

Divided Attention

by Bill Burk

*Everyone knows that the average reader
can trust ISO on their camera meter*

*For average scenes the statistics are right
odds say your pictures are cheery and bright*

*The science is sound, you can't argue with curves
or folks who picked pictures of thousands of nerds*

*The standards are keyed to those excellent pictures
so the loop through psychology and science returns*

*The folks in the studies didn't care much for shadows
but you do, you're looking for details in blackness*

*So your EI is what you tested and dial into your meter,
it's beneath ISO but you know it will make your pictures better*

*With spotmeter you measure the dark for exposure
then the bright for the range and time in the developer*

*You're not pointing at gray, your scene isn't average
and you develop for times that aren't recommended*

*You justify this because you have something to say
you want granite that sparkles and flesh that's light gray*

*You want that point real black and this point nearly white
and let everything else fall where ever it might*

*You tested and threw out the standards all right
and pointed your camera right into the light*

*Now flare is your hobo, he joined for the ride
Your picture is ruined, you're buried alive*

An expansion of ideas first introduced in my APUG thread: Working idea - Zone System exposure - Time/CI darkroom

<http://www.apug.org/forums/forum37/99704-working-idea-zone-system-exposure-time-ci-darkroom.html>

Introduction

TIMELESS APPEAL

The timeless appeal of the Zone System is the promise that you will be able to call your shots like a pool shark. With previsualization, you can plan in advance how each area of the subject should look on the print. Suppose you have an uneasy feeling that your success so far has been largely “hit and miss.” The idea that you might get consistent high-quality negatives that print the way you planned takes powerful hold of your imagination. Expose for the shadows and develop for the highlights. Anyone who follows Ansel Adams should have a good grasp this concept. It’s important to his way of working. (William Mortensen’s teachings are diametrically-opposed, more like “expose for the highlights and develop to gamma infinity”). Performing film tests give you the experience to understand exposure and development. Previsualization gives you the ability to call your shots. It’s possible to break the Zone System apart. You can use Zone System metering and previsualization before you do film tests. Standard sensitometry can replace Zone System film tests.

I really like the Zone System’s metering method as a way to plan pictures. To visualize the print, I’ll often use a Weston Master II meter with pasted-on scale as diagrammed in Zone System Manual by Minor White. With a Zone Sticker on a meter it is easy to Place a reading and take other readings to see where they Fall. Place and Fall is an important concept in Zone System planning. It is very easy to visualize Zone System Normal. This is when everything in the subject that you read falls into place on the Zone Sticker. That is to say, that if you point the meter at any part of the scene and take a reading, and the reading translates to a Zone Sticker patch which shows a print value that you can accept in a final print... then that is Normal. If you find some part of the scene that does not Fall on a patch that you would like on a print, then you can move the meter dial to that reading and double-check the other readings. If you cannot get to where everything Falls into where you want, then Place the shadow reading and read the highlight reading to determine your N+ or N- notation. When a scene is Normal, I will use the recommended exposure and develop the film to Normal (or tell the lab to develop the film to 0.62 Contrast Index). Because I translate Zone System Normal and N+ and N- to Contrast Index, I can tell a lab to develop my film to specification.



Weston Master II with Zone System Scale

Chapter 1

TWO SIDES OF THE BRAIN

Different sides of the brain are involved in different aspects of photography. In the field taking pictures — creativity is important. In the lab, developing film, testing and determining film speed — analytical thinking is important. Then, back in the darkroom making prints — creativity is important again.

So it makes sense to enable creativity in the field, let the thinking mind develop film, and then invite the creative mind back into the darkroom for printing. Fred Picker, the driving force behind Zone VI Photographic Specialties, published a series of newsletters in the 1970's and 80's.

One of the newsletters, ZONE VI Newsletter Number 48, September, 1986 featured a discussion of the book, *Drawing On The Right Side Of The Brain* by Betty Edwards (Los Angeles: J. P. Tarcher, 1979). Betty Edwards' explanation how the two sides of the brain operate relates to problems that need to be solved by every photographer. Bruce Barlow summarized, telling how the technical left-brain and the creative right-brain interfere with each other more often than they cooperate. Each side tries to dominate.

