A Zone System Handbook

Part 2 – The Zone System in Practice

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Remembering the Goal

In the first part of this "handbook," basic elements of photographic technology were laid out. Those basic elements of light meters, camera aperture, camera shutter speed and film or digital ISO were related to the concepts of the Zone System. The Zone System, we learned, is simply another way to think about the relationship of how photographic exposure works, so we have an understanding that Apertures, Shutter Speeds, ISO and the Zone System's "Zones" are all related to one another and can generally be used as equivalent terms. We also learned that the "Zone System" as a concept isn't really anything different from what we already know about photography, but may be a different way of *thinking* about what we already know about the technological underpinnings of the medium.

With all of that under our belts, it's important at this point that we remember that our primary objective in learning the zone system in the first place is so we can *forget* the zone system. Wait… what do we mean by that? Well, the goal of all of this is to be able to put all the "technology" parts of photography into the backs of our heads so that we can concentrate on the things that are really important to us in photography, namely, the creative, visual part. We'd like to be able to forget about wondering whether our photographs will "come out" and be able to stop spending so much time in the darkroom or the computer trying to squeeze the picture we had in our mind's eye out of a negative or file that didn't deliver what we thought it would.

So, the goal, at least to my way of thinking, is to learn these basic techniques in photography well enough that we no longer have to think about how photography *works* and start to think about the interrelated essentials of the creative photographer's world:

- What am I making a photograph of?
- Why does this subject matter to me?
- How will I convey my own feelings about this subject in a photograph?
- What do I want the photograph to look like when it is completed?

We have to remember that the technology of photography is there to serve our creative vision, and that, ultimately, the technology is a whole lot easier to master than the visual aspects of the medium. With that in mind, it starts to make sense that being able to tuck these technical aspects into our "back pockets" allows us to put the creative parts of the medium right out there in the front of our photographic efforts. Ultimately, I think, this strategy makes us better, more sensitive and creative photographers.

The remainder of this Handbook is intended to give you a bit more concrete information about how to apply these basic concepts about the Zone System to making the creative photographs that *you* want to make.

A Few more Details

Previously, we Learned the Following:

- Light meters see middle gray
- We can make light meters "smarter" only by being smarter about what we aim them at; aiming them at important parts of our scene helps us to gain control over what the light meter sees and therefore what it tells us
- Apertures & Shutter Speeds have a 1:2 relationship (half-as-much / twice-as-much)
- The Zone System divides the dark-to-light scale into 11 "Zones" or areas of tone
- The Zones have a relationship of 1:2, just like Apertures and Shutter Speeds
- Zone V (five) is middle gray on the Zone System's scale, so it is what light meters want to see and create
- So, moving one whole Aperture or Shutter Speed in one direction or another changes the exposure of an object by one Zone
- A change in exposure changes *all* the values along the scale. Making one part of a scene one stop brighter makes *every* part of that scene one stop brighter.
- To "Place" a object that has a given amount of reflectance at a particular Zone on the Zone Scale, we simply have to meter that object with our light meters, note the exposure and then move that exposure up or down to make it match what Zone we think the object should be on
- Once we decide where an object should be "Placed" on the scale, we understand that since the reflectance of the scene hasn't changed, other objects will "Fall" on the scale in relative to how much more or less light they reflect than the object we metered and "Placed"
- Our opinion about the Zone important things in our photographs should be "Placed" on, or should "Fall" on is part of the creative process; we get to decide how the image should look
- The Zone System's descriptions of each Zone helps us understand the textural and brightness limits of the photographic process so we can fit the important parts of our images inside those limits

