Gerald's Column
by Gerald Fitton

I am very pleased with the amount of feedback and interest I am receiving as a result of my experimental website for Archive users. You will find it at http://archive.abacusline.co.uk. Please note that there is no "www" in this address and that, to get into this site, you will need to enter the username "archive" and the password "amusement" (in lower case and without the inverted commas). The website is still being developed and comments are still flooding in. Consequently, this month, I thought we would digress from websites and streaming data files and, instead, discuss something else.

Pictures

A month or so ago on Archive-on-Line I noticed that there was a thread about pictures and, in particular, printing them. Concepts such as dpi (dots per inch), pixels, width, aspect ratio, type of paper, colour depth, etc, were discussed.

I have to start by saying that I'm not an expert. That should persuade you that you have every right to tell me that I don't know what I'm taking about and maybe, as a result I shall get lots of correspondence and I might even learn lots of 'useful things'!

Before we get started have a look at the pictures below.

From the camera

The landscape picture with an aspect ratio of 4:3 (top left) is straight from my digital camera. This ratio, with a little mathematical manipulation, becomes either 1.333 or 0.750.

The Golden Section

I could wax lyrical about "The Golden Section" for another ten pages but, in these days of instant information via the Internet I think it best I cut it short! There have been many famous people from the past who have not 'cut it short' and I'm sure that you'll have fun reading what they have done and said. Just one word of warning. I found a site (high up the Google list) allegedly written by some Professor or other which includes the wrong mathematical formula for The Golden Ratio. I'll try to get it (the formula) right.

This allegedly beautiful "Section" concerns pictures, buildings, etc, with an aspect ratio of about 1.618. The mathematical formula for the ratio is $1 + (sqr(5)$ ™ $1)/2$. If you find the reciprocal of this number then you will find that the answer is about 0.618. It is no coincidence that this reciprocal is exactly 1 less than the Golden Ratio. In architecture you will find many beautiful buildings having a frontage which is 1.618 times higher than than the width. Many painters used this aspect ratio for their most important portraits.

One of my other two pictures has an aspect ratio of 1.618 and the other an aspect ratio of 0.618; both ratios are approximate. The composition (not this month!) of the portrait version leaves a lot to be desired but I find the landscape picture aesthetically satisfying. I am sure that, in part at least, this is because the picture has an aspect ratio of 0.618. You must agree that it looks better than the picture taken directly from the digital camera?

Aspect ratios

Now that I have introduced you to one very special aspect ratio, the Golden Section, here's a longer list. Some of these may be familiar to you.

0.618, 0.667, 0.686, 0.707, 0.750, 1.333, 1.414, 1.458, 1.500, 1.618, 1.778.

I had thought about including a set of pictures, one for each aspect ratio! Then I decided that, instead, I would put them on my website at http://archive.abacusline.co.uk/ so that you can download them and study them at your leisure.

Printing

Before considering this wide range of aspect ratios let's digress.

The two pictures below are what art historians might call 'details' taken from the original snap. Although the picture on the left has an aspect ratio of about 1.62 (The Golden Ratio) and hence it looks (to me at least) aesthetically satisfying, that is not my immediate point. My point is that it doesn't look too fuzzy even though it is only a small part of the original picture. It has been magnified to an extent well beyond that which the less knowledgeable might consider possible. The size of the picture on the left is 352 x 572 in pixels.

Of course, I can't print this out on borderless 6 x 4 (inches) paper unless I lose a few pixels at the top or bottom of the picture (or both top and bottom). Indeed, to print at an aspect ratio of 1.5 (on 6 x 4 inch, 15 x 10 cm, paper) I need to cut the height down so that the picture becomes 352 x 528. The picture on the right has been shortened to give an aspect ratio of 1.50 so that it can be printed (borderless) on 6 x 4 inch (15 x 10 cm) paper.

On 6 x 4 inch paper, a picture which is 352 x 528 pixels in size will be printed at 88 pixels per inch (approximately). All modern printers have a much better resolution than this so the limitation to the resolution of the finished product is not the printer but the picture.