Recommended: Drawing On The Right Side Of The Brain by Betty Edwards
(<http://www.amazon.com/Drawing-Right-Side-Brain-Definitive/dp/1585429201>)

Bruce Barlow explained how photographers can reduce the influence of the left-side of the brain during the picture taking process by practicing camera handling to the point where you don't think about it anymore. Compose upside-down on the ground glass with a view camera to make it harder for the left-side of the brain to label what it sees. This gives the right-side of the brain a chance to assemble shapes and form into a creative photograph. Keep the creative right side in charge up until the composition looks right, then switch to the technical side to complete the exposure.

In later newsletters Fred Picker expanded the idea and said that developing film should be boring and technical. He said you should make the darkroom conducive to creative printing by having everything well organized. Establish a routine to give control back to the right-side of the brain when printing.

Take advantage of the two sides of your brain. Take pictures with the right side. Develop film with the left side. Print with the right side.

Chapter 2 SMÖRGÅSBORD

Will you pick and choose the parts of different systems that feel right? Or should you stick to the advice of one author? Most tutorials on the Zone System were not written by scientists. If you look at them critically, all of them contain errors or omissions. But that doesn't destroy their value. Every author has a story to tell. Besides, most errors amount to a stop or less. Looking at the work of a single author, errors introduced at one step are usually canceled out by another error at a later step. As long as all the errors amount to less than about a stop, the whole system will work for all intents and purposes. After all, the system was tested end-to-end by the author who would have noticed any total errors greater than a stop.

If you pick and choose a little bit from here and there, you risk compounding mistakes. You might make two corrections in the same direction. Example of two corrections in the same direction: Shooting at half box speed (setting Exposure Index at half the film's rated speed). And then also following Bruce Barnbaum's advice to place shadows on Zone IV (Make this mistake and you just placed your shadows on Zone V). His main message is perfectly valid: Expose generously. But if you mix and match systems, check that you are not making the same correction twice.

Flare is another factor to watch out for when you mix methods. Some film test procedures are flare-free. The traditional Ansel Adams' camera test is flare-free. In the traditional test, you meter a textured gray subject, stop down four stops to Zone I and shoot in-camera. A common variation on the camera

test creates a significant amount of flare. The high flare test to be wary of is the test where you take a camera photograph of a step wedge taped to a window, lit from behind with sunlight. Even if you mask the scale carefully, there is so much flare in this test that it is difficult to interpret the film curve. The toe never reaches base plus fog. A much better film test is to place the step wedge in contact with the film.

Recommended: APUG Thread: Enlarger ----> Sensitometer:
(<http://www.apug.org/forums/forum37/107764-enlarger-sensitometer.html>)

You can save confusion by taking an entire system from a single author. But if you look at each system for its strengths and are careful to avoid double-correcting factors, you can put together your own system from parts taken from different authors. Make sure the pieces fit together and handle each factor only once. If a factor is ignored, check to see if the factor is canceled out before adding it back in.

Chapter 3

ZONE SYSTEM FRONT-END

Previsualization is where the Zone System really shines. At the picture taking stage you look at the scene in front of you and imagine how it will look as a finished print. Ansel Adams taught the literal approach, along the Group f.64 party line. Everyone who wrote about it understands this. The only reason this is a short paragraph is because existing explanations about using the Zone System to meter and plan straight photographs are great, correct and well explained.

Minor White taught using the Zone System for previsualization. But his explanations go past using it for straight photography, his style is abstract and unnatural. The Zone System provides a perfect way to plan abstracts. He emphasized unusual “place” and “fall” choices to get unreal results. Other metering methods do not adapt as easily to abstract departures from reality as easily as the Zone System.

Recommended: Zone System Manual, How to Previsualize Your Pictures by Minor White.
(<http://www.amazon.com/Zone-System-Manual-Previsualize-Pictures/dp/B000LCYQJ8>)

It's not necessary always to take shadow and highlight readings to determine a subject brightness range. Any two readings can tell you the range. When you explore the subject with a meter marked for Zone System, and every meter reading falls on the Zone you envision, you can call it Normal. Often as you take additional readings you will find the shadow is not as low as Zone II. It's not necessary to place the shadow on a shadow Zone if other parts of the scene fall where you want them. Sometimes you will find everything falls in place except the foliage. Ignore it. Foliage often fools meters due to spectral

response of the meter cell. On the other hand, sometimes you have to move the meter calculator dial for every reading you take. Then you know expansion or contraction is called for.