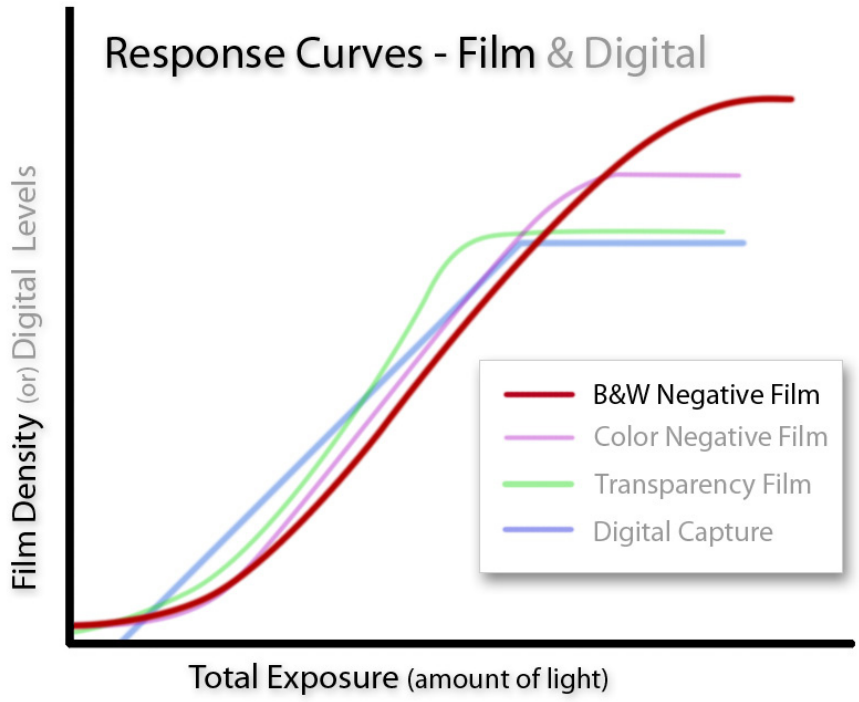
Great, right? Well… as you might suspect, because photography has some technical limitations, and because those technical limits change a bit depending on what material (negative film, transparency film, digital capture) is being employed, there are a few limitations as to how we can apply this scheme of making images. These aren't "deal breakers," but rather realistic issues that are part of the photographer's tool kit.

An issue in applying these principles is how light actually affects light sensitive materials during exposure. There is also the issue of what happens *after* an exposure is made. Whether in the computer or the traditional darkroom, we can exert post-exposure "development" controls on our photographs. In both cases, exposure and development, the application and effect is different in the film and digital worlds.

Film: Light & Exposure

It's Graded on the Curve
For film exposures, it takes a quantity of light to get the film's response "moving." For the first small amounts of exposure (dark picture areas), very little change occurs in the density of the film. Then, once enough exposure has been reached, the film's changes in density more or less match the changes in exposure. At a point up at the high (light picture areas) end of the scale, however, the film's changes in density start to tail off; increases in exposure result in little to no change in film density (see illustration). So, it stands to reason that we need to fit our exposures in between these areas, causing them to land on the "straight line" section of the curve of the film's response to light. If we think about it, the Zone System's verbal descriptions tone and texture are telling us where the film starts responding to light and where it stops responding to additional exposure.

Black & White Film: Changing Development to Control Highlights
For Black & White film, a partial solution to the problem of controlling the film's density range is to change the amount of development the film receives. Changes in development time do not tend to change the shadow areas of the film very much at all, but more development causes the dense highlight areas of the negative to get more dense, while less development doesn't allow highlights to become nearly as dense as they could be. So, exposing the film so that the shadows get correct exposure for the desired Zone value and developing it so that highlights achieve the desired Zone value is the standard method of working.



