holding, we at Linotype CPS would like to offer and share with you the knowledge and experience in the field of scanning which we have acquired in over thirty years of pre-press development and production.

It's important to realize that this isn't a manual for your scanner, and so after reading this book you may not be a fully qualified scanning expert.

But you'll gain an excellent introduction into the world of scanning and its vast potential, so that even as a beginner, you'll easily be able to achieve scanning results which fulfill high expectations.



To make sure your introduction to scanning is as exciting as the topic itself, we'll only address as much theory as is absolutely necessary for a basic but fundamental understanding of the technology. That way your first priority can be a thorough familiarization with our useful, practice-oriented tips. (Some of which may be of help to even the more experienced scanner user.)

Since we have a few surprises waiting for you, there's no point in dragging out the introduction any longer.

Have fun reading, playing, and scanning !!!

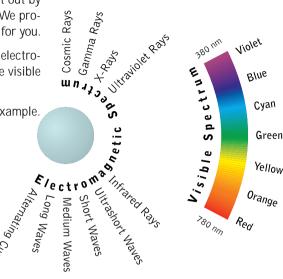
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Opacity and Density
Drum Scanners versus Flatbed Scanners Technical Differences and Areas of Application
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How is it that we see different colors?

To answer that question, we have to start out by taking a look at both physics and biology. We promise, however, to keep it lively and colorful for you.

This graphic shows the whole range of electromagnetic waves, of which only very few are visible to the human eye.

We can't see UV- or infrared rays, for example.



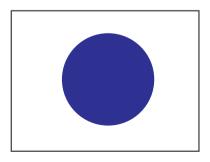
But we can see the colors of the visible spectrum because the electromagnetic radiation in these areas has a wavelength capable of acting as a color stimulus for our eyes.

Thus, to perceive color we need

- light
- an object either to reflect or to let the light through
- the eye and the brain.

Different colors are perceived just as subjectively as sounds, tastes or smells.

The same color can provoke a number of different reactions in different people. Like our little, blue circle here:



- What a blue! Wow!
- That's a terribly loud blue!
- A beautiful, glowing blue. I like it!
- and so forth.

Sometimes these reactions depend not only on a person's sense of taste but also on his or her color sensitivity. The spectral sensitivity of each person's eyes varies slightly. That's why two people might come to different conclusions when judging a single color. One might call turquoise green, while the other might say that it's bluish.

Colors are not only perceived subjectively however, but are also influenced by external circumstances.

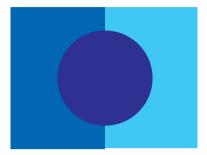
One influence might be the kind of light source.

Which one of us hasn't seen a beautiful colored sweater in a department store which ended up looking absolutely terrible in daylight?

At the same time, the size of an object can be important as well.

Imagine that you've had to pick out a fabric for your sofa by choosing from among small swatches of fabric. When you go to pick up the sofa, one glance and you take a big step back to ask yourd blue! self: is this really the color I picked out? Colors often prove to be much more intense on large surbell Verein / wwwfaces har pasmatter ones.

Of equal importance is the object's background.



Here you see once again our little blue circle, but this time half of it is on a bright background and half on a dark background. Clearly, the effect of the color depends on the background against which it lies.

Last but not least, you have to take the observer's point of view into account.

An object's color can look drastically different depending on the angle from which you're looking at it. The color may look either darker or lighter. This is especially noticeable among fabrics.

How does the monitor display colors?

Monitors and televisions produce color by way of electromagnetic waves that correspond to red, green and blue. However, screens aren't able to display the full range of colors which are visible to the human eye. Their range of color is more limited.

Any desired color can be produced by adding the colors of the three color channels (RGB for Red, Green, and Blue). This is called additive color mixing. If the colors of two of the color channels are mixed in equal proportions, new base colors are created.

Blue and green add up to a bright, light blue called cyan. Magenta, a bright pink, is made by mixing red and blue. Red and green together make yellow.

If red, green, and blue light are mixed equally together at full power, you get white light.

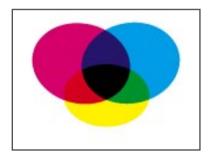


How is it that we see different colors?

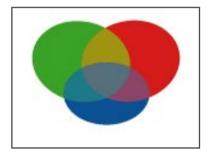
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Printing with Cyan, Magenta Yellow and Black



Printing with Red, Green and Blue

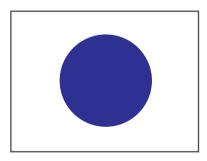
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1 Tone (Hue)



2 Saturation (Chroma)



3 Brightness (Luminance)

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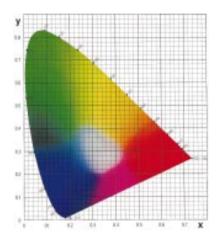
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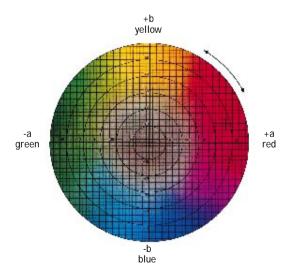
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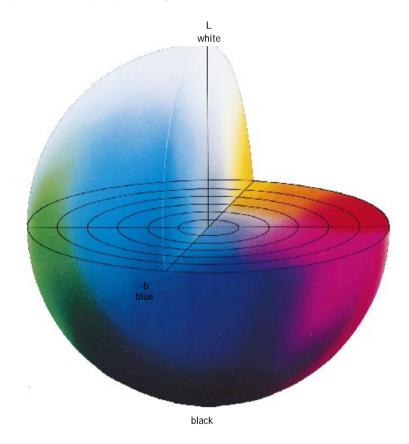
How are colors printed?

Printed colors differ from monitor colors in that they're produced by overlaying ink pigments on paper instead of by combining different wavelengths. If however you were to try to print red, green, and blue on top of one another, you wouldn't be able to produce very many colors.

Hell Verein / www.you.wuldricheabse to make yellow, for instance.

This is why printing inks work using subtractive color mixing, which we'd like to introduce to you at this point.

Imagine that a surface printed magenta and cyan is illuminated by normal daylight. As explained above, this white daylight can be thought of as composed of equally bright red, green and blue rays of light. If this white light strikes a colored surface, the surface absorbs the complementary colors from the light and reflects the rest. Our surface was printed with equal parts of cyan and



magenta. Cyan's complementary color is red, while magenta's complementary color is green. With the subtraction of the absorbed, complementary colors, all that's left is blue. Blue is reflected, and again we see our little blue circle.

Theoretically, if we were to print a surface with equal parts of cyan, magenta and yellow, we'd see black, because all colors would be absorbed and none reflected.

In practice, however, this black looks more like a muddy green or brown. That's why four colors are generally used in printing (you may have heard the expression "four-color print"). Black is used as the fourth color in order to achieve a represent. / www.hell-kiel.de On these two pages you'll find a number of technical concepts and definitions. Some of them might prove to be new to you.

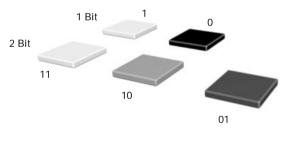
But don't be discouraged, we won't go into too much detail !!!

We'd simply like to pass on to you the fundamentals of the technology with which your scanner and computer work because they're of utmost importance for the actual scanning.

So let's get down to business.

What is a Bit?

