The Infamous, Notorious, but yet very Helpful and Friendly Zone System

“Expose for the highlights, develop (and print) for the shadows.” (from the digital world)

“Expose for the shadows, develop (and print) for the highlights.” (from the negative film world)

In the age of digital cameras, we are actually shooting like the days of slide film. So, now the saying should read: Expose for the highlights, tone map, and utilize the histogram for shadows. This set of notes will focus on the digital zone system. At the end, there is information for negative film photography as well.

You might feel like once you understand 205 basic exposure, then you understand photography. There is much more to it. There is a lot of science to how the zone system works, and if you are curious, you should read about it on your own. If I gave y’all the science, I would probably bore you to death. I am giving you what I call the simplified and practical zone system. The notes below are a combination of information found in your textbook, and The Practical Zone System by Chris Johnson.

Why are we learning the zone system for digital?
1. Meter better in situations where we can’t use a gray card.
2. So that we can avoid the 2 Basic Problems when trying to make a good print:
   • Overexposure in the highlights
   • Underexposure in the shadows
3. Learn how to control contrast in your digital editing process.
4. This is the basis for understand tone-mapping which is used in High Dynamic Range Photography.

Vocabulary

Zone:  A unit of exposure represented on a gray scale by a definite step of gray obtained by one f/stop of exposure. There are 3 ways to define zones:

   1. Print values: each zone corresponds to tones in a print. Example: Zone 0 is black, zone V is middle gray, and zone X is white.
   2. Texture and detail: Each zone contains a different amount of texture and detail.
   3. Photographic measurement: Zones can be measured in terms of f-stops, shutter speeds, and meter numbers.

Value:  The shade of gray represented by each zone. Each zone has a specific reflected value.

Tone:  A gradual change from black to white or white to black. Tone and value represent the same movement from light to dark. However, value changes a step at a time, while tone is a gradual movement. At times, a particular shade of gray is referred to as the tonal value, but in general it is best to try not to confuse these two terms by using them in the same sentence.

Previsualization:  Observing the subject and deciding in advance what the print should look like--before the image is exposed.
**Dynamic Range:** Measurement of darkest to lightest tones that a particular device can capture or display.

- Camera Sensor has a dynamic range
- Monitor has a dynamic range
- Ink Jet Paper and Ink Set have a dynamic range

**Place:** Observing the chosen subject and deciding what shade of gray a particular area should be. That value is placed on the zone scale. This placement determines the exposure needed to make the area the desired shade of gray on the print. The longer the exposure of a certain area, the lighter that area will be on the print.

**Fall:** "The maintenance of the relationship of the placement of values on the zone scale."

What? Like this: If one area is two times lighter than the placed value, then regardless of where the first value is placed, the other value will still be two times lighter. Also known as the Law of Reciprocity.

**Middle Gray 18% gray:** reflectance, which represents the middle of the film latitude or **Zone V** on the zone scale. All exposure meters are calibrated to place the received light in *middle gray*.

**Luminance:** Range of Lights and Darks in reflected light (The lights and darks in the scene).

**Contrast:** The difference between lights and darks in values (think of the print).

**Vocabulary Specific to Film Negatives:**

**Subject Contrast:** The difference between the amounts of light being reflected by the darker (shadow) areas of the scene and the lighter (highlight) areas. For example: A dark door in a shadow vs. a white wall in the sunlight.

**Negative Contrast:** Refers to the relative difference between the more transparent areas of the negative and those that are more opaque. Because photographic negatives are actually coated with thin layers of silver, they said to have **shadow densities** and **highlight densities**.

**Normal Development Time:** Accurate film development time based on film type, developer type, and temperature. (N)

**Develop to:** The process wherein the desired grayness for all the placed values is achieved, whether that grayness is inherent in the subject or not. This grayness difference is achieved through the process of shooting the placed value and developing the other values to the desired shade of gray through "N+" or "N-" development time. There must be at least one f/stop difference in the values for this to be achieved.

Shadow densities = more transparent, and correspond to the darker parts of the print.
Highlight densities = more dense or opaque, and appear as the lighter (whiter) areas of the print.

***Densities can be measured with a densitometer, which tells how much light passes through the negative, and how much is held back. You like me, probably can’t afford to by all the photo gadgets out in the world, so we will learn the zone system using what materials you already have available."
PARTS OF THE ZONE SYSTEM

The Zone Scale:
The key element of the Zone system is a visual ruler that allows photographers to visualize and actually measure the difference between normal, low contrast (flat), and high contrast subjects.

- The zone scale ranges from 0-X (in roman numerals).
- The zone scale divides the continuous “grayscale” into eleven equal parts.
- Each zone is one stop different from its neighboring zones.

