

THE *RELATIVELY* NON-TECHNICAL ZONE SYSTEM FOR BLACK AND WHITE PHOTOGRAPHY

👉 **HARDLY ANY MATH, CHARTS, OR FORMULAS**

WITH METHODS FOR EXPOSURE AND DEVELOPMENT CONTROL
FOR ROLL AND SHEET-FILM CAMERAS

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This manual is intended for use by those who have a working knowledge of black and white photographic techniques. Although not absolutely necessary, having access to a darkroom will **GREATLY** enhance the ability to understand the concepts presented within.

INTRODUCTION

This is it. You have made the commitment. The Zone System is not for the faint of heart. It will take much experience before you have the "AH-HA, I get it" reaction. And having a good teacher is the secret to saving a lot of time. Hopefully, this manual will serve as that good teacher.

After reading this manual, and perhaps several of the suggested books listed near its end (APPENDIX C), it would still be a good idea to take a Zone System workshop with a good instructor. The insight and knowledge gained from this experience cannot be overstated. It is fun, not terribly expensive, and you will leave with so much information that your head might burst.

My goal in writing this manual is to force you to question everything that you do, so that your understanding will be just that much deeper. Further, a question may occur that is answered with another question. Occasionally, an answer will be provided for you in the "NOTES" section (see APPENDIX D). But don't count on it! You are going to have to burn some brain synapses on your own.

The "NOTES" section should be quite useful, and contains much information that is very important. Do not overlook the items in this section.

The number of tests are very limited; however, there are a few that **MUST** be performed. Failure to do them will result in a large gap in your understanding of the Zone System with results that you will find disappointing.

This manual will teach you how to:

STEP 1...Meter the scene you wish to photograph.

STEP 2...Place shadow detail on Zone III.

STEP 3...Meter highlight detail.

STEP 4...Determine number of zones in scene based on STEPS 2 and 3.

STEP 5...Determine development based on STEP 4.

You will also determine:

1. The film speed (ASA) for your equipment.
2. The proper development time for normal contrast scenes.
3. The proper development time(s) for high or low contrast scenes.

THIS CANNOT BE STRESSED ENOUGH: THE WAY TO A COMPLETE AND THOROUGH UNDERSTANDING OF THE ZONE SYSTEM IS THROUGH TRIAL AND ERROR. YOU WILL HAVE SOME GLARING, HEAD-SCRATCHING FAILURES, BUT THESE WILL LEAD YOU TO EVENTUAL AND COMPLETE MASTERY OF THE SUBJECT.

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FIRST EXPOSURE...An introduction

The photograph is born of light, and all visual experience exists through light. Photographers as a breed feel the power and wonder of light in their bones.

Barbara Morgan

Imagine this:

It is a tremendous day. The skies are clear; it is the perfect definition of a "SUNNY 16" day (1).

You are driving on a beautiful backcountry road, heading for photographic adventure, your camera bag on the seat next to you.

You come upon a white car that is traveling in your direction, but is going a bit slower than you would like. You are about to pass when you suddenly have a startling thought "How could I get a photograph of this white car, maintaining both the detail in the white metal of the trunk and the detail in the shadowed road beneath the car?"

What would YOU do? There are several things you COULD do:

1. You could just use your in-camera meter and take the picture.
2. You could try to use an exposure that is half-way between the light and the dark.
3. You could use all of your previous experience to guess at a proper exposure.
4. You could study the Zone System and know exactly what to do and what to expect as a final result.

This quiz might be loaded...we know what the answer is. Actually, any of the above MAY work (emphasis on the word MAY), but only number 4, after much practice, will yield some type of consistency.

The purpose of this manual, then, is to allow you to study the Zone System and to customize it for your particular artistic needs.

Those photographers who use roll film cameras will find that to properly use the Zone System, a bit of extra work will be required (2). However, the basic theory and teachings can be applied to all formats. Access to a darkroom will be very important to properly utilize the system; even a custom lab will not, in all likelihood, provide you with what you need. Nor will they teach you what you need to know.

It is important to realize that it is only the combination of technical expertise and the heartfelt desire to capture an image important to you that will create a photograph with meaning. This manual can supply the technical. You will have to do the rest.

EQUIPMENT YOU WILL NEED

As with any endeavor, you must take along the proper equipment. Sometimes you can substitute one item for another. And sometimes there is no substitute. The following is a list of what you will need to properly perform the tests in this manual:

MUST HAVES:

1. A camera that allows complete manual exposure control.
2. Film. Choose your favorite continuous-tone black and white emulsion. Do not use Kodak Tech-Pan or any infra-red film.
3. A meter, preferably a 1° spot meter. Many newer 35mm cameras have built-in spotmeters that have a very narrow field-of-view with a telephoto lens. A handheld reflective meter will do, but will not be as useful.
4. A good 18% gray card.

WOULD BE NICE:

1. A darkroom to allow complete negative processing and printing or, as a minimum, the ability to develop just the negatives.

SECOND EXPOSURE...Why do you need a system ?

We usually get more out of ourselves by demanding more.

William Feather

Your exposure meter is not your best friend. Its total and only commitment is to make gray pictures. That is how it is calibrated when it leaves the factory. If you do exactly what your meter tells you to do, you will get gray.