What many people find greatly surprising is that even at 75 pixels per inch a colour photo (but not text!) will look quite reasonable unless you decide study it under a magnifying glass. I assure you it is true! I don't recommend going to this 75 pixels per inch extreme, but it just shows what you can do when you are working close to the limits of acceptability.

Printers

Printers are usually rated in dpi (dots per inch). Be wary of whether these are real dpi or whether there is some software interpolation going on! Although there was another 'standard' about 10 (or was it 20) years ago, modern printers usually have dpi rated as some power of 2 times 75. The usual values you'll see quoted are 75, 150, 300, 600, 1200, 2400 and even 4800 dpi. There is no point in buying a printer which is capable of, say, 4800 dpi, if the only pictures you are going to print will be printed at 75 pixels per inch. So do your sums before you buy a specification you'll never use!

My guess is that Paul sends the Archive magazine to a profession Print Shop which will have printers capable of at least 1200 dpi and probably 4800 dpi (perhaps 9600 dpi - but I've never seen such printers on sale). For your 'happy snaps' taken with your fairly high quality digital camera, 1200 dpi is about all you'll really need. After all, 6 inches at 1200 dpi implies a picture 7200 pixels wide, and that's a lot of pixels for a camera.

Photo printers

In my opinion the resolution of the printer is not as important as the way in which it handles colour. Generally speaking, the more colours the better! The printer I use, an Epson Stylus Photo RX500, whilst not being the ultimate by any means, has six separate colour tanks. These are the usual minimum of black, magenta, cyan, yellow, with the extra two tanks being light magenta and light cyan. Some even better printers have eight tanks!

For printing photographs make sure you buy a printer which can use photo paper and photo quality inks. I don't want to enter into any arguments about whether cheaper compatible ink cartridges are as good as the branded units nor do I want to enter into any discussion about cheap refills. I'm sure that there is right and wrong on both sides. What you can not do is print photos on a printer which is not designed to use photo inks and photo paper.

For my best photographs I use (the best) "Premium Glossy" paper and Epson branded inks. However, for printing out emails and web pages I use an ordinary 80 gsm (gm per square metre) white photocopy paper, with an appropriate, non photo, setting on the printer. In this mode the printer runs much more quickly than in photo printing mode.

6 x 4 photo paper

I have seen digital cameras advertised which will shoot in wide screen mode. This mode has an aspect ratio of 16:9, 1.778 landscape or 0.562 portrait. I believe that the APS (Advanced Photo System) takes pictures on film in a format which is about 30.2 x 16.7 mm. This is an aspect ratio of 1.808, wider than wide angle! My view is that this might be OK if all you want to do is to look at the pictures on your wide screen TV but it is not really a good idea for digital cameras particularly if your final output is intended to be on paper.

The most popular (but now obsolescent!) film cameras use 35 mm film. The picture size is 30 x 24 mm, an aspect ratio of 1.458 landscape or 0.686 portrait. This is higher than the usual 4:3 (1.333 or 0.750) of digital cameras.

What seems to surprise almost everyone to whom I've mentioned it, is that 35 mm film does not match exactly the standard 6 x 4 inch prints you usually get from the print shop. There is not a lot of difference but you do lose a little off the height (in landscape) when you print from 35 mm film onto 6 x 4 paper. It's only about 3% of the height and usually doesn't matter - but part of the picture is lost.

When you are taking a picture with a 4:3 (not a 16:9 wide screen) digital camera you should be aware that if you take your memory card into a shop for printing then the 1.333 aspect ratio picture on your memory card will not fit onto borderless 6 x 4 photo paper! You do lose over 10% of the height of your picture so be careful that you do not chop the heads or feet off your subjects!

A4 photo paper

The 'A' series of paper sizes, A4, A5 and A6 are the most common, were chosen such that one side is the square root of 2 times the other side. For example A4 is 297 x 210 mm. This aspect ratio is about 1.414. It is different from the 1.500 aspect ratio of 6 x 4 photo paper and closer to the 1.333 ratio picture stored on a digital camera memory card. Nevertheless about 6% of the height (available on the memory card) is lost and you should be aware of this.