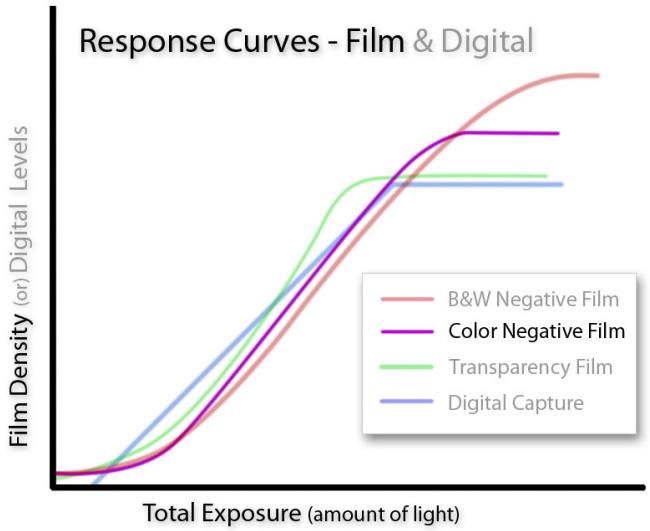
Film: Light & Exposure

This "expose for the shadows, develop for the highlights" strategy has been the mantra of many photographers, especially those working with large-format Black & White sheet film, where development can be changed for every photograph. This is not to say that this method can't be used for small-format roll film, but rather that it makes planning a bit more difficult. If you think about how many times you typically shoot a whole roll of film at a given location (meaning a given amount of light with a given amount of contrast range) then you can see that employing this method of working is completely possible. Additionally, once we have a negative, we have all the controls of the traditional Black & White printing technology or of scanning and digital printing available to help us realize the vision of our image.

Color Negative Film: Expose for Shadows, Keep an Eye on Highlights
The range of tone that color negative film can capture is only about 6 or 7 stops, compared to 9 or 10 stops for black and white film. This means that Zone II becomes your darkest tone and Zone VII becomes your lightest tone. If we keep the important parts of your subject within that range, our exposures will continue to be predictable and accurate.

Color negative films have another significant difference; changes in development do not result in changes in highlight density. Because development changes can't help us adjust the contrast range, it is even more important to make sure that our exposures fit within that "straight line" part of the film's response curve. A helpful characteristic of color negative films is that they tend to have a rather broad "exposure latitude," meaning that they are able to survive mild amounts of under-exposure (a stop or so) and mild amounts of over-exposure (one to two stops) without blocking up too many details at the shadow or highlight ends of the scale.

So, with color negatives, you can still make "placements" and find out where other tones "fall," keeping in mind that you have less range of tone with which to work. When working with color negative films, placing low values (shadows) is still the best way to go, since exposure is most critical where there is the least negative density. Additionally, once we have a negative, we have all the controls of the traditional color printing technology or of scanning and digital printing available to help us realize our vision.

