



Photo © Tom Jimison

ILFORD MULTIGRADE PAPERS

A Manual For The Darkroom



CONTENTS



The Evolution of MULTIGRADE _____	2
One Negative: Twelve Grades _____	4
Choosing Print Materials _____	6
Equipment and MULTIGRADE Filter Sets _____	8
Darkroom Set-Up _____	10
The Negative and Contact Print _____	12
Exposure Testing _____	14
Contrast Testing _____	16
Basic Dodging and Burning _____	18
Controlling Print Tones _____	20
Making a Final Print _____	22
Tray Processing _____	24
Multiple Contrast Printing _____	28
Pre-Flashing the Paper _____	30
Printing from Color Negatives _____	32
Combination Printing _____	34
Paper Negatives _____	36
Creating Black Borders _____	38
Toning _____	40
Retouching MULTIGRADE Paper _____	46
Print Finishing _____	48

THE EVOLUTION OF MULTIGRADE

Variable contrast papers owe their existence to the curiosity and ingenuity of Frank Forster Renwick (1877–1943). Renwick was scientific director at ILFORD in 1936, and was testing an experimental paper coating; the emulsion incorporated traces of dye to extend its sensitivity to colors of light other than blue. He was puzzled by its peculiar behavior, and it occurred to him that perhaps only part of the emulsion had developed a sensitivity to green light. The remainder, he reasoned, had only its natural sensitivity, to blue.

Renwick's staff made up two different emulsions: one with sensitizing dyes, which could be exposed by either blue or green light; and one without, which was blue-sensitive. After mixing and coating the two emulsions, Renwick tried exposing them to light of complementary colors—yellow and magenta. To his delight, he found that he could expose each emulsion individually.

Renwick's idea is still the basis of today's MULTIGRADE papers, though countless hours of research were required to produce a commercial product. It's hard to improve on Renwick's own description of this first MULTIGRADE paper, when he introduced it at a very crowded meeting of the Royal Photographic Society in May 1940:

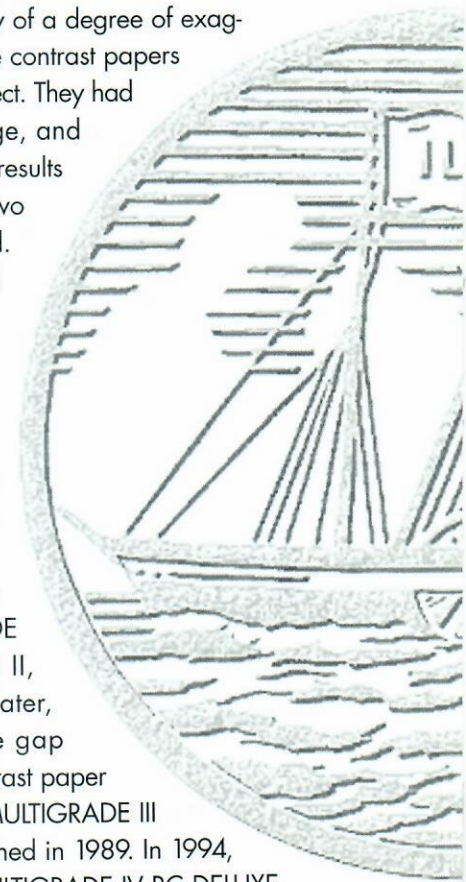
"That portion which is sensitized to blue-green light is of a very contrasty character, equaling in this quality the ultra-contrasty grades of bromide paper, while the unsensitized portion is rather softer in gradation than a "soft" grade of bromide paper."

Renwick went on to describe his paper as having the "magic quality" of changing its contrast to suit the requirements of the negative. He painted a picture of a darkroom that required just one box of paper, and a stack of colored filters, instead of four or five boxes of paper in different grades.

Renwick's speech was an excellent description of the MULTIGRADE system, though modern ILFORD MULTIGRADE papers work in a slightly different way. They actually have three emulsions, each sensitive to both blue and blue-green light. All three have the same speed when exposed to blue light; but blue-green sensitivity varies between the emulsions. Blue light exposes all three emulsions equally, raising the contrast, blue-green light, on the other hand, builds density more gradually in some emulsions than in others, so contrast is lower.

Renwick was also guilty of a degree of exaggeration. Early variable contrast papers were by no means perfect. They had a limited contrast range, and produced rather weak results when only one of the two emulsions was exposed. Most printers who used the first MULTIGRADE kept boxes of grades 0 and 4 for problem negatives.

ILFORD went some way towards correcting this problem with the introduction in 1978 of an improved MULTIGRADE paper. MULTIGRADE II, launched four years later, further narrowed the gap between variable contrast paper and graded papers. MULTIGRADE III RC DELUXE was launched in 1989. In 1994, ILFORD introduced MULTIGRADE IV RC DELUXE which finally provided photographers with a variable contrast paper that was a true substitute for graded papers.




THE MULTIGRADE SYSTEM TODAY

With the introduction of MULTIGRADE IV RC DELUXE, ILFORD has perfected variable contrast paper. This new generation of material is in every respect an appropriate and effective replacement for graded paper, and is in many ways superior to it. Contrast grades are evenly spaced, and correspond with more precision than ever before to the contrasts of graded papers. The MULTIGRADE family has grown to include a full line of paper:

- MULTIGRADE IV RC DELUXE
- MULTIGRADE IV RC PORTFOLIO
- MULTIGRADE IV FB
- MULTIGRADE FB WARMTONE
- MULTIGRADE RC WARMTONE

There is a MULTIGRADE paper for everyone's taste in photography.



Print densities are easily as good as those of the best graded papers—and better than many. Highlights are exceptionally detailed, brilliant and clean, and shadows remain a rich, deep black right through the contrast range.

Softer Highlights

Perhaps the most noticeable improvement to current MULTIGRADE papers is in highlight rendition. Discriminating printers had in the past complained that burning in highlight areas with any variable contrast paper was slow, and produced contrasty detail, even when using a low-numbered filter. ILFORD has solved this problem by inventing a radically new component of the print emulsion which builds highlight density in a novel way. This part of the emulsion now has a steep curve when exposed to blue light, but a more gentle curve when the enlarger light contains mostly blue-green.

In practical terms, the most noticeable difference when switching to MULTIGRADE papers is that all negatives seem slightly easier to print and require less burning in. The differences are especially marked with negatives that have flat shadows and contrasty highlights—such as a sunlit scene that has important detail in both sunny and shady areas. Multiple contrast printing is now a much more effective tool than before: by printing the shadows with a magenta filter and the highlights with a yellow filter, as explained on page 28, you'll get print quality that is virtually impossible to match on other papers.

OPTICAL BRIGHTENERS

In other paper characteristics, ILFORD continues to make progressive improvements to the MULTIGRADE system. The optical brighteners that give MULTIGRADE papers their brilliant, sparkling whites stay exactly where they are needed—in the highlight areas of the print. All MULTIGRADE papers, except MULTIGRADE FB WARMTONE, have anchored optical brighteners which means they won't wash out and the paper stays white. With MULTIGRADE FB WARMTONE, the brighteners can be removed with extended washing for an even warmer base tint.

SAFELIGHTS

Safelight requirements for MULTIGRADE papers are exactly the same as for other ILFORD papers, i.e. ILFORD 902 or Kodak OC. This means that, when switching from a graded paper to MULTIGRADE, you probably won't need to change your safelight. Older yellow or red safelight filters and those designed only for graded paper such as Kodak OA and OB safelights will need to be replaced. Whatever the color of your safelight, it is advisable to carry out the safelight test on page 10 to confirm the lamp is not too close to the paper.

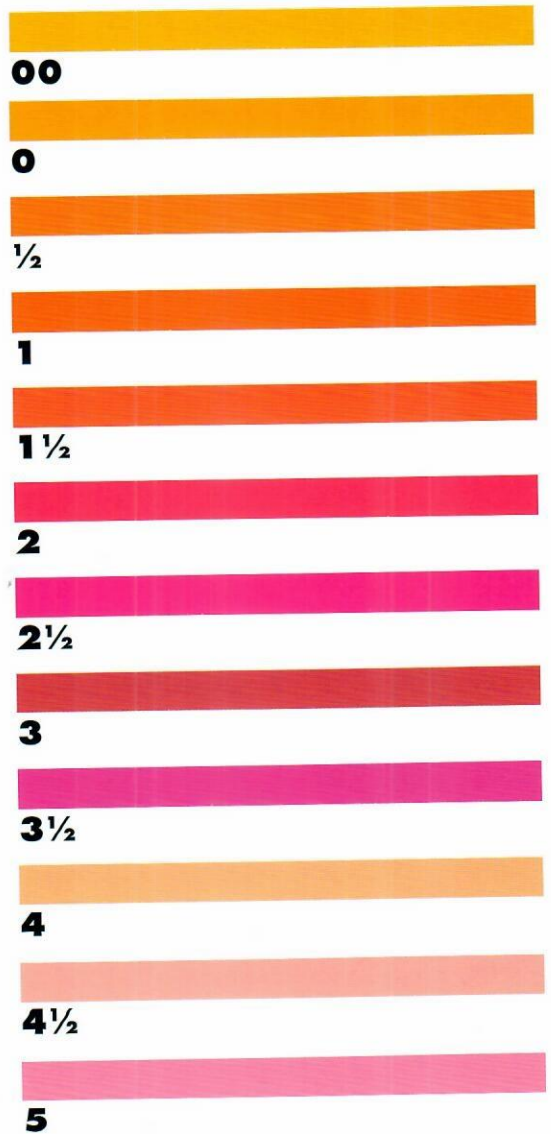
ONE NEGATIVE: TWELVE GRADES

With ILFORD MULTIGRADE papers you can print any negative, regardless of contrast. But equally important, a box of MULTIGRADE paper gives you twelve different ways of interpreting one negative.

Switching between whole numbered filters changes print contrast by one full grade step; intermediate half-grade filters offer finer control than graded paper.



TWELVE FILTER GRADES





0



3



1



4



2



5



CHOOSING PRINT MATERIALS

Print size and surface are largely a matter of personal taste, but economy, display and storage conditions may also influence your choice.

MULTIGRADE papers are available in a wide range of popular sheet sizes, from 3½"x5" to 20"x24", and various roll sizes in widths from 3½" to 50".

SURFACES

MULTIGRADE papers are available in a variety of surfaces. Choice of surface influences the density range of a print, and affects how good it looks on display. Glossy papers give slightly richer blacks, and are therefore the first choice if your print is going to be reproduced in a book, newspaper or magazine. For display, the choice is more difficult. Glossy prints pick up reflections more easily and, in a store window for example, a satin finish print might be easier to see at certain angles. The high sheen of glossy paper also shows up fingerprints and other marks, so if prints are to be handled a lot, satin or pearl paper might be a better answer.

If prints are to be retouched or hand colored, it is best to choose a surface that shows the manipulation the least. For RC prints try satin or pearl; try the matt or semi-matt with fiber base papers.

PERMANENCE

Ageing tests under controlled conditions suggest that a print on MULTIGRADE RC paper will probably deteriorate no more quickly than a print on fiber base paper. In certain conditions, it may even last longer. However, if the permanence of an image is your primary concern, MULTIGRADE fiber base papers are highly recommended. For maximum longevity, prints intended for display, RC or fiber base, should be toned with either a polysulfide or selenium toner.

WHEN TO USE OTHER PAPERS

There are a few circumstances where you may prefer to use ILFORD graded paper.

Really the only remaining reason for using a graded paper is incompatible equipment. Some printing light sources do not produce a full spectrum that you can filter to give the yellow and magenta light MULTIGRADE papers need for a full contrast range. There are four main groups in this category:

- ✓ Pulsed-xenon enlargers
- ✓ Some contact printers
- ✓ Some CRT scanning enlargers
 - These include "flying spot" enlargers such as those produced by Milligan and Log E Tronic.
- ✓ Older cold-cathode (cold light) enlargers
 - Like fluorescent tubes, these usually produce light that lacks certain essential colors.

Though equipment on this list may not produce a full contrast range this does not necessarily preclude the use of MULTIGRADE paper with these systems. Many specialist applications require just one uniform level of contrast, so MULTIGRADE papers are commonly used, even with the light sources listed above.