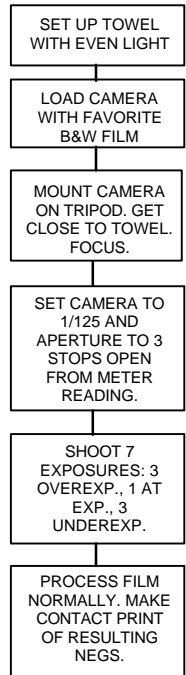
ASSIGNMENT NUMBER 1

We are now going to perform an experiment that will PROVE the above to you. Do not proceed any further until you have successfully completed this experiment. It is suggested that you read through this entire assignment before beginning it.

SETUP

1. Get a coarse towel (3) with a good rough nape. A lighter color would be nice.
2. Tape, glue, tack, or nail this towel to a wall that is well lit but is in very bright shade. Make sure the light on the towel is even.
3. Get your camera. For roll film, load it with 12 or 24 exposures of your favorite B&W film, For sheet film, you will need 7 sheets. Choose this film carefully...you may use it for the rest of your life!
4. Mount your camera on a tripod and attach a cable release. Use your favorite lens.
5. Yes, that's right, you are going to take pictures of the towel. Set up your camera so that the towel fills the entire frame. Try to get as close as you can to the towel. Focus on the towel.

ASSIGNMENT #1 FLOW CHART



PROCEDURE

1. Set the camera's shutter speed to 1/125.
2. Take a meter reading.
3. Hopefully, the meter will indicate an f stop midway between minimum and maximum (about f8) for the lens you are using. If not, adjust the shutter speed up or down until the f stop is midway. You should try to use shutter speeds between 1/30 and 1/250. (4) If you cannot meet this requirement, you must find a different lighting situation that allows the above to be obtained.

It is vitally important, at least when beginning your excursion into the Zone System, to take careful notes as to what you are doing. In particular, a record of camera settings and a description of the various zones in the image are vital.

Use the form at the end of this manual (or a copy thereof) to record your data for assignments.

4. For the sake of example, it will be assumed that your camera settings for the above are 1/125 and F11. Follow this exposure sequence:

NOTE: For the first exposure, you should open up the lens 3 stops from the f stop indicated by your meter. Exposure number 4 will be the actual f stop indicated by your meter. (5)

EXPOSURE NUMBER	f STOP	SHUTTER SPEED	DESCRIPTION
1 (3 stops more exposure)	f4	1/125	Evenly lit towel
2 (2 stops more exposure)	f5.6	1/125	Evenly lit towel
3 (1 stop more exposure)	f8	1/125	Evenly lit towel
4 (meter reading)	f11	1/125	Evenly lit towel
5 (1 stop less exposure)	f16	1/125	Evenly lit towel
6 (2 stops less exposure)	f22	1/125	Evenly lit towel
7 (3 stops less exposure)	f32	1/125	Evenly lit towel

If you find that you cannot use a similar range of exposure values, you may change the shutter speed instead of the f stop. For instance, in the previous example, if your lens does not have an f32 position, for exposure number 7, leave the lens set at f22 and change the shutter speed to 1/250.

5. Process your resulting negatives as you normally would.

O.K. So, now you have a bunch of negatives of a very boring towel. Now what?

Put them on a light table. What do you see? Is this what you expected? Assuming that the exposures were all correct, they should change from very dark (exposure number 1) to very light (exposure number 7). Why is this?

At this point, we are going to concentrate on the negative resulting from exposure number 4. This is the result of setting your camera to exactly the exposure indicated by your meter.

Get a good feel for the "density" of this negative. How does its light transmission compare to the other negatives?

6. Back into the darkroom. Make a contact print of the negatives. Make sure that the negatives are in the same order as the shooting sequence. Print for maximum edge blackness (see APPENDIX A). Use your normal chemicals and procedures.

Now it should be very clear as to what you have produced; It is a gray scale! The area of the print corresponding to negative number 4 should be a very close match to an 18% gray card. The area for negative number 1 should be almost pure white. The area for negative number 7 should be almost pure black.

Your first assignment with the Zone System has produced a series of tones ranging from black (ZONE II) to white (ZONE VIII). The tone from negative number 4 is middle gray (ZONE V). Give the remaining zones their appropriate designation. You will be introduced to the meaning of ZONE very shortly. Do not worry about its meaning at this point.

Pretty amazing that one towel can produce such a large range of tones!

At this point, having successfully completed this somewhat time-consuming assignment, you might ask, "What does all of this mean?"

You have shown that your camera meter will indeed make gray (exposure number 4). You have also shown that, by modifying your exposure based on the initial meter reading, you can make a gray towel "white" or "black" or, for that matter, a white towel "black" or "gray" or a black towel "white".

YOU HAVE TOTAL CONTROL OVER WHAT COMES OUT OF YOUR DARKROOM.

ASSIGNMENT NUMBER 1A

You might try the exact same experiment as above 2 more times, if you wish. Try using a black towel (you may need to do this in direct sunlight). Then try using a white towel.

You can see by these results that your control over the film is complete.

ASSIGNMENT NUMBER 2

This is strictly a "thought assignment".

Think of an image that you would like to produce--perhaps of a mountain or a portrait of someone. You have decided that you would like the main element of the photograph to be somewhat darker than would normally be produced. Perhaps you have taken this picture before and the subject was too light.

How are you going to do this?

Go back to the 4 questions in the FIRST EXPOSURE chapter; they apply here. Again, the answer should be obvious. In fact, you now have a bit of knowledge that will allow you to produce the image you desire, or at least get closer to it.