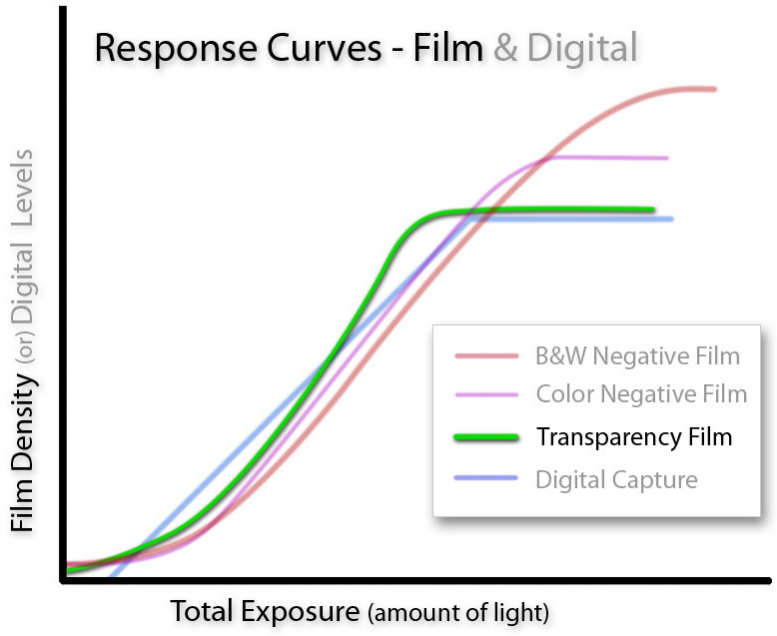


Film: Light & Exposure

Color Transparency Film: A Narrow Contrast Range
Color transparency (slide) material is a lot more finnicky about exposure than negative film. Not only is there no development control over the contrast range, but the contrast range is quite narrow; about 5 stops as compared with the wider range of negative materials. When working with color transparency materials, however, it is best to place the high values, since color slides are direct positives and the high values are where the lowest density of the color dyes that make up the image occur, and you want to be able to control those areas. So, we need to do the opposite thing we would do with negatives; expose for the *highlights* and let the shadows fall where they may (or, alternately, control shadow density with lighting or bounce-reflectors).

Because their tone range is so narrow, exposure accuracy is important with transparency films, and we generally need to be within one–half stop of accuracy for optimum results.

Color photographs are closer to human vision
Another thing to remember about color materials as compared to Black & White materials; most people see in color. Because of this, color photographs make them think that what they are seeing is very close to real. Therefore, black and white images allow more broad changes in your visualization than color images; people will tend to believe a photograph of a very dark gray apple, but not a photograph of a blue one.



Digital: Light & Exposure

Digital Cameras are Linear

The basic ideas of measuring light and making exposures hold true in the world of digital photography, too. With film, we've seen that it takes a certain amount of light to start the film's response "moving" (Zone I) and that the film's density changes more in the middle zones than it does at the dark and light zones.

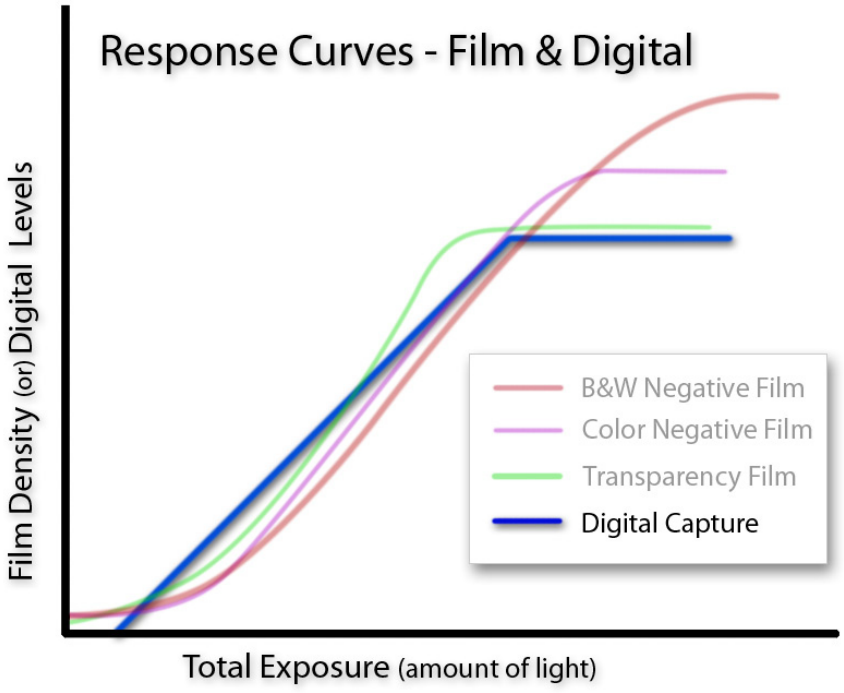
The sensors in digital cameras have a linear response to the action of light. Like film, it takes a bit of light at the low (dark) end of the scale to get them "going," but once started they respond in a linear fashion all the way up the scale… to a point. An important difference with digital image capture is that there is an abrupt end to the camera sensor's response at the high (light) end; once the exposure has reached a certain point, all detail is lost, and it's lost for good.

A good digital camera (one of the "good to better" DSLR cameras) can capture textured information somewhere in the area of 7 zones, from about zone I or zone II to zone VII.