FIBER BASE PAPERS

From a visual point of view, MULTIGRADE RC papers are the equal of any fiber base paper. However, an unmounted print on MULTIGRADE IV FB or MULTIGRADE FB WARM TONE, for example, feels quite different from a print made on MULTIGRADE IV RC or MULTIGRADE IV RC WARM TONE. Many people, especially collectors and curators, prefer the tactile qualities of a fiber base print, and this is a compelling reason for using a conventional baryta paper. (The advantage disappears, of course, if the print is mounted.) MULTIGRADE FB papers offer all the advantages of a variable contrast paper, but on the fiber base that some connoisseurs prefer.

You may also want to select a fiber base paper if you plan heavy retouching of the print. It is much more difficult to knife marks from resin-coated papers without leaving surface imperfections.

CHEMICALS

To make the most of MULTIGRADE papers, ILFORD recommends that you use specially formulated ILFORD chemicals. For tray processing, this means ILFORD MULTIGRADE developer, ILFORD ILFOSTOP stop bath, and ILFORD MULTIGRADE fixer. On pages 24 and 25 you'll find more details about tray processing.



MULTIGRADE SYSTEM COLOR CODE



MULTIGRADE IV FB FIBER



MULTIGRADE IV RC PORTFOLIO



MULTIGRADE IV RC DELUXE



MULTIGRADE RC WARMTONE



MULTIGRADE FB WARMTONE

SURFACE COLOR CODE



.1 GLOSSY



.5 MATT



.24 SEMI-MATT



.25 SATIN



.44 PEARL

EQUIPMENT AND MULTIGRADE FILTER SETS

You can use almost any enlarger to expose ILFORD MULTIGRADE papers. If your enlarger has a filter drawer, you can simply drop MULTIGRADE filter squares into the drawer to change the contrast of the paper. If your enlarger lacks a filter drawer, you can still use MULTIGRADE paper, but you will have to use mounted filters, and slide them into an adapter under the lens.

MULTIGRADE FILTER SETS

There are 12 filters in the MULTIGRADE filter set, covering the equivalent of paper grades 00 to 5, including half grades. The filters are available in sets for use above the lens—as sets 6"x6" square, 3 1/2"x3 1/2" square, and individually in 12"x12" squares—and mounted in holders for use below the lens. The below the lens kit includes a "safelight" filter, and a universal filter holder that fits easily onto almost any enlarger or lens.

Filter transmission values are based on the assumption that a tungsten light source will be used to expose the paper. The optical quality of the filters is high, so they may be used anywhere in the enlarger light path. If you use them below the lens, handle the filters with care to keep them free of fingerprints and other blemishes.

MULTIGRADE filters are very easy to use because they are density-balanced. No complicated calculations are needed when changing from one filter to another. Filters 00–3 1/2 require the same exposure; filters 4, 4 1/2 and 5 require twice as much exposure. For example, if a print made with filter 2 requires an overall exposure of 10 seconds at f5.6, a print with similar midtone density made from the same negative will need 20 seconds at f5.6 when using filter 4 1/2.

USING A COLOR HEAD ENLARGER

If you make color as well as black and white prints, you may have a color head which already incorporates filters capable of changing the contrast of MULTIGRADE papers.

Although this does work, the yellow and magenta filtration controls of most enlargers lack the extreme values that are needed to produce really low and high contrast; also some enlargers have non-linear filtration controls that make consistent fine adjustment of contrast difficult at each end of the scale. Most important of all, though, is the fact that the filtration in your color head is not density balanced. Each time you change filtration you'll need to re-calculate a new exposure time.

If you prefer to use your enlarger's color head, the following charts provide a starting point for your experiments to determine appropriate filtration for each level of contrast. Enlargers vary so much—from model to model and even between apparently identical examples of the same model—that ILFORD is unable to guarantee the contrast produced by your particular enlarger.

FILTER SETTINGS		SINGLE FILTER METHOD		
MULTIGRADE Filters	Durst (Max 130M)	Durst (Max 170M)	Kodak	Exposure Factor For Heads
00	120Y	150Y	199Y	2.5
0	70Y	90Y	90Y	2.3
1/2	50Y	70Y	70Y	2.1
1	40Y	55Y	50Y	1.7
1 1/2	25Y	30Y	30Y	1.4
2	0	0	0	0
2 1/2	10M	20M	5M	1.2
3	30M	45M	25M	1.3
3 1/2	50M	65M	50M	1.6
4	75M	100M	80M	2.0
4 1/2	120M	140M	140M	2.4
5	130M	170M*	199M	2.6

FILTER SETTINGS		DUAL FILTER METHOD				
MULTIGRADE Filters	Durst (Max 130M)		Durst (Max 170M)		Kodak	
00	120Y	0M	115Y	0M	162Y	0M
0	88Y	6M	100Y	5M	90Y	0M
1/2	78Y	8M	88Y	7M	78Y	5M
1	64Y	12M	75Y	10M	68Y	10M
1 1/2	53Y	17M	65Y	15M	49Y	23M
2	45Y	24M	52Y	20M	41Y	32M
2 1/2	35Y	31M	42Y	28M	32Y	42M
3	24Y	42M	34Y	45M	23Y	56M
3 1/2	17Y	53M	27Y	60M	15Y	75M
4	10Y	69M	17Y	76M	6Y	102M
4 1/2	6Y	89M	10Y	105M	0Y	150M
5	0Y	130M	0Y	170M*	—	—

* Some enlargers in this group have a maximum magenta setting higher or lower than 170M. For these enlargers, set the highest possible magenta value as an approximate equivalent to filter 5.



Photo © Eric Luden

DARKROOM SET-UP

With the exception of a set of MULTIGRADE filters, you need no special equipment for printing MULTIGRADE papers. Any darkroom that is equipped for printing on graded papers should be adequate for MULTIGRADE use.

Processing temperature control is no more critical than with other black and white papers. Though temperature variations are of far less importance than with color materials, it is best to keep the developer solutions as close to 68°F (20°C) as possible.

SAFELIGHTING

Before you start printing, pay critical attention to checking for light leaks in your darkroom, and review safelighting carefully. ILFORD recommends using an ILFORD 902 filter. A Kodak OC (light brown) safelight filter can also be used, though this is dimmer. Read the directions supplied with the safelight, and make sure that you do not exceed the recommended bulb wattage: if you fit a bigger bulb, or mount the safelight too close to your developing trays, your prints may suffer from degraded highlights due to safelight fogging.

Testing Safelighting

To be on the safe side, it is wise to test your safelighting methodically. An annual test is worthwhile, because ageing can change the transmission characteristics of safelight filters. This may result in visible fogging of the print or—more likely—in a subtle but noticeable drop in contrast.

The “penny test” for safelighting is not a reliable guide, and to be sure that your safelights really are safe, follow the procedure outlined opposite. Light bulbs blacken with age, so change the bulbs in all safelights before starting.

1. With all the safelights switched off, make a series of test exposures with no negative or filter in the enlarger. From this, determine the level of exposure needed to produce a pale gray tone on MULTIGRADE paper.
2. Leaving the safelight off, expose the right half of the paper sheet using the exposure determined at step 1. Make a notch in the middle of the sheet, so that you know which way to orient it.
3. Still in darkness, take the exposed paper to the part of the darkroom where the safelighting is brightest—usually the area close to the developing tray. Cover up about $\frac{1}{2}$ of the paper with a piece of cardboard, then turn on the safelight and make a series of exposures to the safelight. Give exposures of 1, 1, 2 and 4 minutes, progressively covering more and more of the paper.
4. Turn off all safelighting again, and return to the enlarger. Now expose the left hand side of the paper using the exposure determined at step 1. Use the notch in the paper to make sure that this exposure does not overlap that made at step 2. Process the test in darkness.
5. If safelighting is satisfactory, your test will show two flat gray panels. The test is very sensitive, so you can safely ignore small changes in density. However, if there is a large difference in density across the right-hand panel, then safelight fogging after exposure is causing problems. If the left-hand panel is not even, then fogging before exposure is compromising print quality.

If the maximum “safe” period is shorter than the time the material would normally be exposed to safelighting, then you must change your safelighting arrangements. This may mean reducing the power of the bulbs, or moving the lamps farther from the paper. If the safelight filters are old, they may be faded, and you should replace them.

SATISFACTORY SAFELIGHTING

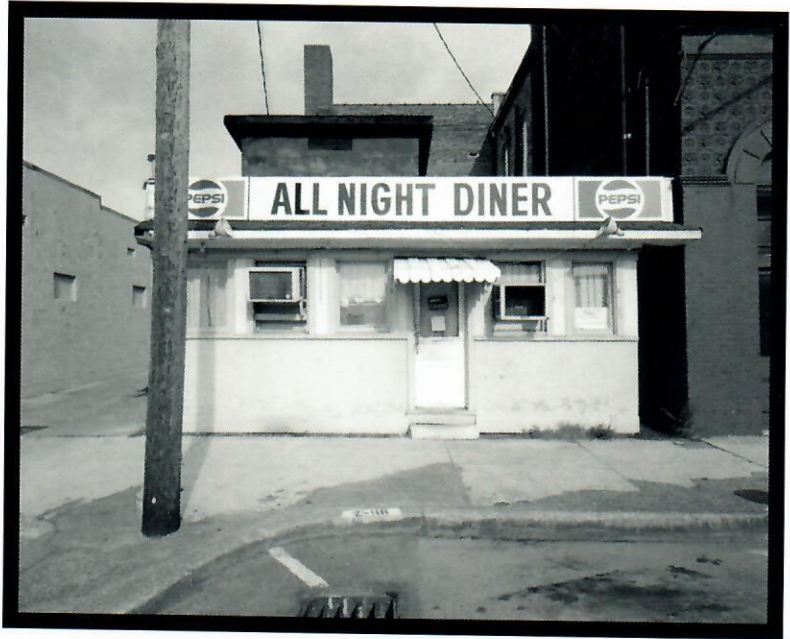
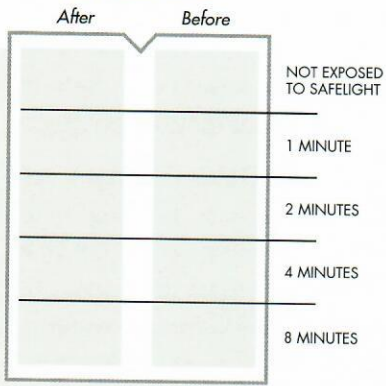
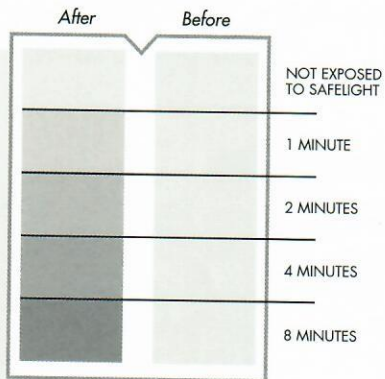
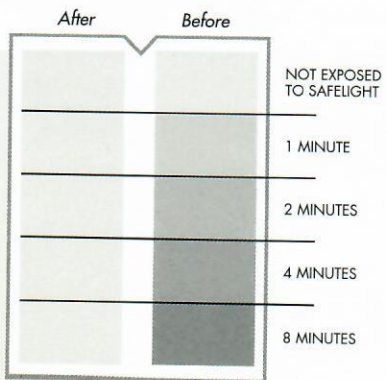


Photo © Tom Jimison

SAFELIGHTING FOGGING AFTER EXPOSURE

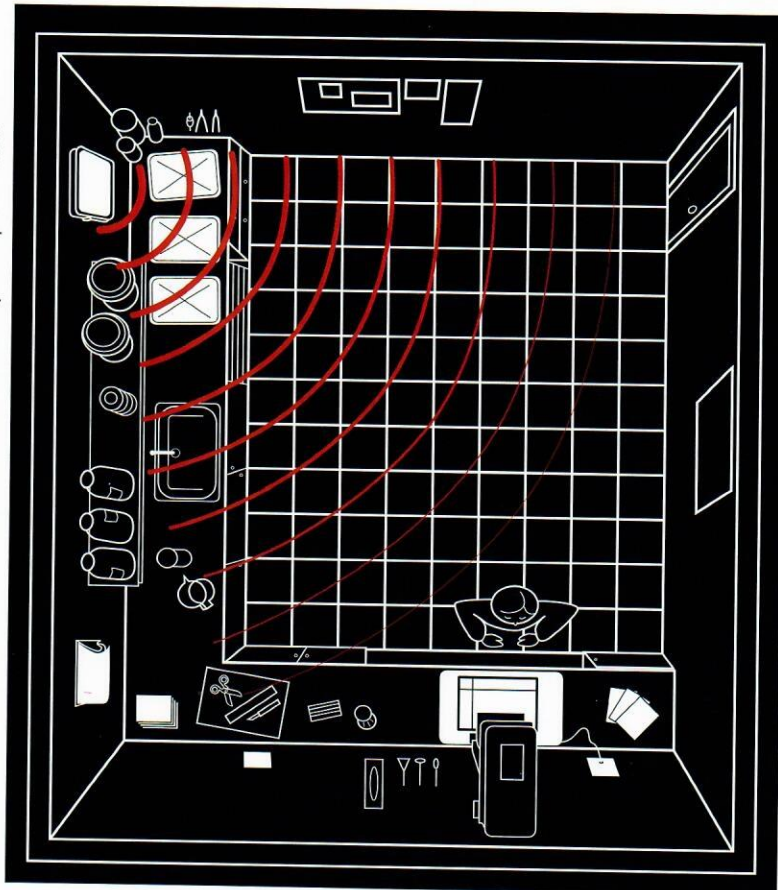


SAFELIGHTING FOGGING BEFORE EXPOSURE



Developer Stop Bath Fixer

Wet side



Dry side

Position safelight to cast shadow on easel.