If you could walk up to the subject and meter it, you could just about guarantee that the subject would be middle gray (ZONE V). At this point, YOU SHOULD KNOW EXACTLY WHAT TO DO TO MAKE THE SUBJECT DARKER. How much darker? Review the contact print you made from assignment number 1. ZONE IV is darker. ZONE III is darker still. Maybe ZONE IV 1/2 is the correct zone. Whatever you decide, you now know how to get there (by simply altering the exposure from that initially indicated by the meter).

There is much, much more to the Zone System than just the above. After all, you could take that old negative (the one where the subject is too light), and just make a darker print. Or you could burn in the subject. But if you make a darker print, everything will get darker. And burning in a complicated subject is usually an impossible task.

Let's go back to the original "thought assignment", the white car. In this case, your task is to make the photograph in such a way that the white of the car does not "wash out" (or, in photo lingo, block up) and SIMULTANEOUSLY, ensure that the road surface in the shadow of the car does not go black (or lose shadow detail). Now we get into the heart of the matter: how do you keep the whites white and the blacks black, while maintaining a complete range of tones in between with excellent detail everywhere?

Read on for more insight!

THIRD EXPOSURE...Control

Nothing great has been achieved without enthusiasm.

Ralph Waldo Emerson

The goal: **THE PERFECT NEGATIVE.**

The reality: **NOTHING'S PERFECT.**

The real goal: **MAKE THE BEST NEGATIVE THAT YOU CAN.**

The "better" your negative is, that is, the more detail it contains, the easier will be the task of printing the photograph. If perfection were possible, then you could walk into your darkroom, and walk out a few minutes later with that perfect print: no dodging, burning, or paper grade other than 2.










But, alas, perfection (or as close as one can come to it) is something that must be worked for. The Zone System is the guide. Your experience will be the road.

Stated in its simplest form, the Zone System is nothing more than

EXPOSE FOR THE SHADOWS, DEVELOP FOR THE HIGHLIGHTS (6)

That's pretty easy. Deceptively so. It's all of the little details that make this whole thing so complicated. But always remember that the guiding light behind the Zone System are those words above.

It's time to expose the somewhat universal definitions for the various zones. They are:

	ZONE I.....Total black. The blackest that the paper can get.
	ZONE II.....Black, but not quite as black as ZONE I.
	ZONE III.....Black with shadow detail. THIS IS A VERY IMPORTANT ZONE.
	ZONE IV...Dark gray.
	ZONE V.....Middle gray. Matches a gray card. Typical of Caucasian skin in shadow.
	ZONE VI...Light gray. Typical of Caucasian skin in sunlight.
	ZONE VII...Gray, with the last vestiges of highlight detail. THIS IS ALSO AN VERY IMPORTANT ZONE.
	ZONE VIII...Very light gray.
	ZONE IXMaximum paper white.

Of the 9 zones listed above, you have made 7 in assignment number 1. You can make a ZONE I (black) print by exposing a piece of photographic paper to a light source and then developing normally. You can make a ZONE IX (white) print by developing a piece of unexposed paper.

Now go back to the contact print you made in assignment number 1. Look for the details, in this case, the nape of the towel. Which image is the darkest with detail? Which is the lightest with detail. If things were perfect, exposure number 6 would be the darkest and exposure number 2 would be the lightest (both with detail). If your prints match the above description, then you are indeed lucky. Odds are, however, that they do not.

Because of differences in equipment and chemical processes, the results of assignment number 1 are not ideal. A large part of the Zone System is composed of performing experiments to determine where these variables might lie AND TO DO SOMETHING ABOUT THEM.

The first and most important variable to control is your equipment's exposure accuracy. Just because you set your camera to f11 at 1/125 is no guarantee that the exposure will be exactly that. It might be f11.5 at 1/145. In addition, your enlarger will introduce error, and the method you use to agitate your film during development will alter things. When correcting for these errors, IT IS IMPORTANT TO CONSIDER THE ENTIRE PROCESS, FROM FILM EXPOSURE UP THROUGH THE DRIED AND TONED PRINT.

What can you do if your camera is inaccurate? The easiest thing to do is to determine the level of inaccuracy, and then to compensate for it. Once you have a correction factor, AND AS LONG AS YOU DO NOT CHANGE YOUR EQUIPMENT, you can "set and forget". Enough talk--let's test.

ASSIGNMENT NUMBER 3

This is **THE** most important experiment that you will perform. Do not skip it. Here, you will determine the actual ASA (ISO) rating of your favorite film. "But," you may say, "I know what it is It's 100. It says so on the box."

That number on the box is correct if all of your equipment and processes exactly match those of the film manufacturer. They usually do not. Therefore, we must do the following to make a correction:

SETUP

This will sound very familiar. Do not let the large number of steps worry you. It's pretty much just repeating the same thing over and over 7 times.

1. Get a coarse towel with a good rough nape. A lighter color would be nice.
2. Tape, glue, tack, or nail this towel to a wall that is well lit but is in the shade. Make sure the light on the towel is even.
3. Get your camera. For roll film, load it with 12 or 24 exposures of your favorite B&W film. For sheet film, you will need 7 sheets.
4. Mount your camera on a tripod and attach a cable release. Use your favorite lens.
5. Set up your camera so that the towel fills the entire frame. Focus on the towel.

