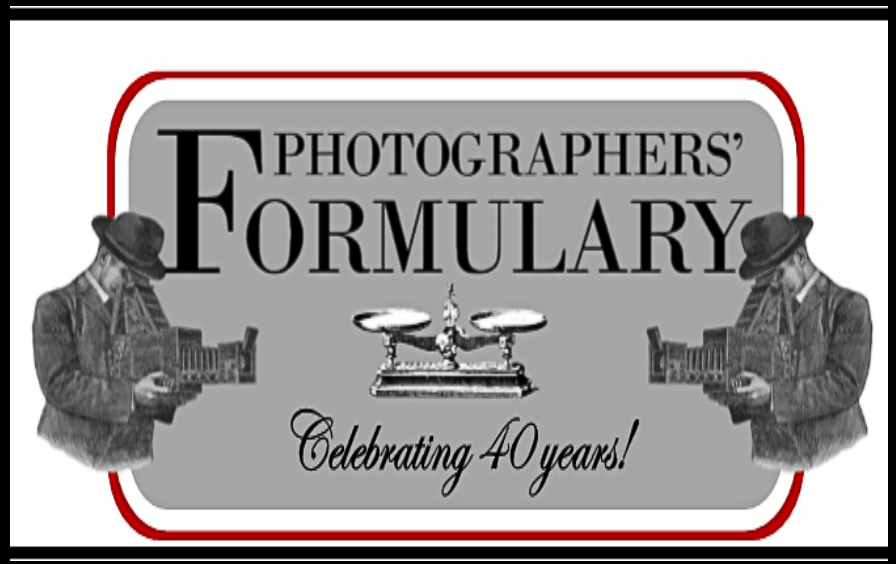
Welcome to Our Photographic Workshop!

The Art of Black & White Photography

by Roy Pope

Using film is a sensory exploration into prolonged concentration.



MY WEB SITE:
www.roypopephotography.com

What we will Explore

- Go over the itinerary.
- Explore and talk about Light, and film.
- Look at the Zone System.
- Look at and talk about our work, our successes and failures.
- Talk about exposure. We'll go out and make a simple seat of the pants test for shadow detail and film processing, and make Sketch images using your cell phones.
- Go out and photograph (Field Trip).
- Paint with Light.
- Talk about developing film and working in the darkroom on new negatives,

  and ones you brought with you.
- Selenium toning.
- Light in a bottle.
- Explore composition.
- We will talk about filters.
- Mounting and Matting our work. Print finishing.
- We will share stories, thoughts, ideas, and photographic camaraderie.
- We will have the best meals during out time here, and meet and interact with the wonderful people here at the Photographers' Formulary.
- I give much credit to the photographers past and present for the many techniques and discussions that I carry forward with me. All of you are the BEST!

Light


Hobbyist Photographers worry about EQUIPMENT.
Pro Photographers worry about MONEY.
Master Photographers worry about LIGHT.

Light is the essence of Photography

Knowledgeable photographers recognize that they are not photographing objects as much as they are photographing light, and the way light defines, delineates, or is emitted by an object.

Photography, therefore, is technically the study and interpretation of light.

"Light" reveals the subject.

Quality of Light

Dramatic Light

1999 Rodney Smith

Window Light

2005 Roy Pope

Storm / Squall Light

1991 Trees,Mist, Sunlight Patrick Jablenski

Contrasty Light

Shadowless Light

1985, Sparky & Cowboy Danny Lyon

Diffused Light

The luminosity that makes a photograph can be thought of as ambient and reflected light.

Ambient Light is the light from a light source (the sun) that falls upon the subject we are photographing.

Ambient Light causes the overall "mood" or aesthetic character of the image (foggy, hazy, bright,etc).

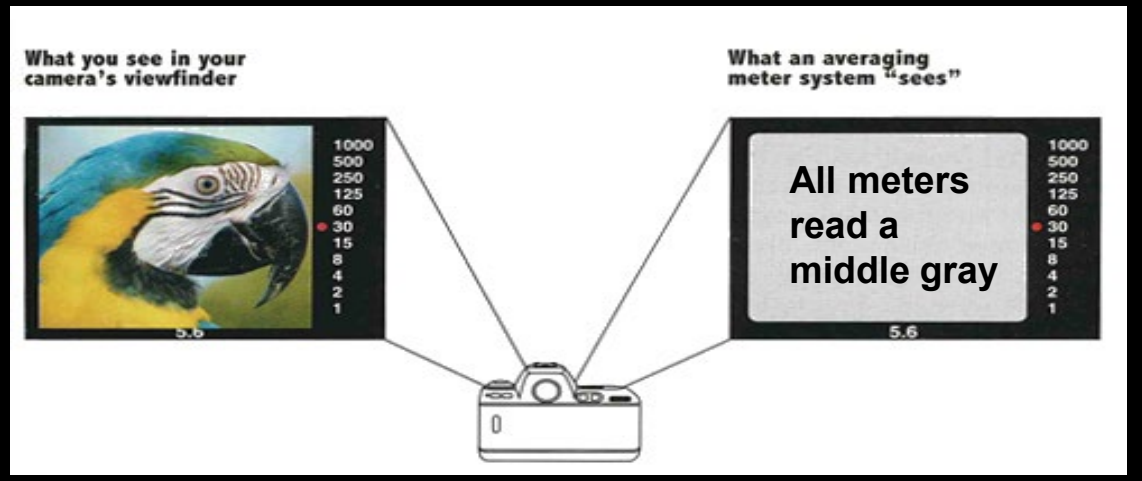
Reflective Light is the light reflecting from the subject that *causes its texture and form*.

Exposure

There is no fix for the shadow areas if the shadows are blank!

- Your film speed (ISO), metering of your shadows, and exposure (zone placement) determines your shadow area's density.

- All meters read a middle gray.



➢What you see *verses* What the meter sees.

- Exposure is the absolute for your photography.
- Without sufficient exposure there is nothing to develop in the shadow areas!

Light Meters

Light meters expose for middle gray

Adjusted Exposure to make the polar bear white. + 2 stops

Metered frame

Adjusted Exposure to make the black gorilla Black. - 2 stops

How to expose black-and-white film for specific tones. If one area in a scene is particularly important, you can meter it, then find the exposure that will render that area as dark or as light as you want it to be in the final print.

Five stops more exposure than indicated by meter. Maximum white of the paper base. Whites without texture, glaring white surfaces, light sources.	
Four stops more exposure. Near white. Slight tonality but no visible texture. Snow in flat sunlight.	
Three stops more exposure. Very light gray. Highlights with first sign of texture, bright cement, textured snow, brightest highlights on light skin.	
Two stops more exposure. Light gray. Very light surfaces with full texture and detail, very light skin, sand or snow acutely sidelit.	
One step more exposure. Medium-light gray. Lit side of average light-toned skin, shadows on snow in a scene with both shaded and sunlit snow.	
Exposure indicated by meter. Middle gray. The tone that a reflected-light meter assumes it is reading. Neutral gray test card, dark skin, clear north sky.	
One stop less exposure. Medium-dark gray. Dark stone, average dark foliage, shadows in landscape scenes, shadows on skin in sunlit portrait.	
Two stops less exposure. Dark gray. Shadows with full texture and detail, very dark soil, very dark fabrics with full texture.	
Three stops less exposure. Gray-black. Darkest gray in which some suggestion of texture and detail appears.	
Four stops less exposure. Near black. First step above complete black in the print, slight tonality but no visible texture.	
Five stops less exposure than indicated by meter. Maximum black that paper can produce. Doorway or window opening to unlit building interior.	

White polar bear given exposure suggested by meter

White polar bear given 2 stops more exposure

Gray elephant given exposure suggested by meter

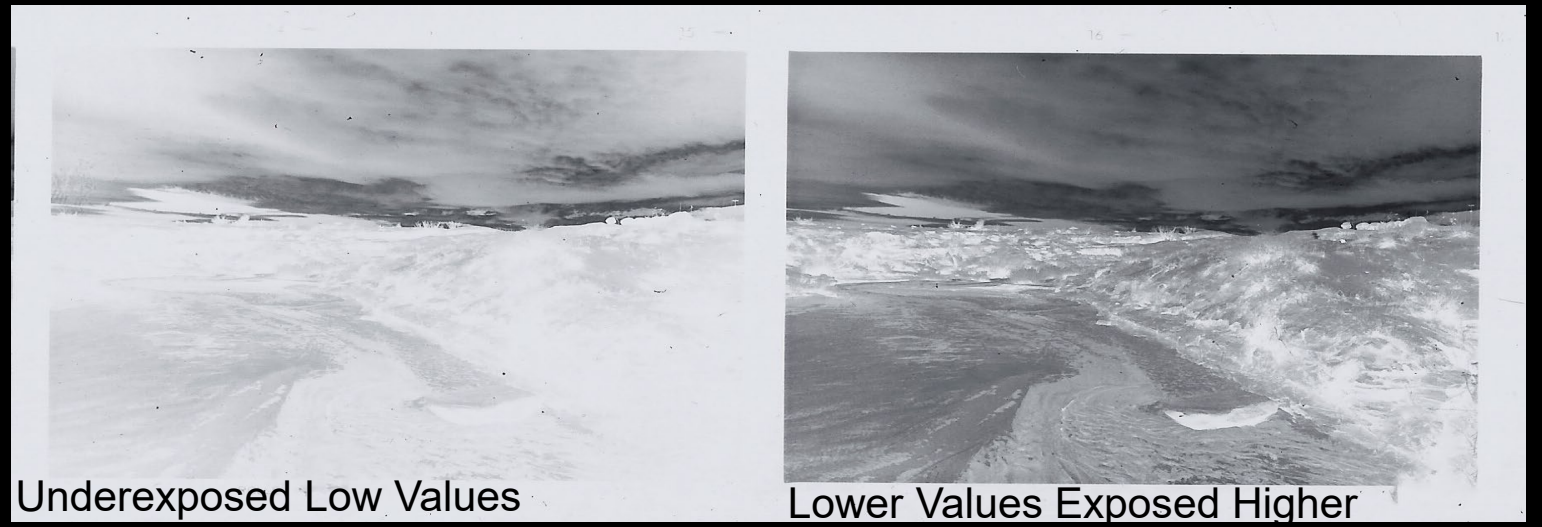
Black gorilla given exposure suggested by meter

Black gorilla given 2 stops less exposure

Film Speed and Exposure

If Shadow Values are underexposed there is NO remedy to bring them back!

Negative



Underexposed Low Values

Lower Values Exposed Higher

Print

Print from underexposed negative.

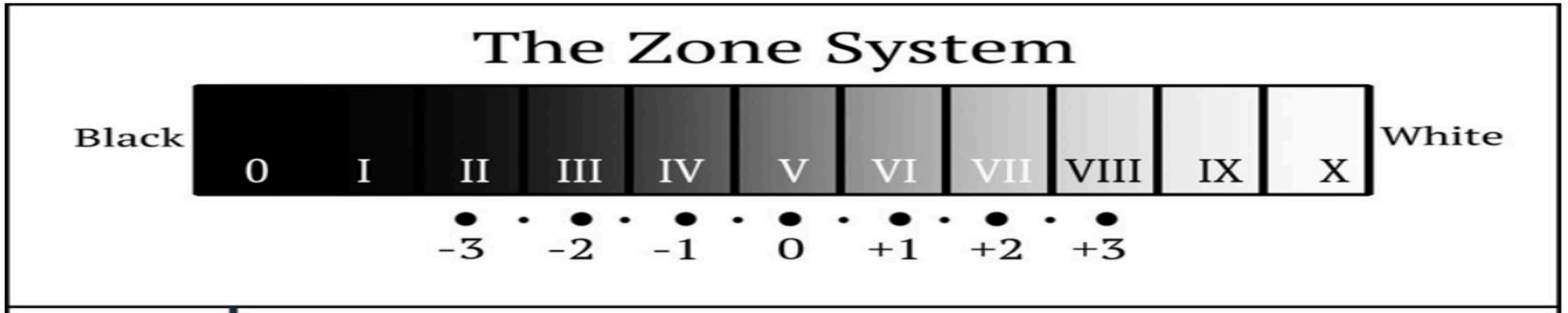
Print from Higher placement of Low values.

Advantages of the Zone System

- Spot metering lightest and darkest objects in the scene gives you the scene's contrast range
- Any object, however light or dark can be exposed in any zone of choice. Placing a very dark area in a lighter zone will render that area lighter.
- The zone system is an essential tool to know how to expose film such that it is printable regardless of contrast range of the scene

Courtesy of David Clough Photography

The Ansel Adams Zone System gives us a range of 7 zones from II to VIII that has tone and texture.

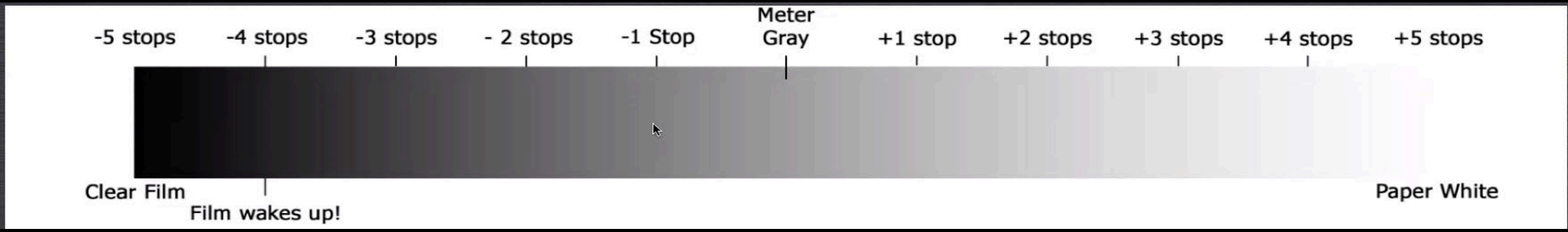


Zone 0	Complete lack of density in the negative image. Total black in print
Zone I	First step above black, slight tonality, but no texture
Zone II	First suggestion of texture. Deep tonalities, representing the darkest part of the image in which some detail is required
Zone III	Average dark materials. Low values showing adequate texture
Zone IV	Average dark foliage. Dark stone. Landscape shadow
Zone V	Dark skin, gray stone, weathered wood. Middle gray
Zone VI	Average caucasian skin value in sunlight. Shadows on snow in sunlit snowscapes. Light stone, clear north sky
Zone VII	Very light skin, light gray objects
Zone VIII	White with textures and delicate values
Zone IX	Glaring white surfaces. Snow in flat sunlight White without texture
Zone X	Light sources, actual or reflected. Printed at maximum white value

Putting it all together:

1. *Place the value you insist on.*
2. *Meter other areas.*
3. *Make development choices.*

- When exposing B&W film, where we decide to place the darkest part of the scene in the Zone System determines if the negative will have tonality in shadow / dark areas of scene.
  - In a portrait the flesh tone is the placed value because it is the most important value.
  - In a landscape the shadow area is probably placed no lower than Zone IV.