Zone Scale In Lightroom (shown on top):

Zone Scale in Photoshop (shown on bottom):
Zone 0: Pure black
Zone I: Near black, with slight tonality but no texture
Zone II: Textured black; the darkest part of the image in which slight detail is recorded
Zone III: Average dark materials and low values showing adequate texture
Zone IV: Average dark foliage, dark stone, or landscape shadows
Zone V: Middle gray: clear north sky; dark skin, average weathered wood
Zone VI: Average Caucasian skin; light stone; shadows on snow in sunlit landscapes
Zone VII: Very light skin; shadows in snow with acute side lighting
Zone VIII: Lightest tone with texture: textured snow
Zone IX: Slight tone without texture; glaring snow
Zone X: Pure white: light sources and specular reflections

Zone:

```
0 1 2 3 4 5 6 7 8 9 10
```

Camera meter:

```
-2 -1 0 +1 +2
```
**Characteristic Curve**

The characteristic curve provides a visual profile of tonal information in the photographic image as recorded on film, paper or a digital file.

The toe of the characteristic curve represents the low luminance areas (shadow detail) of the subject and low densities of the negative, or Zones 0 – III. This is the film’s first sensitivity to light or its threshold of sensitivity.

The straight line of the characteristic curve represents the middle luminance areas of the subject and middle densities of the negative, or Zones IV – VII. The ratio between increased exposure and increased density is uniform on this part of the curve.

The shoulder of the characteristic curve represents the high luminance areas (highlight detail) of the subject and high densities of the negative, or Zones VII-X. As the maximum possible density is approached, the steepness of the curve falls off which means that increasing exposure results in a diminishing increase in density.

**Zone System and Adobe Photoshop**

In looking at the histogram of the digital file (image), the Curves or Levels commands or the Histogram palette can be utilized to view all of the tonal values and zones with the shadow value = 0 and the highlight value = 255.

With the Curves command, the brightness of a specific tone or tonal zone can be altered. Using the Eyedropper tool, any part of the image can be measured and the value will show up on the curve as a small circle.

With the use of the Levels command, to move the values in Zone V toward Zone IV in order to make the image brighter, the Brightness/Contrast slider would be moved towards the left on the histogram and vice versa in order to make the image darker.
Zone System and Histograms:

Histograms, a closer look

Let's look at one more image: the overall tonal distribution of this photograph is quite normal, though slightly weighted to the left hand side, showing that there is a concentration of tones at the dark end of the spectrum.

As you can see, certain areas of the photograph correspond directly to certain areas on the graph. The highlights in the clouds is represented by the far right of the graph; the mid-toned sky is represented by the middle of the graph; finally, the dark silhouetted players corresponds directly to the left hand side of the graph.
If we lighten the image, for instance at the picture taking stage by decreasing the shutter speed, opening the aperture, or by increasing the ISO setting, the weight of the graph will shift right. If we darken it, the weight of the graph will shift left.

If, on the other hand, we increase the contrast in the image without either lightening or darkening it, such as with cameras that will allow us to adjust the contrast of the recorded image, the center of the graph will flatten out and the weight of the graph will shift to the outer edges. Do the opposite and lower the contrast and the weight shifts from the edges to the center.

LIGHT METER NOTES:
* Some cameras have a variety of Metering Modes. For the Zone System procedure listed above, make sure you are NOT using Matrix or Evaluative Metering. Switch to your Spot Metering Mode if you can.

**USING THE SIMPLIFIED ZONE SYSTEM (Digital Camera):**

If you are using a lightmeter built into the camera (unless you have a spot meter function), here is your procedure. You DO NOT USE A GRAYCARD IN THIS PROCEDURE!

1. **Previsualize your Zone VII area.** (think details where you see definition and texture in the highlights)
2. **Make sure you are on Manual Exposure Mode.**
3. **Use a spot meter if possible.** Put your camera in spot meter mode if you do not have a hand held spot meter.
4. Get close enough to the subject so that the Zone VII area fills the metering area of the viewfinder (the center circle). (lightmeter thinks this is Zone V)
5. **Note your lightmeter’s recommended exposure.**
6. **Stop up 2 stops** (2 stops more light or increased exposure) from your lightmeter’s recommended exposure. This will ensure that you have the proper exposure to print zone III. (Zone V moves to Zone VII)
7. **You can check your shadows as well and see how many stops difference they are from Zone VII.** If they are more than 4 stops difference, then you should not see recognizable detail in the shadows.
8. Using the new exposure, step back and take the picture.
9. **Write down details such as contrast level of the scene.** You can use this with curves to play with the contrast later.