Taking pictures

Picture composition (what goes exactly where in the picture) is a big subject and I shall defer discussion of that until another day. Right now just one general principle which, if you look back to the first set of three pictures, you might have guessed already, is this.

Take your picture (using your digital camera) without too much care for the composition. Having done that, load the picture into your computer and then carefully crop it to the right size for your paper. For an A4 picture you will need an aspect ratio of 1.414; for 6 x 4 inch prints you will need to crop to an aspect ratio of 1.500. When you take your picture leave plenty of margin at every edge (top, bottom, left and right); know that you will crop it later.

The clever bit is to compose the picture at the time you crop it so that the composition is aesthetically attractive. I have tried to do that with the first set of three pictures and succeeded with the landscape Golden Section.

The camera

I have no doubt that some cameras are better than others! As a general rule you get what you pay for; so what makes a good digital camera?

Undoubtedly, lots of pixels and lots of optical zoom. I wouldn't dare to be pedantic and suggest that digital zoom is totally worthless, but, in my opinion, isn't worth much!

My current digital camera is a FujiFilm FinePix F700.

I leave it set to its maximum, 6 MP (Mega Pixel) resolution rather than try to economise on memory by degrading the pictures to 3 MP or 1 MP. It has an optical zoom of 3:1, useful but not awe inspiring.

Cropping

The pictures it takes at 6 MP resolution are 2832 x 2128 pixels. Doing a quick sum, 2832 pixels at 75 pixels per inch gives a length of nearly 38 inches or, if you prefer, 960 mm. I don't think I've ever even considered a print of this size.

So I don't really need all these pixels; or do I?

An A4 sheet is 297 mm along its longest side. Starting with my 6 MP picture of 2832 pixels width, I can crop my composed picture down to something with only 877 pixels (on the longest side) and still get an acceptable A4 print.

You will appreciate that 877 pixels is only 31% of the original 2832 pixels. I can discard up to 70% of the width of the picture and still print out at A4. I can discard 85% of the original picture if I am printing at 6 x 4 inch (15 x 10 cm). Of course it is better to crop less rather than more because then there are more pixels to send to the printer but what you must do (when you take the picture) is to be sure to leave enough of a margin all the way around so that you have flexibility when it comes to the cropping stage.

To create good (printed) pictures you need to get into the cropping habit. Look at every picture and decide how much of it to reject. I'm not going to discuss what makes 'good composition' today but there are some simple rules which a complete novice can learn very quickly. Perhaps this is a subject for Archive-on-Line?

If you want a borderless A4 or borderless 6 x 4 inch print then compose your cropped picture with an appropriate aspect ratio. On another occasion I shall discuss pictures for websites.

Only when you are happy with your cropped picture do you get round to wasting your expensive photo paper and photo inks. Of course, lots of practice will rapidly improve your output. There will be lots of waste to begin with but, even after a short while, you won't want to send an uncropped picture to a print shop whatever the savings.

In summary

Buy a camera with lots of pixels and optical zoom.

Don't send your pictures to the print shop unless you are desperate.

Buy a printer which will handle photo paper and photo inks. I believe that more colours is much more important than lots of dpi (dots per inch). 1200 dpi is sufficient.

Shoot your pictures without too much consideration for the composition. Do the bulk of your composing on your computer later.

Be aware of your paper sizes (aspect ratio) and the resolution you need for that paper size. In particular, note that your camera picture has a different aspect ratio from standard paper sizes such as A4, A5, A6, 6 x 4 inch and 15 x 10 cm. If you are going to place your pictures on a website then paper sizes are not so important. Composition is all important.

The most important stage is cropping. Crop your picture so that it has good composition.

Communication

Emails addressed to me at 'abacusline.demon.co.uk' will not be delivered to me any more. The site at http://www.abacusline.demon.co.uk will soon be closed forever.

My website for Archive readers is at the subdomain http://archive.abacusline.co.uk/ It is a protected subdomain. The username is "archive" and the password "amusement" (lower case without the inverted commas).

You will find many examples supporting my Gerald's Column articles on that site.

For Archive correspondence please write to <gerald.archive@ntlworld.com>.