THE NEGATIVE AND CONTACT PRINT

MULTIGRADE papers provide unparalleled control over contrast, but it's worth remembering that contrast control begins in the film developing tank. If possible, you should develop your negatives so that they print easily with filters in the 2-3 range. This may mean using a different development time from that recommended by the film or chemical manufacturer.

These factors will affect the time required:

ENLARGER TYPE

Condenser enlargers produce prints of higher contrast than diffusion enlargers. The film development times that ILFORD recommends in its current publications are between the "normal" and "high" contrast levels that were recommended for use with condenser or diffuser enlargers respectively. This approach is no longer necessary, considering the enlarger types that are popular today.

LIGHTING

When processing a film exposed in overcast conditions, you can increase development time by about 20% to boost contrast a little. You can make negatives exposed in brilliant sunlight easier to print by overexposing the film half a stop or so, and cutting development by about 20%.

SUBJECT MATTER

You may occasionally wish to increase development time a little if your subject is very low in contrast. The reverse however, is not true: high contrast subjects rarely require any special treatment unless the lighting also creates deep shadows.

THE CONTACT SHEET

Why should you make a contact sheet? For three reasons: to assess all the negatives on a roll of film and decide which ones you want to print; to decide how to crop the picture; and to provide a permanent record for filing purposes.

To make a contact sheet with MULTIGRADE papers, set the enlarger head to a height that gives a 16" wide rectangle of light on the baseboard, and put the MULTIGRADE #2 filter into the filter drawer. You'll need an exposure of about 8-15 seconds at f8 for negatives of average density, though you should make a test to determine the correct time.

While a MULTIGRADE #2 filter produces a contact sheet of normal contrast, there is something to be said for producing a low contrast contact sheet using a #1 filter or even a #0 filter. This minimizes the difference between the densities of individual images formed by differently exposed negatives, and retains more of the detail in your pictures.

XP2 SUPER NEGATIVES

If you use ILFORD XP2 SUPER film and take it to a minilab for processing and printing, the postcard size prints make convenient proofs for each frame on the roll. Though they probably will not be a neutral gray in hue, they are an acceptable alternative to a contact sheet. These low cost and rapid proof prints are density balanced at the lab, so you'll even get a good idea of how under- and over-exposed negatives will print.

Though the contrast of minilab-made color proof prints varies, it roughly corresponds to a print on MULTIGRADE paper using a MULTIGRADE #3 filter, so at the printing stage you can use the proofs as an approximate guide for filter selection. Note that XP2 SUPER film prints with equal contrast on all enlargers, regardless of whether they use condenser or diffusion illumination.

EXPOSURE TESTING

The first stage of making a print is to choose the exposure time, by making a test strip. If the negative appears correctly exposed on the contact sheet, you'll already have a rough idea of the necessary exposure—provided you don't move the enlarger head and aperture setting after exposing the contact sheet. If you change the degree of enlargement, you'll also need to adjust exposure. Some enlargers have scales printed on their columns to make this easier.



The area of the negative you choose for exposure testing won't necessarily be the center. It should ideally contain a range of tones that is representative of the negative as a whole. If this is impossible, then pick the most important region of the picture.

The drawback of the traditional exposure test—made by progressively covering or uncovering a strip of paper during the exposure—is that each step shows a different portion of the negative. A better method follows.

LOCALIZED EXPOSURE TEST

1. Cut a sheet of 8"x10" paper into five strips of equal width.
2. Set the enlarger aperture to f8, and put a MULTIGRADE filter 2 into the filter drawer. (You may prefer to use a filter of lower or higher number if your contact sheet suggests that the negative is not of average contrast.)
3. Give the first strip of paper 2 seconds exposure, the next strip 4 seconds, then 8, 16 and 32 seconds for the last three strips.
4. Develop the strips face down in the tray. After 30 seconds in the fixer you can view them under normal room lights, to decide on the correct exposure time. You may find that this falls midway between two of your steps.

If all the test strips are too light, start again with an aperture of f4. If all are too dark, set the lens aperture to f16 and repeat the test.

If you have never made prints before, you may wish to wash and dry the test strips, and mount them on a board for reference.



2 Seconds



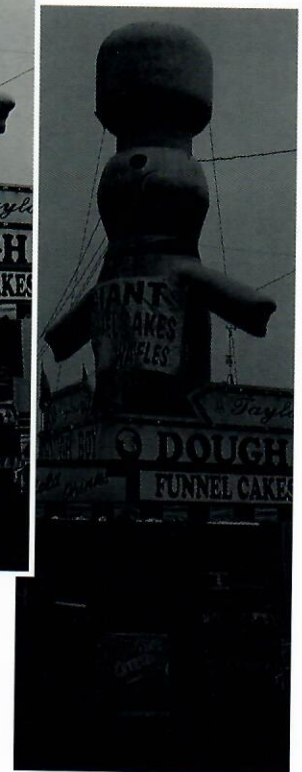
4 Seconds



8 Seconds



16 Seconds



32 Seconds

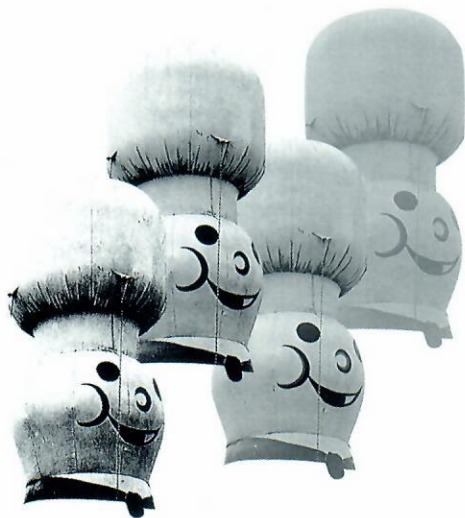
CONTRAST TESTING

Changing contrast with MULTIGRADE papers is very easy, but what is trickier is knowing which filter to use.

For photographs taken in studio conditions, where the lighting is completely under the photographer's control, the decision is easy: choose a filter that records the clear sections of the negative as the deepest black the paper can produce, and the densest sections of the negative as just perceptively darker than the pure white of unexposed paper.

However, the decision is not always as simple as that, because the tonal range of many negatives exceeds that of the paper. To place the deepest shadows and the brightest highlights at the two extremes of the paper's tonal range, you might need to use a very low-contrast filter.

For example, a portrait exposed indoors by diffuse window light may have fairly softly-lit skin tones, but it will also include extremes of density, recording shadow detail in the background, and brilliant highlights in the scene outside the window. Even using MULTIGRADE filter 00, highlight detail in the print will still appear "burned out" and shadows featureless and dark. Worse, the subject's face will appear flat and lacking in contrast.

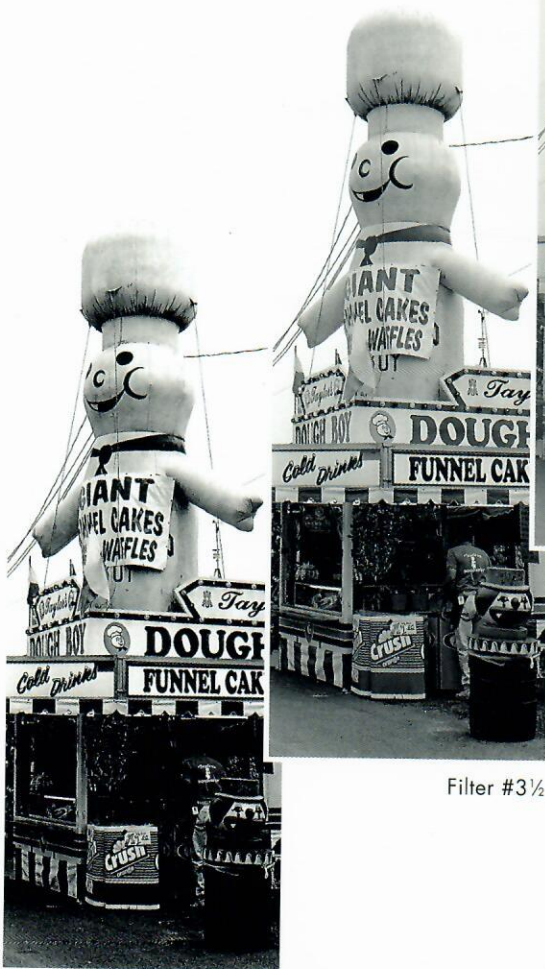


In practice, you would use local density control—dodging and burning in—to retain highlight and shadow detail, and use a mid-range filter, such as 2 or 3, to provide good contrast, and separate the skin tones. The filter you use for overall tonal control should therefore be one that is suitable for the main print exposure.

If you look carefully at your exposure test, you should be able to tell whether you need to use a filter of a lower number, or whether a higher number would be better. If you are unsure, make a contrast test, exposing strips of paper at contrast levels one full step apart. For example, if your exposure test was made using #2 filter, then make contrast tests with #0, 1, 3, and 4 filters. If you are using MULTIGRADE filters use the exposure time you determined from the Localized Exposure Test for the first three strips, and double the time for the last one.

If you are confident that the print needs to be either higher in contrast than the exposure test, or lower, but you don't know by how much, make contrast tests at half-step values. For instance, if it's clear that the print needs more contrast than the exposure test made with a #2 filter, then make tests with filters 2 ½, 3, 3 ½ and 4.

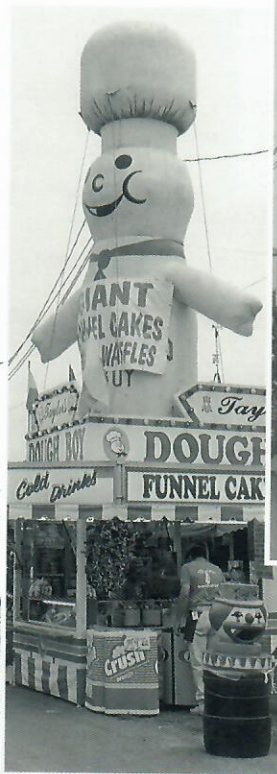
With practice, you'll quickly learn to judge contrast changes without testing. However, if you have just started printing, you may wish to print an average negative with all 12 filters in the MULTIGRADE set, and mount the tests on a board for reference. This will give you a clear idea of how much difference a change of filters makes to the contrast of the print.