When you work with a computer, regardless of whether you're writing a text, preparing a picture, or programming software, calculations are being carried out by the computer. In the process of these calculations, millions of tiny, electronic switches are activated. A bit is one of these switches. It only knows two positions: On and Off. The results of computer calculations are therefore combinations of Ons and Offs. The computer represents them in combinations of 1s and 0s. 1 corresponds to On and 0 to Off.



Relationship between bitdepth and the number of possible shades of gray



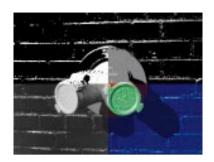
All types of digitalized pictures are called bitmaps. Like in the second picture on the next page, a bitmap is composed of a lot of tiny squares. These tiny square picture points are called pixels. Pixel is formed from the words Picture and Elements.

Whether a pixel can take on black, white, grayscale or even colored tones depends on the pixel's bit depth. This also sounds much more complicated than it really is.

When exactly one bit represents a pixel, depending on whether the bit is switched to On or Off, the pixel will be white or black. Imagine a lamp with a single bulb and a single power switch, a spotlight for example. It can be either On or Off, and the scannand not slightly On or slightly Offerein / www.dffeets inages of gray.

If, however, a pixel is the product of several bits, tones between black and white can also be represented. That would be like a good, old-fashioned lamp with two bulbs and two switches, of which both or neither or one or the other can be switched On at any given time. In this case, there are four (2²) different, possible positions.

Most scanners operate with a bit depth of 8 bits. That means that 8 bits represent each pixel. Therefore the pixel can take on 256 (2°) different positions, and the scanner can produce that many



Bitdepth: 1-bit, 2-bit, 8-bit from black and white to color

If color images are being represented, the scanner functions with a bit depth of 8 bits for each of the color channels. That means that RGB-reproductions are produced with 256 x 256 x 256 (256^3) different combinations of red, green, and blue, and that over 16 million different colors can be represented.

High end scanners work with a bit depth of up to 16 bits. They can thus represent 65536 x 65536 x 65536 different colors. Such a huge number is really hard to imagine, isn't it?

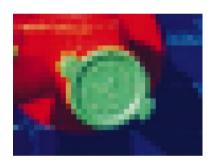
Aside from the bit depth, bitmaps are described by the scan resolution, the dimensions of the document and the selected color model.

The term scan resolution describes the number of individual samples that the scanner takes over a specific area. It's measured in dpi (dots per inch).

Thus the scan resolution is actually pretty important, because the precision of the scan depends on this resolution.

If you scan a document with low-level resolution, the image will be made of only a few dots per inch. Individual pixels will be visible as small squares in the picture. This is most clearly visible along curves or diagonal lines. They often appear to be frayed or stepped, as though someone had been nibbling on them.

The quality's dependence on scan resolution becomes especially obvious when the image is enlarged for printing. If you don't increase the resolution when enlarging an image, the individual pixels themselves will be enlarged and become visible. A resolution that's applied to a small document will suffice as long as the picture is to be reproduced in the same size. If you'd like to enlarge the picture, however, you should select a higher scan resolution.



The enlargement causes the individual pixels to become visible

For this reason it's important to note both the original and the reproduced sizes of the document when determining the scan resolution.

At the same time, you'll have to consider that a higher scan resolution always means that you're working with a larger amount of data. This in turn slows down your computer. Thus, you shouldn't select a higher resolution than is absolutely necessary.

High-quality scanner software automatically calculates the scan resolution required for the selected sizing factor.

If you'd like to start scanning right now, and need information for the calculation of scan resolution, turn to the chapter entitled "Prior to Scanning". That's where you'll find the exact formulas. But be careful: you are bound to miss something in between.

In practice, when light strikes either a transparent original (like a slide) or a reflective original (like a photo or a newspaper clipping), not all the light that strikes the original will be let through or reflected. Some light is always absorbed. The strength of this absorption depends on the opacity and density of the original's color layer.

1000 10

Opacity

Opacity (O) refers to the color layer's resistance to letting light through. In real life, this resistance is never consistent across the whole surface of the document. More light is let through and reflected by bright areas of the document than by dark areas. The less light an area of a document lets through, the greater its opacity. Opacity can be described by a single value — the total amount of light which strikes the surface divided by the amount of light let through.

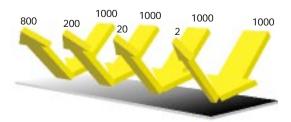
For example:

An amount of light equalling 1000 "light units" strikes a slide. The color layer of a bright area on the slide allows 100 "light units" to pass through. This area of the slide has an opacity of 10.

The same is true for reflective documents.

If a section of a newspaper clipping reflects 200 of the original 1000 "light units", then this section's opacity is 5.

Theoretically, opacity can have an infinite value, but in practice the value usually lies between 1 and 1000.



Regardless of whether it's a transparent or a reflective original, the darker the surface, the higher the surface, the higher

Density

In principle, density (D) designates the same thing as opacity: the document's resistance to letting light through.

Density also tends to vary across the document. Dark surface areas have a higher density and bright surface areas a lower one.

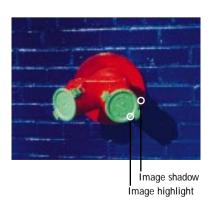
Mathematically, density refers to the power to which we raise the opacity value. Therefore it is generally a smaller, more user-friendly value than opacity.

That sounds pretty confusing, but in truth it's pretty simple:

Let's take another look at the graphic for our transparent document. On a relatively bright area of the document where 100 light units are let through, we calculate an opacity of 10. On a darker area of the document where only 10 light units pass through, the opacity is 100 or 10². The density of this darker area is thus 2.

As you might well imagine, it wouldn't do for a scanner to scan only dark areas properly, or for that matter, only bright areas. The scanner has to work with a document's entire density range if it's to redisplay the natural contrasts between the dark and bright areas. We can figure out a document's density range by looking at the difference between the area with the highest density (the image shadow) and the one with the lowest density (the image highlight).

If we measure, for example, a highest density of 2.4D and a lowest density of 0.3D, our document's density range equals 2.1D.



Reflective originals generally have a density of 2.0D. Transparent originals might have a density of 3.0D or even more. Your scanner has to be that much more sensitive if you're hoping to use it to scan the greater image range of transparent originals with satisfying results. The exact sensitivity of your scanner is listed among its other

Drum scanners and flatbed scanners don't just look different, but are also different in terms of handling, technology, ...

Drum Scanners

Mounting of Originals

All the documents which you intend to drum scan must be mounted on the scanner's acrylic glass cylinder. The documents should be thin and flexible so that they can be laid flat on this drum. To simplify the process, you can remove the cylinder from the scanner and attach it to a specially designed mounting unit. Once the cylinder is mounted, it's easier to position the documents exactly as you'd like them to appear on the screen.

Careful positioning is important: the document image appears on the screen in the same way as you scanned it, and rotating the image angle after scanning costs not only time but diminishes the quality of your results. Efficiency can in fact be further improved by working with additional cylinders: while the first set of originals is scanning, you'll be able to mount other originals on another drum.

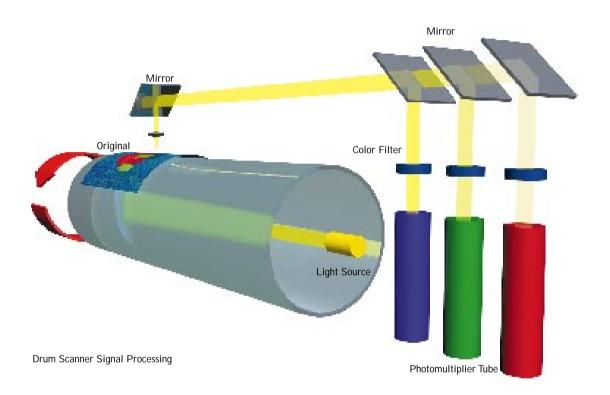
From Light to Electricity to Digital Data

The active scanner reads light reflections from reflective originals (like a newspaper clipping) and picks up the amount of let-through-light when scanning transparent originals (like a slide). The light source projects a laser-like beam which spirals across the original while the cylinder is rotating.

