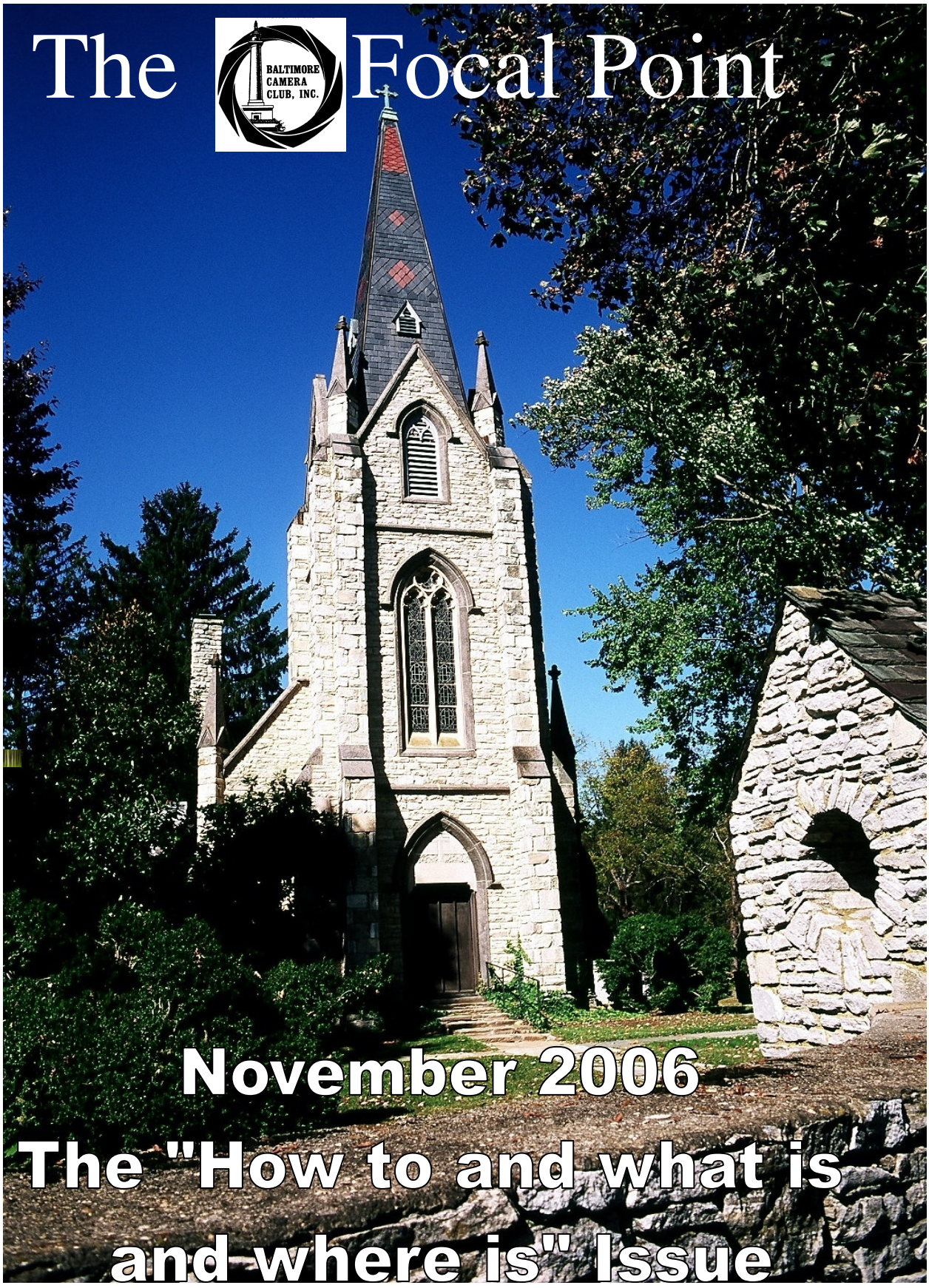
The Focal Point



November 2006

The "How to and what is and where is" Issue

THE WORKSHOP EXPERIENCE

Lewis Katz

The poem arrived in May – it was by Nancy Wood and its theme was the ocean. Our assignment was to find three images that best reflected the essence of the poem. I knew then that I was not in for any ordinary workshop!