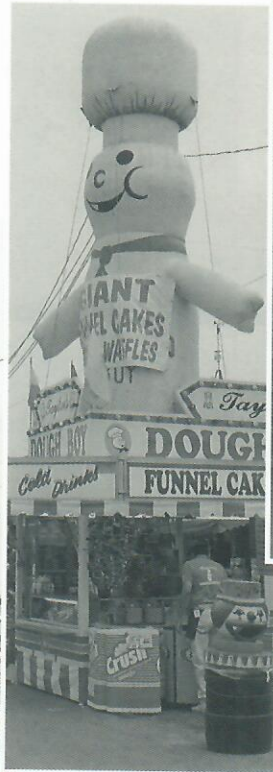
Filter #5



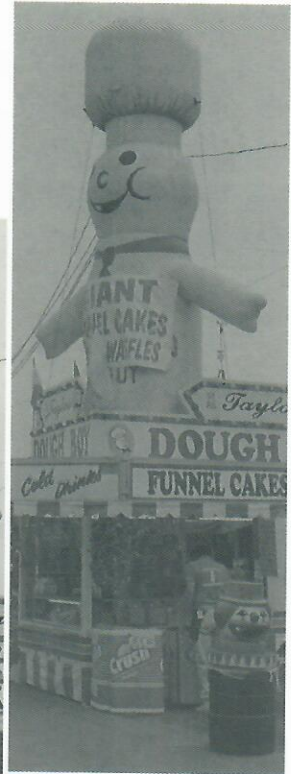
Filter #3½



Filter #2



Filter #1



Filter #00

BASIC DODGING AND BURNING

Very few prints are made with a straight exposure. Depending on the negative, shadow areas often need lightening to prevent them from filling-in to a solid black; and highlights can “burn out” to a blank white.

PRINTER'S SECRETS

Local density control avoids these problems. Additive techniques (often called burning or burning in) give extra exposure to highlight areas. Subtractive techniques (dodging, holding back or shading) cut the exposure that shadow areas receive.

With the additive method, you start by giving the whole print a basic exposure, then give extra exposures to emphasize details in highlight areas. By contrast, use subtractive techniques during the main exposure, covering the shadow areas with your hands or a simple dodging tool for part of the main exposure time. Many prints need a combination of both these techniques, a secret that professional printers know and use.

HOW MUCH MORE OR LESS?

There are no rules about how much you should burn in or dodge a print to retain detail in highlights and shadows: the tonal range of the negative and the MULTIGRADE filter you are using both affect the time. However, as a proportion of the main exposure, additive corrections generally require more time than subtractive ones. Few shadow areas need less than 50% of the main exposure: but brilliant highlights commonly require three times or even four times the main exposure.

MULTIGRADE papers are better in this respect than other variable contrast papers, and generally require less burning in to retain highlight detail.

DON'T OVERDO IT

The aim in dodging and burning is to ensure that the deepest shadow in which you wish to hold detail is visibly lighter than a solid black; and the brightest highlight in which detail is important is slightly grayer than pure white. This does not mean that a solid black and a brilliant white should be missing from your print. On the contrary, most prints look better if they take advantage of the extreme ends of the paper's full tonal scale.

Be careful not to shade every shadow to a very dark gray. Allow the deepest shadows to create areas of solid velvety blacks on the print. In the highlight areas, leave specular highlights—the reflections of light sources on shiny surfaces—to burn out to pure white.

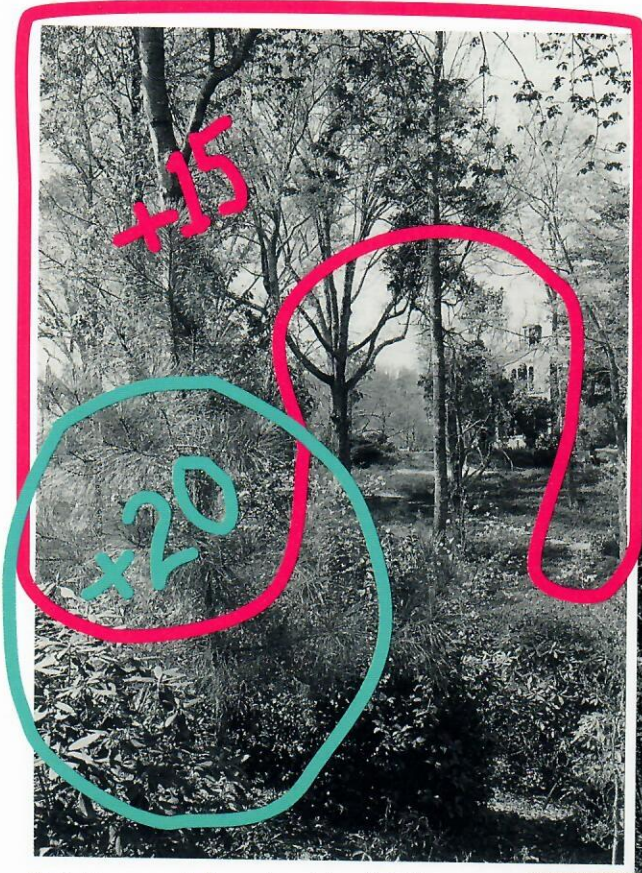
In a portrait, for example, a “catch-light” in the eyes imparts a sparkle to a print, giving it life and brilliance. If you try to burn in specular highlights so that they print as very light gray, you will greatly reduce the impact of the print.

DODGING AND SHADING TOOLS

It's very easy to make your own dodging tools, with a straightened paper clip or a bit of wire, and modeling clay shaped to roughly fit the area of the print you're shading. For large areas, cut cardboard approximately to shape and tape it to wire.

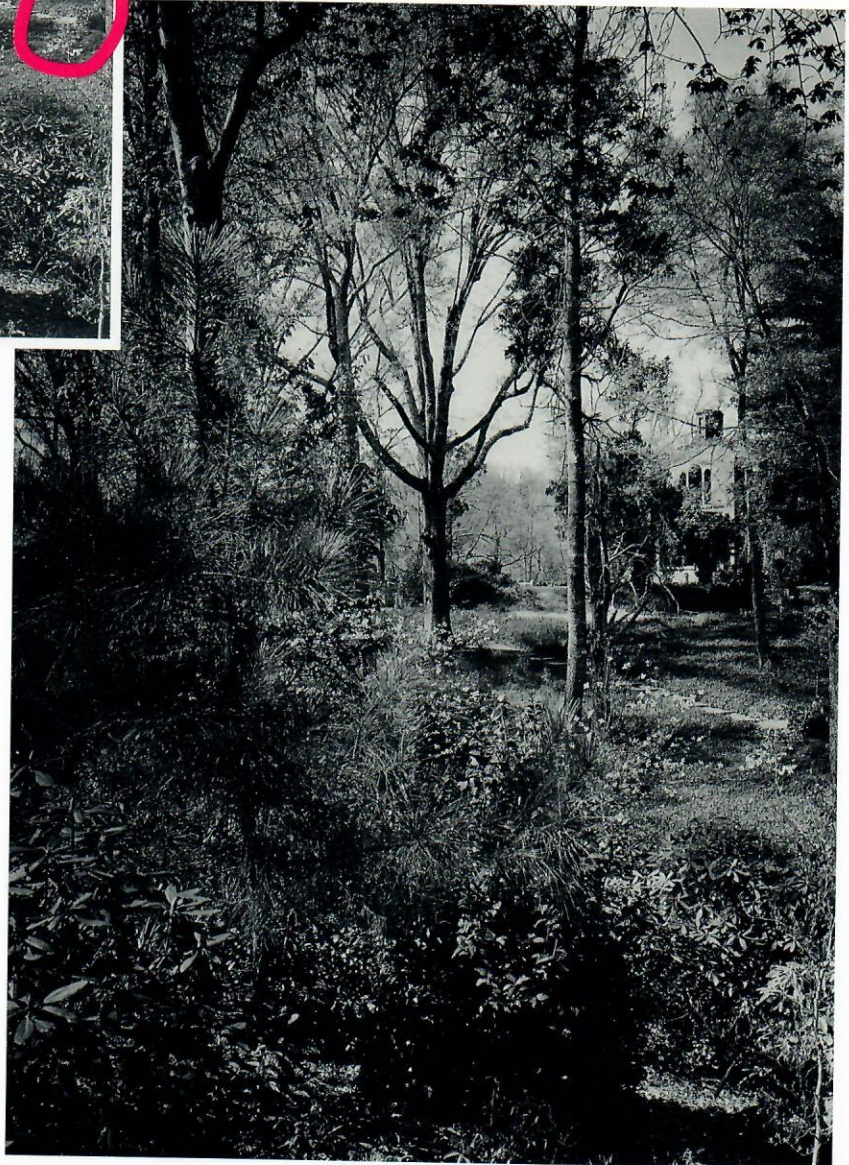
USING CARDBOARD

Here's another professional printers tip: to darken small areas, punch a hole in a piece of cardboard, and hold it half-way between the enlarger lens and baseboard. If you use a white card, you will be able to see an image of the negative projected onto it. This makes it easy to position the hole. (Conversely if you look at the baseboard all you'll see is a small patch of light, without a clearly visible image.) You can also use this technique with a MULTIGRADE filter positioned over the hole to change the contrast of small areas.



Final Print, below.

Basic Exposure 6 Seconds, with a #2½ filter.
+15 seconds and +20 seconds in areas circled.



CONTROLLING PRINT TONES

Dodging and burning are not just corrective processes which help you to retain detail in highlights and shadows. They are also the primary creative tools that a printer uses in interpreting the negative.

Burning in the sky to prevent it from washing out to a featureless white simply corrects the tonal rendition of the film, making a more harmonious picture. But going further, and turning to a mid-gray, can make the same picture look brooding and full of menace.

Heavy dodging can be an equally effective tool. It can "knock out" the surroundings or background to eliminate distracting detail and draw attention to a central figure.

Though these examples are effective, they are simple and crude. With most negatives, skillful printers will use creative tone control in a more subtle way. By selectively lightening small areas of the print, and darkening others, it is possible to move the viewer's eyes around the image, highlighting the most important subject areas, and muting distracting ones.

Original print, below.





Giving extra exposure to darken selected areas greatly enhances the sense of depth in the image.



MAKING A FINAL PRINT

When making a complex print with numerous local exposures, it is very useful to make yourself a "work print." It is valuable for later comparison with finished prints; it helps you keep track of individual exposures as you go along; and, filed with the negative, also serves as a useful record to make a similar print at a later date.

First make a straight print the same size as the final print and process it in the normal way. Put it next to the enlarger and use it to log every exposure. This will ensure that you don't forget any of the individual exposures when you are making the final print.

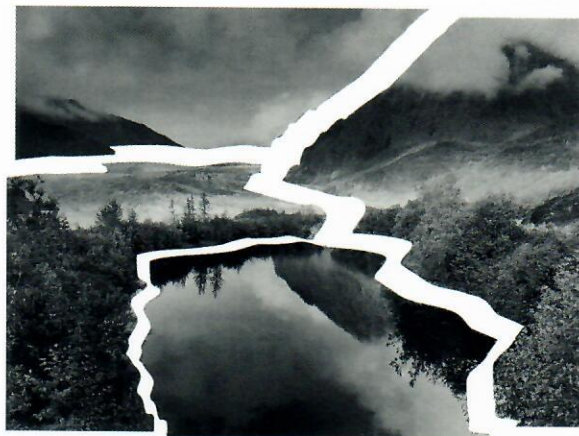
You can mark notes directly on the print using, for example, a grease pencil. Alternatively, you can make a "template" by tracing the main image areas onto a separate sheet of plain paper, and mark up the template.

Filter numbers are shown in red, exposure times in blue. The basic exposure was 7 seconds with a #2½ filter, followed by (as indicated below) +10 seconds/filter #2 in sky, +20 seconds/filter #0 in middle, +6 seconds/filter #2½.



It is a useful practice to always make additional exposures in the same direction—moving round the print either clockwise or counter-clockwise. As you work, you may find it necessary to alter previously made exposures in order to give a more balanced result.

A work print is of particular value if you use the technique of multiple contrast printing outlined on page 28. Because each area of the print can vary not only in exposure, but in contrast too, making a matching duplicate print later can be all but impossible unless you keep an accurate record when you first print the negative.



Final print, below.



TRAY PROCESSING

The processing procedure for MULTIGRADE papers follows the traditional three-bath develop—stop—fix sequence, and if you already have a favorite developer, you can continue to use it with MULTIGRADE. However, ILFORD recommends that you use ILFORD MULTIGRADE developer diluted 1+9, and ILFORD MULTIGRADE fixer diluted 1+4. A stop bath such as ILFORD ILFOSTOP terminates development immediately, preventing staining and prolonging the life of the fixer.

These chemicals, and MULTIGRADE developer in particular, have been formulated to get the best results from all MULTIGRADE papers.