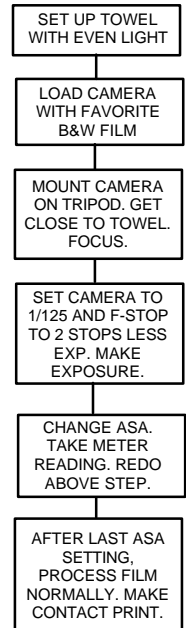
PROCEDURE

1. Set the meter that you will use to the film manufacturer's recommended value. Set the camera's shutter speed to 1/125.
2. Take a meter reading.
3. Hopefully, the meter will indicate an f stop midway between minimum and maximum (about f8) for the lens you are using. If not, adjust the shutter speed up or down until the f stop is midway. You should try to use shutter speeds between 1/30 and 1/250. If you cannot meet this requirement, you must find a different lighting situation that allows the above to be obtained.
4. Close down your f-stop by 2 stops from the meter reading in step 3. For example, if your reading is 1/125 at f8, set your camera to 1/125 at f16. This forces the exposure onto Zone III.

Use the test record form (or a copy thereof) to record your data for this assignment.

5. Make an exposure.

ASSIGNMENT #3 FLOW CHART



6. Change the ASA setting on your meter to 1/3 stop LESS than the film manufacturer's rating. For example, if starting with ASA 100 speed film, now set the meter to 85.
7. Take a meter reading.
8. Make an exposure at that meter reading.
9. Change the ASA setting on your meter to 2/3 stop less than the film manufacturer's rating. For example, if starting with ASA 100 speed film, now set the meter to 67.
10. Take a meter reading.
11. Make an exposure at that meter reading.
12. Change the ASA setting on your meter to 1 stop less than the film manufacturer's rating. For example, if starting with ASA 100 speed film, now set the meter to 50.
13. Take a meter reading.
14. Make an exposure at that meter reading.
15. Change the ASA setting on your meter to 1/3 stop MORE than the film manufacturer's rating. For example, if starting with ASA 100 speed film, now set the meter to 135.
16. Take a meter reading.
17. Make an exposure at that meter reading.
18. Change the ASA setting on your meter to 2/3 stop more than the film manufacturer's rating. For example, if starting with ASA 100 speed film, now set the meter to 165.
19. Take a meter reading.
20. Make an exposure at that meter reading.
21. Change the ASA setting on your meter to 1 stop more than the film manufacturer's rating. For example, if starting with ASA 100 speed film, now set the meter to 200.
22. Take a meter reading.
23. Make an exposure at that meter reading.

24. Process your resulting negatives as you normally would.

25. Make a contact print of the strip of negatives. Print for maximum edge blackness (see APPENDIX A). Use your normal chemicals and procedures.

Find the darkest print where you can still detect the nape of the towel. The print, and its corresponding negative, relate to the actual film speed that you should be using. Use this speed from now on for your current set of circumstances. This will guarantee that when you place something on ZONE III, that's where it will end up, with just the right amount of shadow detail.

IF YOU CHANGE SOMETHING, YOU MAY HAVE TO PERFORM THIS TEST OVER AGAIN.

Well, you have spent all of this time nailing down the shadow detail. You may ask, "What about the highlight detail?" Very good.

Remember the "Guiding Light" saying: Expose for the shadows, develop for the highlights. You just did the shadow part. Now for the highlights.

ASSIGNMENT NUMBER 4

This experiment is a bit more complex than its predecessors. It is also important. And it is the last required test. There are many other tests to do, but you probably would rather go shoot some pictures of something other than a towel. So do this last one!

SETUP

This experiment also has a large number of steps but, once again, they are mostly repetitions.

1. Do the towel thing all over again BUT
2. Take your meter reading and OPEN the aperture by 2 stops. As an example, if your meter indicates f8 at 1/125, use f2.4 at 1/125 or f8 at 1/30 or any constant E.I. Your meter should be set to the ASA you determined in assignment number 3.

What does this do? Do not continue until you can answer this question.

3. Expose an entire roll of film, or at least 6 sheets of film, at this setting.

4. In the darkroom, prepare your developing equipment and chemicals as you normally would. Use your standard chemical temperature and whatever agitation method you are most comfortable with.

ONCE YOU DETERMINE A TEMPERATURE AND METHOD OF AGITATION FOR DEVELOPMENT, YOU WILL HAVE TO STICK WITH THEM.

If using roll film, you will need a pair of scissors. For sheet film users, just ignore the stuff about cutting, and process your sheets as you normally would.

5. Pull out about 4 or 5 inches of film from the canister (**IN THE DARK!**). Cut this off and load it on your reel, then place it in your developing tank.

6. Process as you normally would, using the development time given by the film manufacturer for the temperature you have chosen.

7. Pull out about 4 or 5 inches of film from the canister. Cut this off and load it on your reel, then place it in your developing tank.

8. Process as you normally would, using the development time given by the film manufacturer plus 20% for the temperature you have chosen.

9. Pull out about 4 or 5 inches of film from the canister. Cut this off and load it on your reel, then place it in your developing tank.

10. Process as you normally would, using the development time given by the film manufacturer plus 30% for the temperature you have chosen.

11. Pull out about 4 or 5 inches of film from the canister. Cut this off and load it on your reel, then place it in your developing tank.

12. Process as you normally would, using the development time given by the film manufacturer plus 40% for the temperature you have chosen.

13. When the negatives are dry, contact print them for maximum edge black (see APPENDIX A).

14. Find the print that shows just the slightest amount of good detail in the white. Use the developing time for the corresponding negatives as your new standard developing time.