The reflected (newspaper clipping) or transmitted (slide) light is then picked up and passed along by the scanner's eye-like sensor unit. The incoming light signal is divided into three color channels — red, green, and blue. A separate photomultiplier tube (PMT) senses the light for each color and transforms it into electric signals.

Once inside a photocathode, these light rays produce electrical charges. Unfortunately, the resultant stream of charges is still too weak to be of much use. But once the stream is passed along a "charge intensifier", the available charges are sufficient to produce a strong electric signal.

Because, however, computers aren't designed to work with analog, electric signals, the signals have to undergo one final transformation: they have to be digitalized. This signal transformation takes place in an analog/digital converter (alias A/D converter), which turns the analog signals into



Practical Advantages and Disadvantages

The full-fledged application of drum scanner technology offers several advantages:

- high-speed efficiency
- high sensitivity (density resolution of up to 4.2D), which lets you scan documents that either reflect poorly or don't let much light through
- minimal noise
- optical resolution of up to 9,600 dpi, which allows 3,000% enlargement (enough for you to enlarge a small slide to medium roster size)

The point-by-point scanning guarantees some further advantages, like:

- diminished interference from stray light
- consistently high resolution across the entire scan surface (which means absolutely no change in scan quality)

High-quality drum scanners are universally applicable, but the mounting of originals requires work dexterit -kiel.de

Flatbed Scanners

Mounting Originals

In contrast to drum scanners, documents for flatbed scanning are laid on a horizontal tray. Thus, they don't necessarily have to be thin and flexible. Some scanners will even allow you to scan documents of practically any thickness (books and fabrics for example).

From Light to Electricity to Digital Data: A New Conversion

Flatbed scanning also requires careful positioning of the originals, but this is much simpler on the horizontal tray than it is on the cylinder of a drum scanner. On most flatbed scanners, the tray is attached to the scanner itself. What that means however, is that you can't simultaneously scan and be busy preparing another tray with originals. (At the time being there are only a few exceptions which offer a removable document tray.)

As with a drum scanner, in a flatbed scanner light signals are first transformed into electrical signals and then into digital signals. Internally however, the flatbed scanner's technology is quite different to that of a drum scanner.

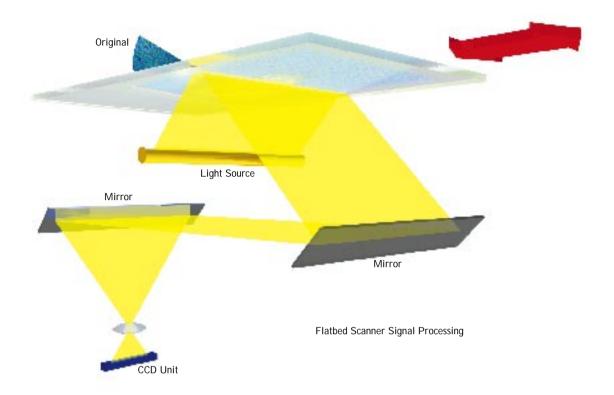
A halogen lamp acts as the sole light source. The lamp shines on a single strip of the original and the original is scanned line-by-line.

The light reflected or let through by the original is picked up by thousands of extremely small photodiodes. These photodiodes are aligned on a silicon chip. The selected charges set free by the light are collected for a while and then transmitted into a CCD (Charge Coupled Device)-line.

From here on, the signal proceeds similarly to the way it would in a drum scanner. The charges are read out from the line and finally turned into computer-ready digital data by an A/D-converter.

If the CCD in question has a single filter for red, green and blue color channels, then all three color channels can be scanned in a single pass (also known as the Single Pass Technique).

If however the CCD is working with the help of external filters, the scanning has to be divided among a total of three passes (called the Triple Pass Technique) to allow for a filter change before the start of each pass. Almost all modern flatbed scanners operate with the Single Pass Technique because it allows the added advantage of higher



A Practical Comparison to the Drum Scanner

- most flatbed scanners aren't as efficient as drum scanners
- the optical resolution is determined by the number of CCD-elements and can only be increased or diminished by software interpolation
- because it's more sensitive to stray light, flatbed line-by-line scanning is more likely to produce images with faults than dot-by-dot drum scanning
- lower density resolution than with a drum scanner

Despite these disadvantages, a high-end flatbed scanner performs comparably with a drum scanner when scanning normal originals. The drum scanner is truly superior only in cases demanding very high quality work. Furthermore, new CCD technology is continually being developed — and even now the more moderate price and simpler handling often make flatbed scanners the preferred choice.

Digital Cameras

In the field of photography, CCD technology is also being used to produce computer images of large and three-dimensional objects. The case of digital cameras has been outfitted with individual matrix-shaped CCDs.

The result is that a subject can be captured directly in digital data without resorting to film. This technology is primarily used in photography for catalogues, by journalists (who send press photos over modems to their editing offices) and in vadvertising for studies hotography.

Scanner Flatbed Scanner Drum Scanner Office DTR Upper Mid Range High-End Lower Mid Range Area of Office Applications Pre Press, Office Applications, Pre Press. Pre Press. **Application** (for example, OCR), DTP and Advertising DTP and Advertising High-End High-End Discriminating Image Production Image Production Agencies Agencies Home Users Reflective Reflective or Reflective or Reflective or Reflective or Originals, Transparent Transparent Transparent Transparent Originals, Originals, Originals, Originals flexible or stiff, flexible or stiff, flexible or stiff, flexible or stiff, flexible, various thicknesses, almost any almost any ≤ 0.4 inch thick thin thickness for thickness for Reflective Reflective Originals Originals (3D-Objects), (3D-Objects), b&w and color Work Efficiency average to high high very high low average 300 x 300 dpi to 600 x 1200 dpi > 1200 dpi > 3800 dpi > 9600 dpi Resolution 400 x 400 dpi **Density Range** < 3,0 D < 3,0 D > 3,0 D > 3,7 D> 4,2 D

This table gives you an overview of the various types of scanners, their main applications and much more.

In many offices nowadays, the scanner is just as common and as much at home as the computer. It's often used to record text and for document archives.

Scanners are becoming increasingly popular at home as well. When you combine a scanner with a reasonably priced computer, you can slowly familiarize yourself with digital image preparation. You shouldn't expect professional quality results, but you'll definitely have a lot of fun with it.

The vast majority of scans, however, are still taking place in other fields: in the high end region, by which we mean not only professional image preparation but also small companies with their own DTP departments as well as in advertising agencies for graphic design jobs. These are exactly the sorts of places where a scanner can be a helpful

In principle, your scanner is just as friendly or as finicky as any other electronic device. That means that the scanner doesn't like to be too hot, too cold, or too damp. But when preparing a scanner work station, you should keep the following considerations in mind:

Place your scanner on a sturdy surface.

It's really annoying to have to remain absolutely still just because the slightest motion could cause the table under the scanner to rock, which in turn might lead to faulty scan results.

Set up a work station in an area which can be fairly well protected against sun light. Reflections on the monitor can be bothersome even if you're just writing a text. In work that involves pictures, reflections can be a real pain. Image details can become unrecognizable, and that doesn't make your work any easier.