But let me back up a bit and discuss workshops in general. They run the gamut from one day "refreshers" like the one we are offering with Rod Planck, weekend workshops where you can choose certain classes and instructors and weeklong workshops. You can further subdivide the week long workshops into location workshops and classroom/.field trip ones. There are two major organizations that offer the most weeklong workshops – the Rocky Mountain School of Photography (www.rmsp.com) and the Santa Fe School of Photography (www.sfworkshop.com).

The benefits of the classroom/field trip style is more critiquing of your work – both past and present) as well as more feedback from the instructor and your fellow photographers. The limitations are geographic – however the scenery in and around Santa Fe is spectacular! Although digital photography has completely changed the dynamic and the possibilities it was great to have the work (in my case slides) you shot the day before on your light table the next morning. The course I took at Santa Fe was taught by Eddie Soloway and was called "The Natural Eye."

The Megapixel Myth and the Megapixel Chart

This month I found myself in the process of trying to make a decision as to which new camera to purchase. The decision came down to a choice between value and megapixels and, along the way I discovered this chart. To me the most significant data point on the chart is the the chart on the next page. Pay particular attention to the date referring to 35mm images.

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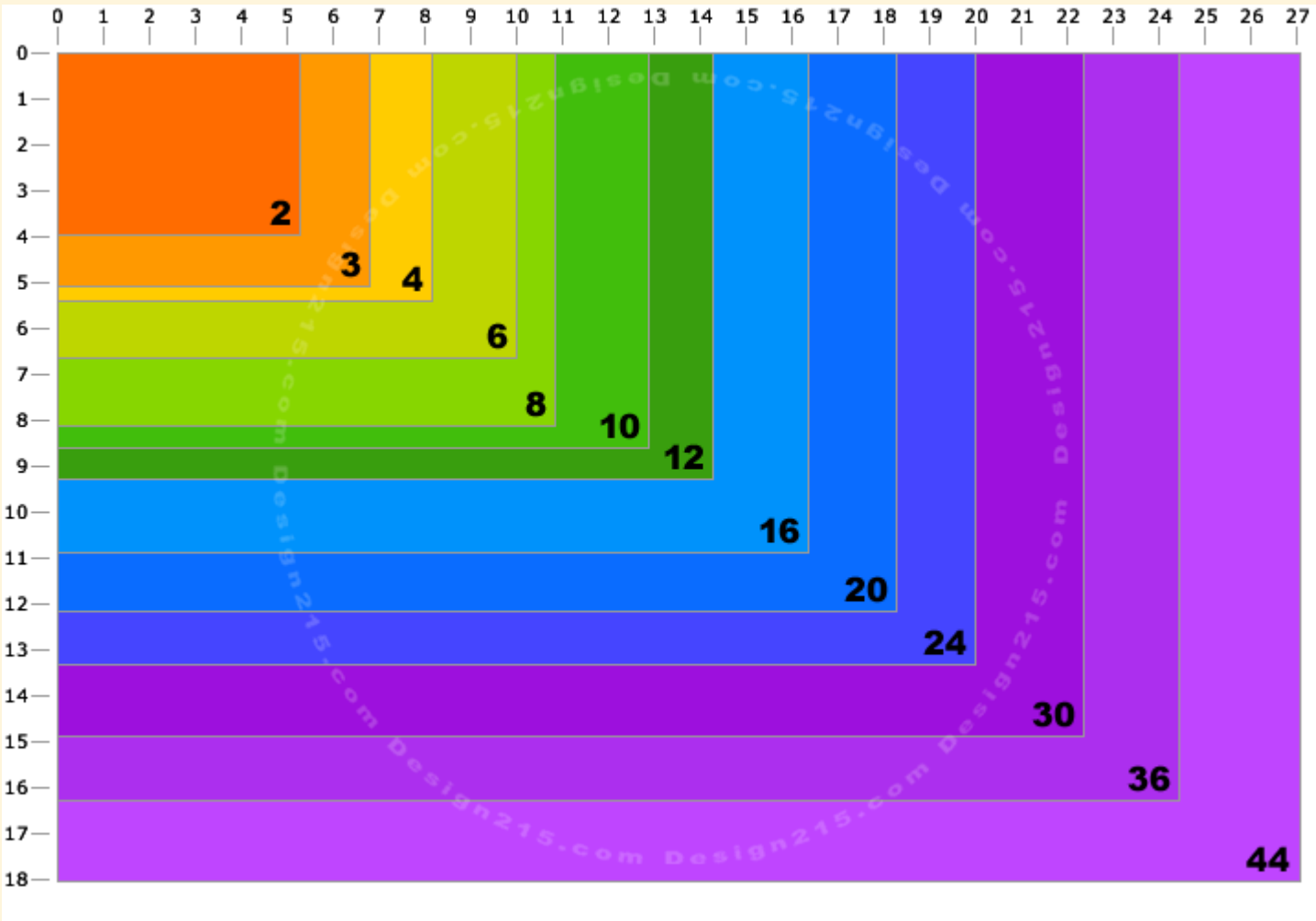
Each colored box represents a certain number of megapixels. The numbers along the top and left side are print dimensions in inches at 300ppi (**pixels per inch**). Most books and magazines require 300ppi for photo quality. For example, the chart shows that you can make a 5" x 7" photo quality print from a 3 megapixel camera.