If you do not have acceptable detail, then you must continue. If the increase in development time only produces denser negatives (lighter prints) with no detail, then you must start decreasing time. This situation is very unlikely.

If you find that you still have too much detail in the prints resulting from the negatives that received a 40% time increase, then you must continue increasing the development time. This situation is also very unlikely.

In summary, you have done a test to select an appropriate film speed to ensure good shadow detail, and a test to ensure proper development for good highlight detail.

These 2 items, your new ASA and standard development time, are very important. Write them down and put them in a bank vault. They are more important (to you) than the secret recipe for Coke.

Remember, if you make a substantial change in ANYTHING, you may have to repeat the above tests.

REVIEW

Let's take a moment to review what has been accomplished so far.

You believe (it is hoped) that it is possible to change the tone of an image by altering its exposure. More exposure results in a denser negative which, in turn, results in a lighter print. Less exposure results in a thinner negative, and hence, a darker print.

You have done some testing to find the actual ASA for your situation. This will result in a controlled over- or under-exposure of all of your images. This will ensure some detail in the shadow areas, which otherwise would print too dark or too light.

You have determined, by test, what would be the proper amount of development to give your negatives to ensure good highlights with detail. Too little development would make thin negatives, which would have gray highlights. Too much development would produce a dense negative, which would have whites with too little detail.

At this point, a new bit of information will be made available to you that will tie all of the above together. It is this:

When making an exposure, changing the exposure has very little effect upon the highlights (Zone VII and Zone VIII) within the image.

When developing film, changes in development time has very little effect upon the shadow areas (Zone II and Zone III). (7)

It is the above that makes the Zone System work.

The following section will deal with development control.

FOURTH EXPOSURE...Time to take some photographs

Now that you have performed the minimum testing required to allow proper exposure and development, it is time to take some photographs and begin to put some of the results into practice. It is suggested that you start taking photographs in a location that will allow you to return several times to make corrections to your first attempts. A backyard is perfect. Choose a scene that appears to have a normal contrast range (a total of 5 zones). Meter this scene to ascertain the actual number of zones. Don't worry about setting up your camera at this point; instead, sit in a chair and study the scene through your meter and carefully determine various zone placements. Use the "ZONE PLACEMENT" form at the end of this manual to record this information.

For example, what do you want to be on Zone III (black with shadow detail) and what should be on Zone VII (light gray with detail)? After making these placements, what ends up on the "in-between" zones? Do any items fall below Zone III or above Zone VII?

The above questions are important. They are the questions that you will ask yourself for every image that you expose. After a while, they will become automatic, and the notes that you will take will become very simple, usually just the development required. But to get to this point takes time and practice.

Let's say that there is a rock in the scene that you would like to be dark with detail. What zone would you place it on? If you take a meter reading of the rock, what zone would it be on if you just exposed the scene at that meter reading? How do you get the rock from there to where you want it to be?

If you take the exposure at the aperture and shutter speed indicated by your meter, the rock will come out gray--18% gray. Underexposing the scene will cause the negative to be thinner, and therefore the rock will be darker. If you close down one stop, the rock (formally on Zone V) will now end up on Zone IV. Another stop down will render the rock on Zone III. For example, if the meter indicates f11 at 1/250, setting your camera to f16 at 1/500 (2 stops less exposure) will produce a Zone III rock.

Now, go find a scene that has too much contrast. This might include a brightly lit wall with deep shadow areas. Determine the number of zones in this scene. If you place the shadow areas on Zone III, do the highlights (where you want detail) fall in Zone VIII or perhaps Zone IX? Do you want the highlights to print with detail instead of just light gray or white? If so, then you must do something to prevent the higher zones from washing out. What would this be? (8)

Finally, find a scene with low contrast. This might occur on an overcast day where there are no distinct shadows. Perhaps you will find only 4 zones. Perhaps you place a particular area on Zone III and, as a result, the highlights fall on Zone VI, a medium-light gray. What would you do to pump up the highlights to Zone VII to create some good highlight detail?"

If you do not do something about the highlights in the above 2 situations, you will end up with just white (in the high contrast scene) or gray highlights with no sparkle (in the low contrast scene). Underdevelopment will bring highlights that are too high down to a printable level. Overdevelopment will bring gray highlights up to a brighter value.

Before beginning to photograph the above situations, there is one final bit of information that is required: you must know the amount of time required to develop the negatives. For scenes that contain too much contrast, you must reduce development. Conversely, for scenes that are low in contrast, you must increase development. The Zone System uses a terminology to allow you to very simply write down what is required for development. The terms are:

- N-2** Drastically reduced development, for very high contrast scenes.
- N-1** Moderately reduced development, for high contrast scenes.
- N** Normal development, for normal contrast scenes.
- N+1** Moderately increased development, for low contrast scenes.
- N+2** Drastically increased development, for very low contrast scenes.

Another way to look at the development:

- N-2** For a scene that contains 7 zones.
- N-1** For a scene that contains 6 zones.
- N** For a scene that contains 5 zones.
- N+1** For a scene that contains 4 zones.
- N+2** For a scene that contains 3 zones.

Do you see a trend here? The goal is to create a negative with 5 zones. (9)
You can do this, for example, by subtracting 2 zones (N-2) from a scene with 7 zones or adding 1 zone (N+1) to a scene with 4 zones.

How do you "add" or "subtract" zones? This is accomplished by altering the film development time by a known amount to compress (reduce the contrast) or expand (increase the contrast) of a particular scene.