You might think you need a spotmeter to do Zone System metering. But that's not true. You can use any reflected light meter. If you look at early articles and booklets, you will see they are based on the dial of a Weston Master, an averaging reflected light meter. With an averaging meter, instead of aiming at a spot, you simply walk up close to the subject.

Recommended: Constant Quality Prints by John L. Davenport US Camera 1940
(<http://www.tmax100.com/photo/pdf/cqp.pdf>)

Phil Davis, in his book *Beyond the Zone System*, explains how to use incident meters to plan exposure and development. For straight photography, his system is well thought-out. His book gives several clear examples how to estimate shadow exposure without using a spotmeter. But be careful. Read the instructions carefully as you meter Subject Brightness Range and calculate exposure based on simulated shadow readings. He asks you to double the Exposure Index setting. Be sure to set Exposure Index back to your usual setting when you use other metering methods.

Recommended: Phil Davis, *Beyond the Zone System*
(<http://www.amazon.com/Beyond-Zone-System-Phil-Davis/dp/0240803434/qid=1439157540>)

If a complicated scene is difficult to meter, try measuring part of the subject and placing it on its appropriate Zone. Or take an incident meter reading. To simulate an incident meter, it is very simple to meter the palm of your hand with a reflective meter and “place” the reading on Zone VI. Compare this reading to an incident meter reading and you will probably have two different recommended exposure settings. Assuming you made no obvious mistake (such as using a combination meter in the wrong mode), both exposures could be considered correct. Then your choice is yours — between two equally-good options.

For planning abstracts, the Zone System place and fall with development nomenclature is unrivalled. But for straight photography, many different metering methods are worth knowing. When you know multiple ways of metering, you can double check your calculations.

Chapter 4

TAKE PICTURES

You can use manufacturer recommendations for exposure settings and development times. There is so much tolerance built into the black and white film photography process, that you could make serious mistakes and still get good negatives. For example a one-stop exposure error and a 15% development time error — even if the errors are compounded — are not enough to ruin a negative. Hopefully your luck will give you few underexposed, underdeveloped shots.

I recommend a slight overexposure. For example, I rate 400 speed film at Exposure Index 250. I know the film's real speed is its rated speed, but I prefer additional shadow detail. Many people recommend “half box speed” and I fully agree that is a good choice. But if you want to experiment with pushing 400 speed film to EI 800 or more, then I am not the one to talk to. Pushing is a classic theme, and I support artistic expression. But I don't like risking underexposure. So I have nothing positive to say about pushing.

If you do not have time for film testing, you can develop for the manufacturer's recommended times. You can take advantage of a collection of developing times at the Massive Dev Chart. The contrast aims are not specified, which makes it hard to verify. But at least they are starting points.

Recommended: Massive Dev Chart

(<http://www.digitaltruth.com/devchart.php>)

You can always ask for advice from well-meaning writers on photography forums.

Recommended: APUG

(<http://www.apug.org>)

Recommended: LFINFO

(<http://www.largeformatphotography.info>)

Film is so reliable that you can follow instructions and nearly always achieve successful results.

Chapter 5

QUALITY

Standard definitions of speed and development times were based on extensive tests. People judged the quality of the best prints that experts could make from test negatives. The decisions of the judges were always firm. They always found the first excellent print used just a little bit of the toe in shadows. Just one additional stop of exposure caused a slight decline in quality for enlargements. (With contact prints the judges continued to see excellent prints for several stops of overexposure).

Other standards based on different qualities exist. Some common examples: Astronomers want to detect faint stars or measure their intensity. Color Separators want to use the straight line portion of the curve to maintain gray balance. Film developed by reversal process generally demands clear whites. Negatives intended for printing by alternative processes generally need to be developed longer than negatives for silver gelatin printing.

But you can always come up with your own standard of quality. You might decide that the effect you want requires so much exposure that halation occurs. You could decide you want maximize grain. Here's a strange idea, what if you wanted to have a standard print time. It would be great if most of my negatives needed 32 seconds to print at my usual print size and at the optimum aperture of my enlarging lens. For all these special use cases, nobody else's recommended Exposure Index is going to work for you. You sometimes go down the road where you feel you must figure it out yourself.