inches @ 300ppi (numbers inside colored boxes are megapixels)



that as the print size doubles, the megapixels required increases geometrically. You can make nice 8" x 10" prints with a 6 or 8 megapixel camera, but to make a true photo quality 16" x 20" print, you need between 24 and 30 megapixels. Don't be fooled by manufacturers' claims that say you can make 16" x 20" prints from an 8 megapixel camera. While you certainly *can* make a print that size, it will not be **true photo quality**.

Megapixels vs. Maximum Print Size Chart

Megapixels	Pixel Resolution*	Print Size @ 300ppi	Print size @ 200ppi	Print size @ 150ppi**
3	2048 x 1536	6.82" x 5.12"	10.24" x 7.68"	13.65" x 10.24"
4	2464 x 1632	8.21" x 5.44"	12.32" x 8.16"	16.42" x 10.88"
6	3008 x 2000	10.02" x 6.67"	15.04" x 10.00"	20.05" x 13.34"
8	3264 x 2448	10.88" x 8.16"	16.32" x 12.24"	21.76" x 16.32"
10	3872 x 2592	12.91" x 8.64"	19.36" x 12.96"	25.81" x 17.28"
12	4290 x 2800	14.30" x 9.34"	21.45" x 14.00"	28.60" x 18.67"
16	4920 x 3264	16.40" x 10.88"	24.60" x 16.32"	32.80" x 21.76"
35mm film, scanned	5380 x 3620	17.93" x 12.06"	26.90" x 18.10"	35.87" x 24.13"

Notice in the above chart that according to the logic postulated on the pervious page and accompanying chart, the largest “photo quality” print which can be made from 35mm film is approximately 18” x 12 ” or, as we would say, 12 by 18. Anyone who has ever done darkroom work KNOWS that is just not true, to the eye, that is.

NOW, HERE’S IS THE REASONED POINT OF VIEW

INTRODUCTION

Forget the silly debate over pixel counts among digital cameras. There is little visible difference between cameras with seemingly different ratings. For instance, **a 3 MP camera pretty much looks the same as a 6 MP camera, even when blown up to 12 x 18!"** I know because I've done this. Have you?