Shopping Tips

If you're establishing a new DTP department in which several people are to work, you should consider setting up a special station intended exclusively for scanning purposes. On the one hand you'll avoid crowding at the station, and on the other hand the station can be supplied with its own specialized equipment.

You'll need a high performance computer with plenty of memory to process and store the large amounts of data. And, if you want to reproduce the scans yourself, you'll also need an appropriate printer. Above all however, you should have a really good, large monitor with a suitable 24-bit graphic card.

Only high-quality, well-equipped systems allow for truly good work.

A good scanner by itself doesn't amount to a good scanner workstation !!!











How does calibration work?

High-quality scanners leave the factory properly calibrated. If after a while you start to notice changes in the portrayal of individual originals, you should recalibrate your scanner. The simplest way to test the calibration is to rescan an original that you've already successfully scanned and saved. You can then compare the earlier and more recent scan results side by side on the monitor.

For calibration, you're going to need a calibration set which consists of:

- a calibration document (for instance, a standard IT8 document)
- a disk with the determined Lab values of the individual color fields of the test document
- calibration software

In case you've just unpacked and installed your new scanner, you should check to see that your system (which consists of your monitor, scanner, and printer) is fully calibrated. By calibration we mean that the pieces of your system conform to one another or are in tune with each other.

Why does the system have to be calibrated?

A scanner senses red, green and blue (RGB) light differently than the human eye does. That means that a scanner, or even a monitor, "sees" an original differently than our eyes would, and as a result displays the colors in a different way. Even with the introduction of special color filters, the image won't conform 100% to our expectations.

A scanner might also need recalibration if you are installing a new system component, even if this new component is replacing an old one of the same make and model. You should always recalibrate your system when you change scanners, monitors or printers, or when you replace a part of a component.

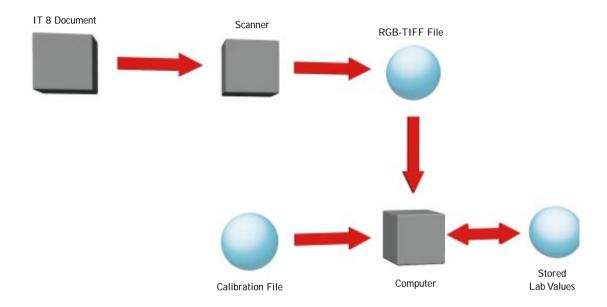
A certain aging process in the scanner's halogen bulb can also bring about changes in scan results.

Once in a while you should give your scanner a check-up. If the need arises, adjust or repair trouble spots that have developed.



This is what an IT 8 document looks like (larger in real life, though)

The actual calibration begins with a scan of the test document (known as the Calibration Scan). The values for individual color fields obtained through this scan are then compared with the determined Lab values on the disk. From this comparison, the computer can calculate a specific color profile for your scanner.



For all further scan processes, the scanner's color profile will be assigned to the RGB-data of the scanned image.

Keep in mind however, that scanner calibration alone doesn't suffice. The monitor and printer have to be calibrated as well. Either your software will allow you to select the proper monitor and printer calibration settings so that you can undertake a similar calibration, or you can request the color profile of your component including their calibration settings from the manufacturers.

Only completely calibrated systems will guarantee that the original image on your monitor looks the same as both the unscanned original and the original produced by your printer. By the way, an IT8 document has a gray scale spectrum which is very well suited for the check-up.

A Practical Tip

For the calibration check-up, rescan a gray-scale original in color mode because its changes are easier to notice than those of a color original. If you see a color cast, it's time for a new calibration.



Avoid Chaos !!!

Don't be surprised that the question of data storage arises before you've even started scanning.

Before you scan the first original, you should definitely review the following:

A Is obvious and easy to explain ...

You're working with large amounts of data. Make sure that you have enough memory at your disposal before starting work. Especially when several images are being scanned in one batch. You might not notice until the last second that there's not enough disk space left to save the final scans. You shouldn't let annoying things like that happen to you.

B Takes a little longer to explain ...

Try to establish a definite structure for data storage before you start working. Decide which folders to set up and by which system the files should be named. If you don't, you may end up spending a lot of time searching for misplaced data. This can be especially critical when several people are preparing the data and each develops his own system for the purpose of data storage. Even if you know which folder to search through, you can still

Hell Verein / www.heaveproblems finding the file.

This text (the one you're reading right now) could for example, be stored under the following file names:

• stostruc, according to the text content. This system would be fairly conclusive but might be awkward when working with pictures.

For pictures you might need a data name like womanwithchildunderpalmtreeingardenin-franceonabeautifulday, which would probably conflict with the software's restrictons for the number of permitted characters.

• 072495, according to the date on which it was produced.

That could prove to be troublesome, though, because after a while you probably wouldn't remember when each file was produced.

• paul5, because it's the fifth file on which Paul worked on a certain day.

... not so nice, however, when you pass on your data to a third party who knows that Mr. Smith gave him the data, but who doesn't know that Mr. Smith's name is Paul, and thus doesn't know in which stage of the job Mr. Smith worked on the data.

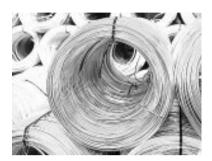
That sounds trivial, but it can be a real problem. Thus, you should establish a single system to which everyone always keeps.

Restructuring a full hard drive after the fact is much more time consuming than keeping to one storage structure from the start.

projects		
<u>na me</u>	size	
▽ 🗀 project "Game 01"	<u></u>	
	1 <u>22</u> 8	
building 1	3.904K	
☐ building 2	256K	
☐ building 3	352K	
	<u></u>	
▽ 🗀 project"paper"	1 <u>22</u> 8	
01 correction 1	352K	
01 correction 2	3.904K	
🗋 01 original	2.656K	
▽ 🗀 project "Caddy"		
☐ front	2.656K	
□ perspective	992K	
🗋 right	64 0K	
□ top	3.904K	

Grayscale Images

Grayscale images are what you might generally call black and white. These images are actually black, white, and gray. Included are slides or photographs.



Bilevel Images (Line Art Images)

By bilevel images we don't necessarily mean images which are split into two sections.

Bilevel images are any originals that consist of only black and white — no gray, no color. A handwritten text (provided it's written on white paper, using black ink) e.g. is a bilevel image.

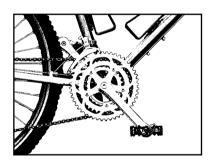
Because different sorts of originals have to be scanned in different ways, you should always begin the scan process by assessing and classifying your originals.

In the following pages we've prepared a number of groups and examples which should be of help in assessment and classification.

First of all we should consider those originals which are most easily scanned. In practice, these Standard Originals make up the vast majority of all originals. Included in the group of Standard Originals are:

Color Images

By color images we mean color slides or photos.



Of course these originals are only considered to be standard if they don't contain particular subject-based features, like strong color cast or low contrast.

If they did contain such particular features, or if the image had to be scanned in an unusual way, they would be counted among the Heads-Up Originals.



Within the group of Heads-Up Originals you can find:

High Key Images

High key images are images which depict a very bright subject with very little contrast, like the picture below. A further example of a high key image is the famous "polar bear in snow".



Low Key Images

Low key images are low contrast just like high key images. The difference is that low key images are exceptionally dark.



Catchlight Images

Catchlight images contain small very bright reflections, or "catchlights", just like you might see on windows or chrome metals.