The work leading up to current quality standards is really amazing. The statistics are sound and the proof is solid. You can trust ISO. But you do not have to. You can define your own standards of quality. In many cases, for a little more shadow detail, "half box speed" is a great choice.

Chapter 6

SENSITOMETRY

I put sensitometry at the end on purpose. Because the way I see it, you can leave sensitometry work until the very last minute. If you need an Exposure Index, half the rated speed is good enough to start with. You don't need development times for "N" until you go to develop the film. You can put off this work and do some important shooting. Come back to this chapter when it is time to process some film.

You can send out your film to a lab. If you would like to do that, just read far enough to understand how to use the charts that relate subject brightness range (SBR) and paper log exposure range (LER) to contrast index (CI). Then you can send your film to a lab with instructions to develop the film to a certain contrast index. They should be able to do that.

Zone System “N” notation is shorthand for subject brightness range (SBR). You choose the “N” number when you previsualize the picture. With incredible foresight, Ansel Adams kept Zone System development “N” notation in terms of subject contrast. The term isn’t combined with paper characteristics to give development times. Since the “N” number is a direct measure of subject brightness range (SBR), you can directly translate from “N” to SBR. Traditional sensitometry charts relate subject brightness range (SBR) and paper log exposure range (LER) to give contrast index (CI). So we have a directly useful number when you start with a Zone System “N” number.

I take a standard view of “N.” When previsualizing, I will note that the scene is “N” or if needed, I will call for expansion and contraction in traditional Zone System terms. For example, if one Zone of expansion is needed I will note “N+1.” This is pure Zone System nomenclature at this point. All the authors who teach this terminology give good explanations how to do it.

I make a very simple translation of Zone System “N” terms to subject brightness range (SBR). I count a Normal scene as Zone I through Zone VIII = 7 stops. In my way of counting, I define for myself that “N” Normal equals 7 stops subject brightness range (SBR). In other words, for me “N” = 7 stops.

Starting with my definition, if “N” equals 7 stops subject brightness range (SBR), then “N-1” is the equivalent of 8 stops subject brightness range (SBR). Going the other direction, “N+1” is 6 stops subject brightness range (SBR). This is how I correlate “N” numbers to the subject brightness range (SBR) numbers in either of the two following charts.

To find my row in the charts for paper log exposure range (LER), I set aside some time to follow a scientific approach. I was going to measure the log exposure range (LER) of my papers and aim between the two paper grades I keep in stock. But an amazing thing happened. Before I had time to do all that testing, I found two special negatives. They were really hard to print - for opposite reasons. One was too long a range for Grade 2 and the other was too short a range for Grade 3. I made good prints from both, but they were both struggles. So I decided right then and there, that from that day forward, I will try to make all my negatives fall somewhere between these two tough negatives. The two marginally bad negatives measured 1.18 density range (DR) and 0.86 density range (DR). So my aim is right between them: 1.02 density range (DR). Since the charts don’t have a row for 1.02, I use either 1.05 or 0.95 Log Exposure Range (LER).

Here are the charts I use:

Choosing a Contrast Index

Recommended: Chart takes SBR and LER to determine CI with fixed flare model

(<http://beefalobill.com/imgs/Contrast%20Indexes%20-%20Kodak.jpg>)

**FILM CONTRAST INDEX REQUIRED TO PRINT SCENES ... VARYING BRIGHTNESS RANGE ON DIFFERENT PAPER GRADES
NORMAL FILM EXPOSURE, DIFFUSE ENLARGER OPTICS**