Joe Holmes' limited-edition 13 x 19" prints of his American Museum of Natural History series sell at Manhattan's Jen Bekman Gallery for $650 each. They're made on a D70.

There are plenty of shows selling shots from fuzzy Holgas for a lot more money, just that those folks don't tell me about it. Holgas sell for $14.95, brand new, here. You can see an award-winning shot made with a Holga hanging in Washington, D.C.'s Hemicycle Gallery of the Corcoran Museum of Art in their 2006 Eyes of History competition of the White House News Photographers Association here.

Resolution has little to do with image quality. Color and tone are far more important technically. Even Consumer Reports in their November 2002 issue noted some lower resolution digital cameras made better images than some higher resolution ones.

PIXELS, RESOLUTION and PIXEL COUNT (MEGAPIXELS)

Pixels

Images are made up of little dots called pixels. Pixel stands for PICture ELment. Put enough of them together and you have a picture. They are arranged horizontally and vertically. Get close enough to your computer screen (or use a magnifier) and you'll see them.

Resolution (Linear Resolution)

Image Resolution

Resolution is how many pixels you have counted horizontally or vertically when used to describe a stored image. Digital cameras today have between 2,048 and 4,500 pixels horizontally. 3 MP cameras have 2,048 pixels horizontally and 14 MP cameras have 4,500 pixels. They have fewer pixels vertically since the images aren't as tall as they are wide.

That's not much of a difference, is it? That's the whole point of this article. I'll explain that a little further down.

Print Resolution

Resolution is also how many pixels you have per inch or other linear unit when you print on paper. Most prints are made at 200 - 300 pixels per inch (PPI or DPI, dots per inch). This is the image resolution and has nothing to do with the technology by which the print is made. (For instance, inkjet printers' nozzle sizes are the silly 2880

DPI or other numbers you see. These printer numbers are often used by hucksters to hoodwink and distract you when talking about resolution. These only refer to how the ink is spat out on the paper.)

Screen Resolution

Most computer screens today are about 100 DPI, dots per inch. There isn't much variation from screen to screen so we rarely discuss this. It's easy to figure out: most computer screens are about 1,024 x 768 pixels. If your screen is 10" wide then divides 1,024 by 10 and you have a 102.4 DPI screen. Bigger screens tend to have more pixels, for instance, my 22" CRT has 1,600 x 1,200 pixels and has a viewing area of 16 x 12."

Yes, laptops with bigger screens tend to have lower linear resolution. No big deal.

Pixel Count, expressed as Megapixels

Pixel Count, expressed as Megapixels, is simply multiplying the number of horizontal pixels by the number of vertical pixels. It's exactly like calculating area. A 3 MP camera has 2,048 (horizontal) x 1,536 (vertical) pixels, or 3,145,728 pixels. We call this simply 3 MP.

Small differences in pixel count, between say 5 MP and 8MP, are unimportant because pixel counts are a square function. It's exactly like calculating area or square footage. It only takes a 40% increase in linear dimensions to double the pixel count! Doubling pixel count only increases the real, linear resolution by 40%, which is pretty much invisible.

THE MYTH

The megapixel myth was started by camera makers and swallowed hook, line and sinker by the public. Camera makers use the number of megapixels a camera has to hoodwink you into thinking it has something to do with camera quality. They use it because even a tiny linear resolution increase results in a huge total pixel increase, since the total pixel count varies as the total area of the image, which varies as the square of the linear resolution. In other words, an almost invisible 40% increase in the number of pixels in any one direction results in a doubling of the total number of pixels in the image. Therefore camera makers can always brag about how much better this week's camera is, with even negligible improvements.

This gimmick is used by salespeople and manufacturers to you feel as if your current camera is inadequate and needs to be replaced even if the new cameras each year are only slightly better.