Color Cast Images

Color cast images contain a color imbalance. When looking at one you have the feeling you are looking through a color filter (or toned sunglasses). Old yellowed photos are a good example.



Improperly Lit Originals

These originals are either very bright and overexposed or very dark and underexposed. In these cases brightness or darkness is the product of a technical mistake and not related to the depicted subject of the image.





Unfocused Originals

Unfocused originals are those originals in which lines aren't clearly defined. The outlines appear hazy.



Not only the subject but also the subject presentation can contribute to difficulty in scanning an original. For example we have:

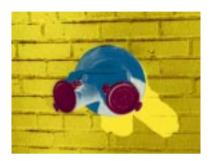
Artistic and Computer Generated Originals

This palette of various techniques includes, for example, watercolors or oil paints. But also computer generated images show some particularities which you have to regard.



Negative Originals

These are grayscale or color originals presented in the form of negatives.



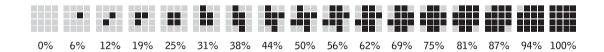
Screened Originals

Any original, be it grayscale or color, is screened as soon as it is reproduced in a printed format (for example, newspaper clippings). The screen represents different hues with dots of various sizes.



A screen dot which is supposed to be 25% black (you might also call it light gray) is smaller than a 50% black screen dot (which is a bit darker), which is in turn smaller than a 100% black dot. A single screen dot is always made up of several image dots which can be either black or white. The dark-er the screen dot is supposed to be, the more black image dots you have. Just as is the case with bit depth, the number of representable color levels depends on the number of image dots that form each screen dot. The minimum number of gray shades required to represent an optically continual color spectrum is 64. Thus, a screen dot consists of a matrix of 8 x 8 picture dots.

The width of the print screen is described by the number of screen lines per unit area. The unit of measure is lpi, or lines per inch.



Surprise No. 1

If you like, you can now figure out the screen width with which our sample picture for Screened Originals was printed:

re. In one area of the screen counter you should now see a pattern over the picture. The image is structured as though it was made of fabric. It could also appear to be lines or even small stars. This isn't an indication that you're suffering from a circulatory disorder. Actually, this effect is called moiré. If you read the value on that part of the screen counter you'll have the screen ruling.

Don't rush off to start scanning now that you have assessed the originals !!!

Now's the time to ask yourself a fundamental question:

Do you want to reproduce your image exactly as it is now (same size, poorly lit, etc.), or should you alter the image in one way or another? If, for example, you want to change the size of the image, you should take this into account in the scan resolution.

Quality scanner software takes over the resolution calculation for you, as the formulas presented below are already integrated into the program. All you have to do is input the desired print-out size and the screen ruling manually. The software takes care of everything else.

For those of you however, who would like to learn the exact formulas, here is all you'll need to calculate the scan resolution for the most used printout forms.

For printers that can reproduce gray shades (like a thermosublimation printer)

In case you'll later want to print the image with a printer that reproduces gray shades, you can calculate scan resolution using the following method:

The sizing factor is found by dividing the desired size by the original size.

For example: You want to scan an original that's 1x1 inches. The original is too small, so you decide to enlarge the reproduction to 3x3 inches and print it with your 300 dpi printer.

The following calculation results:

If you want to reduce your image, the sizing factor is accordingly smaller than 1. For a reduction of the 1x1 inch image to 0.5x0.5 inches, the sizing factor would be 0.5.



The scan resolution depends above all on the medium with which the image is to be reproduced later on.

Scan Resolution =
Resolution of the Printer x Sizing Factor

Sizing factor = 3/1 = 3Scan Resolution = 300 dpi x 3 = 900 ppi

Scanning for Screen Printing

The story's the same, whether you want to scan a grayscale or a color original. If you want to print the image at some later date (for use as a magazine illustration, for instance), use the following formula to calculate the scan resolution:

In real life it is extremely rare that a single pixel correlates exactly to a single screen dot. If the scan resolution were to correspond to the screen resolution, the screen dot could take on an incorrect color value. This would be especially visible at sharp edges in the image. In order to avoid that, you have to include the screening factor in the equation. This factor increases the scan resolution and lets the output device (for example a printer) calculate the color value of the screen dot more precisely. The screening factor should be roughly 2. Then the color value of each screen dot will be calculated from four pixels (a 2x2 matrix) and thus be much more precise.

So, if we still want to enlarge our 1x1 inch image to 3 x 3 inches, but this time for the purpose of printing it in a 150 lpi raster for a magazine, we should calculate the scan resolution like this:

Scan Resolution = Printout's Screen Ruling x Screening Factor x Sizing Factor

Screen Ruling = 150 lpi Screening Factor = 2 Sizing Factor = 3 Scan Resolution = 150 lpi x 2 x 3 = 900 ppi

Printing with a Screening Printer

Quite a lot of computer printers also work with print screens. You already have the formula for this kind of printout. In principle, it's the same as for screen prints.

All that's left to calculate is the one value with which we'll replace the printout screen ruling. This value is dependent on the maximum print resolution of the printer and the number of testred coor revise. / www.hell-kiel.de Back to a little math:

We can calculate the desired value by dividing the maximum print resolution of the printer by the square root of the number of desired color shades.

Don't put the book away yet !!!

This is as easy to understand as it is to explain.

You're once again scanning our now famous 1x1 inch image and still want to enlarge it to 3x3 inches. Later, you're going to print it on your 600 dpi printer and want to achieve a minimum of 64 different color shades.

You'll want calculate it like this:

Therefore, you need the following scan resolution:

There's a relationship between the screen ruling and the number of representable color shades. If you're trying to produce higher quality work by working with a finer screen, the number of representable shades is reduced accordingly. Color vignettes in such a case often can't be displayed without obvious gaps.

Unfortunately, scan resolution has technical limitations. It can't be raised to arbitrarily chosen levels. For large-scale image enlargements, you have to rely on another source of assistance to ensure a quality printout.

This software-based assistance is called interpolation. Interpolation adds new pixels to the original ones so that these originals don't have to be enlarged as much as they did before. The color values of the new pixels are determined on the basis of the surrounding pixels.



 $\sqrt{64}$ = 8 600 dpi / 8 = 75 lpi Screening Factor = 2 Sizing Factor = 3 Scan Resolution = 75 lpi x 2 x 3 = 450 ppi



Too much interpolation can blur the individual picture lines, causing the entire image to appear fuzzy. Therefore you should never attempt to increase the scan resolution of bilevel originals by way of interpolation. The exact scan resolution of bilevel originals is determined using the formula: Scan Resolution = Printer Resolution x Sizing Factor. You never want to overstep the maximum resolution of the output device.

So, now to the question of whether the image's subject should be depicted just as it appeared in the original, or if changes in the tonal range and gradation should be set up in order to manipulate the image during the scan. What's that? We still haven't explained what the tonal range of an image is? No problem. We'll clear that up right now.

Take another look at our standard original for a grayscale image:



Now take a look at the diagram which accompanies this image:



On the diagram you see an axis numbered 0 to 255 which extends from black to white. There are 256 vertical bars arranged along this axis. (The number 256 should be familiar to you from the Bits and Bytes chapter. It corresponds to the number of shades of gray that an 8 bit scanner can distinguish.)

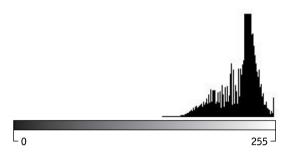
The height of a bar indicates exactly how many pixels display that individual shade. Taken collectively, the bars form the original's histogram.