PAPER GRADE	PAPER LER	SCENE BRIGHTNESS RANGE IN STOPS:																	
		4	4-1/3	4-2/3	5	5-1/3	5-2/3	6	6-1/3	6-2/3	7	7-1/3	7-2/3	8	8-1/3	8-2/3	9	10	
-0.5	1.70	2.13	1.89	1.70	1.55	1.42	1.31	1.21	1.13	1.06	1.00	0.94	0.89	0.85	0.81	0.77	0.74	0.65	
0	1.55	1.94	1.72	1.55	1.41	1.29	1.19	1.11	1.03	0.97	0.91	0.86	0.82	0.78	0.74	0.70	0.67	0.60	
0.5	1.40	1.75	1.58	1.40	1.27	1.17	1.09	1.00	0.93	0.88	0.82	0.78	0.74	0.70	0.67	0.64	0.61	0.54	
1	1.26	1.60	1.42	1.28	1.16	1.07	0.98	0.91	0.85	0.80	0.75	0.71	0.67	0.64	0.61	0.58	0.56	0.49	
1.5	1.15	1.44	1.28	1.15	1.05	0.96	0.88	0.82	0.77	0.72	0.68	0.64	0.61	0.58	0.55	0.52	0.50	0.44	
2	1.05	1.31	1.17	1.05	0.95	0.88	0.81	0.75	0.70	0.66	0.62	0.58	0.55	0.53	0.50	0.48	0.46	0.40	
2.5	0.95	1.19	1.06	0.95	0.86	0.79	0.73	0.68	0.63	0.59	0.56	0.53	0.50	0.48	0.45	0.43	0.41	0.37	
3	0.88	1.10	0.98	0.88	0.80	0.73	0.68	0.63	0.59	0.55	0.52	0.49	0.46	0.44	0.42	0.40	0.38	0.34	
3.5	0.80	1.00	0.89	0.80	0.73	0.67	0.62	0.57	0.53	0.50	0.47	0.44	0.42	0.40	0.38	0.36	0.35	0.31	
4	0.73	0.91	0.81	0.73	0.66	0.61	0.56	0.52	0.49	0.46	0.43	0.41	0.38	0.37	0.35	0.33	0.32	0.28	
4.5	0.65	0.81	0.72	0.65	0.59	0.54	0.50	0.46	0.43	0.41	0.38	0.36	0.34	0.33	0.31	0.30	0.28	0.25	
5	0.57	0.71	0.63	0.57	0.52	0.48	0.44	0.41	0.38	0.36	0.34	0.32	0.30	0.29	0.27	0.26	0.25	0.22	
5.5	0.50	0.63	0.56	0.50	0.45	0.42	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.25	0.24	0.23	0.22	0.19	
6	0.45	0.56	0.50	0.45	0.41	0.38	0.35	0.32	0.30	0.28	0.26	0.25	0.24	0.23	0.21	0.20	0.20	0.17	

NORMAL FILM EXPOSURE, CONDENSER ENLARGER OPTICS

PAPER GRADE	PAPER LER	SCENE BRIGHTNESS RANGE IN STOPS:																	
		4	4-1/3	4-2/3	5	5-1/3	5-2/3	6	6-1/3	6-2/3	7	7-1/3	7-2/3	8	8-1/3	8-2/3	9	10	
-0.5	1.26	1.58	1.49	1.26	1.16	1.05	0.97	0.90	0.84	0.79	0.74	0.70	0.66	0.63	0.60	0.57	0.55	0.48	
0	1.16	1.45	1.29	1.16	1.06	0.97	0.89	0.83	0.77	0.73	0.68	0.64	0.61	0.58	0.55	0.53	0.50	0.45	
0.5	1.09	1.35	1.20	1.09	0.98	0.90	0.83	0.77	0.72	0.68	0.64	0.60	0.57	0.54	0.51	0.49	0.47	0.42	
1	0.97	1.21	1.00	0.97	0.86	0.81	0.75	0.69	0.65	0.61	0.57	0.54	0.51	0.49	0.46	0.44	0.42	0.37	
1.5	0.85	1.06	0.84	0.85	0.77	0.71	0.65	0.61	0.57	0.53	0.50	0.47	0.45	0.43	0.40	0.39	0.37	0.33	
2	0.78	0.98	0.87	0.78	0.71	0.65	0.60	0.56	0.52	0.49	0.46	0.43	0.41	0.39	0.37	0.35	0.34	0.30	
2.5	0.71	0.89	0.79	0.71	0.65	0.59	0.55	0.51	0.47	0.44	0.42	0.39	0.37	0.36	0.34	0.32	0.31	0.27	
3	0.65	0.81	0.72	0.65	0.59	0.54	0.50	0.46	0.43	0.41	0.38	0.36	0.34	0.33	0.31	0.30	0.28	0.25	
3.5	0.6	0.75	0.67	0.60	0.55	0.50	0.46	0.43	0.40	0.38	0.35	0.33	0.32	0.30	0.29	0.27	0.26	0.23	
4	0.54	0.68	0.60	0.54	0.49	0.45	0.42	0.39	0.36	0.34	0.32	0.30	0.28	0.27	0.26	0.25	0.23	0.21	
4.5	0.48	0.60	0.53	0.48	0.44	0.40	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.24	0.23	0.22	0.21	0.18	
5	0.43	0.54	0.48	0.43	0.39	0.36	0.33	0.31	0.29	0.27	0.25	0.24	0.23	0.22	0.20	0.20	0.19	0.17	
5.5	0.38	0.48	0.42	0.38	0.36	0.32	0.29	0.27	0.25	0.24	0.22	0.21	0.20	0.19	0.18	0.17	0.17	0.15	
6	0.33	0.41	0.37	0.33	0.30	0.26	0.25	0.24	0.22	0.21	0.19	0.18	0.17	0.17	0.16	0.15	0.14	0.13	