Where do these times come from? Usually, you would have to perform a large number of tests to determine proper development. Such testing is beyond the scope of this manual (refer to APPENDIX C at the end of this manual listing other sources of Zone System information for testing methods), but you can come close to times that result in suitable contrast control by using the following chart: (10)

FILM TYPE: PLUS-X (RATED AT ASA 64), TRI-X (RATED AT ASA 200).

N-2...REDUCE "N-1" TIME BY 20%.

N-1...REDUCE "N" TIME BY 30%.

N AS DETERMINED PREVIOUSLY IN ASSIGNMENT #4.

N+1 ...INCREASE "N" TIME BY 40%.

N+2...INCREASE "N+1" TIME BY 50%.

FILM TYPE: T-MAX 100 (RATED AT ASA 50), T-MAX 400 (RATED AT ASA 200).

N-2...REDUCE "N-1" TIME BY 15%.

N-1...REDUCE "N" TIME BY 15%.

NAS DETERMINED PREVIOUSLY IN ASSIGNMENT #4.

N+1 ...INCREASE "N" TIME BY 20%.

N+2...INCREASE "N+1" TIME BY 25%.

You can see the effects of modified development on Zone placement (at least graphically) by referring to Figure 1 (see following page). This chart shows what happens to each Zone as development is altered. The center portion shows what happens for "N" development; each Zone attains its expected density. That is, Zone III is Zone III, Zone VI is Zone VI, and so on.

If you look at the portion for "N-1" development, you will notice that Zones I, II, and III stay pretty much where they are. However, Zone VI has moved to Zone V, and Zone IX has moved to Zone VII. This represents a significant decrease in contrast. "N-2" development brings Zone VI down to Zone IV 1/2, while leaving the lower Zones relatively intact.

Alternately, "N+1" and "N+2" development cause the high Zones to move up significantly, while the lower Zones again remain relatively "stuck". (The values depicted in this graph are provided only for evaluative purposes. The actual changes to Zone values, while following the basic concepts of this chart, may vary).

Of course, the scene that was recorded with the exposure must require such modified development. If a scene with normal contrast were developed for "N-2", the resulting negative would be so low in contrast as to be unprintable. Conversely, a normal contrast scene developed for "N+2" would be so dense

that, again, it would be unprintable. Figure 1 clearly shows how severe development changes can be and how important it is to match the contrast of the scene to the required development.