- *Once you know the zone system and your film's characteristics you will have your foot on the rock for exposure and development of your negatives.*

Reciprocity

San Xavier Del Bac Mission; Tucson, AZ

Tri-X 320
Lens: 120 Super Angulon
N+1 Ilfotec HC 6 minutes
F/32 @ 60 seconds – Reciprocity exposure – 3 minutes

Reciprocity

COMPENSATING FOR RECIPROCITY FAILURE: EXTRA FOR LONG EXPOSURES

	WITH MOST BLACK-AND-WHITE FILMS			WITH KODAK T-MAX FILMS	
Indicated exposure	**Open up aperture or to**	**Increase exposure time to also**	**Decrease development time by**	**Open up aperture or**	**Increase exposure time to**
1 sec	1 stop more	2 sec	10%	1/3 stop more	No increase
10 sec	2 stops more	50 sec	20%	1/2 stop more	15 sec
100 sec	3 stops more	1200 sec	30%	1 1/2 stops more with T-Max 400; 1 stop more with T-Max 100	300 sec with T-Max 400; 200 sec with T-Max 100

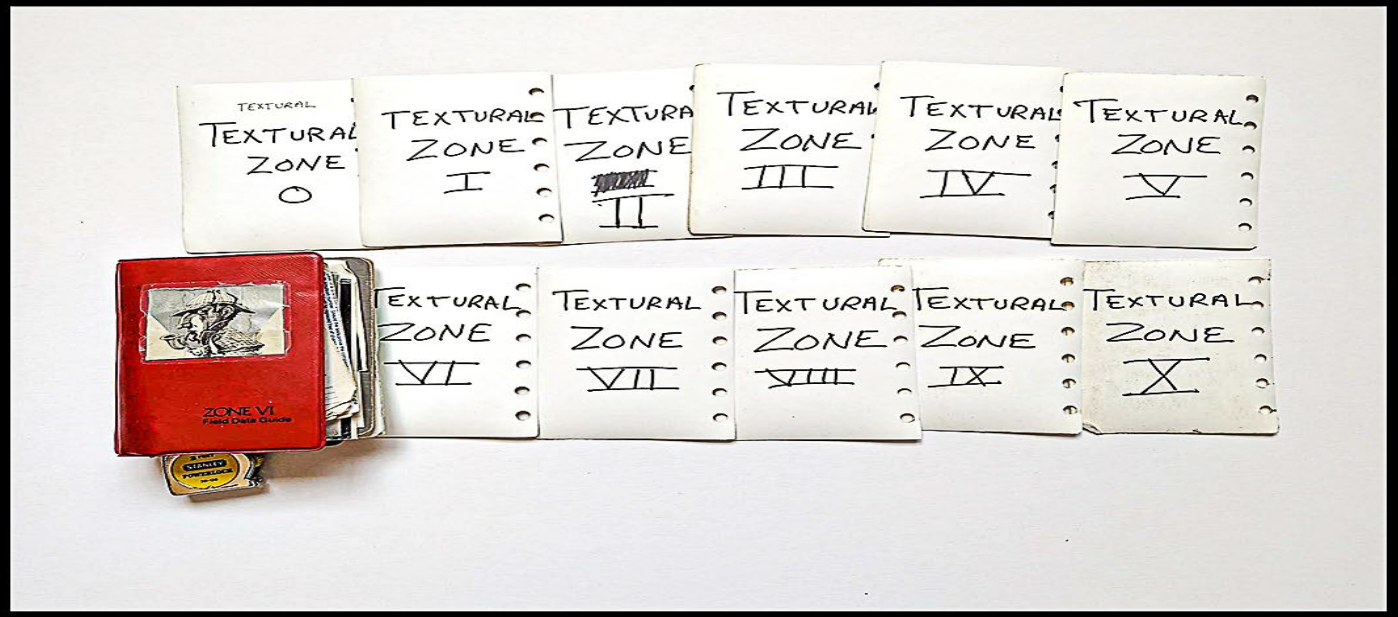
At exposure times of 1 sec or longer, film does not respond exactly as it does at shorter shutter speeds. One unit of light falling on film emulsion for 1 sec has less effect than 10 units of light falling on the same emulsion for 1/10 sec. This departure from normal reciprocity during long exposure times means that exposures must be increased or the film will be underexposed, particularly in shadow areas.

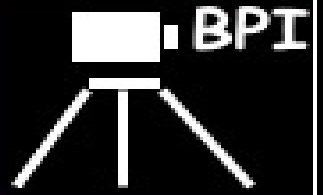
To compensate for this, increase your indicated or measured exposure by the amounts shown in the chart above. Highlights are less subject to reciprocity failure during long exposures with some films, so to prevent too dense highlights when you increase exposure, decrease development time as shown in the chart.

Reciprocity: A film responds to light within a standard range of 1 second to 1/1000 second. There is a reciprocal relationship between exposure and light. For times beyond 1 second this reciprocal relationship breaks down because the film is less efficient in its ability to gather light.
To correct for this you will need to increase the exposure time as in the example in the chart above.

Zonal Field Prints

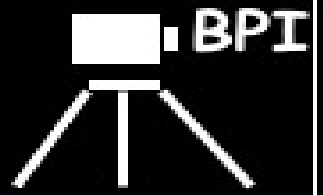
- Using the film you normally use, make a series of exposures from Zone 0 to Zone X.
- Use the natural Light:
  Sunlight, and shadows that you encounter in nature. This approach is worthwhile to duplicate field conditions as closely as possible.
- Make the shadow exposures of zones usually recorded on or below Zone V.
- Make the sunlight exposures of zones almost always placed on zonal values Zone VI to X.
- Process using your normal developer, and make prints using your enlarger normal printing paper, and a #2 printing filter.





Some Objects in Nature Have a Neutral (Zone V) Luminosity

Medium Gray (Tree Trunk, Granite Rock)
Medium Red (Iron Oxide Soil) (S. Utah)
Medium Brown
Medium Green (Grass)
Blue Sky



Certain Objects in Nature Are Not Neutral

Color/Object	Zone	Compensation
Green/Evergreen Trees	4	-1 Stop
White/Snow	7	+2 Stops
Flesh/Caucasian	6	+1 Stop
Yellow	6+	+1 ½ Stops
Orange	5+	+1/2 Stop
Black	3	-2 Stops

Courtesy of David Clough Photography

What's Out There (Subject Reflectance) Under Normal Sun and Shade

Black & White card - **All Sun**

All Sun-5 zones between Black & White

Black & White card - **All Shade**

Black & White Card's Reflectance in the same illumination is 5 zones

All Shade-5 zones between Black & White

Black Card in - **Sun and Shade**

Black in sun & shade **3 zones**

White Card in - **Sun and Shade**

A Black, or A White Card's Reflectance when metered in Sun then in Shade is 2 1/2 to 3 zones difference.

White card in sun & shade **3 zones**

White card in Sun-Black card in Shade

71/2 zones between a Black and White Card when the black card is in shade, and the white card is in sun

A full-scale photograph of a black and white card (the extreme reflectances that we photograph).

A Black card and a White card under the same illumination will give a 5 stop difference.

A Black card or a White card metered in sun, then in shade will give a 2 1/2 - 3 stop difference.

The difference in reflection when a white card is in sun and a black card is in shade is 7 1/2 zones.

Key Day Exposure

- Test on the brightest day you will encounter. Key Day-look up no veil of clouds. Look down-shadows are sharp.
- Set your lens to the smallest aperture.
- Make a series of shutter speed exposures from slow to fast for the film you are using.
- Process the film and make a contact sheet.
- Select the photo that shows detail in shadows and highlights. A realistic rendering. Are the high values delicately detailed?
- This is your key day exposure.

Sunny 16 Rule

Sunny 16 rule

Determining exposure without a meter

- If you find yourself in a situation without a meter, or the battery fails.

F/16 rule. In direct sunshine showing distinct shadows, **using f/16** and a shutter speed of **1/over the ISO(film speed)** will usually put you in the ballpark of exposure.

For Example. If you are using Tri-X film that is rated at **ISO 400**, and it is a **sunny clear day** producing **distinct shadows**. You would **expose at f/16 at a shutter speed of 1/400**. Since our cameras do not offer 1/400, use the nearest shutter speed, opting to give the film a little more exposure, and use 1/250.

In this example you would use f/16 @ 1/250th of a second.

Corrections to the f/16 rule when it isn't a sunny day:

• Hazy day (soft shadows)	open up 1 stop
• Cloudy day (no shadows)	open up 2 stops
• Heavy overcast or open shade	open up 3 stops

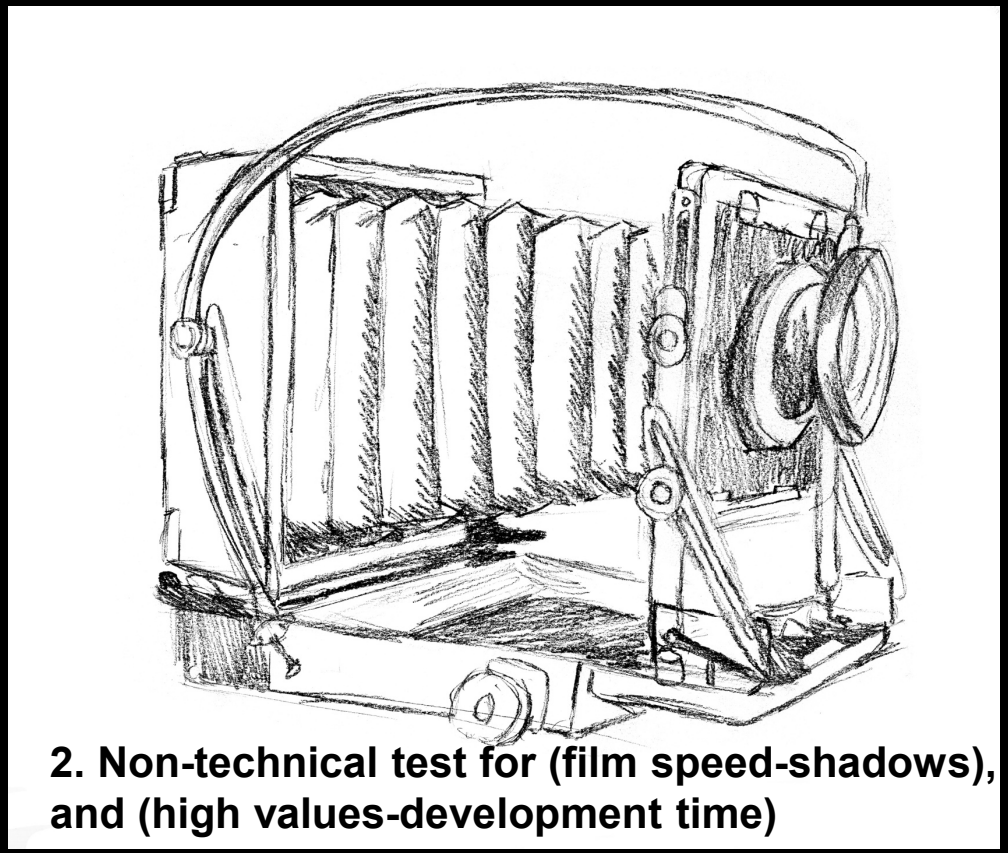
Testing Materials

- Don’t make tests that you pass or fail.
- Make tests to find out what happens.
- Make tests for the information that you have to know about the materials you are using.

Two Exercises:

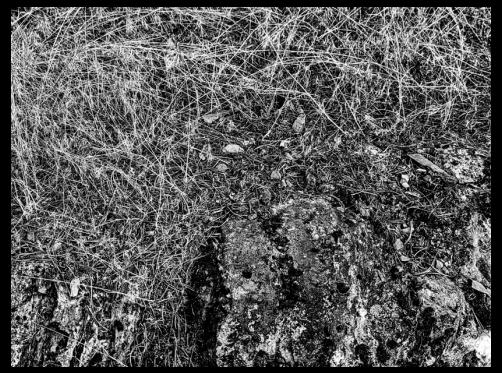
1. Using our Cell Phones for making Sketch Images.

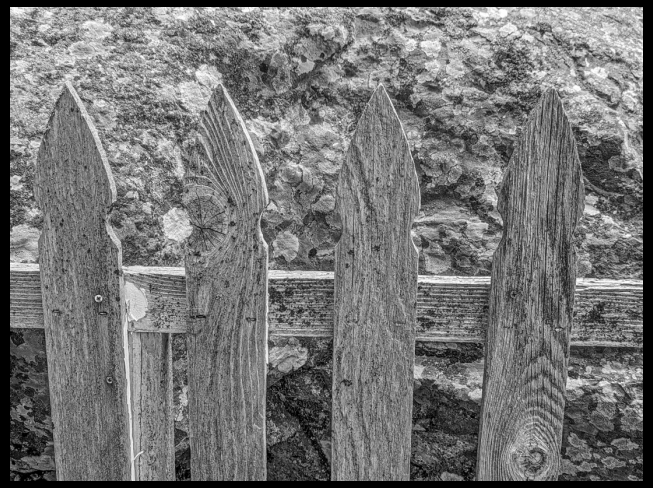
2. Using our Cameras for a non-technical test for shadow and High Values.

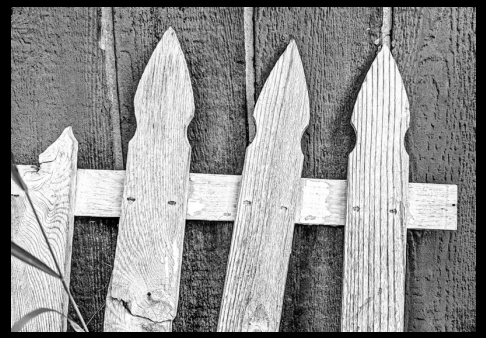


2. Non-technical test for (film speed-shadows), and (high values-development time)

Sketch Images Using Our Cell Phones

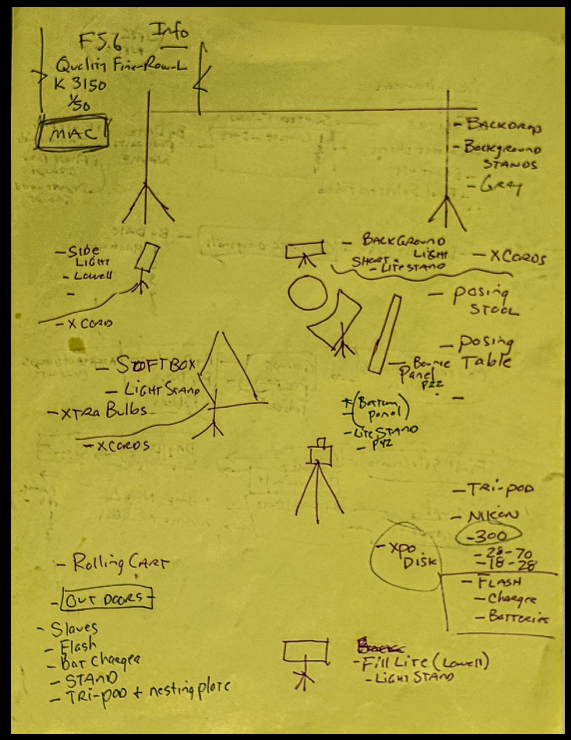


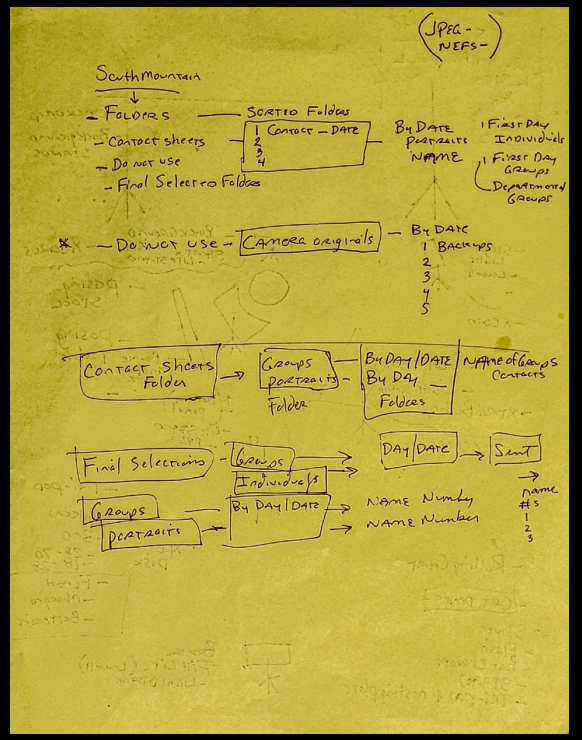




Sketch Images for locations

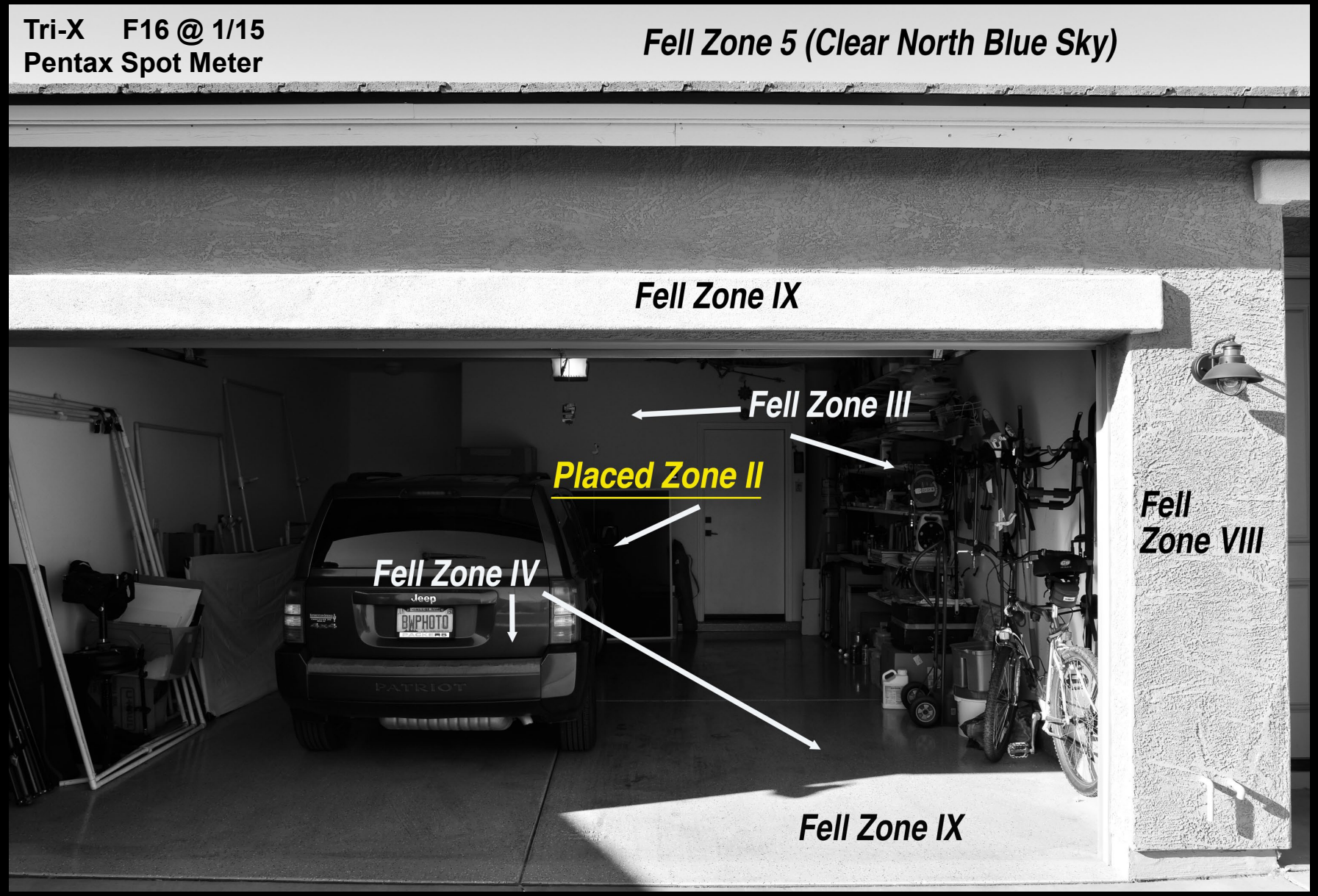
I will give myself constraints (such as Lens Focal Length) to keep the images consistent, and test beforehand for exposure, and color balance.





Non-Technical but useful test for High and Low Values

- If the shadows are blank, decrease your ISO. (ex: 400 to 200).
- If the high values are blown out, decrease your development time.
- If the high values are too gray, increase your development time.



Painting with Light

- Wear dark colors.
- Bring flash lights, strobe units, phone light.
- We will take an incident meter reading f/8.
- Time exposure.
- Process film N+1.

- Head lamps use the red mode to preserve night vision.
- Let’s have fun and see what we get.
- Serendipity is the key word.

Time Exposure

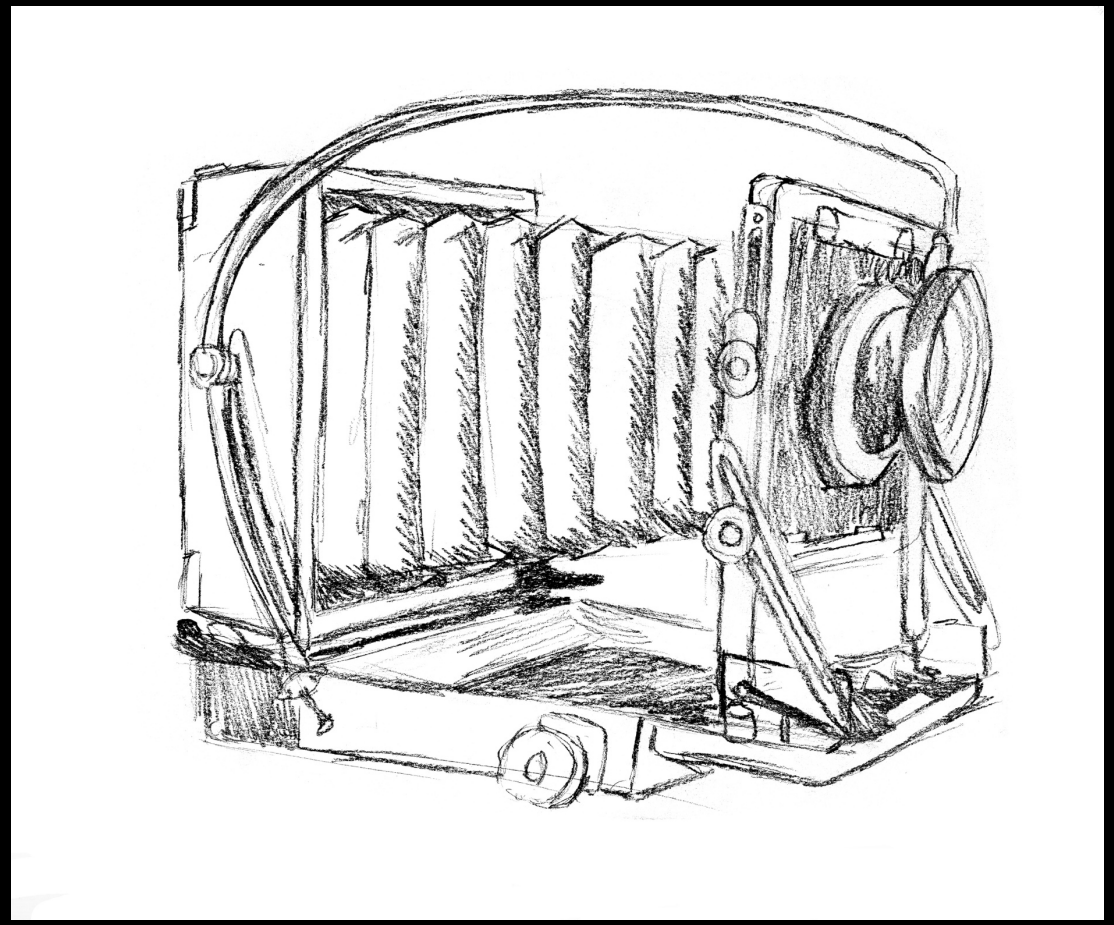
- F/8
- 12 hour exposure
- 120 Super Angulon Lens
- 4x5 Tri-X 320 film
-
- N+1 Ilfotec HC 1:31
-
- 6min DT

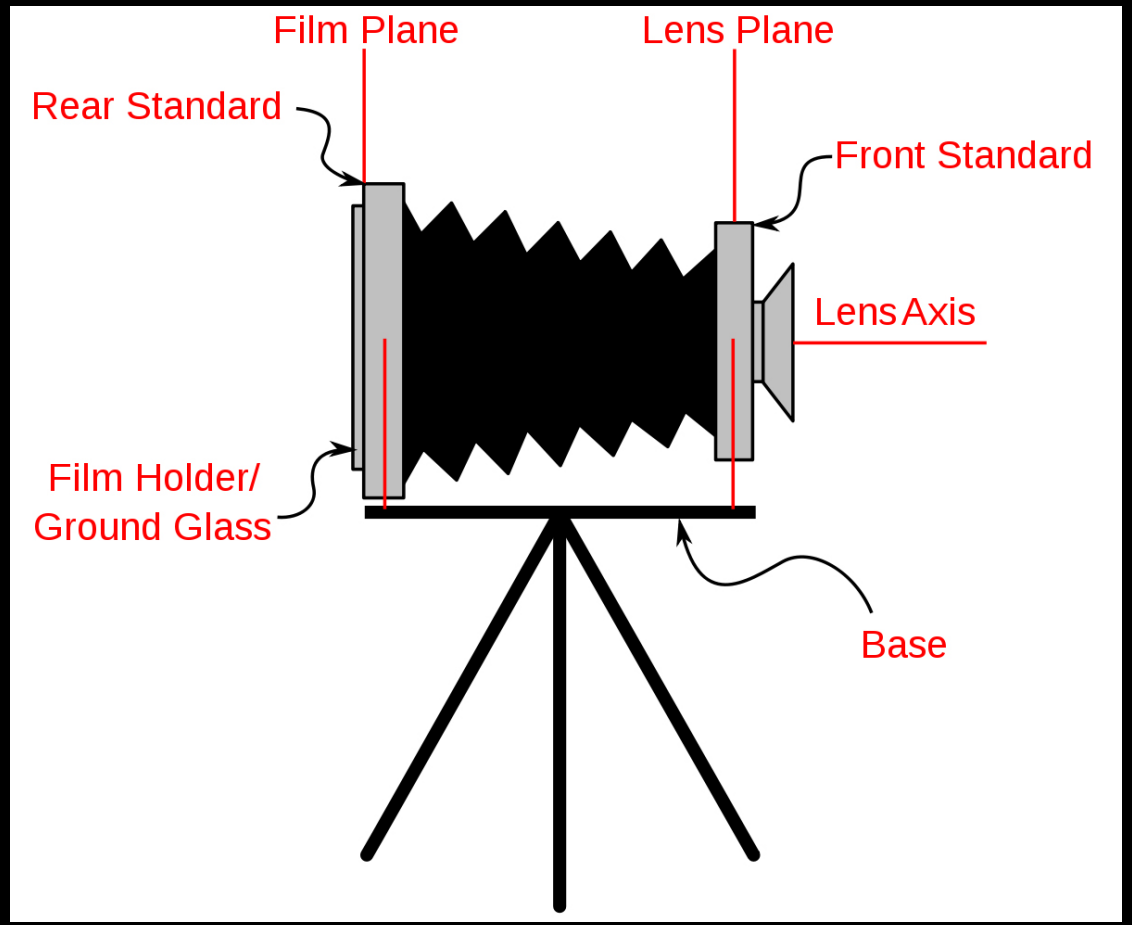
Day/Night exposures:

Example:
Chicago buildings. During twilight, I'd place the exterior on zone 4, and make an exposure.
Then when evening sets in, I would double expose for the windows placing them on zone 8.
You can also expose a full moon into the scene using a 3rd. exposure.

Quadrantids Meteor Showers over the Superstition Mountains; Apache Junction, Arizona

The Camera




Film Plane
Lens Plane
Rear Standard
Front Standard
Lens Axis
Film Holder/
Ground Glass
Base

Viewing Frame/Cut Out Card

Cut outs should match your film format

To measure the focal length of the lenses you work with, you can staple a tape measure, a string with knots, or use your fingers.

- Before you pull out your camera, explore the area and your subject using a cut out card. Study how an object or scene changes with different focal length lenses.
- A cut out card facilitates finding your spot, and will help with your seeing, and composition strengths. Observe the importance of the edges.
- When you are standing on the spot that you will make your photograph from, you can use the card to determine the lens you will use, and the compositional elements that you want in your scene. If I'm using my 210mm lens, I would hold the card 8" from my eye.

After Marking your spot – Set up your camera

To keep my image of the fence in focus, I set my image plane, lens plane, and subject plane to intersect at roughly the same point.

The technical term is called the Scheimpflug Intersection of lines.

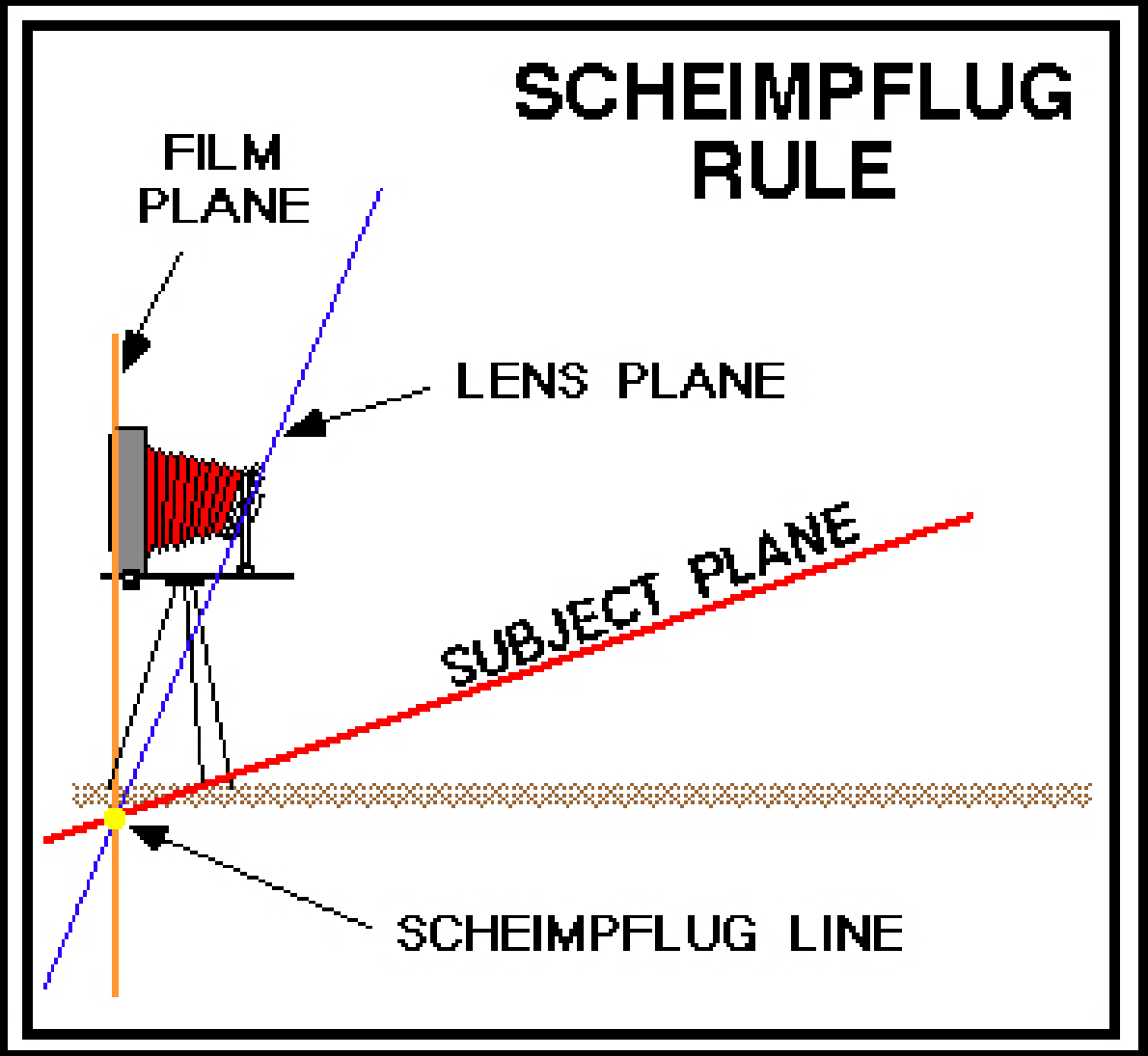
Check your focus on the image plane (camera back) as shown with me photographing the fence.

- A simple intuitive way to think about this is:

- The lens looks.
- The back backs away.

Scheimpflug Rule

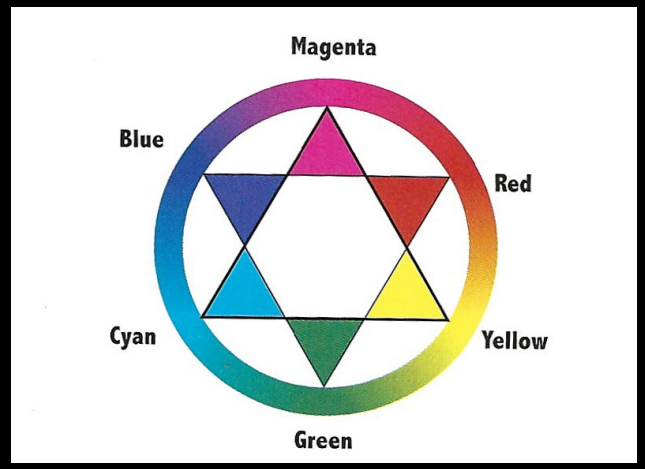
Use the Scheimplug Rule for the best depth of field when using your view camera.



Viewing Filter to check for tonal mergers

- The viewing filter uses a Kodak Wratten #90 filter.
- The viewing filter shows you the approximate tonal relationship between different areas of a scene as recorded by B&W film.
- It will show you if there are any mergers of tone within a scene.
- In which case you would use a filter to separate the tonal mergers.

Filters



- A filter passes its own color and absorbs colors opposite it.
- In the example on the right, without a filter the colors (tones of gray) merge together.
- Filters allow us to modify and convert the way the film will respond to the different colors in a scene.
- Filters absorb light. To compensate, exposure needs to be increased using the filter factor for the filter used.
- A factor of 2 = 1stop. A factor of 4 = 2stops.

These colors are to be translated by black-and-white film into well-differentiated shades of gray

Without a filter, black-and-white film renders red and green with little contrast in nearly equal shades of gray

#25 Red Filter *brightens red and darkens green*

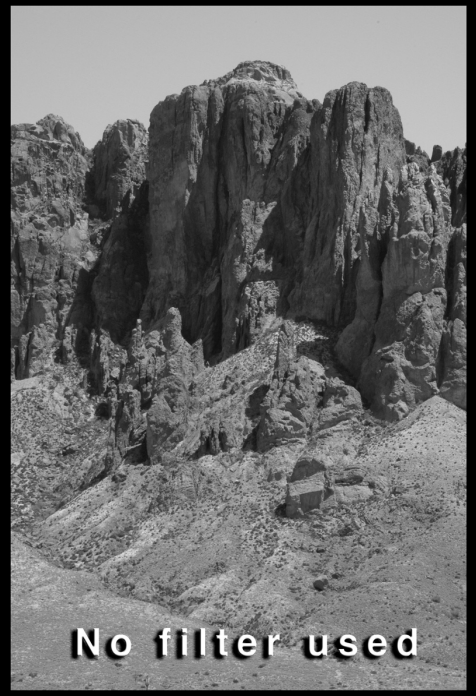
#58 Green Filter *darkens red and lightens green*

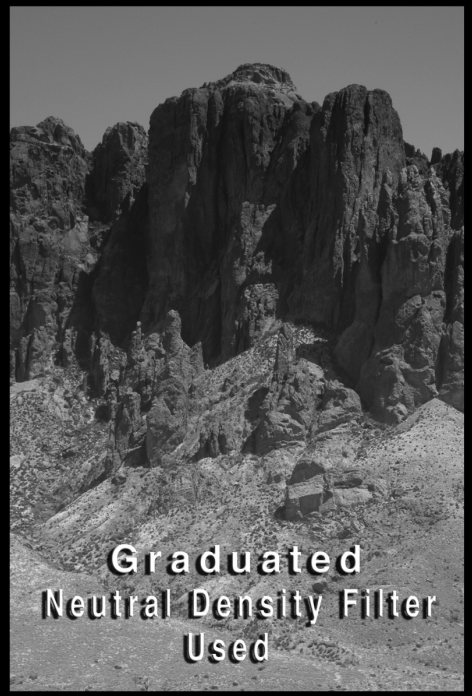
Polarizing Filters

- A Polarizing Filter can remove or reduce reflections except from metal.
- To see its effect, look through it and rotate it until the unwanted reflection is reduced.
- When rotated at 90•, most of the polarized rays are blocked.
- A polarizer can make skies uneven in density especially when using a wide angle lens.
- An exposure increase of 1 1/3 stop is needed.

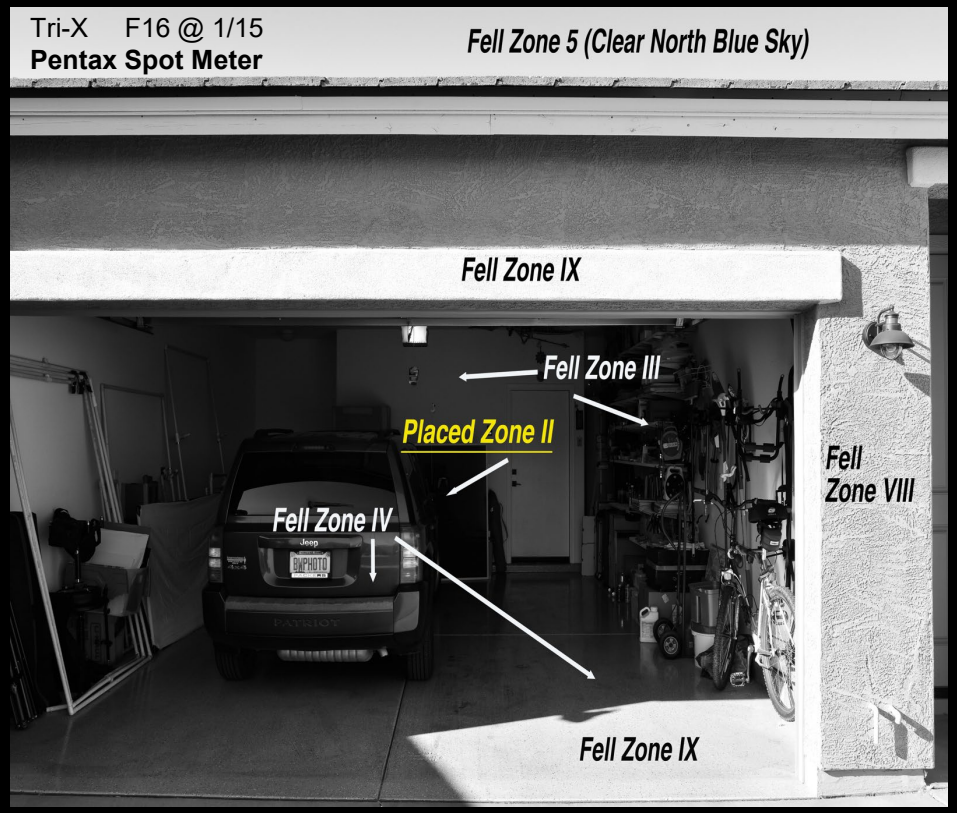
Neutral Density Filters

- Absorb equal quantities of light from all parts of the spectrum.
- Increase required exposure so camera can be set to wider aperture or slower shutter speed.
- A creative filter to explore long exposures.
- Exposures vary with filter's filter factor.
- Use filters to get the image almost finished in camera.





Pre-Exposure/Flashing in Camera to raise the shadow values on Film.



Deep Shadow subject example.

Pre-Exposure for film to raise shadow values on film

Zones:	I	II	III	IV	V	VI	VII	VIII	IX
Basic Exposure (Units):	1	2	4	8	16	32	64	128	256
Added Units of Pre-exposure:	2	2	2	2	2	2	2	2	2
Total Units of Exposure:	3	4	6	10	18	34	66	130	258

*I use 1/8" plexiglass over the lens for Pre-Exposure. Hold plexi close to lens pointed at subject to make reading. Double exposure is needed. Use original exposure placement to expose your subject.

Note that the pre-exposure has the effect of adding 2 units of exposure throughout the scale; this value of 2 units is determined by the fact that the pre-exposure was on Zone II, and the basic exposure gave 2 units for a Zone II exposure. Thus the Zone II area receives a total of 4 units, the equivalent of a one-zone increase (Zone III

Step 1. Meter reading thru Plexi next to lens plane.

Step 1. Place on zone II make an exposure thru Plexi.

Step 1:

Take a meter reading from the lens.

Place on Zone II and make an exposure through the plexiglass.

Step 2:

Make a 2nd. (double exposure) for the original exposure placement of the subject.

The Darkroom: Film Processing & Printing

Photographers' Formulary Darkroom

The Darkroom:

- Keeps the Outside Out.
- The dark gives the artist the ability to clearly focus their senses.
- This enables the creative process in the making,
  and in searching for the path of possibilities for the photographic print.

Kodak's definition of a good Photograph.

Kodak's definition of a good photograph: A good photograph is one that makes the viewer so aware of the subject that they are unaware of the print.

1994 Roy Pope

Photographs are made to delight the senses.

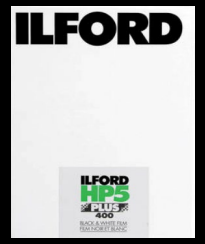
Film Processing

Black & White **Film Overview**

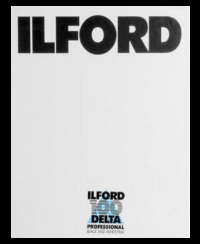
- **320 Tri-X**
- The classic gritty black-and-white look that you're probably thinking of when you look at some of the most heralded photos from history.
- Panchromatic B&W Negative Film.
- Versatile Film that works for pretty much any type of photography.
- ISO 320 in standard process.
- Excellent tonal gradation and brilliant highlights.

- **400 Tmax**
- Panchromatic B&W Negative Film.
- ISO 400 in Standard Process.
- High Sharpness and Edge Detail.

- **100 Tmax**
- Panchromatic B&W Negative Film.
- ISO 100 in Standard Process.
- Very Fine Grain, T-Grain Emulsion.
- High Sharpness and Resolving Power.



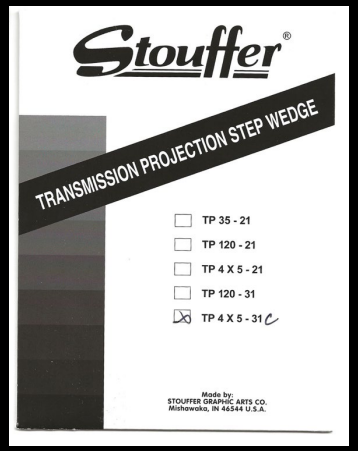
- **Ilford HP5 400**
- Panchromatic B&W Negative Film.
- ISO 100 in Standard Process.
- Very High Sharpness and Fine Grain.
- Ilford Proprietary Core-Shell Crystal Technology.

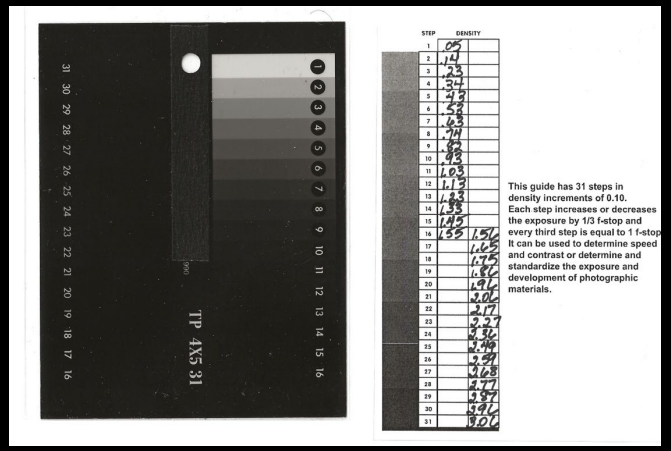


- **Ilford Delta 100**
- Panchromatic B&W Negative Film.
- ISO 400 in Standard Process.
- Medium Contrast.

- Get to know 1 film, developer, and paper combination.
- When exploring another film, developer, or paper, select only one at a time to compare it to your standard material.
  - Remember: Compared to what?
- If you use more than one film, you'll never learn the nuances of any of them. Like the guy in the Western said, "one gun is enough if you know how to use it."
- Your criteria for negative material is what kind of print it can make.

Stouffer Calibrated Scales





Heiland Densitometer
NO circle
Native white light

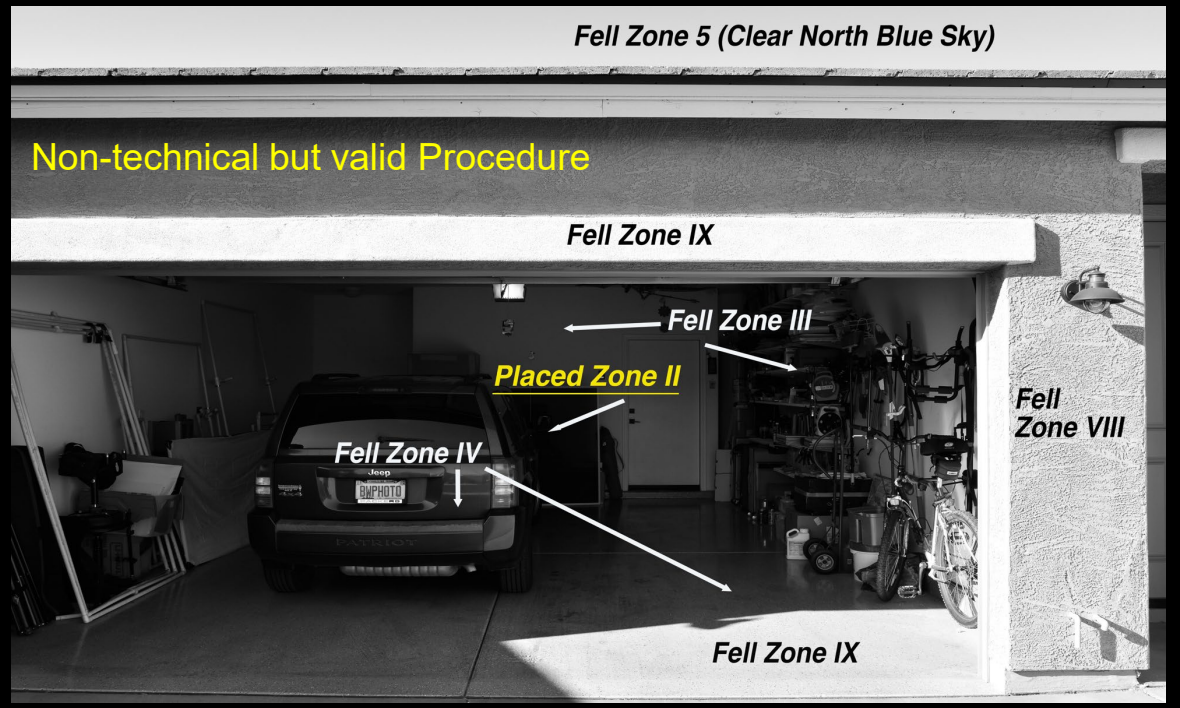
Zone Equivalents for Stouffer Step Tablet

Z-1 = .12
Z-5 = .75
Z-8 = 1.35
Z-9 = 1.45

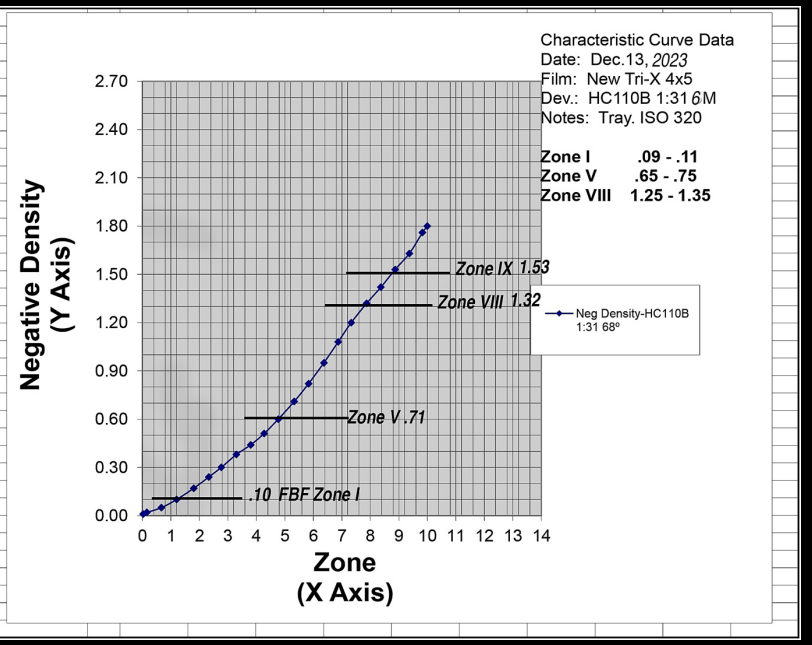
Date: April 2023
Film / Size: Tri-X 320
Dev: HC110B 1:31 68° 6min Developing Time
Notes: Tray

Zone = 10-(Step Density/0.3) Example:Stouffer patch 3 equals 10-(0.26/.3) = 10-0.867 = Zone 9.13

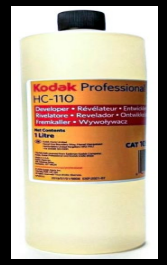
	Step #	Step Density	Zone	Neg Density	Neg Density	Neg Density	Neg Density	Zone	Neg Density	Neg Density
10	Dmax	None	10.00	1.80				14.00		
	1	0.08	9.73					13.73		
	2	0.16	9.47					13.47		
9	3	0.26	9.13	1.53	Zone 9			13.13		
	4	0.36	8.80					12.80		
	5	0.45	8.50					12.50		
8	6	0.55	8.17	1.32	Zone 8			12.17		
	7	0.65	7.83					11.83		
	8	0.76	7.47					11.47		
7	9	0.85	7.17					11.17		
	10	0.96	6.80					10.80		
	11	1.06	6.47					10.47		
6	12	1.15	6.17					10.17		
	13	1.26	5.80					9.80		
	14	1.36	5.47					9.47		
5	15	1.48	5.07	.71	Zone 5			9.07		
	16	1.58	4.73					8.73		
	16	1.57	4.77					8.77		
	17	1.68	4.40					8.40		
4	18	1.78	4.07					8.07		
	19	1.89	3.70					7.70		
	20	1.99	3.37					7.37		
3	21	2.10	3.00					7.00		
	22	2.21	2.63					6.63		
	23	2.30	2.33					6.33		
2	24	2.40	2.00					6.00		
	25	2.53	1.57					5.57		
	26	2.62	1.27					5.27		
1	27	2.72	0.93	.10	Zone 1	.10 OVER FBF		4.93		
	28	2.82	0.60					4.60		
	29	2.91	0.30					4.30		
	30	3.00	0.00					4.00		
	31	3.09	-0.30					3.70		



Zone	Neg Density-HC110B 1:31 68°
0.03	0.01
0.16	0.02
0.67	0.05
1.20	0.10
1.80	0.17
2.33	0.24
2.77	0.30
3.30	0.38
3.80	0.44
4.27	0.51
4.77	0.60
5.33	0.71
5.83	0.82
6.37	0.95
6.87	1.08
7.33	1.20
7.87	1.32
8.37	1.42
8.87	1.53
9.37	1.63
9.83	1.76
10.00	1.80



Characteristics of Selected **Black & White Film Developers**

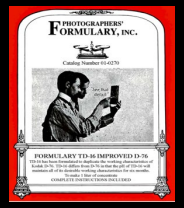


Kodak HC-110 Developer

- A liquid concentrate, usually diluted 1:31.
- Used as one-shot.
- Suitable for normal and push-processing.
- HC-110's characteristics include moderately fine grain, full shadow detail, a long density scale, wide development latitude, and no loss of film speed.

Kodak D-76

- Powder film developer offering fine grain results along with full film speed, good shadow detail, and normal contrast.
- Can be used straight or diluted 1:1 for increased edge sharpness (acutance) with slightly more graininess.
- D76 uses sodium sulfite as a silver solvent to reduce grain size.



Photographers' Formulary

- Provides a large selection of film developers.

Ilford Ilfotec HC

- An economic, versatile, highly concentrated liquid film developer.
- Ilfotec HC solutions have a long life producing high quality, sharp results under a wide range of conditions.

Adox Rodinal

- Developer is highly concentrated ,fine-grain, Old and Reliable.
- One-shot black and white film developer.
- Grain is also a factor that will be influenced by the dilution.

There are only two things you can do wrong (technically) when making a negative:

1. *you can expose it wrong*

and/or

2. you can develop it wrong.

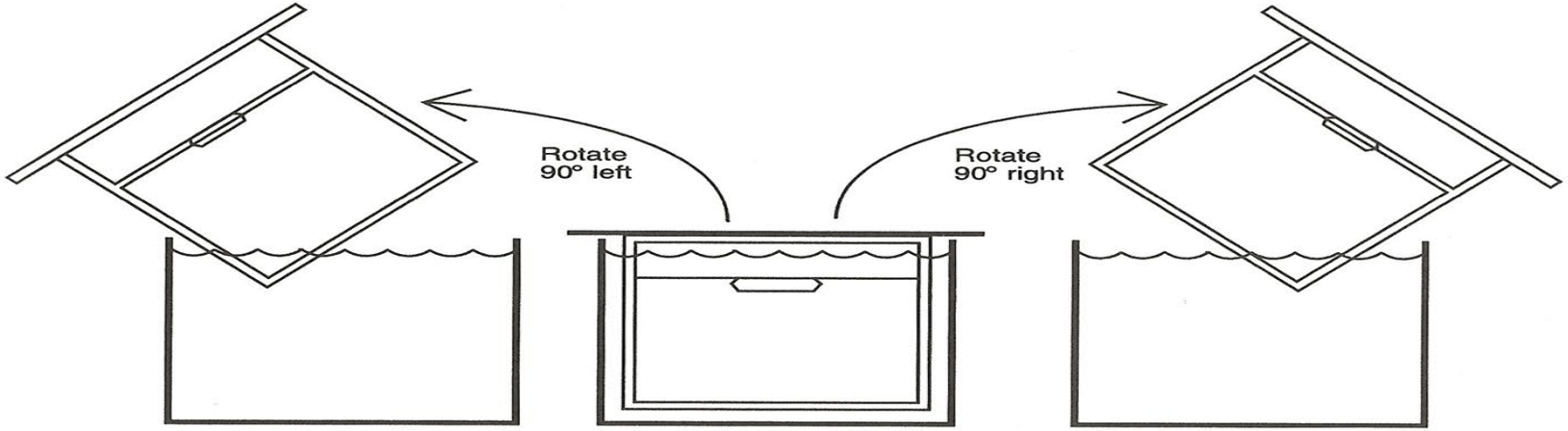
- **Make all of your image controls and contrast adjustments in your film's exposure and developing.**
- **Make your print(s) using your standard time, temperature, developer, and #2 / 21/2 Filter.**

Trays

Tube

Stearman

Slousher



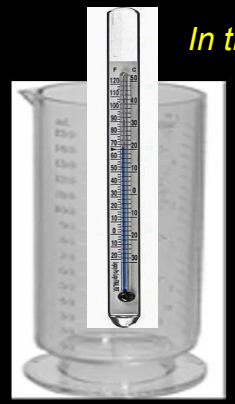
Agitation procedure for sheet film development in hangars

After dropping the hangars into the tank and banging them down several times to dislodge any air bubbles on the negatives, agitate by raising the hangars first against the left edge of the tank and rotating 90° to the left then dropping them back into the tank. Then raise them against the right wall of the tank and rotate them 90° to the right and drop back in the tank. Repeat the procedure for all agitation.

Film Processing Sequence

In the Developer, use a Thermometer to measure the temperature to use on time/temp charts to determine your film's developing time.

Pre Soak
2 minute
Constant Agitation



Developer
Time/Temp chart
Intermittent Agitation

Stop
30 Seconds
Constant Agitation

Fixer
5 minutes
Constant Agitation

Hypo Clear
5 minutes
Constant Agitation

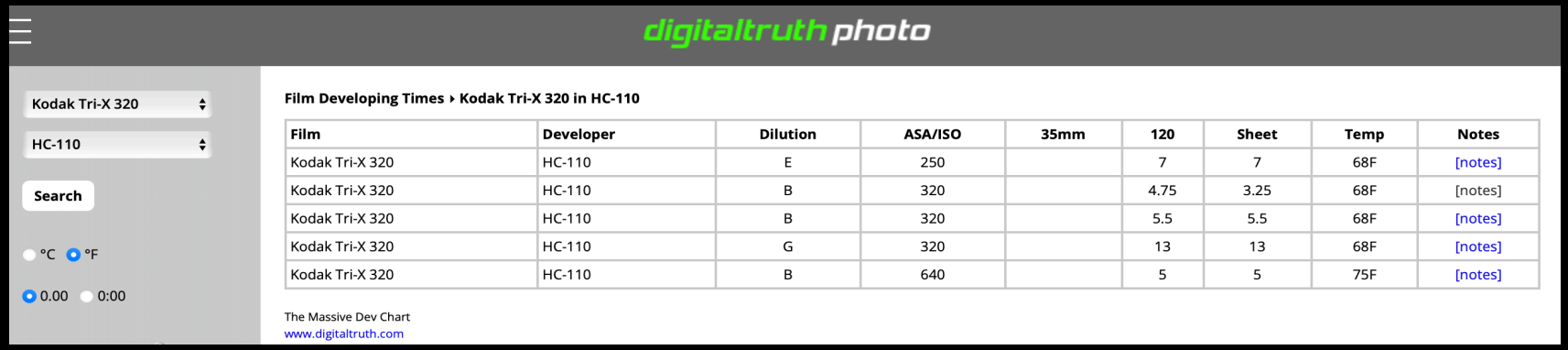
Wash
20 minutes

Wetting Agent
Photo Flow
2 minutes
Constant Agitation

Hang Film to Dry

The temperature generally recommended is *68° F*, which combines efficient chemical activity with the least softening of the emulsion. Diluting Developer increases developing times.

Film manufacturers provide a time & temperature chart using their developers to process their film. Charts such as the one by Digital Truth ("The Massive Film Chart") will include film speed along with time/temperature change information. Use Charts as a guide - modify them for best results.

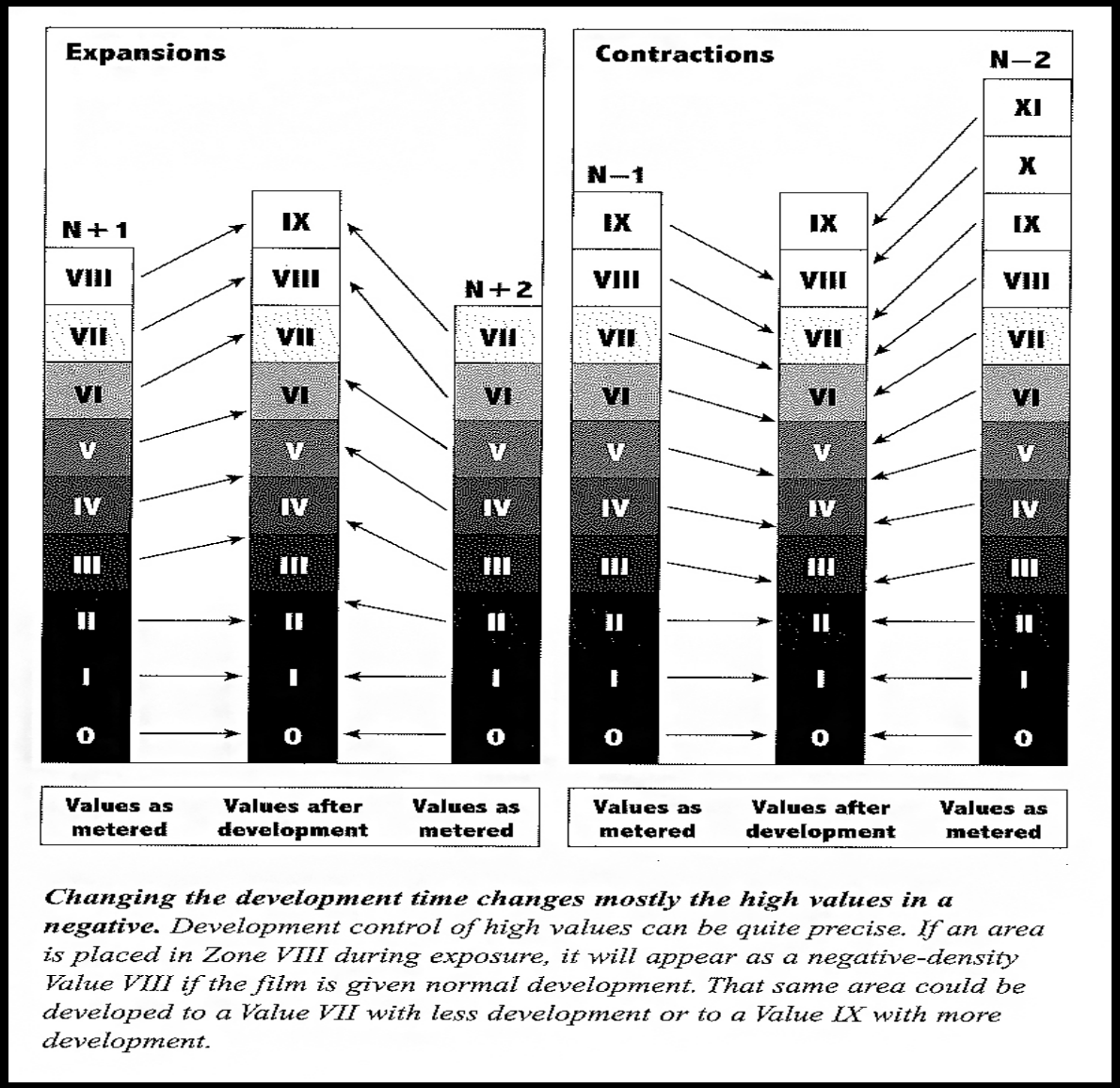


TRI-X 320 Film / 320TXP—Sheets

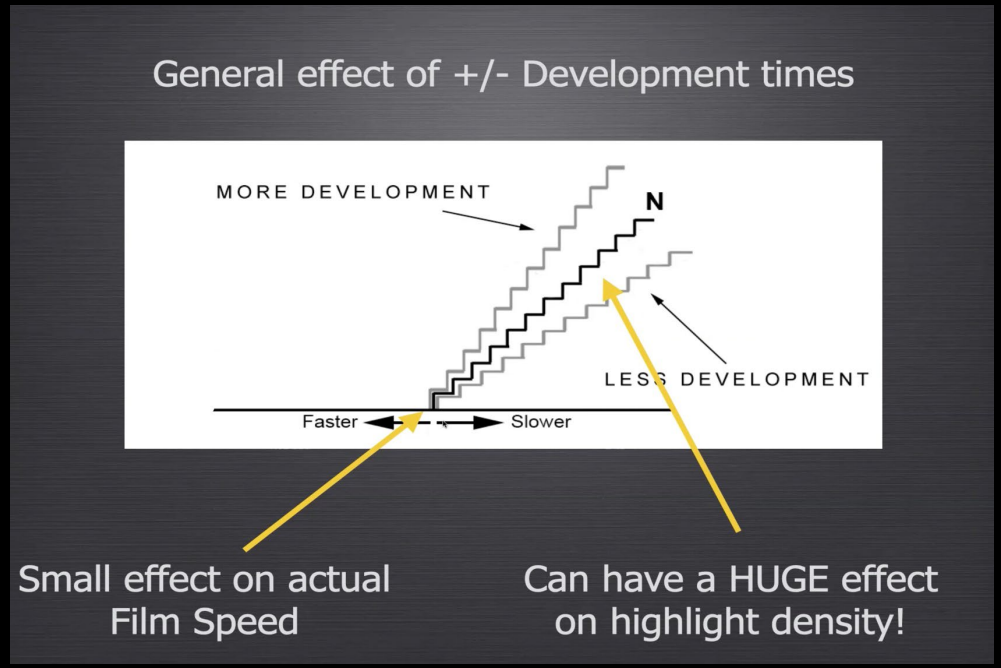
KODAK PROFESSIONAL Developer or Developer and Replenisher	Development Time (Minutes) Tray*				
	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX RS	3	2¾	2½	NR	NR
HC-110 (B)	3¾	3¼	3	2¾	2½
D-76	6 ¾	6	5½	5	4½
D-76 (1:1)	10¼	9	8½	7¾	6¾
XTOL	6¾	6	5½	5	4½
XTOL (1:1)	9½	8½	7¾	7¼	6¼
MICRODOL-X	8¾	7¾	7¼	6¾	5¾
DK-50 (1:1)	5	5	4½	4½	4

* With continuous agitation.

What is N+ (Expansion) & N- (Contraction) And What is Normal (N) Development



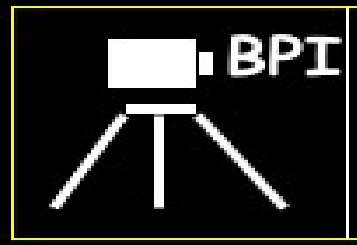
Changing the development time changes mostly the high values in a negative. *Development control of high values can be quite precise. If an area is placed in Zone VIII during exposure, it will appear as a negative-density Value VIII if the film is given normal development. That same area could be developed to a Value VII with less development or to a Value IX with more development.*



Shadow density is primarily a product of exposure not development.

Expose for the shadows.
Develop for the highlights.

The amount of development time needed for each zone to reach its proper density what is known as the NORMAL DEVELOPMENT TIME.



Explaining N Development

Spot metering the shadows and highlights of your scene will give you the contrast range

If you determine that your scene has too little contrast, you can call for N+ development

N+1 development calls for increasing development to give one stop increase in contrast. To adjust development to N+1, increase development time by approximately 15% (You can test to determine exact exposure for N+-)

If you determine the scene has too much contrast and if you place the shadows high enough on the zone scale such that the highlights fall above zone IX, you call for N- development. N-1 calls for decreasing development time such that the highlights are reduced by one stop.

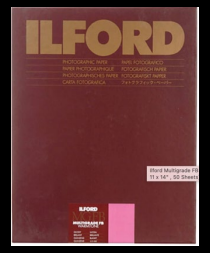
To adjust for N-1, reduce the development time by approximately 15%

The Darkroom

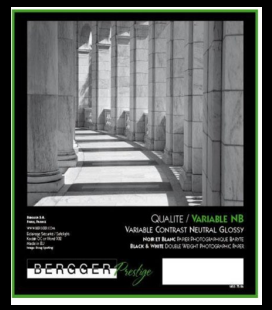
Characteristics of Selected Darkroom Enlarging **Photo Paper**

Ilford Multigrade FB Classic Glossy

- For Traditional Black & White Printing.
- Baryta-Coated Fiber Base.
- Delivers Seven Full Grades of Contrast.
- Double Weight, 255 gsm.
- Neutral Color, White Base Tint.
- Responds Well to Toning.



Available in warm-tone.



Bergger Prestige Variable NB

- A double weight photographic paper.
- A high quality emulsion.
- A white Fiber base.
- Surface is glossy.
- Neutral image tone.

Available in warm-tone.

Foma Fomatone MG Classic 131 VCFB

- Baryta-Coated Double Weight Fiber Base.
- Silver Chlorobromide Emulsion.
- Variable Contrast.
- Cream Base Color, Warm-Tone Paper.
- Slow Speed, Ideal for Contact Printing.
- Responds Well to Toning.

Available in Neutral Tone

- The word ‘baryta’ comes from the chemical compound barite – barium sulphate. This is a natural mineral, similar to clay.
- Baryta photo papers help brighten the image, giving you richer, deeper blacks and highlight detail.