You can see that the heights of the bars are quite consistent, as is the distribution of various shades of gray on the original. This consistency extends from totally black to completely white.

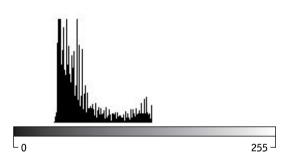
For color images, a histogram can either indicate the brightness of the entire image or be set to provide the histograms of each, distinct color channel.

For the purpose of comparison with the standard original, take a look at these high key and low key images along with their histograms:









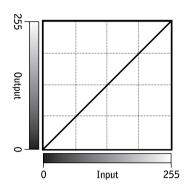
Clearly, the distribution of bars and thus the distribution of the pixels are by no means consistent along the axis. Rather, the pixels of the high key image are bunched in the brighter region while those of the low key image are gathered in the darker region. If you're interested in manipulating these images so that you can print them differently than they originally appeared, you should now direct your attention to gradation.

Take a look at this diagram:

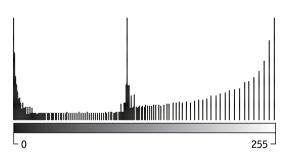
Along the horizontal axis you see the input values for the various shades of gray. The vertical axis displays the corresponding output values. For the represented gradation curve, this means that all the values will be expressed in the same shades in which they were originally entered.

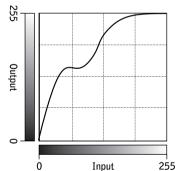
With help of these gradation curves you can manipulate your original.

Just take a look at our slightly manipulated standard grayscale original, its histogram and this altered gradation curve:









For comparison, here's the original prior to manipulation:



You see that we have darkened the dark tones and brightened the bright tones. Thus, the tonal range has been stretched out. The histogram now depicts holes at a few places. That means that a few intermediate shades are no longer present. Details are disappearing from the image. This

Manipulating an image by introducing influences to the gradation curves requires some experience. You should practice by testing the effects of different changes on the images of various originals.

The pretty illustration on the right page shows in full detail the exact sequence of the scan process. Nevertheless, we want to share a few explanatory points with you.

You'll begin the scan process by mounting the originals. You should try to ensure that the originals and the tray are as dust-free as possible. Make sure you lay the originals flat on the glass. Correct folds or waves in the originals as they arise.

An entire scan process can consist of three individual scans.

The first of these scans is the overview scan.

On the overview screen you see the tray with all the mounted originals. From this overview, you'll select the area that you'd like to scan, and enter, as far as your software allows, the type of original that is to be scanned (negative, reflective, transparent, etc.).

After the overview scan, you activate the pre scan. Before your scanner starts the pre scan, your software will probably do the following three things:

First, the computer will alter the original gradation so that the monitor's RGB image corresponds to the perception of the human eye.

Next, an automatic tonal range correction is performed to guarantee an optimized data transfer of the RGB image.

Finally, the computer will automatically analyse the original. It will basically be repeating the same analysis which you already went through:

- Is this a standard original with a clearly defined image shadow and image highlight?
- What does the tonal range look like?
- Does the image have a color cast?

The automatic tonal range correction however, could cause a high key image to become a lot darker because the scanner mistook it for an over-exposed image.

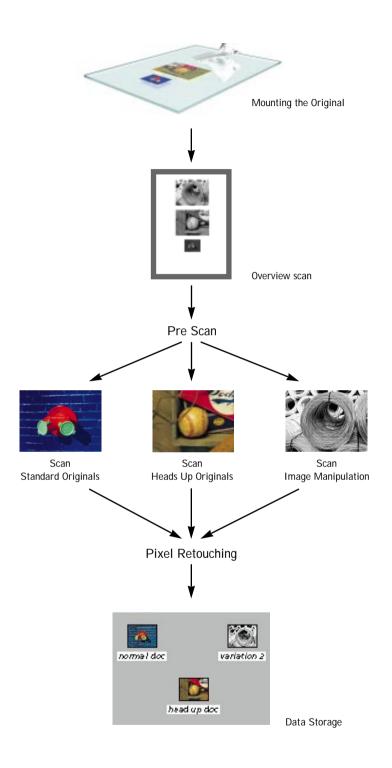
Clearly, that's not our goal. We want the computer image to look just like the original that we liked in the first place.

To that end, before doing the scan you have to choose the option of either a Standard Original scan, a Heads-Up Original scan, or a Manipulation scan.

Following the scan, these options streamline once again into a single path.

If necessary you'll retouch the image. Then you'll save the personally quality-controlled image that you've personally scanned in a personally selected file of a personally selected data carrier.

But now to the differences of scanning in full



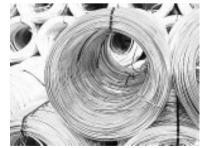
Tip:

If you try to wipe the dust from the originals with a normal dust rag, you might end up making the situation worse despite your good intentions. Rubbing an original brings about a static charge which attracts even more dust. Cleaning with an anti-static rag isn't a good idea either, since they're vavailable in a lart and design stores.

often soaked in an emulsion that can leave streaks on the original.

The most suitable tool for cleaning the originals is an anti-static brush, like the kind you used to clean vinyl records with. These brushes should be





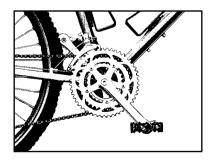
This is a quick and easy chapter. Scanning standard originals like this one is a very simple and almost automatical procedure.

As long as you've thought out the appropriate But before you do resolution in advance by taking all the relevant relevant points one fipoints into consideration, and as long as you're not considering any manipulations of the image All wstandard original?

that you have to do now is enter the desired resolution, activate the scan, lean back and wait for the final result.

But before you do that, you should review all the relevant points one final time.

Are you sure that you're really dealing with a standard original?



Have you calculated the resolution properly?

(If you're scanning for printing purposes, pay attention to the screen ruling.)

Should the original really be scanned without manipulation?

Have you answered all these questions with Yes?

We've named these originals Heads-Up Originals because they're all unusual in ways that have to be accounted for when you're scanning. That doesn't necessarily mean that they're more difficult, only that they can't be scanned as quickly or, most importantly, as automatically as Standard Originals.

In this chapter you'll find the most important types of Heads-Up Originals, their individual features, and tips for working with them so that justice is done to their unusual characteristics.

High Key and Low Key Images

The trouble with scanning high key images has already been briefly mentioned. If the automatic tonal range correction was activated, the resultant image might look like this:





Original

because the scanner mistook it for an overexposed original. The image shadow would be reset to a lighter area of the image (the value of which is too high) and the entire image would end up darker than the original image.

The same is true for low key images, except that here the image highlight is reset to a darker area (with a changed highlight value that's too low) and the entire image is brightened. This is how it looks:





Original

Go through the pre scan using all the available automatic functions (the correction function should be set to "normal"). Now take a look at the preview image on the monitor. Do you like it? Does it look just like the original? Good. Activate the scan.

More likely, though, you will see the effect we've just described and the image will have changed, so that now the high key image looks darker or the low key image appears brighter. If this is the case, you should see if you prefer the result once you have manually adjusted the image shadow or highlight.

You can achieve a number of different effects by changing the image shadow and image highlight. Try a few different values and see what the preview images look like. If you like one of the settings, go ahead and activate the scan. Manual adjustment of image shadows and image highlights calls for some practice, but in the end you'll be able to scan and reprint your high and low key images so that they look just like the originals.

Catchlight Images

The earlier principle applies here as well: pre scan with all the available automatic functions, take a look at what comes out of it and then decide what you want to do.