Note: It is common to darken shadows in post production with this technique
Example:
I am taking a photograph of a man wearing a white shirt. He is in direct sunlight. His shirt would appear gray (Zone V) if I metered normally with no adjustment. Most likely, I would blow out highlights with matrix or evaluative metering. So, I meter his shirt up close with the camera and the spot lightmeter tells me that the exposure is f-11 at 1/125 sec. In reality, the camera lightmeter thinks this is Zone V exposure. I need to correct 2 stops to match my Zone VII exposure. So, I change the exposure 2 stops to: f-5.6 at 1/125 sec. Then I step back and take the picture.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Original Metering</th>
<th>Adjusted Metering</th>
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<tbody>
<tr>
<td>V</td>
<td>f-11 @ 1/125 sec</td>
<td>f-5.6 @ 1/125 sec</td>
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**USING THE SIMPLIFIED ZONE SYSTEM (Film NEGATIVES):**

If you are using a lightmeter built into the camera (unless you have a spot meter function), here is your procedure. You DO NOT USE A GRAYCARD IN THIS PROCEDURE!

1. **Previsualize your Zone III area. (think details where you see definition, detail, and texture)**
2. Get close enough to the subject so that the Zone III area fills the viewfinder. (lightmeter thinks this is Zone V)
3. Note your lightmeter’s recommended exposure.
4. Stop down 2 stops (2 stops less light) from your lightmeter’s recommended exposure.
   This will ensure that you have the proper exposure to print zone III. (Zone V goes back to Zone III)
5. If you have highlights where you want detail, check to see if they fall into zone 7 at your new exposure. If your important highlight areas fall above or below the previsualized zone, then you will have to adjust development time.
6. Using the new exposure, step back and take the picture.
7. Write down details such as contrast level of the scene
8. Make any necessary adjustments in development. (usually only in low contrast situations)
9. Adjust print contrast, burning and dodging as necessary.

As your understanding of the creative possibilities of the zone system grows, you may want to meter the scene for different zones.

***WHEN USING DIGITAL CAMERA OR SLIDE FILM, IT IS BEST TO METER FOR ZONE VII. HOWEVER WITH CAMERA RAW IN DIGITAL PHOTOGRAPHY, THIS REALY ISN’T A BIG PROBLEM ANYMORE.

Example:
I am taking a portrait of a woman with long brown hair. Her hair matches Zone III, which means her hair is the most critical dark area that I can see texture and detail. So, I meter her hair up close with the camera and the lightmeter tells me that the exposure is f-11 at 1/125 sec. In reality, the camera lightmeter thinks this is Zone V exposure. I need to correct 2 stops to match my Zone III exposure. So, I change the exposure 2 stops to: f-22 at 1/125 sec or f-11 at 1/500 sec. Then I step back and take the picture.
Original metering  
Original metering  
Adjusted metering

**Darkroom / Development Notes for Film Zone System:**

**Developing For The Highlights:**
The duration (time) of film development determines the density of the negative’s highlights and overall contrast. Development time determines how white or gray the lighter areas of the print will eventually be. As you develop film, the middle and highlight densities increase at a much faster rate than the shadows, and overall contrast becomes much greater.

**Contraction:** For extremely contrasty scenes. First choose an exposure based on the amount of detail you want in the darker areas of the print. Second, reduce your normal development time. (N-)
(Example situation: dark room with a sunlit window or outside on a bright sunny day)

**Expansion:** For flat contrast scenes. First expose for the shadows. Second, increase normal development time. (N+)
(Example situation: dark interior or a cloudy day)

***To get the best understanding of these principles, shoot 3 roles of film of the exactly same scene. Develop one role at normal time, one at increased time, and one at decreased development time.

**General Rules and Solutions To Problems**

<table>
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<tr>
<th>Problem</th>
<th>Solution</th>
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<tbody>
<tr>
<td>Subject has very flat contrast (before shooting)</td>
<td>Increase negative’s development time</td>
</tr>
<tr>
<td>Subject is extremely contrasty (before shooting)</td>
<td>Decrease negative’s development time</td>
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**Rough Guidelines if you don’t do an expansion and contraction test on your film:**

- For 1 stop expanded development (N+1), increase development time 25%.
- For 2 stops expanded development (N+2), increase development time 50%
- For 1 stop contracted development (N-1), develop 80% of normal time. (decreasing 20%)
- For 2 stops contracted development (N-2), develop 60% of normal time. (decreasing 40%)
- Compared to other films, Kodak TMAX needs less of change in development. Change development time half as much as listed above. (This is based on personal experience and other’s experience.)

**Printing for the Highlights:**
On multigrade paper, you might find that you prefer 1 filter printing with a #3 contrast filter. If you have a lot of contrast in your negative, then you are best using Multiple Filter Printing Technique. If you metered the scene and you had a highlight that pushed into Zone 9 or 10, then be prepared to burn.