Recommended: Chart takes SBR and LER to determine CI with practical flare model
(<http://beefalobill.com/imgs/Practical%20Flare%20Model%20b.jpg>)

		Subject Luminance Range																
		10	9 2/3	9 1/3	9	8 2/3	8 1/3	8	7 2/3	7 1/3	7	6 2/3	6 1/3	6	5 2/3	5 1/3	5	4 2/3
Paper Grade	Paper LER	3.00	2.90	2.80	2.70	2.60	2.50	2.40	2.30	2.20	2.10	2.00	1.90	1.80	1.70	1.60	1.50	1.40
-0.5	1.70	0.09	0.71	0.74	0.77	0.80	0.83	0.86	0.90	0.94	0.99	1.04	1.10	1.16	1.23	1.32	1.41	1.52
0	1.55	0.63	0.65	0.68	0.70	0.73	0.76	0.79	0.82	0.86	0.90	0.95	1.00	1.06	1.12	1.20	1.29	1.39
0.5	1.40	0.57	0.59	0.61	0.63	0.66	0.68	0.71	0.74	0.78	0.82	0.86	0.90	0.96	1.02	1.08	1.16	1.25
1	1.28	0.52	0.54	0.56	0.58	0.60	0.62	0.65	0.68	0.71	0.75	0.78	0.83	0.87	0.93	0.99	1.06	1.15
1.5	1.15	0.47	0.48	0.50	0.52	0.54	0.56	0.58	0.61	0.64	0.67	0.70	0.74	0.79	0.85	0.91	0.98	1.07
2	1.05	0.43	0.44	0.46	0.47	0.49	0.51	0.53	0.56	0.58	0.61	0.64	0.68	0.72	0.76	0.81	0.87	0.94
2.5	0.95	0.39	0.40	0.41	0.43	0.45	0.46	0.48	0.50	0.53	0.55	0.58	0.61	0.65	0.69	0.74	0.79	0.85
3	0.88	0.36	0.37	0.38	0.40	0.41	0.43	0.45	0.47	0.49	0.51	0.54	0.57	0.60	0.64	0.68	0.73	0.79
3.5	0.80	0.33	0.34	0.35	0.36	0.38	0.39	0.41	0.42	0.44	0.47	0.49	0.52	0.55	0.58	0.62	0.66	0.72
4	0.73	0.30	0.31	0.32	0.33	0.34	0.36	0.37	0.39	0.41	0.43	0.45	0.47	0.50	0.53	0.56	0.61	0.65
4.5	0.65	0.26	0.27	0.28	0.29	0.30	0.32	0.33	0.35	0.36	0.38	0.40	0.42	0.44	0.47	0.50	0.54	0.58
5	0.57	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.32	0.33	0.35	0.37	0.39	0.41	0.44	0.47	0.51
5.5	0.50	0.20	0.21	0.22	0.23	0.23	0.24	0.25	0.27	0.28	0.29	0.31	0.32	0.34	0.36	0.39	0.41	0.45
6	0.49	0.20	0.21	0.21	0.22	0.21	0.24	0.25	0.26	0.27	0.29	0.30	0.32	0.33	0.36	0.38	0.41	0.44

Sensitometry is the science of how film responds to light and development. Zone System workbooks were not usually written by scientists. In sections that cover sensitometry, almost all the popular texts contain errors and omissions. But they all have good points to make and every author is sincere in their effort to understand and explain sensitometry. Since most of the errors are minor and the results are demonstrated success, all these problems are forgivable. I enjoy reading the books for the stories.