The problem with catchlight images is that the program can set the image highlight in a catchlight, resulting in an image that's too dark. If the catchlights are small like reflections on water, the program sometimes recognizes what they are, and the problem doesn't arise. Larger catchlights can become troublesome, though, for example, a bright window.

This effect is very similar to what happens when you're taking pictures with an automatic aperture selection. If you take a picture against the light and the sun is part of the picture, the lighting will be set accordingly. People or things in the picture may end up looking like black outlines.

If you notice that the preview image is clearly darker than the original, you should once again manually set the image highlight to the proper position. This is the brightest area of the image, aside from catchlights. But as before, manually setting the image highlight will definitely take some practice.





Original

Tip:

If you're dealing with one large catchlight, you can select an image section for the original analysis which doesn't include the catchlight. That way, the catchlight won't be taken into account in the analysis, and the above-mentioned problem in

Color Cast Images

Once again, the question is whether the computer image is supposed to correspond to the original or if it should be altered. Should the color cast be kept or filtered out? Maybe you want the yellowed photo from the Fifties to look the same once it's scanned. If your software is equipped to correct color casts, you should deactivate the function by setting it to "uncorrected". You should also deactivate the color cast balancing function if your program is unable to recognize that a high-percentage color cast is probably intentional. Otherwise, the red might be filtered out of that excellent sunset photo. If you actually do want to filter the red out of the sunset, the automatic color cast corrector (if you have one) won't suffice. You'll either have to choose the option "stronger" for the color cast corrector manually or alter the saturation of the red area by hand. That would be a shame for the sunset, though, wouldn't it?



These recommendations also depend on whether the later computer image is supposed to actually look like the original or if you want to correct it.

If you don't want to change anything, scan your underexposed original like a Standard Original and set the correction function to "uncorrected" so that it is not activated. The scanned image will then correspond to your original, and be just as poorly lit.







However, if you do want to correct the image, and your software lets you address the problem as a poorly exposed image, it's rather simple.

By entering "underexposed", you automatically activate a special program which performs exactly the same job that we've just described for high and low key images (except that there we didn't want it). The image will be analyzed and automatically corrected. The image shadow of an overexposed

that has a higher value. The result is that all areas which are darker than this one will be set to black. The image will turn darker overall. In underexposed images, the image highlight won't be set in the brightest area. All areas brighter than the image highlight will be set to white, and the entire image will look brighter.

it). The image will be analyzed and automatically If your software doesn't allow you this option, corrected. The image shadow of an overexposed following the pre scan you'll have to reset the original will be set in a screen that brighter area////image highlight or shadow by hand.

Unfocused Originals

Most scanners offer an automatic sharpening option. Just like all the other automatic functions, this will also have to be shut off if the computer image is to remain as unfocused as the original. Then the original will be possible to be scanned just like a standard original. However, this might only rarely be the case.

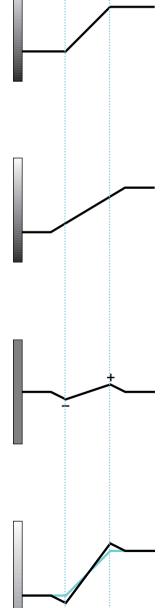
If you try to sharpen the image by activating the filter option, the technical result is this:

This graphic shows you the tonal value jump between darks and brights on one section of the image. If these were to be a sharp edge in the image, the transition would be very direct and the curve very steep. Here, however, you see the line climb relatively slowly. The transition is soft.

An even less focused copy will be produced from the unfocused image. (Sounds illogical? Don't worry, it'll be clear in a minute!) The transitions between the individual gray shades in the less focused copy are smoother and less conspicuous than in the original.

When the curve of the less focused image is subtracted from the curve of the unfocused original, this curve results.

If we now add this "mask" to the line of the original image, small peaks appear at the points of transition. This means that at these positions the dark region turns a little darker, and the bright region a little brighter. The overall contrast between dark and bright intensifies at this point. The resultant image looks more countries of the point of the



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Be careful !!! Too much sharpening can bring about unpleasant side effects.

First of all, the image may suddenly look very sharp but also terribly artificial. Something will look wrong with the image, but you won't be able to pinpoint the exact nature of the problem.

Furthermore, the image contrast might be too drastic, so that halos form around the bright areas in the image. These bright surfaces spread out and as a result fewer details can be seen. This effect is similar to posterisation.

A related side effect arises when sharpening not only affects the image subject but also causes the individual pixels or even film grains to become visible. Here, effects like mottling or speckling can pop up. Mottling is taken to mean the large scale development of dots on the image. Film grains or unevenness in the film texture can be seen. Speckling refers to the pixel inaccuracy, often caused by noise, in which bright individual pixels appear in dark regions.



Speckling resulting from too much sharpening



Artistic and Computer Generated Originals

A number of different problems can arise when you're scanning artificial and computer generated images. First, the colors worked with often lie outside the range of printable colors and are therefore difficult to reproduce. The same is true of color effects such as neon colors.

The structure of the image can be another problem. Oil paintings for instance, often come alive not just because of the colors but also because of the visible color layering. This can't be reproduced in the scan or subsequent print.

All you can do here is to try different settings and see which of them comes closest to portraying the original.

Negative Originals

Negative originals are truly a topic in themselves.

Let's take a case in which we're dealing with a negative original with nothing unusual in the subject, a true Standard Original without anything particular (not high key, not low key, not poorly exposed and definitely no color cast): this negative can be scanned like a regular Standard Original. Generally your software will let you enter the original as a negative. The reversal process proceeds automatically so that a positive image appears on

Hell Verein / www.the abhitor directly after the pre scan.

Even specialists, however, have to resort to good old trial and error when dealing with more difficult subjects.

Here's another practical tip:

Don't wait until you're pressed for time to work with negatives for the first time, but go ahead and experiment beforehand to see what effects you can create. They can be pretty exciting: for instance, not just a color cast but a red cast for the bright areas and at the same time a green cast for the dark areas is possible among many other effects.

As we just said, if you're not pressed for time and have a full half hour to produce a top quality, fully normal image, it can be a lot of fun!

Screened Originals

If you scan screened (printed) originals as you would Standard Originals, you'll often end up with the unwanted moiré effect (the little stars or bright lines).

You don't have to believe us, though: you can try it out for yourself with the help of our second surprise.





Moiré

How can you avoid this effect so that you can scan and later even re-use a newspaper clipping?

Your software has a descreening function. This function helps you to artificially defocus the original. For that, however, you have to know the screen ruling with which the image was printed. Once again back to the screen counter!

All this assumes that defocusing and later refo-

For scanners which can't descreen, the following tip:

You can achieve good results if you can make your scanner think that it's had an unfocused original from the start. You engage in a little hardware defocusing, so to speak.

This is achieved by simply laying a glass pane or a film layer over the document tray. The originals will be assembled on the pane of glass and thus be beyond the range of focus. A pane of glass is actually better suited because film can bring about stray light effects. It should be about one tenth of an inch thick and above all have polished edges.

However, be careful: make sure that you don't

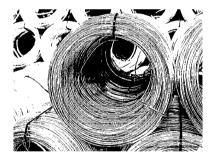
Surprise No. 2

Go ahead and scan a photo. Then scan the printed version of this image with the same resolution.

You'll see the Moiré effect appear in the printed image but not in the photographe Verein / vscratch the document traven the scanner! You've already read a lot about image manipulation in the section on scanning Heads-Up Originals. Every time you darken an overexposed image or filter out the offending shade in a color cast original, you're performing an image manipulation. Above and beyond that, though, there's still a lot of room for manipulation!!!