ILFORD Developer	Dilution	Temp.	FB	RC
			PAPERS Time	PAPERS Time
UNIVERSAL	1+9	68°F (20°C)	1½–3	1
MULTIGRADE	1+9	68°F (20°C)	1½–3	1
MULTIGRADE	1+14	68°F (20°C)	1½	
BROMOPHEN	1+3	68°F (20°C)	1½–3	1½–3

PROCESSING TIPS

Slip the paper, face up, very gently into the developer; if you press a floating sheet of paper under the surface of the solution, you may cause creases that are impossible to remove.

With RC prints, because the image appears so rapidly—as little as ten seconds after you immerse the print in the tray—it is tempting to remove it prematurely. Shortened development will lead to weak shadows, so always leave the print in the developer for the recommended time, rocking the tray intermittently. Most pros develop prints by time rather than by inspection.

At a dilution of 1+9, a liter of working strength MULTIGRADE developer is sufficient to process up to 100 8"x10" RC prints and 40 8"x10" fiber base prints.

MULTIGRADE developer has excellent keeping qualities and can be stored in unopened bottles for two years. In an open tray, it remains usable for two working days.

STOP BATH

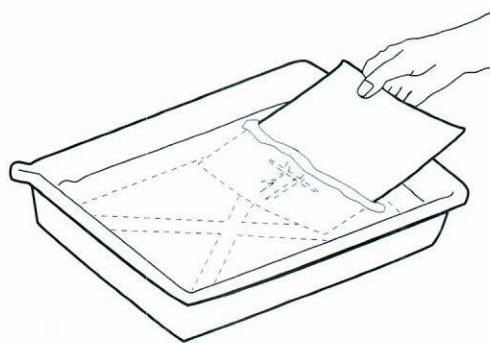
Rinse prints in ILFORD ILFOSTOP stop bath and immediately transfer them to the fixer. If you are processing several prints at once, it is not a good idea to use the stop bath to store prints until they are all developed.

FIXER

ILFORD MULTIGRADE fixer is a non-hardening rapid fixer; if you substitute another fixer, do not use a hardening one, as it reduces washing efficiency. Fix RC papers for 30 seconds and fiber base papers for 1 minute. Note that prolonged fixing can reduce print quality.

WASHING

Wash RC papers for 2 minutes. Don't leave prints soaking in water. With prolonged washing, water penetrates the edges of RC paper causing curling and edge separation. Wash FB papers for 1 hour in running water at 68°F (20°C), or follow the ILFORD Optimum Processing Sequence for a much shorter wash time.



Processing for Optimum Permanence

The biggest cause of premature deterioration of black and white photographs is undoubtedly poor processing technique, notably inadequate fixing and/or washing. In the case of fixing, this can mean times that are too long as well as too short.

Before the fixing and washing method using UNIVERSAL Wash Aid was introduced by ILFORD, it was probably true to say that there had not been a significant change in the way conventional black and white papers had been fixed and washed since the turn of the century. There had been, and still is, a resistance to using shorter fixing and washing times than those established by tradition. Where image quality and permanence are concerned this is understandable.

When optimum permanence is needed (up to 100 years), perhaps for archival storage of prints, the ILFORD Optimum Processing Sequence at 68°F (20°C) is recommended using UNIVERSAL Wash Aid. Be careful not to exceed the capacity of the fixer or to extend the fixing time. Extra time in the fixer increases the absorption of the fixer by the paper base, and reduces the efficiency of the washing stage.

The recommended processing sequence is as follows:

DEVELOPMENT	MULTIGRADE Paper Developer (1+9)	2 minutes
STOP BATH	ILFOSTOP Stop Bath (1+19)	30 seconds
FIXING	MULTIGRADE Fixer (1+4)	60 seconds
FIRST WASH	Good supply of fresh running water	5 minutes
WASH AID	UNIVERSAL Wash Aid (1+4)	10 minutes
FINAL WASH	Good supply of fresh running water	5 minutes

All processing times are at 68°F (20°C).

This sequence, totaling approximately 23 minutes, is shorter than the standard over 60 minute sequence, and saves a considerable amount of water.

FIXER SOLUTION CAPACITY

The recommended capacity of MULTIGRADE fixer for MULTIGRADE IV FB and MULTIGRADE FB WARMTONE is about 40 sheets of 8"x10" paper, or equivalent, per liter of working strength solution when using a two-bath fix system. When a regular wash is used, capacity for single-bath fix is 10 sheets of 8"x10" paper per liter. By using the ILFORD Optimum Processing Sequence, the capacity of a single-bath fix increases to 40 sheets of 8"x10" paper per liter.

Tray Processing: Fine Tuning

Printing is a personal process, and it's natural for inquisitive printers to try different combinations of chemicals. In particular, some printers prefer a more leisurely development process than MULTIGRADE developer can provide at the standard dilution.

If you prefer to develop prints by inspection, you may wish to dilute MULTIGRADE developer 1+14. At this higher dilution, development takes about 90 seconds.

Alternatively, you can use a different developer altogether. ILFORD UNIVERSAL Paper developer is a good choice. At 1+9 it provides a longer induction time, and though development is complete after one minute at 68°F, higher dilutions can prolong the development so that density continues to build. Many discriminating printers who use RC paper feel that this gives them a level of control comparable to that which they enjoy with the slow-developing fiber base papers.

DEVELOPMENT BY INSPECTION

With slow development, you can examine the print by safelight to determine when it has achieved the density you want. You will still get good blacks as long as you haven't overexposed the print and dramatically curtailed development. Massive overexposure and under-development leaves prints with weak shadows and development marks.

Drying

A final rinse in wetting agent such as ILFORD ILFOTOL, diluted 1+199, aids even and rapid drying.

RC PRINTS

MULTIGRADE RC prints air dry rapidly: remove surplus water with a sponge or squeegee, and hang them up or lay them face up on clean, absorbent material. They will dry flat in 10–20 minutes at room temperature.

FIBER PRINTS

There are three traditional ways to dry fiber base enlarging papers: air drying, blotting or heat drying. (Photographic blotters and belt print dryers are not recommended with MULTIGRADE FB WARMTONE as there is a risk that prints will stick to them.)

AIR DRYING

After taking prints from the wash, they should be placed face up on a clean surface, allowed to drain and then squeegeed on both sides to remove excess water. They can then be hung on a line with clips or placed face down on a clean nylon or plastic mesh screen to dry.

Air drying does have one disadvantage, however. Depending on the relative humidity of the room, prints tend to curl while drying and can be difficult to flatten effectively.

PHOTOGRAPHIC BLOTTERS

The use of photographic blotters is widespread since they assist in producing neat, flat prints that are easy to work with for mounting or storage.

It is essential that only photographic-quality blotters be used; other blotters invariably contain contaminants that can have an adverse effect on the keeping quality of the resultant prints. Photographic blotters are generally available in most photographic stores.

The following procedure has been found to work well:

1. Squeegee the print and place it on a clean blotter.
2. Place another blotter on top of the print and rub the blotter lightly.
3. Squeegee a second print and place it on the second blotter and rub lightly. Continue in this way until all the prints have been placed between blotters.
4. Turn the stack of prints and blotters over and place the top print on three clean blotters. Cover that print with three clean blotters and transfer the second print from the first stack to this new stack. Continue in this way until all the prints have been transferred to the second stack.
5. When all the prints have been placed between sets of three sheets of blotters, place a weight on top of the stack to flatten the prints and leave the prints for about half an hour.

HEAT DRYING

There are two problems associated with heat drying on flatbed and rotary dryers. The first is of a general nature and concerns prints sticking to the blanket. The second relates to the requirement that the blanket must be perfectly clean to assure maximum permanence for prints.

The second problem is associated with the difficulty of keeping the dryer blanket or apron clean. Great care must be taken to ensure that only those prints that have been thoroughly washed are dried on such equipment, otherwise the blanket can easily become contaminated with fixer. Remember, it takes only one insufficiently washed print to contaminate all others that are dried subsequently.

Machine Processing

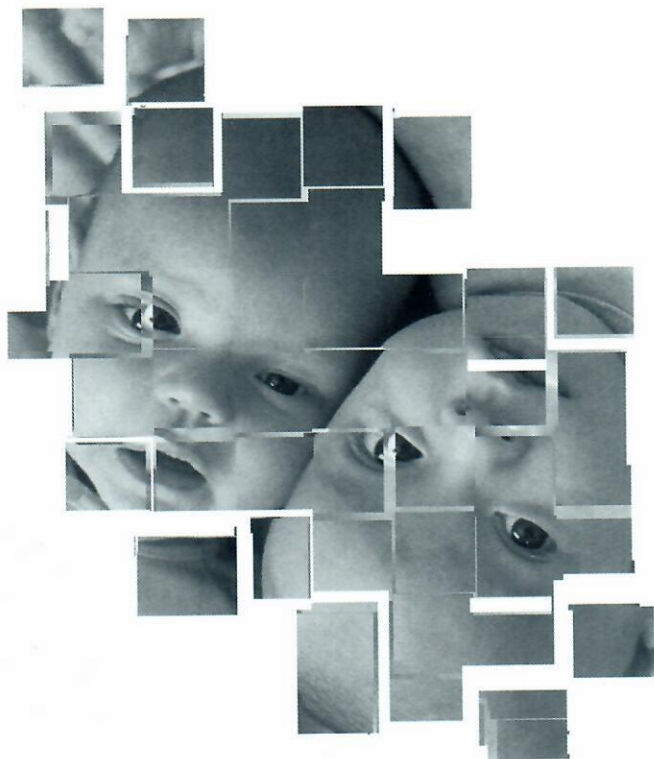
MULTIGRADE RC papers are especially suited to machine processing. A compatible roller transport processor can deliver finished washed and dried prints in little more than a minute, which greatly speeds throughput and productivity in the busy lab.



Photo © Tillman Crane

MULTIPLE CONTRAST PRINTING

Simple dodging and burning helps to retain detail in highlight and shadow areas, but they are not complete answers to print tone control. On a single negative, there may be wide variations not only of density, but of contrast, too. With MULTIGRADE papers you can print different areas of the image using different MULTIGRADE filters.



The most common example is a sunlit landscape with important detail in both highlight and shadow areas. With conventional paper, grade 4 might be necessary for sufficient contrast in the shadows, but this would create impossibly high contrast in the sunlight regions of the picture. You can make the main exposure with a MULTIGRADE #4 filter. Then, after changing to a #1 filter, burn in the sunlit areas, and cover the shadows.

METHOD

1. Establish the correct filtration and exposure time for the main part of the print.
2. Test for contrast and exposure in the secondary area that requires printing through a different filter.
3. Place a sheet of cardboard mid-way between the enlarger lens and the baseboard, and sketch onto it the line through which the filtration should change. Cut along the line with a sharp knife to produce a "mask."
4. Expose the whole print using the filtration and time determined at step 1.
5. Finally make the secondary exposure using the filter and time established at step 2 above; this time use the mask to cover the darker areas of the print that should appear at the higher contrast.

You may sometimes want to reverse this procedure and make the main exposure at the lower contrast setting. For example, if you were printing a picture of a figure dressed in white, and you wanted to darken the background, you'd burn in the edges of the print with a MULTIGRADE #5 filter. Any inaccuracy in burning in would not affect highlight areas—whereas at a lower contrast setting you might see a "dirtying" of the clothing around the periphery of the figure.



Photo © Klaus Schnitzer

PRE-FLASHING THE PAPER

By using the MULTIGRADE #00 filter, you can make good prints from negatives of extremely high contrast. However, negatives that have been over-developed often compound the problem of excessive contrast with blocked highlights that are almost impossible to burn in. Don't give up on these difficult negatives: using controlled low-level pre-fogging you can sometimes make an acceptable print.

The technique, called pre-flashing, consists of a secondary low-level exposure to white light. Its effect is to add a little density to highlight areas of the print without significantly affecting mid-tones and shadows. Flashing is particularly effective with MULTIGRADE papers because you can use the MULTIGRADE filters over the light source to control the contrast of the fogging exposure.

Precise control over the level of fogging exposure is the key to the success of the technique. Too much exposure will visibly fog the print; too little will have no effect.