Zone System Concepts Still Apply

We can still make "placements" and find out where other tones "fall," but the approach is similar to what's used with working with color transparency materials; we need to work from the high end of the scale to make sure that the highlights don't fall off that abrupt edge and get "blown out."

With that information above, we would assume that exposing at the bottom of the scale would be our best bet; expose low on the scale to make sure that the highlights don't fall off the top end. Unfortunately, it's not quite that simple.



Digital: Light & Exposure

Bit-by-Bit(Depth)

Digital images are, well… *digital.* This means that our digital exposures are built of the strings of Ones and Zeros ("bits") that make up the digital universe. This means that there are some issues that are related to digital photographic exposures that compromise the information used to describe dark values and favor the information used to describe light values.

If we shoot a JPEG image in the camera, the file we get captures 8 bits of data per pixel, which represents a total of 256 different levels of brightness per pixel per channel (one channel each for Red, Green & Blue). When this happens, half of those 256 levels go towards recording the brightest stop (zone), half of the remaining levels (128 levels) go towards recording the next brightest stop (zone), then half of what's left after that (64 levels) goes towards recording the *next* brightest stop and so on for the rest of the stops. There is a straight, linear halving of data for each stop on down the scale. So, when we get down to the darkest textured areas of the image, we usually have only 4 (or, in some cases, 2) levels recording that detail, meaning that we wind up with "texture" being recorded by only 2 or 4 different values, and we can't describe much delicate texture with those few values.

The 8-Bit Problem

Textured Zone Value	Number of Levels used to describe that value (8 Bit File)
VII (brightest pixel)	128
VI	64
V	32
IV	16
III	8
II	4
I	2
0 (darkest pixel)	0

So, with the zone system as it applies to digital photography, we want to "place" the highlights and then let the shadows "fall" where they will, making sure that, if there is important shadow detail, those shadows don't fall too far down on the exposure scale. We then just have to be aware that, when we meter something and "place" it on the high value, we don't get too much farther up the scale than zone VII and try really hard to make sure that our low values don't fall too far down so that they get described with enough different levels.

Bigger Bits with RAW

There is another solution, and that's the "RAW" file. When you shoot RAW files, you don't just get 8 bits of data. Most of the better cameras capture RAW files at 12 bits of data per pixel, so when you have one of those files, you record 4096 levels per pixel per channel. This means that you have 2048 levels recording the brightest stop (zone), then 1024 levels describing the next brightest stop (zone) and on down the line until the darkest pixel is probably being described by at least 16 levels, and that's the black, textureless areas; lighter areas will be recorded by more levels. Obviously, this method makes sense for the photographer who wants the greatest amount of detail at both ends of the scale.

The High-Bit Solution

Textured Zone Value	Number of Levels used to describe that value (12 Bit File)
VII (brightest pixel)	2048
VI	1024
V	512
IV	256
III	128
II	64
I	32
0 (darkest pixel)	16