The most commonly omitted factor in Zone System textbooks is flare. The whole-system nature of Zone System tests is often touted as a benefit. But I see it as a detriment. Where variables of equipment and process can be eliminated in a test, I think they should be broken out. You can always factor them in later. For example a slow camera shutter can lead you to conclude the film has a higher Exposure Index than it really has. Sure, you will get great results if you use that wild Exposure Index with that particular camera. But it would be better to have a reasonable Exposure Index you can use with any camera. You can always test and keep a chart of actual tested shutter speeds with each camera. Now, more than ever, bad camera shutter speeds are a big problem as vintage cameras get older and need service. It's more important than ever to eliminate shutter speeds from the tests.

A good film test will not include flare, will be easy to perform and will use a minimal amount of film. For me, that means a test where you contact-print a step wedge on film. Expensive equipment is not required. I recommend the uncalibrated transmission step wedge with 21-steps and 0.15 density per step.

Recommended: Stouffer Step Wedge T2115

(<http://www.stouffer.net/TransPage.htm>)

You can set this scale on top of a piece of film, cover it with a piece of glass, as for contact printing, and expose under an enlarger. Although this isn't highly accurate, it is easy to setup and will be much better than most other test methods. There are two important flaws in the test: reciprocity law failure may occur due to a few seconds exposure and the light source of the enlarger is different than the spectrum of light you would probably use when taking pictures. The advantages of contact printing outweighs the significance of these flaws.

Recommended: Enlarger -----> Sensitometer

(<http://www.apug.org/forums/forum37/107764-enlarger-sensitometer.html>)

A sensitometer is a piece of equipment dedicated to making test exposures. Many small, inexpensive sensitometers are available as surplus because they were commonly used to test X-ray film. These devices performed admirably in a recent test. If you can get a sensitometer, you can make this work easier.

Recommended: Great Sensitometer Shootout

(<http://www.apug.org/forums/forum43/111164-great-sensitometer-shootout.html>)

The tests: Expose about 5 sheets of film and develop for various times to cover your usual range of expected development times (for example a range of times between 4 and 20 minutes). Then measure and graph the results, you will have what is called a family of film curves. Taking a measurement of the times and contrast, you can draw a Time/Contrast graph.

Now it's time for darkroom printing. Creative mind takes over, high-tech analytical side shuts down.

Now I have negatives that are likely to fit Grade 2 or Grade 3 paper. That's all the paper I have. So I make a judgment call. If the negative is thin, I will print it on Grade 3. If the neg is kind of contrasty, I pick Grade 2. This is a very easy and decisive judgment call. I make a test strip by F/Stop times in third-stop increments. When I look at the result, I try to estimate dry-down (I use Fiber Based paper). I sketch out my burns and dodges based on parts of the picture that look good on the test strip. This is where having a negative that prints well on Grade 2 is a pleasure. The burns and dodges tend to have the effect I was going for. I recently made four prints on Grade 4. It was pretty hard for me to keep the tones delicate when the difference between a 10 and 20 second burn (on a 70 second base exposure) made a significant difference in the highlight. For those comfortable printing Grade 4, more power to you, it's not for me.

Appendix

WORKSHEETS & EXAMPLES

Recommended: Sensitometry Graph Paper

(<http://beefalobill.com/imgs/sensitometry.pdf>)

Recommended: Time/Contrast Graph Paper

(<http://beefalobill.com/images/TimeCI.pdf>)

Recommended: Contrast Index Meter (print onto overhead transparency film)

(<http://beefalobill.com/imgs/cntrastindexmeter.pdf>)