1 picture says 1000 words, and on these two pages alone we have 6 pictures. Here you see our standard color original as a grayscale original and our usual grayscale original as a bilevel original.





We've achieved this effect by intentionally misleading the scanner. When you enter the sort of original you're supposed to be scanning, no one's forcing you to tell the truth. Any time that you're mounting a color original on the document tray, you can claim that it's a grayscale original. The scanner automatically sets the conversion into action.

On the following page we've manipulated our Standard Original in a number of very different ways. After the pre scan, all you do is alter the gradation curve of the image and start the scan on the basis of these altered settings. We've depicted the gradation curve that goes with each of the images in order to show you how we set up the mani-



Output 0 Input 255

Variation of all color channels

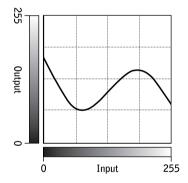


O Input 255

Variation of cyan channel



Variation of magenta channel



If your software has a "Sector Correction" menu option, one simple manipulation possibility stands out. With this option you can change the saturation or even the tone of an individual color (hue), which quickly and easily allows you to achieve effects like these:



These pages depict only a small proportion of the possible manipulation effects. Experimentation in this area will not only be worth the effort, it's

Dust, fluff, scratches, water marks are what you don't want to see on your originals. But unfortunately, in the real world you can't always protect them from the environmental influences which bring about these side effects.

After the pre scan, you can check to see if a bit of fluff or dust appears on the digital image on your screen. These imperfections will be especially clear to the eye after drastic enlargements.

You should wait until after the scan to remove them, though, because then the problem can be seen in finest detail.

Even though much is entirely automatic, pixel retouching still has to be carried out by hand.



Technically speaking, when retouching you're replacing individual pixels whose color values have been altered by dust or scratches. In actual practice what you're doing is copying a neighboring pixel. Even though it sounds complicated, this is very simple if you use the right tool.

Since however the typical image usually doesn't contain two neighboring pixels with exactly the same color value, it won't suffice to simply recolor all the faulty pixels in the same tone. The retouching would be just as striking as the imperfection.

To successfully remove disruptive factors, you need a tool with which to reconstruct the diverse arrangement of the individual pixels.

To that end, you'll copy an entire group of pixels from a neighboring area with similar colors and use it to replace the faulty pixels.

This retouched picture will be much less conspicuous.

If however there are large imperfections across the entire image, this practice can be rather time consuming. Thus it's really important that you protect your originals from unwanted fluff, water, and





Imperfect pixels replaced by one single color





Imperfect pixels replaced by neighboring pixels

After the scan and pixel retouching (if necessary) all you have left to think about is saving the data and handing it over. At this stage, there are a couple of guidelines you should follow to ensure that everything flows as smoothly and efficiently as possible.

It's important that you take time to consider data and image formatting before you start to save your data. This table shows the space requirements for various originals in different image formats:

Image (6.3 x 7.9 in) Storage as:	Disk Space Required TIFF File without Compression
Bilevel Original, 600 ppi	2,195 KB
Bilevel Original, 1,200 ppi	8,729 KB
Grayscale Image, 200 ppi	1,984 KB
Grayscale Image, 300 ppi	4,416 KB
Color Image saved as RGB or Lab File, 200 ppi	5,856 KB
Color Image saved as RGB or Lab File, 300 ppi	13,120 KB
Color Image saved as CMYK File, 200 ppi	17,472 KB

Here you see that the space requirements from one piece of data to the next vary depending not only on the kind of original involved (whether it's a graytone or color image, for example), but also decisively on the color space (RGB, CMYK, CIE-LAB). Neverthless, you shouldn't simply select the format for your data which requires the least amount of memory. When selecting a format you have to consider the data's intended use. Is the data going to be used only once or over and over for different purposes?



This might make the situation clearer:

Your scanner software operates with a specific color model (CIELAB, for example). If you want to use the data for a number of different applications you should definitely save the data in a format that corresponds to this color model (a CIELAB format, in this example). From here, the data can be reformatted to correspond to further applications.

If however you save your data in a special format (like CMYK for offset printing), and then afterwards have to use it for another application with a second special format (like RGB data for a multi-media show for instance), you're going to end up reformatting twice. The data will first have to be converted to match the color model of the scanner software before it can be changed to the new format. This double conversion not only wastes time but also threatens the quality of the end



The same is true for the image format:

The most common image format is TIFF (Tagged Image File Format) in which the images are saved pixel by pixel. All of the most common systems support the TIFF format.

So even if you're constantly using different programs for different purposes, you can generally import all your data as TIFF data into the program you're using at the moment and continue your work worry-free.

In practice, this means that you're always on the safe side as long as you save your data in the color model of your scanner software and in the TIFF format.

Now, if you know exactly how you plan to use the data and if you're really only going to use it for a single purpose, you can go ahead and deviate from this sure fire practice.

So, you know for example that the originals are to be used for layout work and with a specific DTP program. It's probably the right choice to save the data directly in CMYK-EPS format. EPS stands for Encapsulated Postscript. If you save a CMYK image as EPS data, a total of five data pieces will be produced. They first of all contain a main file in either TIFF or PICT format that offers a rough preview of the entire image. Meanwhile, the fine data for the image are saved in four different files arranged by the four, distinct CMYK color channels.

The rough preview can be of use when positioning your layout. The smaller amount of data in this image simplifies and speeds up the work in comparison to the fine data.

If you're absolutely sure that the scans are to be printed and you know the exact printing process, the exact screen ruling and the sort of paper to be used in printing and you also know that the scans won't be used for another printing process sometime next week — then, and only then, you should have the data in the correspond to the work that the work that

General Tips for Data Transfer

You should be sure to ask five times over what kind of data carrier you're supposed to use when transferring the data.

Diskettes are often inappropriate for the transfer of large amounts of data.

DAT tapes are also problematic because they can be formatted in various ways.

Magnetic optical disks (MOD) are generally trouble-free, as are removable cartridges for which the data carrier's designation has been standardized. But even here there are a number of different formats (for example cartridges for 44MB, 105MB, 200MB, etc.). You should therefore ask about the hardware prerequisites early on.

In case the data are to be used for printing, be sure to ask ten times over what data format you should use. Verify which printing process, paper and screen ruling have been lined up. This verification is without a doubt faster than reworking the data or scanning the entire original set once again. (An especially important point, since right before a deadline you're not likely to have a lot of time at your disposal.) Time lost due to unreadable data can be a terrible aggravation.

It's even more aggravating when false or missing information leads to mistakes in data storage and transfer, or to printed work that doesn't at all look like it's supposed to.

Make sure that you have all the necessary information!



Well, that's the first step as far as we're concerned.

We hope we were able to make this book's demanding content understandable and even entertaining, despite all the theory.

Now that your scanning career's getting started, be sure to take time to try things out. Experiment! Play with the possibilities that your scanner and software offer and see what kinds of effects they'll let you create.

You'll soon discover that it's not only fun but quickly helps you gain valuable experience.



One last practical tip

Jot down all the effects that you see while experimenting and especially note the settings that you used to create them. If later on you unintentionally produce something similar, it'll be a lot easier for you to figure out how and why it's suddenly come up again.

Well, there are only two things left to say in this book:

Thanks for your interest !!!

And most of all, we wish you success in scanning !!!

Publisher

Heidelberger Druckmaschinen AG Siemenswall D-24107 Kiel

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