METHOD

1. Position a 15 watt bulb at least three feet above the darkroom work-surface.
2. Expose a strip of MULTIGRADE paper, using exposures of 1, 2, 4, 8, and 16 seconds.
3. Process the test strip in the normal way. The correct flashing exposure is the longest one that did not produce any visible darkening of the paper. If every step is fogged, double the distance between bulb and paper.
4. Now give the whole sheet of paper a fogging exposure using the settings determined in step 3. Then using this pre-exposed sheet, make your print exposure in the normal way.

To control the contrast of the fogging exposure, you will either need to use a second enlarger, or improvise a filter holder to cover the light bulb.

If you use an enlarger as the fogging light source, you must reduce its brightness—but don't do this by stopping down the lens to its minimum aperture, or images of dust on optical components may spoil the fogging exposure. Instead wind the head to the top of the column and cover the lens with two white polystyrene cups, one inside the other, to diffuse the beam. Alternatively, insert a neutral density filter into the filter drawer—a 2.0 density is a good choice—as it cuts exposure by more than six stops.

Generally you'll want to make the flashing exposure using a low-numbered MULTIGRADE filter, but when gross over-exposure has blocked up the highlights and reduced their contrast (a common example is an overexposed window in an interior scene), you can use a high-contrast filter to boost the density of the highlights and separate the tones.

With the latitude of MULTIGRADE, flashing should rarely be necessary, but it remains a valuable technique when all else fails. It's also useful if you plan to tone prints, because it counteracts the bleaching of highlights that sometimes occurs.

Straight print, right, at 6 sec.
with a #2½ filter.



Below, the same print at 6 sec., #2½ filter, was pre-flashed for 1 sec.



PRINTING FROM COLOR NEGATIVES

MULTIGRADE papers have a slighter wider color sensitivity than ordinary photographic papers, so they are more suited to printing color negatives than a conventional graded paper. However, all general purpose photographic papers—including MULTIGRADE—are insensitive to part of the color spectrum, so some compromises of color rendering are inevitable when printing color negatives in black and white. Generally, prints made from color negatives resemble photographs taken on regular black and white film through a cyan filter. Red parts of the subject appear black on the print, and blue skies appear white.

This unusual color rendition does suit many subjects. MULTIGRADE often produces good tonal separation in the flesh tones of portraits produced on color negative film—though it will exaggerate blemishes such as broken veins.

Another advantage of using MULTIGRADE, rather than a panchromatic black and white paper, is that you can work in safelighting, which is more convenient and better for creative printing.

All color negatives have a yellow-orange masking layer that acts like a safelight filter to slow print exposure: you should expect printing times to be some three to four times longer than for conventional black and white negatives of comparable density. The filtration needed depends on the contrast of the original negative, but as a starting point for experimentation, use a MULTIGRADE #3 or #4 filter. Small changes in filtration have a greater effect on contrast than they do when printing from black and white negatives.

You'll get the best results from slower color negative film, particularly the new generation of high-definition films. Faster films give disappointing results because the grain pattern is very conspicuous.



Original color negative.



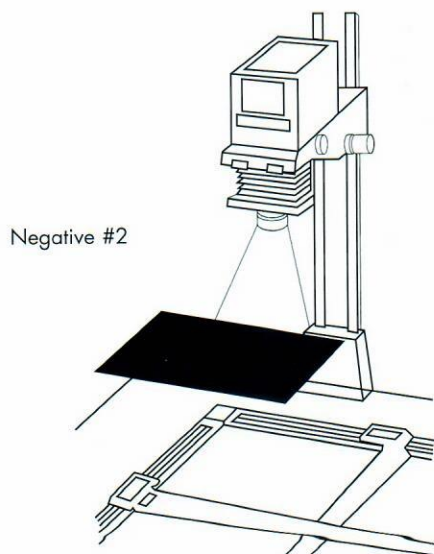
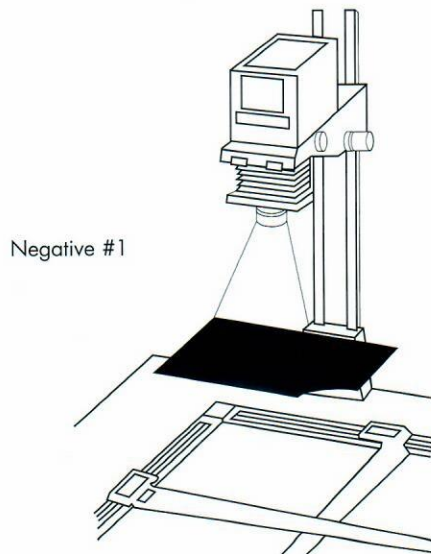
Color print, left.

Print on MULTIGRADE paper from color negative.



COMBINATION PRINTING

This technique involves exposing two images onto the same sheet of paper: they can be kept separate, or superimposed to make one picture; you can use the same negative, and expose it twice, or two different negatives.



The most commonplace example is to add a panorama of puffy or stormy clouds to a landscape shot on a dull day. Burning usually just makes an overcast sky look dull and leaden, but printing the sky from a second negative can transform a picture.

The variable contrast of MULTIGRADE is especially valuable if you are using two negatives shot in different lighting conditions. By changing filters between exposures, it is easy to ensure that all parts of the print have the same contrast.

The principle of the combination printing is simple: cut positive and negative masks to match the shapes of the two image elements you are combining, just as with Multiple Contrast Printing on page 28.

After exposure and contrast testing, expose one image using the positive mask to shade part of the paper. Then, change the negatives and print the second image, using the negative mask to shade the area exposed earlier.

In practice, combination printing requires a very methodical approach. Unless you exposed the negatives specifically for this, it is unlikely that both will require the same degree of enlargement, so you will have to reposition the enlarger head between exposures, and refocus. You'll find this easier if you mark the two positions of the enlarger head on the column. If you have access to a communal darkroom, try setting up two adjacent enlargers with one negative in each. This greatly speeds the process, because you don't have to make any adjustments between exposures.

To help with positioning the individual images, mark their locations on a guide sheet. Then test each of the images for exposure and contrast, and assess which areas need burning in or dodging.

With skill and practice, combination printing can produce very complex and original prints. However, the simplest examples are very easy to do, and make a strong statement.



The two images above were used to make this final combination print, below.



PAPER NEGATIVES

In the past, when photographers used glass plates to make contact prints without an enlarger, retouching involved penciling on the surface of the negative itself, to remove blemishes. Nowadays, most negatives are so small that this is no longer practical.

However, it is still possible to retouch a paper negative, which you can make by contact printing an ordinary print onto another sheet of MULTIGRADE paper. Remember though, that you must make this intermediate print the exact size that you want the final print; you cannot enlarge paper negatives.

First make a normal print to the final image size. This "intermediate positive" may need to be slightly darker and lower in contrast. Make the contact print by sandwiching this original positive print emulsion-to-emulsion with a fresh sheet of paper, and pressing them tightly together under a sheet of heavy glass. Then expose the "sandwich" to the light of the enlarger, just as if you were making a contact sheet of a roll of film. MULTIGRADE papers are especially suitable for this technique because—unlike many papers—they are not marked on the reverse with the manufacturer's name.

Retouching the image is simply a matter of adding density to the back of the print, using a soft pencil such as 4B, a grease pencil, or charcoal. Because the marks are on the back of the paper, they are not clearly visible on the contact print.

It is best to do retouching in two stages: add density to the initial positive print in the areas where you want the final print to be darker; darken the back of the intermediate negative to lighten the final print.

Finally, contact print the intermediate negative in exactly the same way to make the finished positive print.

THE FIRST POSITIVE PRINT

The best initial positive prints for this technique are soft in contrast and fully exposed, so there is plenty of highlight detail. Unless you photographed the original subject in very flat lighting, you'll get optimum results by making the initial positive print with a MULTIGRADE #0 or #1 filter.

To see where retouching is necessary, place the print face down on a light-box, or hold it up against a window. You can check the process of retouching from time to time by contacting another paper print from it. If you go too far, you can always make another interpositive and start again. The original negative will still be as good as new.

MULTIGRADE RC papers are particularly suitable for making paper negatives, because their resin coating hides the fibrous nature of the paper. Uniform areas of light tone such as sky may still show a little unevenness, but not the strong mottling effect that is apparent when a fiber base print is used as a paper negative.



Step 1: Original Positive Print, 4 sec., #2 filter.
(22 sec. to expose negative at f5.6, #2 filter.)



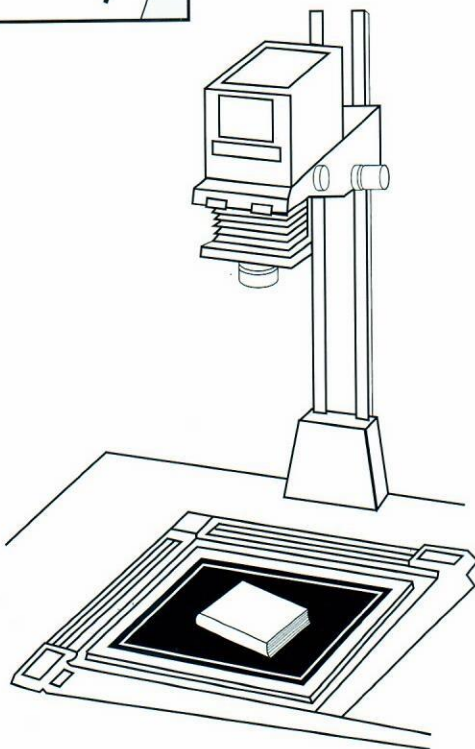
Step 2: Paper Negative

Step 3:
Print from Paper Negative.



CREATING BLACK BORDERS

A black border often enhances a print, and does not involve any sort of mounting or overlay. The easiest way to produce narrow black borders is to rule them with a pen: an India-ink pen gives the most solid line, but solvent based ink markers are much less expensive and almost as good.



For slightly wider black borders, use a narrow, self adhesive strip, which is available from graphic arts suppliers. This tape is supplied in dispensers in various widths—not only in black, but also in white and in colors. The tape provides borders of consistent width, with clean edges and sharp corners.

PRINTING BLACK BORDERS

If you want wide black borders, it's best to produce them by fogging the paper with light from the enlarger.

Place a sheet of paper in your print easel so that a strip the width of the borders you want is covered on all four sides. The area remaining in the center is the picture area. You now need to cut a piece of cardboard to exactly fit this area. The easiest way to do this is to put a sheet of cardboard underneath (slightly larger than the exposed area) and draw around the opening with a sharp pencil. Then remove the cardboard and cut it carefully to size, making sure that the edges are perfectly straight and the corners neat.

Then when you're ready to print, put a piece of paper into the print easel, put the rectangle of card in place, place a weight such as an unopened can of soda onto the card and adjust the blades of your easel to the width of the black border required. With no negative in the enlarger, and using a MULTIGRADE #5 filter, expose for the shortest possible time that will produce a solid black. The time required depends on print size, enlarger type and lens aperture, so you'll need to make tests before you start.

Having exposed the "borders", re-adjust the blades of the easel to the card, remove the card and print your picture in the central area of the paper.