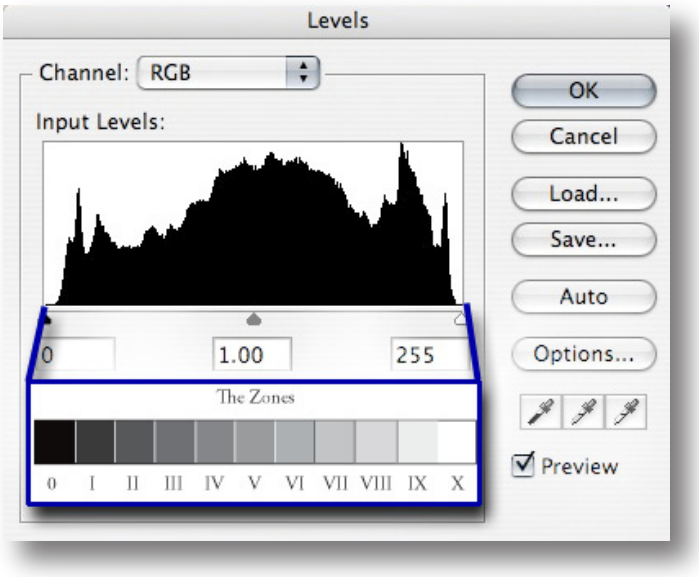
Digital: Light & Exposure

But Wait, There's More!
The really big deal about this isn't just the additional bits creating more levels at the bottom of the tone scale, though. It's the additional exposure "headroom" that the file has; usable exposure that is both above and beyond what we can capture with a JPEG file. This headroom can be accessed and manipulated with software that can "decode" or read the RAW file, software like Adobe Photoshop's Camera RAW module, Adobe's new Lightroom software or Apple's Aperture.

Post-processing the RAW file with software allows you to interpret the information that was captured in a wide variety of ways. This process has an analogy in the film world, in that the RAW software allows for development control *and* printing control, but with a great deal more interactivity and control. One of those controls is that all of the above-mentioned software tools (and others, too) will allow some degree of "highlight recovery." If there is a bit of highlight detail available in at least one of the 3 image channels, the software will make an "educated guess" interpolation of what the channel(s) with no detail should look like.

Another advantage in the digital exposure realm is that we can use the histogram on the camera's LCD display and later on the computer to be able to "read" where our exposure falls on the zone scale. As you might have guessed as we've gone along in this discussion of exposure, the histogram has some strong parallels to the Zone System's Zone Scale.

A warning here is that with RAW files, your camera's histogram can only be used as a "guideline" for the overall exposure, because it's really displaying 8-bit data that it extrapolates from your higher-bit-depth RAW file. Still, it's a pretty good indication that you've not created an exposure that goes too far towards one extreme of exposure or the other.



Approximate Zone Correlation to Levels

Zone	Photoshop Level
Zone 0	0
Zone I	30
Zone II	55
Zone III	80
Zone IV	105
Zone V	128
Zone VI	155
Zone VII	180
Zone VIII	205
Zone IX	230
Zone X	255

"Doing" the Zone System

So, now that you have some conceptual and theoretical understanding of how all this works, what do you do next?

- First, remember that the Zone System is really all about by making images of things you want to make images of. You will learn lots about how the Zone System (and photography) works when you make some photographs and then process and evaluate them.

- Make some photographs by placing the important low values of the subject on the proper Zone for that subject. Remember that we do that by metering the significant dark area in the photograph (and only that area) and then placing that area on a dark (low) Zone by remembering that the meter wants to create middle gray and then closing down one, two, three or four stops (Zones) to make that dark area the Zone we want it to be. How do you know what the proper Zone is? The beauty of the Zone System is that you get to make the decision based on what you want to see in your finished image.

- Once you have made some images by placing low Zones, make more images placing high Zones. Remember that we do that by metering the significant light area in the photograph (and only that area) and then placing that area on a light (high) Zone by remembering that the meter wants to create middle gray and then opening up one, two, or three stops (Zones) to make that light area the Zone we want it to be. Pick the Zone you think is right, make the exposure and then process and evaluate the images you make.

- In both of the above situations, you have ignored the contrast of the scene. You have metered and exposed for only one end of the scale. The next step is to expose for one end of the scale and then meter the opposite end of the scale and find out how many stops (Zones) apart the two important values are. If (for example) you place a dark area on Zone III and the important light area is four stops (Zones) more reflective, then it falls on Zone VII. Then more of your judgment comes into call: is that acceptable to your original visualization of the image? If not, you may want to rethink your visualization, or know that you'll develop the film/process the digital file differently. You see, the Zone System allows you to become the maker of your images. It allows technical control, certainly, but what it really allows is creative control.

Remember that it's all about being able to forget about the technology and be more creative!

The Zones

0 I II III IV V VI VII VIII IX X