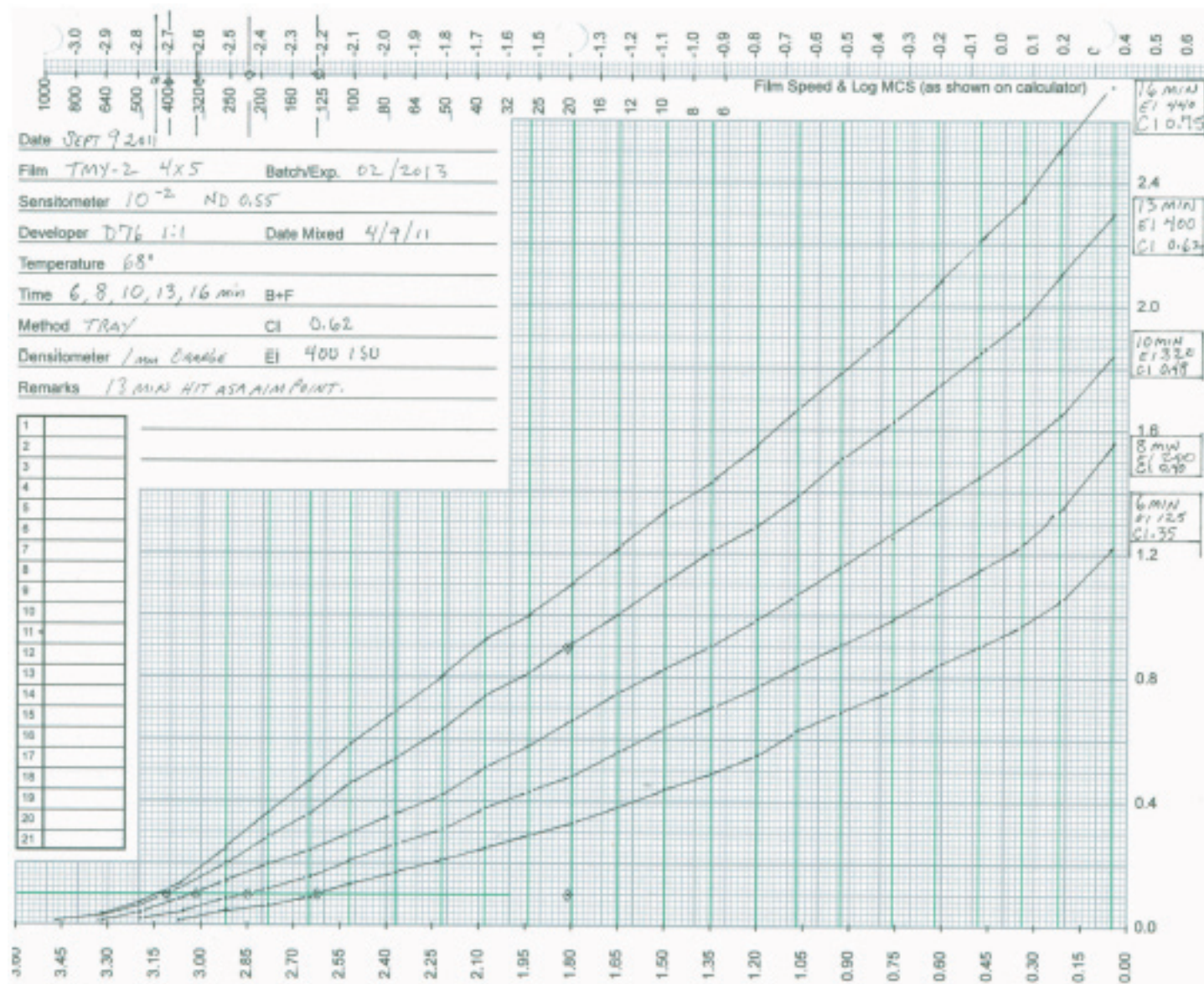
Recommended: Lab Notes Negs

(<http://beefalobill.com/images/labnotesnegs.pdf>)

Recommended: Lab Notes Prints

(<http://beefalobill.com/images/labnotesprint.pdf>)

Example: Sensitometry for TMY-2
 (<http://beefalobill.com/imgs/Sept9TMY2.pdf>)



(<http://beefalobill.com/imgs/tmy2timeci.jpg>)

1	
2	
3	
4	
5	
6	0.35
7	
8	0.40
9	
10	0.45
11	
12	
13	0.60
14	
15	
16	0.75
17	
18	
19	
20	
21	