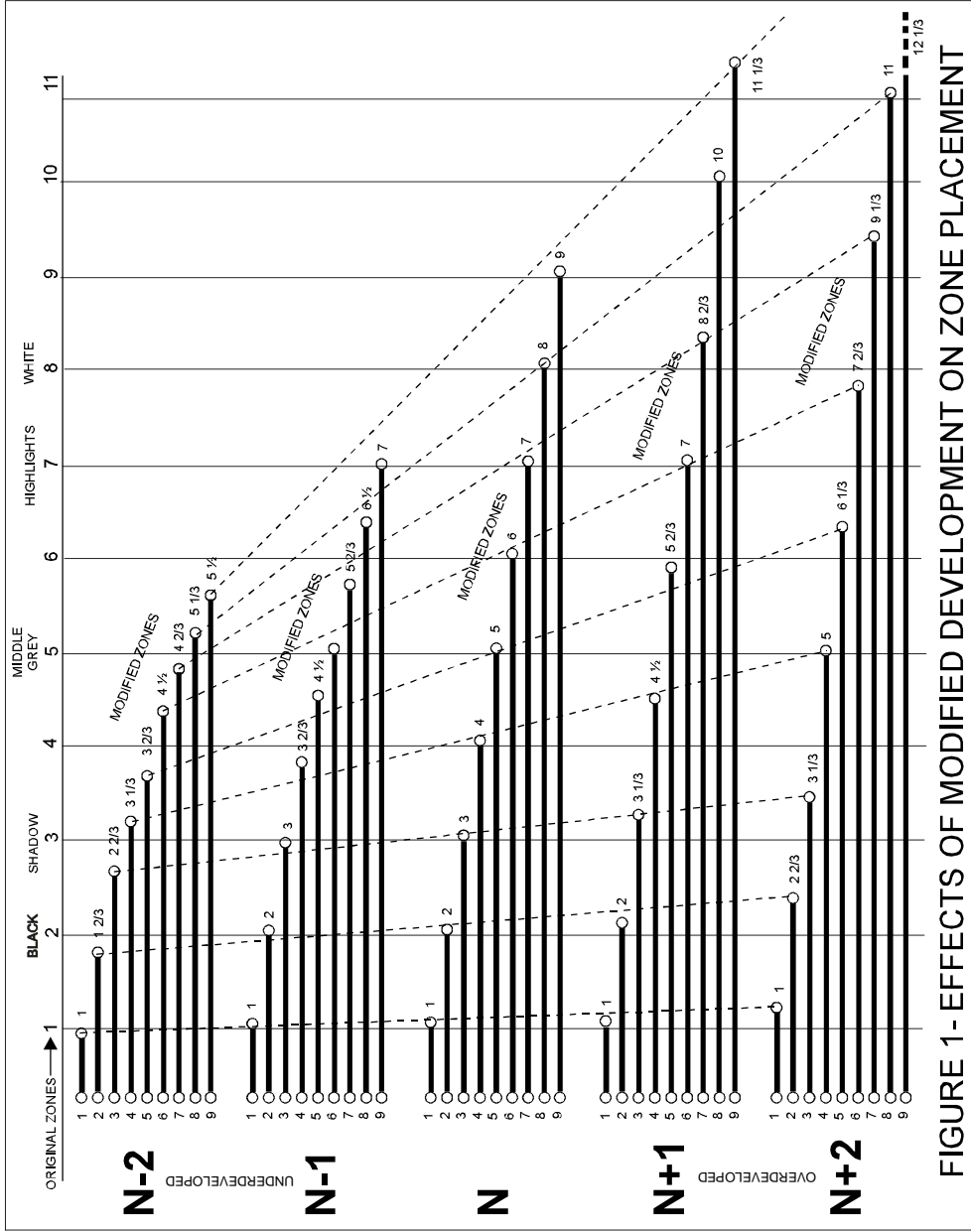


FIGURE 1- EFFECTS OF MODIFIED DEVELOPMENT ON ZONE PLACEMENT

FINAL EXPOSURE

Well, that's it for the basics. The absolute best thing to do at this point is to go out and take some photographs. If you are an experienced photographer but are new to the Zone System, you may find it VERY difficult to set your camera to an exposure different from what your meter says. We all went through this. It can take weeks or months to get out of the old habit; the habit of producing gray images.

You must also spend much time in the darkroom. You must carefully refine your development and printing techniques and ensure repeatability. Remember that changing something as simple as your film-development agitation method may alter your results. You will eventually acquire all of the skills necessary to produce consistent negatives and prints.

But just DO IT. DO IT over and over until it becomes second nature. You will be very pleasantly surprised at what you discover and just how good your black and white photography will become.

Nowgo out and find that white car!

APPENDIX A

PROPER PROOFS - Printing for maximum black.

When making proof sheets of your negatives, it is important to ensure that as much information about the image is available within the proof. This will allow you to make some initial decisions about what you may wish to do to the image as you make the final print. For example, if the proof is too dark, you will not be able to tell if there is any detail in the shadows. If too light, you will miss details in the highlights. If the proof is too contrasty, you will also miss this information.

What to do?

The solution is to make a proof sheet that presents you with the maximum amount of information about the negative. This can be done by printing for maximum edge blackness at a low contrast. The translation; if you expose and develop the proof sheet so that the area of the paper under the clearest part of the negative (usually along the edge or, for roll film, clear leaders or ends of the roll) has printed just about as black as it can get, then the rest of the image will have as full a tonal range as possible.

SETUP

1. Use your normal procedure and equipment for making proof sheets.
2. Choose several negatives with clear edges or with large areas of completely unexposed (clear) areas.
3. Place these negatives in your proofing device.
4. Adjust the enlarger to a height sufficient to cover the proofing area.
5. Focus the enlarger. (Even with no negative in the enlarger, you will usually be able to focus it by looking at the projection of the edge of the negative carrier on the baseboard. Alternatively, you could temporarily place a negative in the carrier for focusing).
6. Select an interval on your enlarger timer of 1 or 2 seconds.
7. Set the enlarger lens aperture to f8.
8. Use a contrast grade of 1.

PROCEDURE

1. You are going to make a test strip. Using a piece of heavy cardboard, expose a one-inch wide strip of paper through the proofing device for the interval on your timer. Repeat for the next one-inch strip and so on until the entire piece of paper is exposed.
2. Develop the paper as you normally would.
3. When dry, observe the proof sheet under the same lighting as that in which the final print will be viewed. Find the strip in which maximum black is achieved (from the unexposed parts of the negative) and in which the image itself has not printed too dark. The time associated with this strip is the proof exposure time you will use from now on for the given paper/developer combination and enlarger height.

If you find that a suitable strip did not emerge from your first effort, adjust the time interval on the enlarger timer or the lens f stop to produce a proper set of strips for evaluation.

From now on, use this same setup for making all of your proofs. This will give you a large amount of information about the negative, and will allow you to make decisions about actual printing, including the selection of contrast grade, cropping, burning, and dodging.

You will occasionally encounter thin or heavy negatives, either on purpose or by accident (which should be minimized by use of The Zone System). You may wish, when proofing such negatives, to either dodge or burn them in a bit to ensure a reasonable amount of detail for evaluation. This will give you an idea as to proper exposure when printing such negatives.

APPENDIX B

Review Questions

1. What is your new ASA? Why do you use this value instead of the value printed on the box of film?
2. What happens to the highlight details (the dense areas on the negative) with increased development? What effect does increased development have upon the shadow details?
3. What happens to the highlight details (the dense areas on the negative) with decreased development? What effect does decreased development have upon the shadow details?
4. How do the changes in development in questions 2 and 3 affect the final outcome on the print?
5. What development would you give a scene that has:
 - A. 7 Zones?
 - B. 5 Zones?
 - C. 4 Zones?
6. If you wanted shadow detail under a rock, what Zone would you place this area on? What if you wanted almost pure black with no detail? What about a dark gray with plenty of detail? Assuming a scene with 5 Zones, what happens to the highlights in the previous 3 cases, and what are you going to do about them?

APPENDIX C

Suggested further reading.

The following publications will provide further insight into the Zone System, as well as information on basic B&W darkroom practices. Some of these are very technical in nature, as indicated with an asterisk (*). Some may also be out of print.