BPI

Foma Paper

1st Digit - Base Type
- 1 - Double Weight
- 2 - Single Weight
- 3 - Resin Coated
- 4 - Resin Coated 110g /sq.m
- 5 - Natural

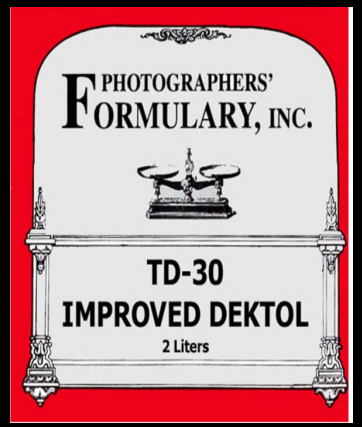
2nd Digit - Base Whitenss
- 1 - Extra White
- 2 - White
- 3 - Cream Colored
- 4 - Chamois

3rd Digit - Surface Type
- 1 - Glossy
- 2 - Matte
- 3 - Velvet
- 4 - Lustre
- 5 - Pyramid Grain

542 II Chamois is the same as the original 542 but with a sheen, and mid to low values display an olive-green cast, cooled off with careful split toning in selenium

Foma Information Courtesy of David Clough

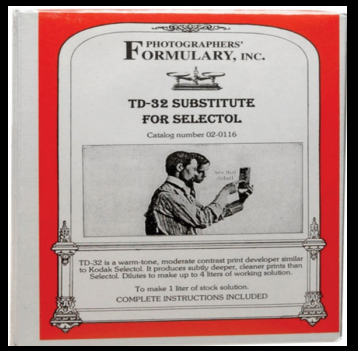
Characteristics of Selected Photographic **Paper Developer**



Dektol

- Kodak
- Photographers' Formulary

- Standard tray powder paper developer for RC and fiber-based papers.
- Produces neutral or cold tones with cold-tone papers and warm tones with warm-tone papers.
- Dilute 1:2 for working solution.



Selectol Soft

- Photographers' Formulary
- Legacy Pro

- Can be used with Dektol as Split Developer.
- Powder form.
- Classic low contrast paper developer.
- Provides Warm tones.
- Tray developer for RC and FB papers.
- Dilute 1+1 for normal use or 1+2 for softer tones.

Ilford Multigrade

- Liquid Developer.
- Neutral image tone.
- Tray developer for RC and FB papers.
- Dilute 1:9

Black-and-White Printing Papers

Cold-tone paper

Warm-tone paper

Image Tone:
Although black-and-white papers are monochrome, the color of black can vary from warm to cold. *The image color is determined by the emulsion type used, and by the tint of the paper's base.*
Silver Chloride and Silver Bromide produce neutral and cold tone Images. When combined they can produce warm-toned images, but mostly they are mixed together to make the paper faster, and neutral.

Many modern papers use both Bromide and Chloride silver salts, these papers are called ***Chlorobromide papers***.

Paper Base Tint:
The color of the paper stock can range from pure white to off-whites such as cream. Many papers contain optical brighteners to add brilliance to the highlights.

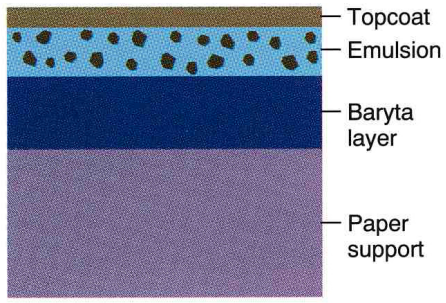
Photographic paper's ISO
Cross section of Graded and Variable Contrast Photo Paper

ISO Speed (P)
NB ISO Paper speeds are not the same as Film ISO speeds, MULTIGRADE RC papers have approximately an equivalent Film ISO of 3-6.

The speed of MULTIGRADE papers depends on the filtration used during exposure. (see table below)

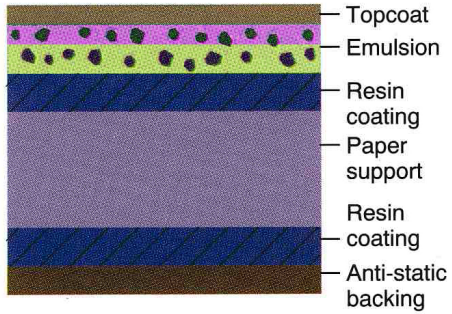
PRODUCT	FILTER							
	00	0	1	2	3	4	5	None
MULTIGRADE IV RC DELUXE	200	200	200	200	200	100	100	500
MULTIGRADE RC WARMTONE	100	100	100	100	100	50	50	200
MULTIGRADE RC COOLTONE	200	200	200	200	200	100	100	500
MULTIGRADE IV RC PORTFOLIO	200	200	200	200	200	100	100	500

Exposing light sources
MULTIGRADE RC papers are designed for use with most enlargers and printers, that is, those fitted with either a tungsten or tungsten-halogen light source. It is also suitable for use with cold cathode (cold light) light sources and LED exposing heads designed for variable contrast papers. Other cold cathode (cold light) and pulsed xenon light sources may give a reduced contrast range.



Fiber-Base Photographic Paper Structure.

Graded Photo Paper



Resin-coated (RC) Photographic Paper Structure.

Variable-Contrast Photo Papers

Black and white photo paper when used in camera is sensitive to some visible and UV light.

When using photo paper in camera as a negative or positive, use an ISO of 3-6.

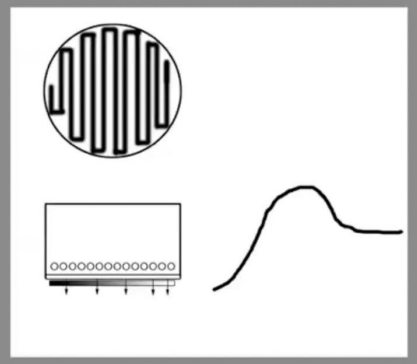
Variable-contrast papers have 2 emulsion layers - magenta and yellow, which enables the use of variable-contrast filters and filtration settings to vary the contrast of the paper.

We use this to our advantage when burning and dodging using a softer or harder filtration.

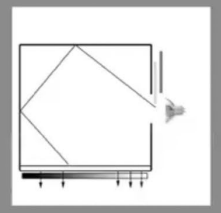
Enlarger Light Sources

Diffusion

Traditional

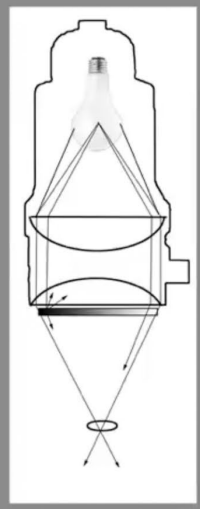


Cold Light

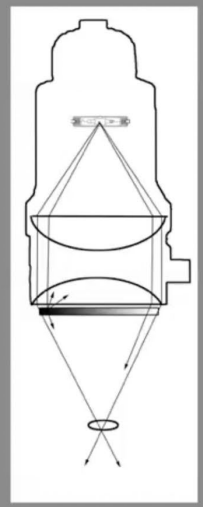


Halogen

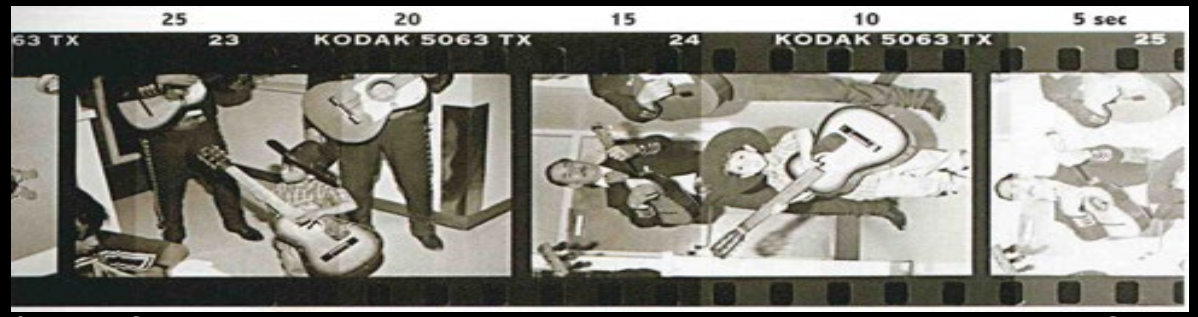
Condenser



Point-Source



Making the **Proper Proof** of your Film's Negatives



Look for the 1st black that is no blacker than the stripes that follow.

- *The Proper Proof is the real control.*
- *When your negatives make good Proper Proofs, they will be as good as they can be.*

How to Make a test strip of your negatives.

1. Set the enlarger so the cone of light completely covers the proofing glass, (See example above) using a grade 2 filter or paper (which is the middle of the contrast range of photo paper).

2. Set the timer for 3 seconds, and make test strips.

3. Examine the clear unexposed areas of the film.

4. Select the first strip that goes black.

5. *This is the time, filter, f-stop and enlarger height you should use when making your proof sheets.*

Establishing a standard exposure or proper proofing time can give you valuable information about your film's characteristics such as your film speed, accuracy of your exposures, image contrast, normal development times, expansion and contraction development times, and equipment function.

Look at your proof to gather as much information as possible (Shadows-film speed, High Values-Film development time, Composition).

TEST STRIPS For Prints

***Look for the lightest tone that has tone and texture.**

*Skies are not typical and require burning & dodging.

*Look for a time between **12 & 20 seconds.** If your exposure doesn't fall in this range, adjust f/stop and redo test.

***3 second increments** are large enough to see, and still create, a fairly subtle difference.

WHEN PRINTING:

EXPOSE for the highlights,

and

DEVELOP for the shadows.

- ***Test Strips are controlled mistakes*** that tell us what exposure produces the high values we like.
  Using 3 second increments, add an additional 3 seconds by moving the cover card one inch at a time to make 10 strips adding up to 30 seconds.

- One strip will be too light; one too dark. **In our example above, 12 seconds is the lightest tone that has tone and texture.*
  Set our timer to 12 seconds to make our first work print.

- Because of Intermittency Effect, we will use 3 second exposures to make our test strips, find the best overall time, and set our timers to this time.
  Intermittency Effect: Because of timer errors, several repeated exposures on paper do not produce the same density as one long exposure of the same time.

- *Try to keep printing times between 12 & 20 seconds. Under 12 seconds is too short for burning & dodging. Sometimes times over 20 seconds become tedious.*

Print Developing Sequence

Developer
2 minutes
Constant and
Flipping Print
Face up to Face
down Agitation

Stop Bath
1 minute
Constant
Agitation

Fixer
After 1 minute
print can be
brought into
the viewing
light
5 minutes
Constant
Agitation

Wash Aid, or
Hypo Clear Agent
5 minutes
Constant
Agitation

Holding Tray
Prints can stay until
Printing session is completed.

Wash
20 minutes or
Change tray water
every 5 minutes

Density & Contrast

- When printing, if you are aways using a higher filter, then increase your film's developing time.

- When printing, If you are always using a lower filter, then decrease your developing time.

Prints are judged- and adjusted-for density & contrast

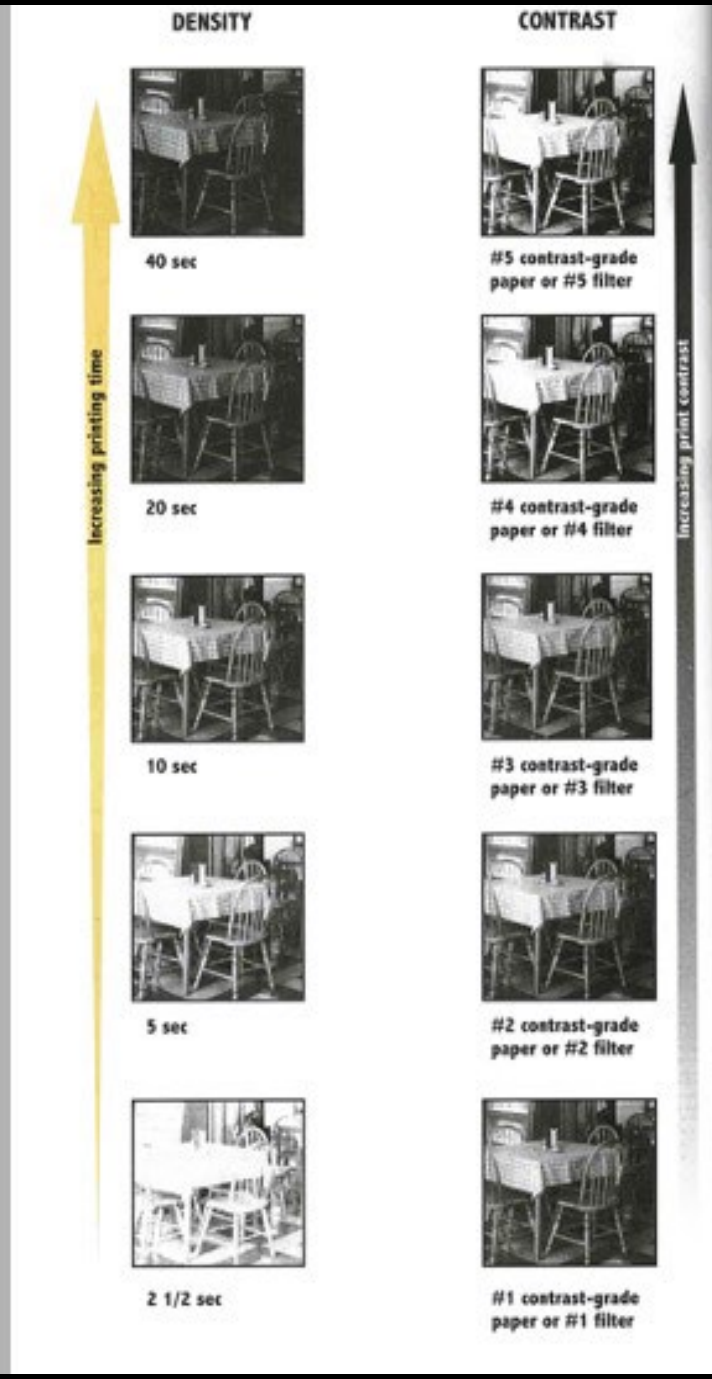
Expose for the Highlights - Develop for the Shadows.

1. Choose an ***exposure time*** that shows detail and tone in the **high values**.

then

2. Make a full print at this exposure time.

then



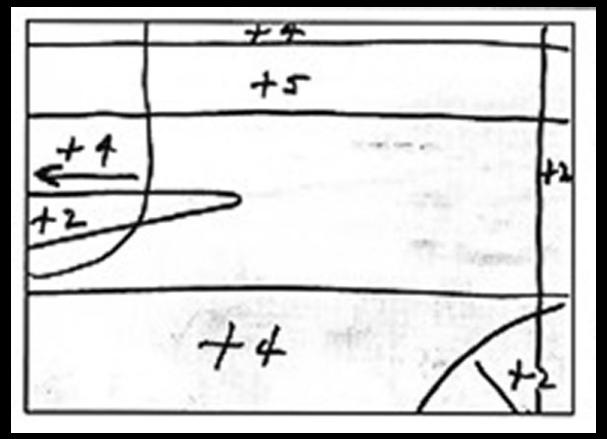
3. Judge ***contrast*** in the **Low values**.

- ***Look at the darkest tones.***

- *If they are uniformly black and show no signs of texture where texture exists in the negative, then* ***the contrast is too high****. Remake the print on using a lower contrast filter.*

- *If, on the other hand, the whites in the print are satisfactory but the dark areas are a dark gray rather than a black, the* ***the contrast is too low****. Remake the print using a higher contrast filter.*

Print Recipe
Print Notes

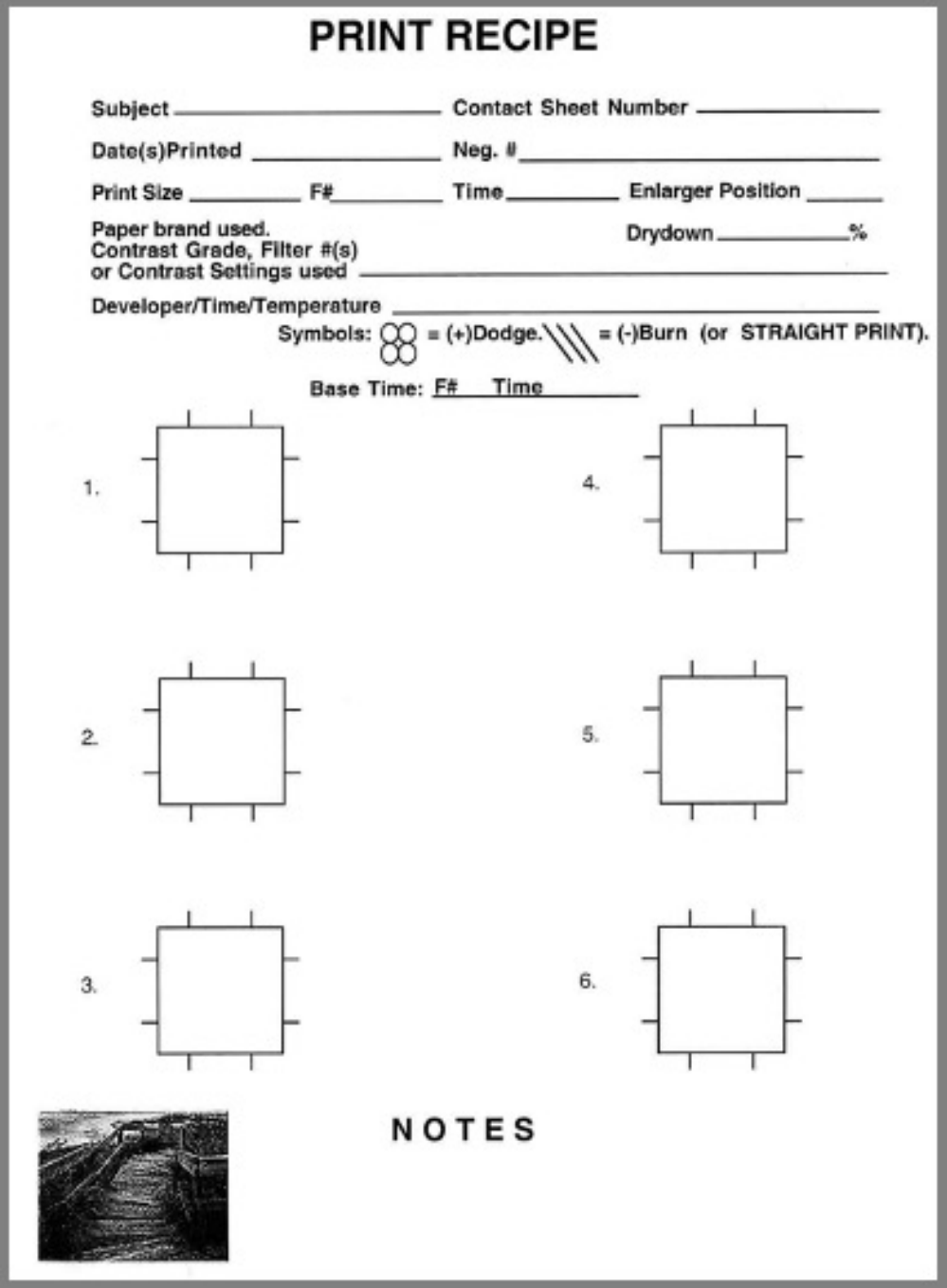


Reprints will be easier if you make notes of what you did.

A sketch of the print records how much to dodge or burn each part of the image.

Use this information to make print puzzles to layer on top of your work print.

A Print Recipe will keep track of printing decisions.



PRINT RECIPE

Subject _____ Contact Sheet Number _____

Date(s)Printed _____ Neg. # _____

Print Size _____ F# _____ Time _____ Enlarger Position _____

Paper brand used.
Contrast Grade, Filter #(s)
or Contrast Settings used _____ Drydown _____%

Developer/Time/Temperature _____

Symbols: ○○ = (+)Dodge. \\\ = (-)Burn (or STRAIGHT PRINT).

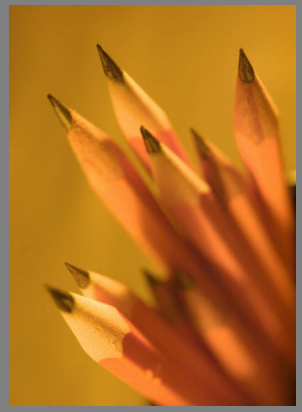
Base Time: F# Time _____

1. 4.

2. 5.

3. 6.

NOTES

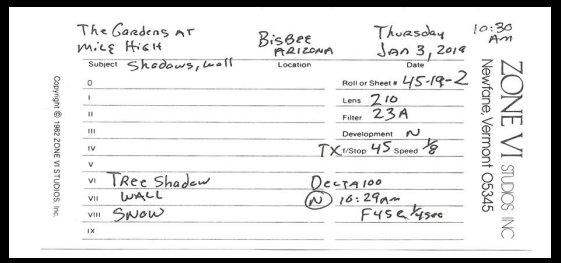


Always use a **#2 Pencil** to write printing information (f/stop, exposure time, and printing filter used) on the back of your **test strips** and **Work Prints**. *Write relevant information on the back of work prints.*

DO NOT WRITE ON THE BACK OF YOUR FINAL PRINTS! Bleed through will occur during Mounting Print.

Examples of Notes:

- Field Notes
- Darkroom Printing Notes – Sketches
- Print Recipe
- Resulting Print

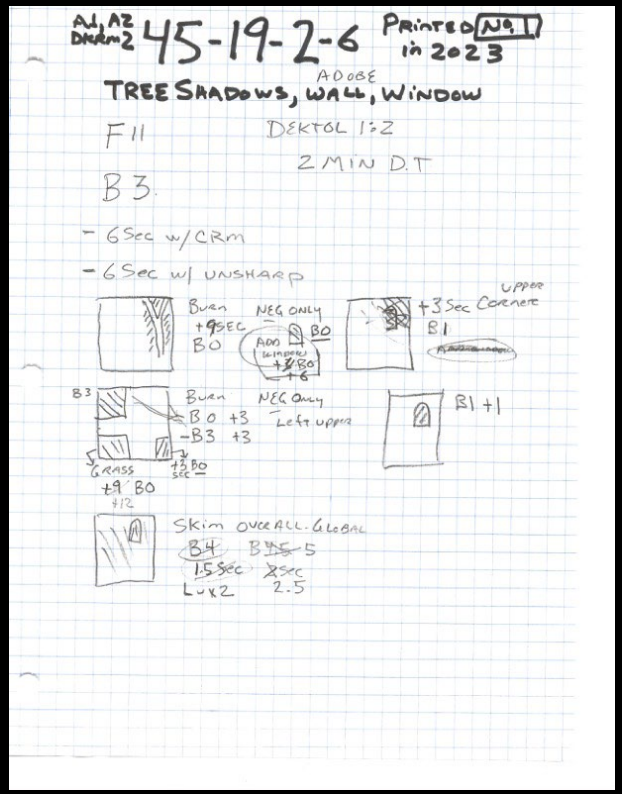


Field Notes

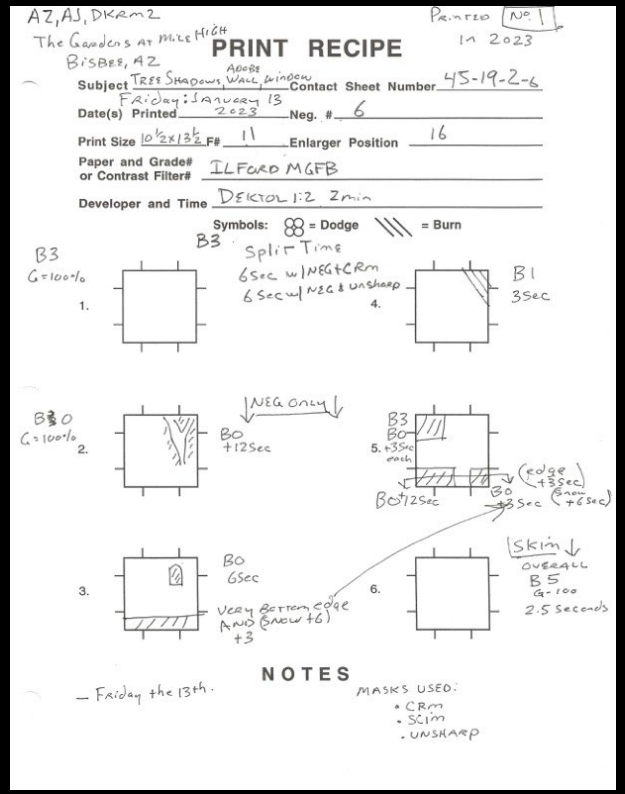
Side Notes:

My cell phone is used to:

- Record field notes.
- Make a photo of the scene photographed for GPS information.
- Make sketch images.



Darkroom Print Notes



Darkroom Print Recipe

Tree Shadows, Wall; Resulting Print

Selenium Toning

- Selenium is often used in B&W printing to give permanence to prints
  - It converts image silver into silver selenide
- Additionally, selenium increases black tones, i.e. Dmax
- Characteristically, selenium initially attacks shadow areas and eventually mid tones and highlights if left for longer period
- Mixed in higher concentrations, selenium changes the tone or color of prints
  - Strong: (For Color Change) 250 ml Selenium _ 250 ml H20
  - Weak: 1:19
- Typically, mixing at ratio of 1/19 with water will give results without color change.
  - Should be preceded by hypo clearing bath after fixing and the same bath subsequent to toning, followed by a final water bath
- Cold tone papers don't tend to change tone with selenium, whereas warm tone papers do

Selenium Toning of **Prints**

- *Permanence aspect of toning occurs during the first minute. Color change in 3 to 5 minutes.*

Water
Holding Tray

Plain Hypo
3-5 minutes
Constant Agitation

Selenium Toner
1 1/2oz selenium
to ½ gallon of water.
5 minutes
Constant Agitation

Hypo Clear
5 minutes
Constant Agitation

Rinse

Final Wash
30 minutes or several changes of water in a holding tray

- After Final wash place the print one by one on the back of a clean tray, or a plexiglass sheet. Swab the prints off front and back with a sopping wet clean sponge. Place prints face down onto drying screens.

Side Notes:

- Selenium turns brown when exhausted. Pour selenium into fixer to discard.
- Hypo Clear is used to prevent Yellow staining by residual fixer.

Selenium Toning of Negatives

- *Selenium Toning of your negatives will give you approximately 1 stop additional density and contrast.*

Water
Holding Tray

Plain Hypo
3-5 minutes
Constant Agitation

Selenium Toner
1oz selenium
to 3 oz of water.
5 minutes
Constant Agitation

Hypo Clear
5 minutes
Constant Agitation

Rinse

Final Wash
20 minutes or several changes of water in a holding tray

Wipe sheet film off with sopping wet sponge front and back and place in Photo Flo/wetting agent.
2 minutes
Constant Agitation

- Hang sheet film by clipping at the corner where the notches are. That's where the sky is and best to drain toward the foreground area.


DARKROOM GUIDES
WITH RACHEL BREWSTER-WRIGHT
EPISODE 2.
SELENIUM TONER
ILFORD PHOTO

Photo Finishing

Thoughts about Photo Finishing

- Mounting and Spotting gives you a chance to be in solitary study with your photography.
- Being with your work gives you the time to explore, evaluate, and allows the time for your photography to speak to you.
- As you spend time with your photograph use this time to help you with self-critique, discovery, and adding possible ideas into your repertoire.
- Discovering potential ideas may add a wonderful technique to the habitual processes you currently use.
- Spending time with your work only enhances your photographic knowledge, experiential options, possibilities, and ideas for you to use and explore with your camera, and in the darkroom.

Mounting & Matting Your Photograph for Framing and Presentation

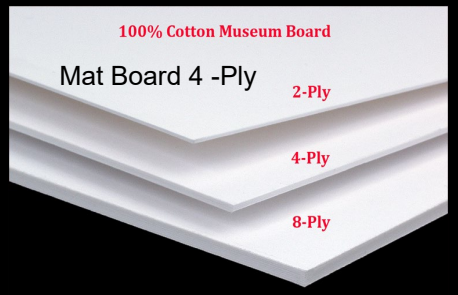
Supplies and Equipment needed:

Your Photograph to Mount & Mat

White Gloves

Series 7 Spotting Brushes

Tacking Iron



Acid-Free mat boards in various thicknesses

Pencil & Ruler

Release Paper

Seal Hot Press

Logan Mat Cutter

Print Finished: Window Matted and Framed

Make your vision your goal.


It is good to have an end to journey toward; but it is the journey that matters, in the end.
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