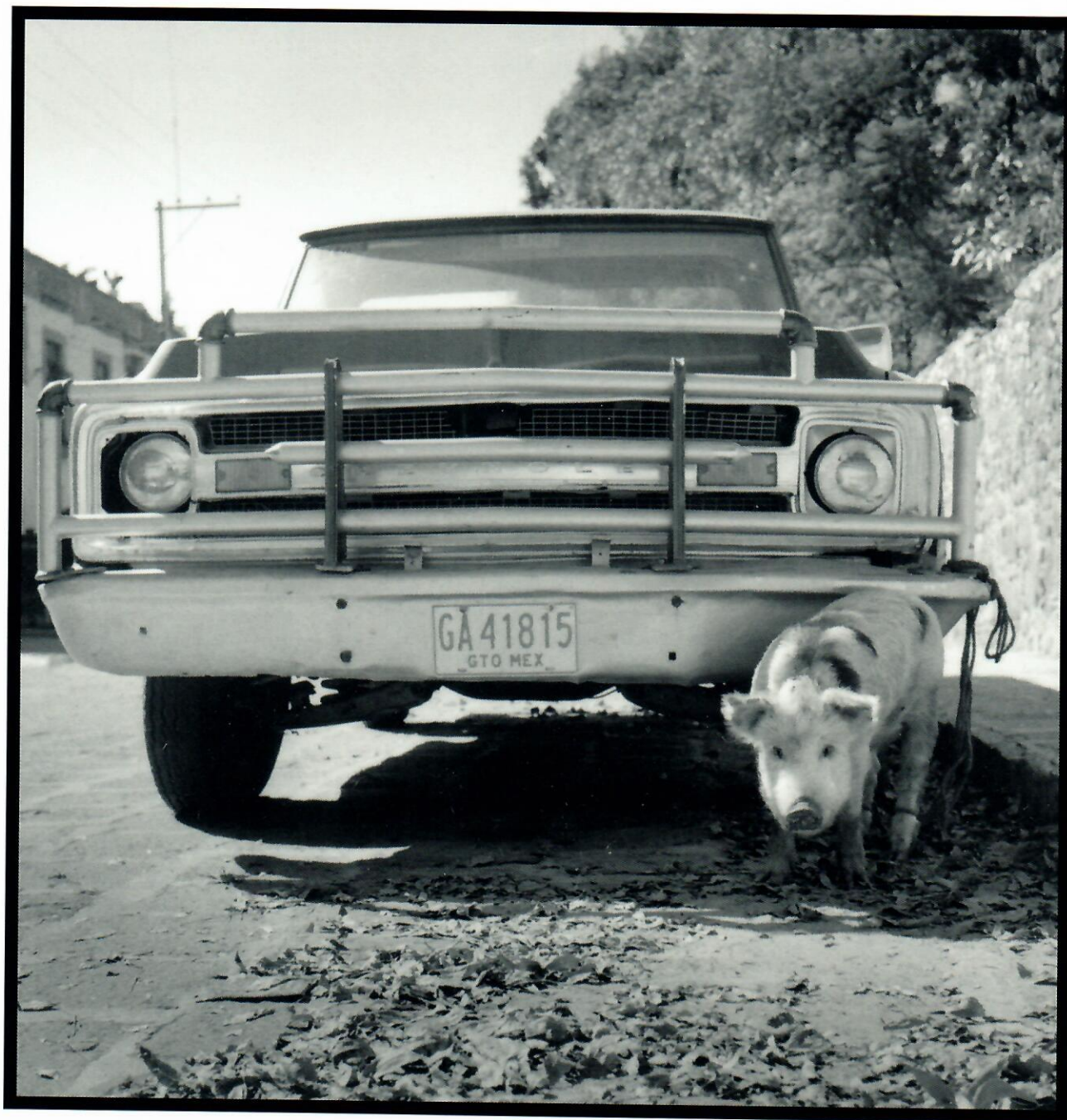


Photo © Mike Bain

TONING

One advantage to using black and white photographic papers is that they can be toned. Toning changes the color of the silver and is used not only as part of a protective processing sequence, but also as a purely artistic statement. All prints that are intended for display should be toned. Both resin coated and fiber base black and white papers are easily toned. The degree of color change however, is very dependent on the paper being used. Of the ILFORD MULTIGRADE papers, MULTIGRADE WARMTONE FB or RC offer the best toning characteristics.

SAFETY FIRST

The processes mentioned here suggest the use of certain substances and/or proprietary chemical preparations. Before using these materials, please obtain the Material Safety Data Sheets appropriate to them. These sheets are available, free of charge, from the suppliers of the chemicals.

Please read the safety data sheets carefully, and observe the safety precautions within them. In the absence of any specific safety precaution you should always:

- ✦ Work in a well-ventilated area.
- ✦ Wear safety goggles and gloves when handling chemicals.
- ✦ If you feel you have come into contact with the chemicals and feel unwell, seek medical advice and take the chemical container with you.
- ✦ Never eat or drink while handling chemicals.
- ✦ Never smoke in the darkroom or while working with toners.

The Toners

The most widely used toners fall into four broad categories:

DIRECT SULFIDE TONERS

These are single solution toners which act on the image directly to convert it, partially or completely, to silver sulfide.

Commercial toners such as Agfa Viradon or Kodak Brown toner are both alkaline solutions of polysulfides and fit into this category. Hypo-alum toners work in a similar way but are not widely available commercially prepared. These toners can be used at room temperature but they act very slowly, taking up to 30 minutes to reach completion. This time can be shortened considerably by raising the temperature to 100°F. Unfortunately, the foul smelling toning solution is even more unpleasant at higher temperatures. Direct sulfide toners work well with MULTIGRADE FB WARMTONE paper. These toners have the advantage that toning can be stopped when the desired color is reached. Partially toned prints can also be further treated in other toners to produce various other special effects. The colors you can achieve with these toners range from light brown to dark brown.



Photo © Barbara König

INDIRECT SULFIDE TONERS

Indirect sulfide toners use a two-step bleach and re-develop process to convert the silver image, either partially or completely to brown silver sulfide. Nearly all the so-called "sepia toners" on the market fall into this category.

The bleach is usually a ferricyanide bromide type which converts the silver image to silver bromide. The darkening (re-developing) bath used is usually a solution of sodium sulfide. Kodak sepia toner uses this type of re-developer. However, this solution has a very strong smell and most people now prefer to use the odorless toners. These use an alkaline solution of thiourea to convert the silver bromide image to silver sulfide. Apart from being odorless (a real plus!) they also have the advantage of allowing the resulting image color to be adjusted by controlling the pH of the second bath. The pH adjustment is achieved by adding more or less sodium hydroxide solution to the second bath. More additive gives a colder image tone, less additive gives a warmer image tone. These so-called variable warmth toners work well with all the ILFORD papers but a larger addition of the hydroxide solution is required with MULTIGRADE WARMTONE papers to stop the image tone from becoming too yellow.

The sulfide sepia toners and non-variable warmth thiourea toners work well with ILFORD MULTIGRADE WARMTONE papers. The colors you can achieve with these toners range from yellow brown to rich chocolate brown.

Prints toned in sepia toner can be further toned in blue (iron) toner to give a green tone or, if only partially bleached, a blue/green/sepia split tone. They can also be treated in a gold toner to produce an orange-red image.

Sulfiding Or Darkening Solutions

The solutions normally used in bleach and re-develop sepia toning are either a 1–2% solution of sodium sulfide or an alkaline solution of thiourea. Both of these need very careful handling. Thiourea is a powerful fogging agent and great care should be taken to avoid any contamination. Sulfide solutions give off hydrogen sulfide gas, which has a very offensive odor. High concentrations of the gas may be toxic and can also act as a fogging agent. (See Safety First, page 40.)



SELENIUM AND GOLD TONERS

Selenium toners are single solution toners that partially convert the original silver image to silver selenide. The degree of toning can be varied by changing the toning time or solution dilution. MULTIGRADE WARM TONE papers are very responsive. Treatment at higher dilutions (1+10, 1+20, etc.) gives a slight cooling of the image tone and shift in hue towards red. Used at lower dilutions (1+3, 1+5, etc.) a purplish brown can be achieved.



Most commercial gold toners are single solution toners which, when used on their own, shift the image color of a print to a blue black. However, they are often used in combination with a sepia toner to produce an attractive orange-red color.

SELENIUM AND SAFETY

Always take extreme care when using selenium toner. Be sure to obtain Material Safety Data Sheets from the manufacturers. Wear gloves and goggles, and never heat the solution, as the fumes it gives off are poisonous.

Selenium is as hazardous to wildlife as it is to human health, and in many areas it is illegal to dispose of spent toner by pouring it down the drain.

Before using selenium toner, contact your local water authority for advice on safe disposal of selenium toner residues.

METAL TONERS

These toners, usually single solution, convert the original silver image to the ferrocyanide salt of a transition metal.

A number of metals can be used but only those based on iron (blue) and copper (red) are commercially available. These toners can produce very vivid colors and work well with virtually all types of photographic paper. When using a blue toner, it is recommended that the highlights are cleared in a 10% sodium chloride solution.

BLUE TONING

Blue toning darkens the print slightly, so start off with a lighter print than you would normally make.

With the right subject, blue toning can look spectacular. The most obvious examples are seascapes and frozen winter scenes, but use the effect sparingly.

There are many brands of blue toner readily available from photographic dealers.



Mix the toning solution as instructed, pour it into a tray and immerse your well-washed and still wet print. It will begin to turn blue quite quickly. When the depth of color you want has been reached, transfer the print quickly to a weak solution of stop bath, such as ILFORD ILFOSTOP diluted 1+40. This will clean up unwanted blue in the highlight areas. Wash and dry the print as usual, but do not use heat for drying as this will greatly reduce the blue color. Over-washing also reduces the intensity, and this can actually be a useful way to remove blue stains from the print's highlight areas.

SPLIT TONING

By carefully controlling the toning process, or by only partially bleaching the print, you can use sepia toner very subtly. You can warm up the black of MULTIGRADE, or perhaps tint shadows and highlights a different color.

Partial bleaching before sepia toning is the easiest technique: just dilute the bleach with water to reduce its activity. Bleaching continues even after you start washing the print, so remove it from the solution while the image is still slightly too dark. If you then sepia tone the print, the warm hues will be more visible in the highlights than in the shadows.

Toning the print again in blue toner can produce an unusual duo-tone blue/brown print. You can use prolonged washing to control the density of the blue tints.

WASHING AFTER TONING

Some toners contain thiosulfate (Kodak Rapid Selenium and Polytoner and hypo-alum) and need a full wash after toning. With fiber papers the use of a wash aid is advisable. Some other toners (blue being the most common) produce images which are slightly soluble in alkaline tap water so wash times should be kept as short as possible.

DRYING

Heat drying should be avoided with toned prints as there is often a loss of color.

RELATIVE TONING RESULTS ON ILFORD MULTIGRADE WARMTONE PAPERS*

TONER	DILUTION	IMMERSION TIME	COLOR
Fotospeed Sepia ST20	Standard + 30ml Additive	Standard	Greenish Brown
	Standard + 75ml Additive	Standard	Warm Brown
	Standard + 100ml Additive	Standard	Slight Yellow Brown
	Standard + 75ml Additive followed by Tetenal Gold Toner	Standard	Reddish Brown
Kodak Sepia Toner	Standard	5 min. / 3 min.	Yellow Brown
Agfa Viradon	1+50	3 min.	Cold Brown
	1+50	5 min.	Medium Warm Brown
	1+50	10 min.	Chocolate Brown
Berg Brown/Copper Toner	Standard	30 seconds	Warm Brown
	Standard	60 seconds	Reddish Brown
	Standard	120 seconds	Brownish Red
Kodak Rapid Selenium Toner	1+9	5 min.	Cool Neutral
	1+5	5 min.	Purplish Neutral
	1+3	10 min.	Reddish Brown
Fotospeed Blue Toner BT20	Standard	5 min.	Deep Blue

* Results on neutral toned MULTIGRADE IV RC and MULTIGRADE IV RC PORTFOLIO will be slightly different due to differences in base and image tone. Make tests to determine the color you need for your prints.

Printing and Processing Pointers for Better Toning

EXPOSURE

Some toners intensify (blue, selenium etc.) while others reduce density (sulfide toners [direct and indirect] and most dye toners). It is often necessary to adjust print densities to compensate for these effects. When using a variable warmth sepia toner formulated to give a very warm image tone, the density and contrast loss can be considerable. Prints intended for brown/sepia toning should be made slightly darker and higher in contrast. Selenium toning increases contrast slightly and deepens shadows so underexposing prints which will be selenium toned may be desirable. Toning causes subtle changes. Keep an extra untoned print nearby for comparison purposes.

DEVELOPMENT

It is most important that prints are always fully developed. In fact, with brown/sepia toning, overdeveloping by about 50% is a good way to obtain the slight extra density required.

STOP BATH

This is essential to prevent uneven development which is often much more apparent after toning.

FIXING

This should be thorough to prevent staining. One- or two-bath fixing can be used and hardening fixers are not recommended. Hardeners will impede not only fixing and washing but toning as well.

WASHING

This should also be thorough as many toners react with residual thiosulfate to produce staining and/or bleaching. Exceptions are hypo-alum toner and Kodak T21 Gold toner which can be used with a short wash after fixing.

RETOUCHING MULTIGRADE PAPER

Once you have created a print you are proud of, you need to take great care at the print finishing stage. Exhibiting a poorly finished print is probably worse than showing one that is completely unretouched.

There are two main reasons for print finishing: one is to remove dust spots and the marks left by small hairs which were present in the enlarger at the printing stage. These show up as white spots or lines on the print, and the process of removing them is called spotting. The second reason is to sharpen contours or remove small areas of distraction—or even to remodel the entire print. This is called retouching, and normally only professional retouchers attempt it. However, practicing with a scrap print can be fun, and you may become sufficiently accomplished to retouch your own prints.

SPOTTING

It is important to choose a good retouching medium: Spotone is probably the best available. This is a non-opaque dye which, when applied to the print, is readily absorbed by the emulsion leaving no tell-tale marks.

Spotone comes as a pack of three or six different colored inks: Olive Black, Neutral Black and Blue Black plus 1, 2 and 3. The manufacturer recommends mixing the dyes in exact proportions according to the paper you are using. Depending on the developer and contrast of the paper used, you may have to adjust the color of the dye. Practice makes perfect.

Take a clean white saucer and a 0 or 1 sable hair brush; add four to five brushfulls of ink. Rinse the brush thoroughly and blot until almost dry. The brush should be kept moist throughout spotting. Dab the brush. Lift a small amount of ink and dab onto a clean area of the saucer until you achieve the required tone, or a slightly lighter one. Now carefully dab the print with the brush to try and recreate a grain pattern. You will achieve better results with two or three thin coats than with one heavy one.



To help accommodate the various image colors produced on ILFORD papers such as ILFORD MULTIGRADE WARM TONE, this alternate spotting method can be used.

Purchase an inexpensive 8"x10" glass picture frame. Remove all unnecessary packing materials so that only the glass, frame and backing remain. Tape an old print onto the glass making sure the back (white) touches the glass. Place two drops of each Spotone dye on a portion of the glass. Let dry and place the glass in the frame. Mark the back of the frame with the corresponding dye. Using distilled water mixed with a wetting agent, wet your brush, lightly dry the brush and add one or two brushfulls of the gray (#1, 2 or 3) that matches your image color closest to an "empty" area of the glass. Rinse the brush thoroughly and blot until almost dry. Add as much of one of the "colored" dyes (B, O or S) to your "base" gray to match the color of your image. Use the method shown above to add the dye to your print. After letting it dry, put the back on the frame and store for future use.

Careless processing or bad storage causes scratches or pinholes in the negative which appear as black lines or spots on the print. You can cut out these marks from a damp print, and then retouch the white area, but even the sharpest knife leaves a conspicuous cut in resin-coated paper. Instead you may prefer to use one of these two methods.

You can retouch large marks on the non-emulsion side of the original negative using photo-opaque. This will leave a white mark on the print, which you can retouch in the normal way.

Alternatively, use Spotoff. This is a bleaching solution which removes the black mark on the print itself, again leaving a white area to be retouched with brush and ink.

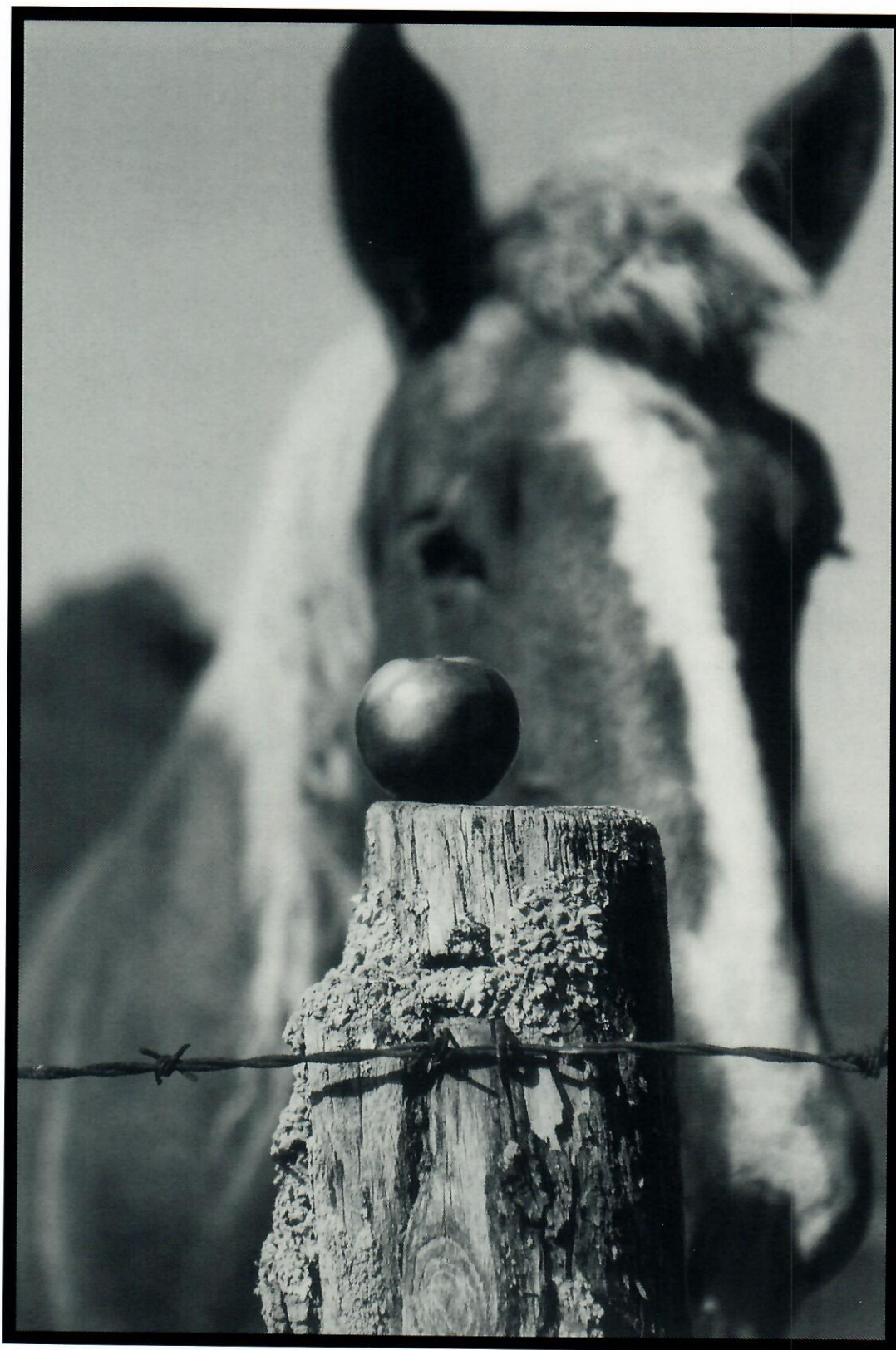


Photo © Donna Foster

PRINT FINISHING

RC PRINTS

MULTIGRADE RC prints are very easy to mount, as long as you remember that the paper base of the print is enclosed between two sheets of non-porous polythene. You should therefore not use adhesives that rely for their effect on the evaporation of a solvent. ILFORD recommends the following methods of mounting.

SPRAY ADHESIVE

These vary: some are permanent, others, repositionable. Follow manufacturers' instructions carefully, and work in a well-ventilated area. Take care to prevent the spray from drifting onto the print surface, or onto the mount, as it stains and is hard to remove.

DOUBLE-SIDED ADHESIVE SHEETS

These provide an effective and convenient method of mounting MULTIGRADE RC prints onto porous or non-porous surfaces. Several types are available in sheet or roll form.

DRY MOUNTING

If prints are to be mounted for long periods (a year or more), this is the best method, though it requires a dry mounting press. With glossy papers use a foil overlay to prevent the press from marking the print surface. Use silicon release paper to protect satin and pearl prints in the press. Although you should always follow the instructions for the press and tissue, most tissues give good results at a temperature of 175–195°F for about 30–40 seconds.

BACKWRITING AND STAMPING

The back of MULTIGRADE RC papers is treated to accept pencil, most ball-point pens, non-water-soluble fiber-tipped pens, fast-drying stamp pad inks and all printing inks formulated for polyethylene printing. Many users photocopy onto the back of prints, but ILFORD does not recommend this practice as it can damage the print or the copier.



Photo © Gregory Ford

Follow these rules for back-stamping:

- ⇨ Use an ink with a rapidly evaporating solvent.
- ⇨ Add solvent as well as ink to the pad to prevent clogging.
- ⇨ Don't over-ink the pad.
- ⇨ Make the first impression onto a blotter to absorb excess ink.
- ⇨ Close the lid of the pad when not in use to prevent it from drying out.

FIBER BASE PRINTS

ILFORD MULTIGRADE FB prints are often used for gallery, museum and long-term storage. It's important to choose the correct mounting materials to keep the components within "archival" specs.

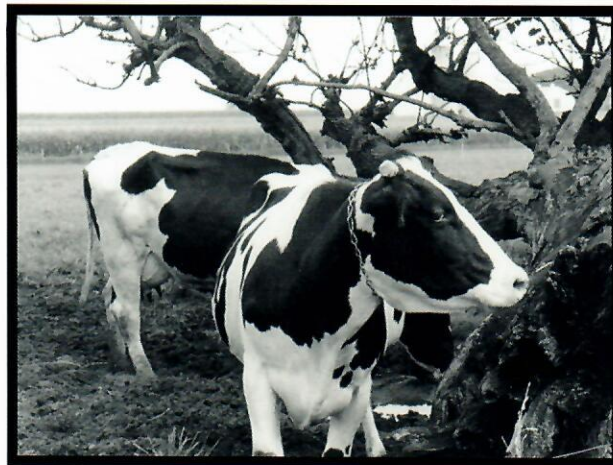


Photo © John Placko

MOUNTING PRINTS

The following methods are used for fine print display:

DRY MOUNTING

This technique is convenient, fast and clean. It provides a permanent bond between print and mount. The procedure itself is straightforward, but there are certain points to be conscious of when using this method.

It is essential that both print and mounting board be dry. This can be easily ensured by placing both print and board in the mounting press for a few seconds prior to tacking on the tissue and mounting.

The choice of dry mounting tissue is important when mounted prints are required for long-term use. The dry mounting tissue should be of neutral pH and the process should ideally be reversible (i.e. it should be possible to remove the print from the mount at a later date without damaging the print in any way).

The best assurance that mounting tissue is of acceptable quality is to use a product certified by its manufacturer to meet ANSI Standard PH4.20-1958.

It is also very important that the board selected be 'acid-free' and 100% rag. The best assurance that the mounting board is of acceptable quality is that it be certified by its manufacturer to meet ANSI Standard PH4.20-1958.

Cleanliness of the work area and meticulous handling techniques are also essential. Even the tiniest particle of dust or dirt trapped between print and mounting board will be seen as an unsightly and permanent lump on the print. Board, tissue and print should always be carefully cleaned before mounting.

One final point. Prints should not be subjected to heat in the press for longer than necessary or at a higher temperature than recommended by the tissue manufacturer. 20 seconds should normally suffice at temperatures between 175°F (80°C) and 195°F (90°C). Excessive time and/or higher temperatures will cause the print to undergo a mild form of accelerated aging.

MOUNTING FOR MUSEUM OR GALLERY DISPLAY

For museum or gallery display, most photographers prefer the use of museum mounting corners (acid free "corners" hand made or purchased from suppliers of archival materials) to affix the print to the substrate. Archival mounting strips can also be used. Check with companies specializing in archival products for details. Mounting corners or strips hold the print to the backing board, allowing the print to be removable, which is a requirement of most galleries and museums.

ILFORD may modify its products from time to time and consequently the information given in this publication is subject to change without notice.

All ILFORD products referenced in this brochure are ILFORD trademarks. ILFORD product names are trademarks of ILFORD. Other brand and product names are trademarks of their respective holders.

Photo © Wendy Erickson for the following pages: 4, 5, 13, 15, 17, 19, 20, 21, 23, 30, 31, 32, 33, 35, 37.

Photo © Tillman Crane, inside cover pages.

ILFORD Imaging USA Inc
West 70 Century Road
P.O. Box 288
Paramus, New Jersey 07653
(201) 265-6000

ILFORD Imaging Canada Limited
361 Steelcase Road, Unit #4
Markham, Ontario
Canada L3R 3V8
(905) 479-2555

www.ilford.com

Printed in U.S.A.

Catalog #192 7328
KD 10M 12/98





Photo © John McNamara