ZONE VI WORKSHOP, Fred Picker, Amphoto

BASIC TECHNIQUES OF PHOTOGRAPHY, An Ansel Adams Guide, John P. Schaefer, Little, Brown and Company

THE PRACTICAL ZONE SYSTEM, Chris Johnson, Focal Press

*THE CAMERA, Ansel Adams, Little, Brown and Company

*THE NEGATIVE, Ansel Adams, Little, Brown and Company

*THE PRINT, Ansel Adams, Little, Brown and Company

THE NEW ZONE SYSTEM MANUAL, Minor White, Morgan and Morgan

ZONE SYSTEMIZER, John J. Dowdell III, Morgan and Morgan

THE ART OF PHOTOGRAPHY, Bruce Barnbaum, P.O. Box 1791, Granite Falls, WA 98252

APPENDIX D

Notes, and answers to (some) questions.

1. **SUNNY 16 RULE:** This rule comes in very handy for those times when you forget your meter or when it dies just before the most important photograph of your life. It's easy to remember: on a bright, sunny day, a subject in direct sunlight will require an exposure of f16 at 1/ASA. For example, if you are shooting a film rated at ASA 100, you would shoot a SUNNY 16 scene at f16 at 1/125 (or f11 at 1/250, or f22 at 1/60, etc.).
2. Users of roll-film cameras basically have two choices:
 - A. You can use one roll of film per scene. This is a perfect place for "roll your own" film canisters and bulk film. This is the recommended method for 35mm film.
 - B. You can leave blanks on the film between different scenes and cut the film so that each scene will receive independent development, if necessary. This is the recommended method for 120 film.
3. Many of the assignments in this manual will suggest that you use a towel as a photographic subject. If you wish, you may use a gray card. The advantage of the towel, however, is that the nape will provide a very good indication of the appearance (or disappearance) of texture in a photograph.
4. Why limit the choice to these shutter speeds? These are the speeds used most often in general photography. If you have a special photographic niche that relies heavily on other speeds, then the tests should be performed at those speeds.
5. Even though it's pretty early in the game, can you guess why this is done? What will be the difference between exposure number 1 (opened 3 stops) and exposure number 4 (meter reading)? As a hint, consider over- and/or under-exposure.
6. Do not believe this statement! It is only valid for a short time while you are learning the Zone System. The whole point of the Zone System is to give you complete control. Perhaps you want to turn a normal scene into a high-key image, or, perhaps, just the opposite. Maybe there are no shadows. A true understanding of the Zone System will prepare you to handle images that do not fit the rule.
7. Here's why: When making an exposure, the highlights become the dense areas of the negative. At the upper end of the scale, increasing the light available (increasing exposure) to an area that has just about reached its maximum density will result in a further slight increase. But an increase or decrease in development will have a very significant effect upon these dense areas. Increasing development increases the density, and therefore makes the highlights lighter. Conversely, decreasing development reduces highlight density, making them print darker.

8. When reducing development to compensate for a scene that is too contrasty, too much detail may be lost in the shadows due to this decreased development. Therefore, when exposing a scene where development will be reduced, increase the exposure slightly to compensate.

9. Why 5 zones? While film can record a large number of zones, by the time you are done printing (due to the limitation of printing paper), only 5 zones will show up. If you try to push this limit, you will get a lot of pure black and white.

10. These times are only approximations. They vary with different film types, different developers, even with different methods of agitation. If you find that the results you are experiencing are not to your satisfaction, you have several options:

A. Increase or decrease the times until you are getting results that you like.

B. Perform the actual development tests to find the actual times. "A" is the easiest. "B" requires much more work and may require a densitometer. It is also beyond the scope of this manual.

These times are based on using HC-110 developer (1:7 for Plus-X and Tri-X and 1:9 for T-Max 100 and T-Max 400) at 68 degrees F. They are roughly adapted from Chris Johnson's "The Practical Zone System".

When developing, the shadow areas of the negative, which are low in density (or are clearer) finish developing very quickly, simply because most of the silver is eventually washed away. Therefore, any changes in development will have a minor impact in the density of the lower zones.

Putting this all together translates into this:

Exposure .has a very big impact on the lower zones. Development has a very big impact on the upper zones. Controlling both exposure and development will allow complete control over the contrast of the negative.

EXPOSURE TEST TABLE

Use this form to keep track of your test exposures. Keeping track will allow you to review your work after it is developed. You can then see where your successes and failures lie. This form can be used with either sheet film or roll film. An asterisk (*) indicates columns that are for more advanced tests. It is suggested that you copy this form; you will use it several times.

FILM TYPE: _____ ASA RATING: _____ CAMERA: _____ LENS: _____

EXPOSURE NUMBER	f STOP	SHUTTER SPEED	E.I. VALUE*	DESIRED ZONE PLACEMENT*	DESCRIPTION
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
23					
24					

ZONE PLACEMENT INFORMATION

Use this form to record information about zone placement in a particular scene. Use it also to record such information as film type used, rated film ASA, exposure, and development.

ROLL/SHEET NUMBER: _____ EXPOSURE DATE: _____ TIME: _____

LOCATION: _____

FILM: _____ ASA: _____ CAMERA _____ LENS: _____

FILTER(S): _____ SHUTTER SPEED: _____ APERTURE: _____

FILM DEVELOPMENT: _____ (N ,N+1, ETC.)

ZONE	ITEM IN SCENE	E.I. VALUE	
I			
II			
III			
IV			
V			
VI			
VII			
VIII			
IX			

NOTES: