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CHAPTER FOUR

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The F/Stop Method of Printing and Basic Exposure

Every technique or method of photographic printing I have ever seen uses units of time to designate print exposure. The print will be shown to have been given a 'basic' exposure time of, for example, '10 seconds'. Areas that have had to be given more or less exposure are also assigned a time such as +2 seconds to 'burn-in' the hands and face, +10 seconds for the background, and, say, −5 seconds to hold back or 'dodge' the shadow areas.

Where the picture is printed to a specific enlargement, using specific paper, specific lens aperture, specific intensity of the enlarger lamp, a specific enlarger, a specific developer, then and only then do these specific times apply.

But what happens to these exposure times if there is any change to any one of these and many more variables?

What if that picture is nothing like yours? How would those specific times apply to your work? What have you learned about printing?

The same confusion would exist if a photographer changed the exposure by designating the change in units of time. Suppose, for example, he changed the exposure to 1/250 of a second. What would be the actual change in photographic exposure?

To answer, some information about his previous exposure time would be required. If it were 1/500 to begin with, he would be increasing the EXPOSURE (as opposed to 'exposure time') by +1 f/stop. But had his earlier exposure time been 1/30 – this change to 1/250 would mean reducing the EXPOSURE −3 f/stops.

If you have not skipped reading Chapter Two on photographic exposure you will have come to some basic understanding of how photographers designate exposure. It is NOT in units of time! Photographic 'exposure' can only be designated in *relative* values of 'f/stops'. 'Exposure time' is only a measure of duration. Time, I must stress, is NOT a unit of photographic exposure.

THE F/STOP IS THE UNIT OF PHOTOGRAPHIC EXPOSURE.

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When we take pictures we readily refer to exposure in 'f/stops'. Changes to the exposure are usually made by adjusting the lens aperture. Rarely do we fiddle with the shutter or exposure-time setting.

So why did we start using units of time to express print exposure? How did we come to accept the arbitrary values of time to designate exposure? Simply for the convenience!

In the darkroom the controls available for adjusting the exposure, like those on the camera, are the lens aperture and the exposure time. But in a darkroom environment it is easier to adjust the exposure time than it is to adjust the enlarging lens aperture. This is why exposure has been referred to in terms of 'add on a couple of seconds'.

The F/Stop Method of Printing uses time as well, but only to measure duration of exposure. The system is similar to taking pictures: the exposure changes are designated in f/stops, but instead of changing the aperture the equivalent exposure time is used.

The F/Stop Method of Printing uses a fixed set of exposure times that represent increments of photographic exposure.

THEORY AND BACKGROUND

Notice the exposure times on the shutter speed control on your camera: 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, 1/15, 1/8, 1/4, 1/2, 1, 2, 4, 8 seconds.

These shutter speeds, or exposure times, represent values of exposure equal to individual aperture changes of (+) or (−) one photographic unit f/stop.

By adjusting the shutter speed you can effect changes in exposure, as if the lens aperture had been used. With the aperture fixed, changing the exposure time from 1/60 to 1/30 would be equal to increasing the aperture lens +1 f/stop. On the other hand, changing the exposure time to 1/125 would reduce the exposure −1 f/stop.

DOUBLING THE EXPOSURE TIME INCREASES EXPOSURE +1 F/STOP; HALVING THE TIME REDUCES IT −1 F/STOP.

This basic relationship is used to provide a set of exposure times for printing.

Containers of compressed air for blowing dust off negatives. Keep the container upright when using, otherwise the liquid will spray out.

If we start with an exposure time of 5 seconds and progressively double it the times are: 5, 10, 20, 40, 80 and 160 seconds. These individual exposure times represent intervals of whole f/stops. But these whole-unit intervals of exposure for printing are too great an exposure increment. Finer adjustments are needed.

On the camera, because the shutter speeds are fixed, fractional adjustments to exposure are made using the aperture.

In the darkroom, to effect finer changes of exposure when printing, smaller intervals of exposure time are needed. The progressions of 5, 10, 20, 40, 80, 160, can be subdivided into intermediate values of ¼ f/stop intervals for the F/Stop Method of Printing:
5, 5.9, 7.1, 8.4, *10*, 11.9, 14.1 16.8, *20*, 23.8, 28.3, 33.6, *40*, 47.6, 56.6, 67.3, *80*, 95.2, 113.2, 134.6, *160*.

(How these values are derived is explained in Chapter Twelve.)

For convenience these exposure times are presented in the following table form:

F/STOP EXPOSURE TIME

5	10	20	40	80
5.9	11.9	23.8	47.6	95.2
7.1	14.1	28.3	56.6	113.2
8.4	16.8	33.6	67.3	134.6

These individual exposure times are comparable to the shutter speeds on the camera: 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, etc. The print exposure times, however, represent the exposures in ¼ f/stop increments. Thus +¼ f/stop more than 10 seconds, for example, is 11.9 seconds; whilst −½ f/stop less than 20 is 14.1.

Using these fixed values avoids the confusion of just guessing how much more, or less, time to use. To add on, say, 2 seconds, may or may not make any difference to the initial exposure. If the exposure time had been 2 seconds to start with, adding 2 seconds more is a +1 f/stop increase and would show an appreciable change to the print. But the same 2 seconds added on to 40 seconds would do very little. Think, as well, of the results of reducing the exposure by 2 seconds in each of these examples!

DETERMINING THE BASIC EXPOSURE TIME FOR A PRINT

The basic exposure is the one single, overall exposure that provides the best possible print without any 'dodging' or 'burning-in' exposure modifications.

The following instructions and information are to guide you through the process of determining this exposure:

1. Prepare the DEVELOPER, STOP and FIX solutions as recommended by the chemical manufacturer.

The commercially-available chemicals are all I use – I have no magic brew. Kodak, Ilford, Agfa, and those others who manufacture photographic materials know more about chemicals than all of us put together! Mix your own chemicals if you must for economic reasons.

2. Clean the negative with brush and/or compressed air.

Check to see if any dust is still clinging to the film by holding it under the enlarger with the lamp on and holding it at an angle to the light. I refer to dust spots on the print as 'white grain'.

Fingerprints or other marks on the *non-emulsion* side of the negative that cannot be removed with either brush or compressed air need a bit more effort. My technique is to breathe on the non-emulsion side so as to leave a thin film of vapour. I then place this on a clean sheet of paper or negative bag and using a clean handkerchief or tissue paper immediately wipe the vapour off. This should rid the film of the marks as well. Failing this I use a bit of 'nose grease'. Rub the side of your nose with your forefinger. This natural oil is then rubbed on the offending marks and usually eliminates the problem. The oil is removed by breathing on the film and wiping it off. I use this natural oil as well to help eliminate scratches on the negative. Gently rub the oil in the direction of the scratches.

3. Place the negative in the carrier and ensure that the film is firmly held around its edges. Any side of the negative not held in place will be difficult, if not impossible, to focus.

4. Switch on the enlarger lamp, open up the lens to its widest aperture, size-up and focus the image. The enlargement size is entirely up to you. The F/Stop Method of Printing takes into account all the variables in printing. There is no need to specify the enlargement, intensity of light, focal length of lens, temperature of solutions, paper speed, and all the other variables in individual darkrooms.

5. Use a grain focuser to focus the film grain. The use of a blue filter will enable focusing for the sharpest image as explained in Chapter 1: Grain Focuser.

6. 'Stop down' the enlarging lens. The main purpose of this is to control the intensity of light, but it also provides *depth of focus*. Stopping down creates the depth of focus on the negative film plane to allow for any curvature or buckling of the film. I usually stop down 2 f/stops.

If you use glassless negative carriers allow sufficient time for the enlarger lamp to heat up and 'pop' the negative in position. The negative will remain stable in this position as long as the lamp is on. If you focus and then turn off the lamp for any appreciable length of time, the lamp head will cool and the chances are the negative will 'pop' back out of focus. This will produce an out-of-focus print irrespective of its having been pre-focused.

To minimize the heat loss between the time you finish focusing and actually start the exposure, leave the lamp on and use the red safe filter directly under the lens. Just before you make the exposure turn off the lamp, swing the red filter away, then start the exposure.

If you do not use a darkroom timer with the facility to switch the enlarger on and off, I would suggest using the safe filter as the on/off 'switch'. Leave the lamp on and swing the filter away to start, then swing it back to stop exposure.

7. Place a sheet of photographic paper in the easel. The emulsion side of the negative faces the emulsion side of the paper. Think 'emulsion to emulsion' if confused about which side of the negative to expose through or which side of the paper to expose on.

The contrast grade of paper will depend on your negative. I suggest that you use the normal grade 2 to begin with. The only way to learn which grade to use is to make a print. If the result appears 'flat' use a harder grade. If the range of tones is too 'hard' use a softer grade. The correct contrast grade will come with experience.

EXPOSING THE TEST STRIP

It is important that you should adhere to the following instructions exactly. It is surprising how many people do not make a proper test strip.

1. Expose the entire sheet of paper first for 5 seconds. Now *cover* ¼ of the paper with a large piece of card and expose for a further 5 seconds. Now move the card and *cover* ½ the paper area and expose for 10 seconds. Finally *cover* ¾ of the paper and expose this last bit for 20 seconds. The paper will now have been exposed for 5, 10, 20 and 40 seconds. These are exposure test strips in f/stop intervals!

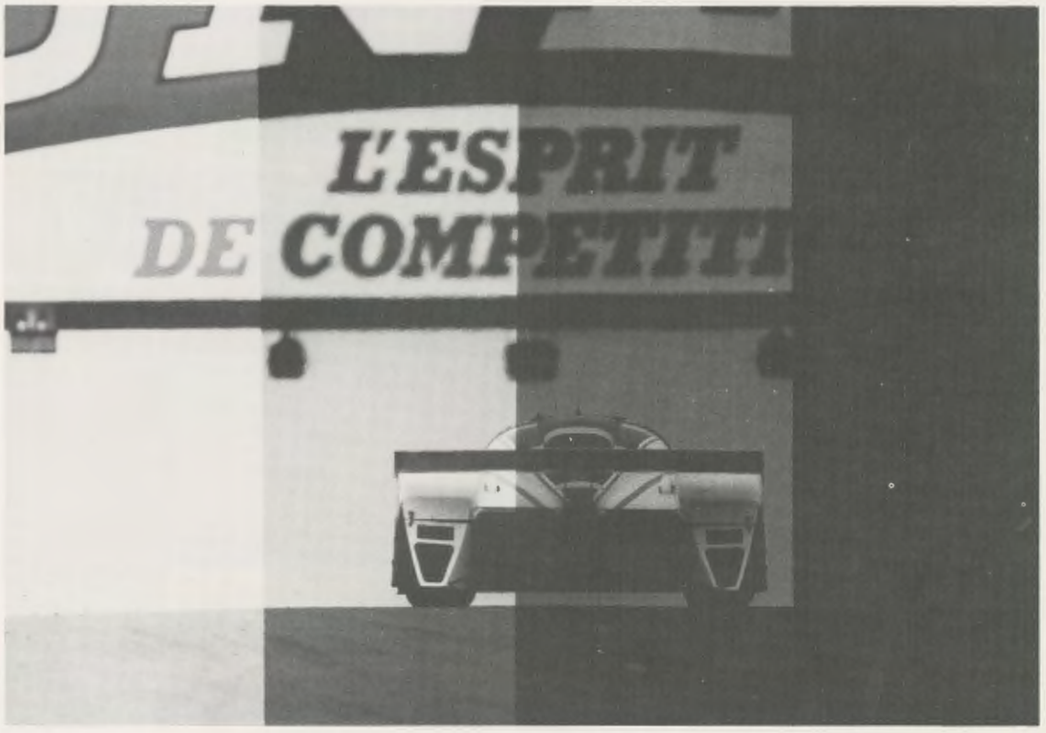
2. Process the exposed sheet for the manufacturers' recommended time. 'Stop' and 'fix' the print. Stop the print from developing further by placing it in a tray of weak acetic acid solution. Use of a stop bath will help prevent the print from staining. Years ago I used only a tray of running water, thinking that a stop bath was unnecessary. It was only after many stained prints that I realized the value of using a stop bath. The direct interaction of developer and fixer causes the discolouration of the print.

Make sure that the print is agitated in the tray of fixer. Do not just leave it resting in the solution. Agitation in the fixer is just as important as agitation in the developer. The idea is to provide a fresh flow of fixer solution over the print to remove the unexposed silver halides. Follow the manufacturers' recommended time for fixing, and the working capacity of the solution. Do not prolong the fixing time as this will tend to bleach the image. The print, as well, will absorb more of the chemicals and require a longer washing time.

Now examine the results in normal viewing light. This print should show a range of exposure strips spanning a range of 4 f/stops.

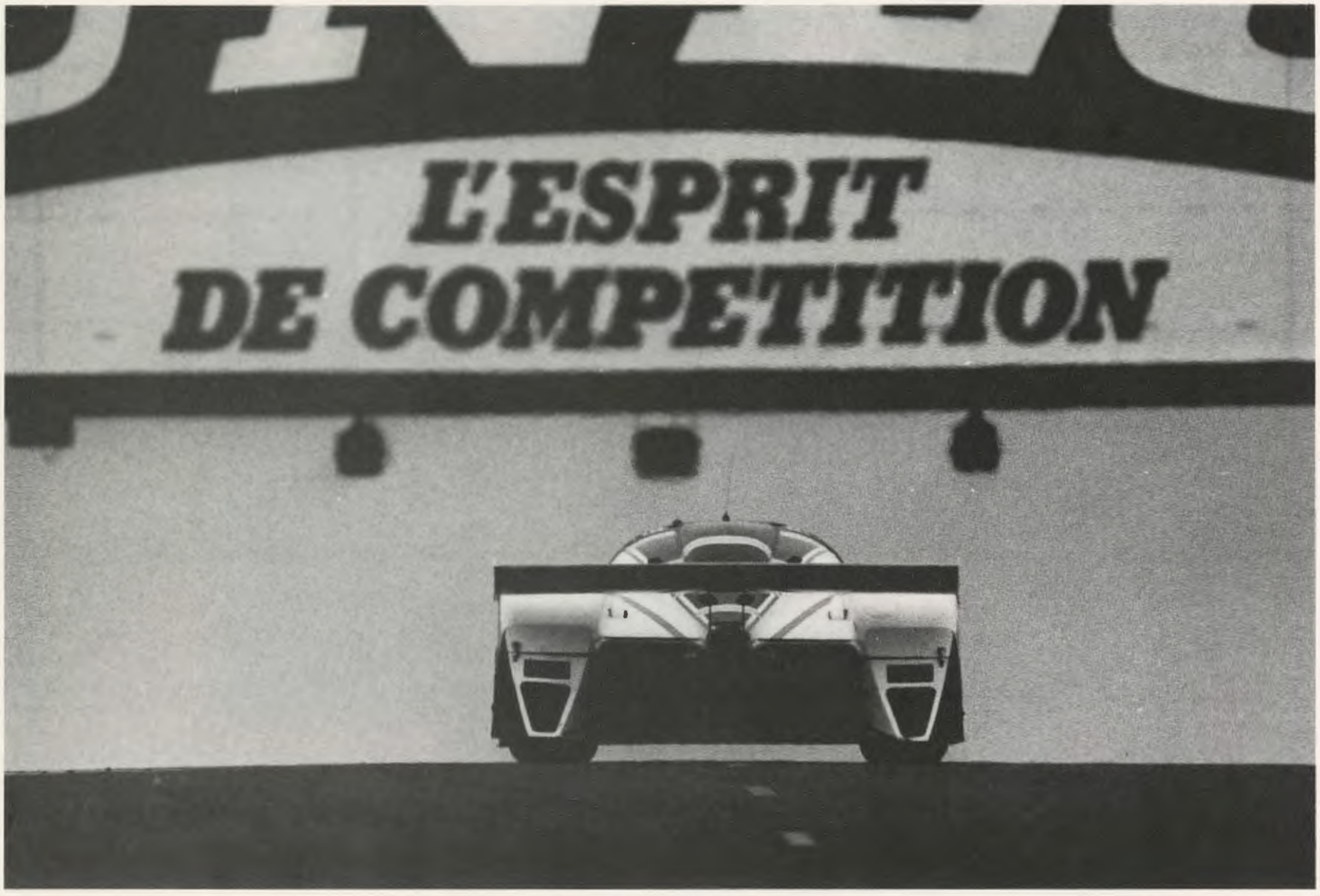
If the image is very faint or if the result is much too dark 'open up' or 'stop down' the enlarging lens accordingly 2 aperture f/stops and make another set of 5, 10, 20, 40 seconds exposure strips.

One very important point: keep the developing time constant. Normal room temperature should maintain a constant temperature of the chemical solutions. In a later chapter I will describe how, to a certain extent, you can control the contrast of the print by adjusting the development time.



A test strip with exposures of 5, 10, 20, and 40 seconds. The exposure strips are at intervals of 1 f/stop. Remember to COVER, not uncover the image while making the exposures, otherwise you will have exposure strips of 40, 35, 30 and 20 seconds, which are not in f/stop increments so the result will serve no purpose.

The 10-second exposure is too light, the 20-second exposure too dark. Using the F/STOP EXPOSURE TIME Table the exposure time between these two values is 14.1 seconds.



The exposure made for 14.1 seconds. It is just too dark for my liking. – ¼ f/stop less might prove better (an exposure time of 11.9 seconds).

The print exposed for 11.0 seconds. No dodging or burning-in is necessary.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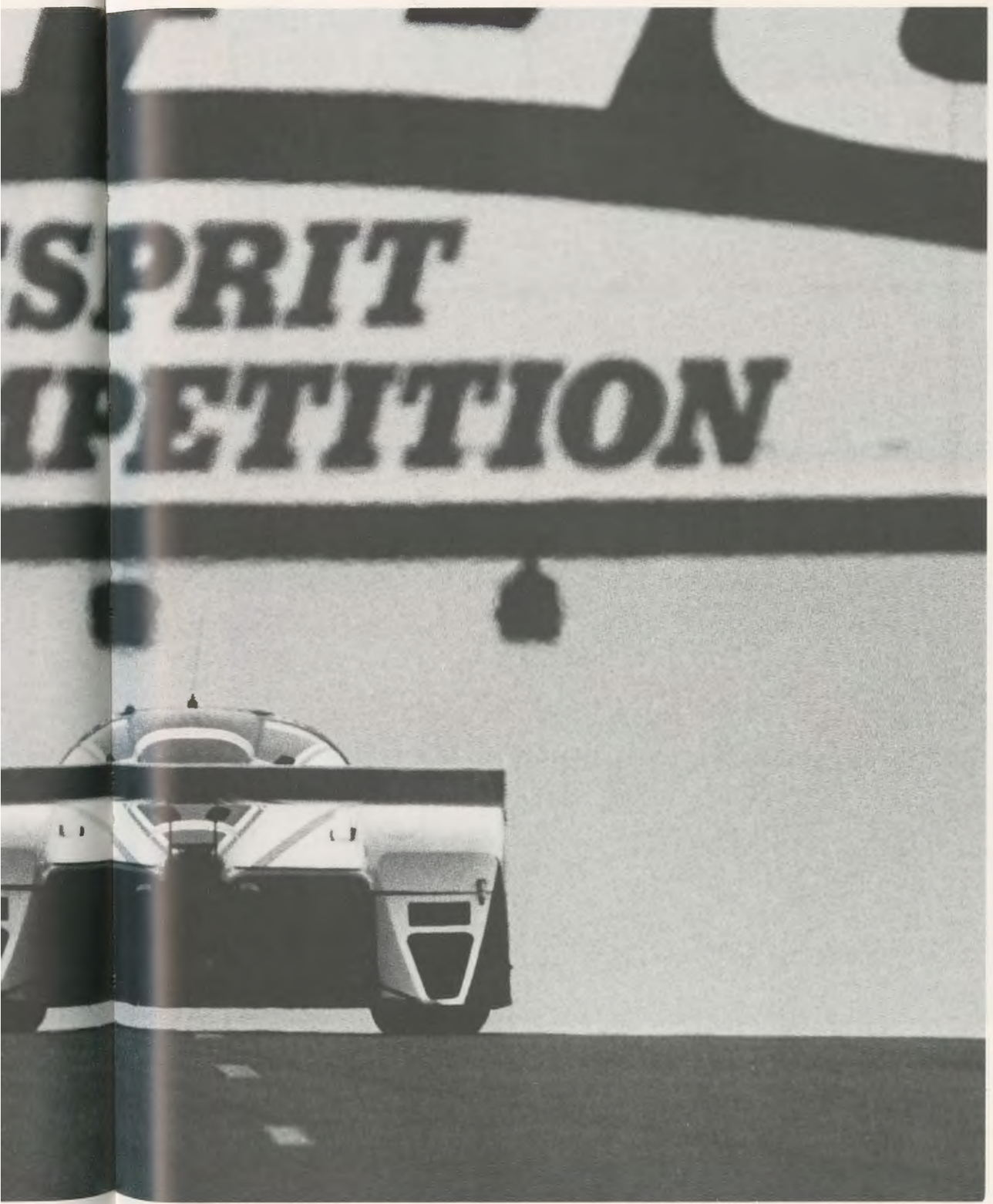

Spirit of Competition Malcolm Bryan.

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THE BASIC EXPOSURE

F/STOP	EXPOSURE TIME			
5	10	20	40	80
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1. Choose what appears to be the best exposure from the test strips. If it looks as if it is a value in-between the strips use the F/STOP EXPOSURE TIME Table to find the intermediate exposure time. If, for instance, the exposure is somewhere between the 10 and 20 seconds then use the exposure time in-between. This is 14.1 seconds. Expose and process the print. Remember to process it for the same time as the test strips.
2. Examine the print. If it needs further refinement refer again to the F/STOP EXPOSURE TIME Table. If it needs to be lighter simply use the time which represents a value of exposure $-\frac{1}{4}$ f/stop less than that previously tried. If it needs to be darker use the exposure representing $+\frac{1}{4}$ f/stop more.

How will you know if the BASIC EXPOSURE print is right?

Photography is the study of light. The print, for me, must have this study, this feeling of light. There had to be light to take the picture. The print should thus reflect the existence of light.

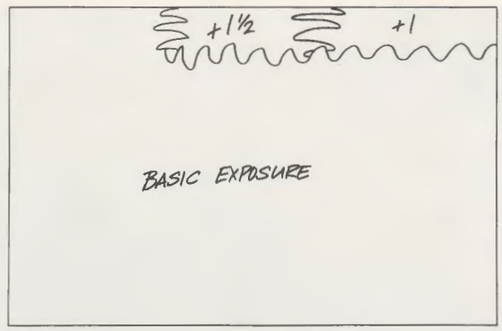
Finally. The F/Stop Method requires strict discipline. The method may seem objective, perhaps lacking artistic temperament and flair, but the discipline it stresses is very much a part of any artistic endeavour. Creativity is a conscious effort.

This set of test strips proved to be too dark. The detail in the shadow, if there is any, cannot be seen.

The lens was stopped down to produce this series of test strips. The last two exposures here represent the first two exposures of the first test strip. The detail that can be seen in the boys lends nothing to the picture overall, so I decided to use the third strip as my basic exposure. This would have been 20 seconds, but to reduce the exposure time I *opened up* the enlarger lens 2 f/stops, back to the original setting, thereby reducing the basic exposure time to 5 seconds.

The basic exposure print, exposed for 5 seconds. The sky appears too light and to me is distracting.

Here the right side of the sky has been burned-in + 1 f/stop (10 seconds) and blended in the centre for + 1 ½ f/stops (14.1 seconds). Notice, however, that the horizon is not level.



Final printing template.

Boys on the Beach Linda McCartney.