PRINT SIZES

If an image is clear you pretty much can print any image from any modern camera at any size. Sure, if you print mural size you won't have the sharpness you'd get from 4 x 5" film, but you'll have an image that looks fine when viewed from the reasonable distance at which normal people will view that image.

Ideally you'd like to print at 300 DPI to look sharp even when viewed too close. You can figure this by:

Long print dimension in inches = 4 x (square root of megapixels)

For example, for a four megapixel camera the square root of four is two. Two times four is eight. Thus the biggest print you can make without losing sharpness compared to film at normal viewing distances is is 6 x 8." From a sixteen MP camera likewise you could go 12 x 16." Of course you can print bigger, just you won't have the sharpness of film. Also few people are able to get all the sharpness of which film is capable, making this harder to compare.

Of course most people want to print bigger than that, and that's fine.

The entire resolution issue is one of scale and viewing distance. Sure, more resolution is better at bigger sizes, but how sharp your image is has little to do with how good it is. Far more important technically is whether or not the colors are correct and whether or not any sharpening was done tastefully. Many digital cameras add nasty looking sharpening that puts very artificial halos around sharp lines, making the image look obviously digital to those of us who recognize these things. Sloppy sharpening is done to impress the innocent by overemphasizing the lines around things if real sharpness and resolution is lacking.

Of course you can print much bigger, since sharpness isn't as important in color as most people worry. You can get great results from a 6MP camera at 20 x 30" if you want, since normal people view big images from further away. This is all art and in the eye of the beholder; I prefer huge prints made from my 4 x 5" film camera, and for portraits I prefer the smoothing of digital cameras.

Don't worry too much about this, since sharpness is not as important in color as it is in B/W. I make 12 x 18" color prints all the time from 3 to 6 MP cameras and they look great, since I only print images that are good to begin with.

TO REPLACE FILM

Digital does not replace film. Just look here for why a magazine like Arizona Highways simply does not accept images from digital cameras for publication since the quality is not good enough, even from 11 megapixel cameras, to print at 12 x 18."

If you do fret the pixel counts, I find that it takes about 25 megapixels to simulate 35mm film, which is still far more than any practical digital camera. At the 6 megapixel level digital gives about the same sharpness as a duplicate slide, which is plenty for most things. Honestly, I have actually had digital files written back out onto film to see this. See also my film vs. digital page here.
Of course I use much bigger film than 35mm for all the pretty pictures you see at my website, so digital would need about 100 megapixels to simulate medium format film, or 500 megapixels to simulate 4x5" film. This is all invisible at Internet resolutions, but obvious in gallery size prints.
For images seen at arm's length you need to have about 300 real pixels for every inch of your print's dimensions. If you are looking too closely, as with a contact print, then you'll love to have 600 real pixels or more for every inch of your print. Stand further away as you would from a huge print and even 100 pixels per inch (DPI) can look great. By real pixels I mean real optical pixels, *not* phony interpolated ones. Multiply the inch dimensions by these DPI figures to get the total resolution (horizontal and vertical, typically thousands in each dimension) you need for a decent image, and multiply these together to get a total number of pixels (usually in the millions, or megapixels.) For instance, for an excellent 8x10 you need [8" x 300 DPI] x [10 x 300DPI] or 2,400 x 3,000 pixels, or 7,200,000 pixels, or 7.2 megapixels. This is what the formula at the top calculates the easy way.

EDITOR ' S DISCLAIMER

Nothing in this article, "The Megapixel Myth" is original. It was compiled by your editor (—*ED*) and Steve Harmon. So, if there are any lawsuits about copyright infringement, I hope we get separate cells. I never did trust tree huggers.

Our thanks go out to Lewis Katz for his contribution and we would encourage the rest of you to contribute as well.
—ED

Our Cover and the image below: 35mm Velvia film image 28mm lens, two Photoshop layers (Nightmare) one vertical and one rotated.

HAPPY HALLOWEEN: The image (below) is called "Nightmare"