

# Photographic **LAB** **HAND** **BOOK**

**JOHN S. CARROLL**

**AMPHOTO**

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## MASTER INDEX TO THE PHOTOGRAPHIC LAB HANDBOOK

On the following pages is an overall index covering the contents of the entire *Photographic Lab Handbook*. This is intended to aid the owner of this volume to find the material he desires without a good deal of searching through the various sections and their indices. To avoid unnecessary duplication, as well as to obviate the need for frequent revisions and updating, this index omits listings for the individual film and paper data pages; to find the data page for a given film, the reader should refer directly to the sectional index in question. Thus for data page on a given black-and-white sheet film, see the index to Section BWF; for a color film data page, check the index to Section CF; for motion picture films, see the index to Section MPS. If, however, a given film has an extended discussion in addition to its data page, then that film will also be found listed in this *Master Index*, as well as in its appropriate section index.

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## **INTRODUCTION**

This volume, the first completely new photographic data book in more than 25 years, is offered to the photographic community to fill a long-felt need. The idea of a master data service is, itself, not new — several are offered, most by manufacturers of photographic products.

The problem is simply that the average photographer does not limit himself to the products of one manufacturer, and when he has to refer to data sheets, and pamphlets issued by the various manufacturers, he finds himself in at least one dilemma. Namely, the format used by different manufacturers differs, and data is offered in a variety of forms, arrangements, and even, in some cases, using different systems of measurement. Film speeds are given in ASA by American manufacturers; foreign makers use BSI, DIN, and sometimes others. Developer formulas make up to quarts, liters, and in some cases, British Imperial pints.

So, then, the first purpose of this volume is to standardize the presentation of photographic information; to make it completely comparable. This is not entirely new, either; it has been done before, with varying degrees of success.

More important, in terms of purpose, is to be sure that the information offered is in such form as to make it easiest to refer to. A book which over-classifies is as bad as one which is insufficiently classified. It should not be necessary to turn pages a dozen times while looking up information on a given make or type of film. One should not have to refer to one section of the book to find the speed of a film, another section for filter factors, a third for flash guide numbers, and a fourth for developing data. This approach may be useful in an encyclopedia, but not in a workbook for practical photographers.

Thus the first and most important difference between this book and all others is that the basic information required by the photographer for any and all sensitized materials is conveniently grouped, mostly in tabular form, using just a single page for each film, plate or paper. If, for instance, you wish to find out how to work with Kodak Plus-X Sheet Film, you will find a data page devoted to this one film; on this page you will find its film speed (ASA), the recommended safelight for loading and processing, a table of filter factors, a table of flash guide numbers, a table of guide numbers for electronic flash, and a table giving the developers recommended.

Manufacturer sections, as such, are neither used nor required. The second section, logically, is devoted entirely to black-and-white films, which includes both sheet, roll films, and 35 mm. films.

The third section, arranged in much the same manner covers all the commonly used color films, mainly of American manufacture. Although it might be of some value to the curious to read the data for such minor foreign products as Telcolor, Orwocolor, and so on, we feel that this book is intended for the serious worker, amateur and professional, who wants useful useable information. There is little use in cluttering pages with data about products which can't be bought anyway.

Again, the fourth section is arranged in much the same order; it contains data on all commonly used photographic papers for black and white photography, and a standardized format has been devised so that everything you need to know to use a given paper will be found on a single data page.

As we mentioned previously, each data page contains processing recommendations for that particular film, plate or paper. But these recommendations are only for time of development for one or more recommended formulas. The broad subject of processing is covered in the following two sections.

The section on processing black-and-white films opens with a general formulary; it contains formulas for mixing developers, stop baths, fixing baths, and incidental formulas such as intensifiers, reducers, toners, and so on. This formulary has been very strictly edited; the huge proliferation of published formulas could result in this section running into hundreds of pages, most of them devoted to material of very dubious utility.

The fact is that there has been a very notable change in the entire philosophy of black-and-white photography in recent years. It is now generally appreciated that image characteristics are mostly "built-in" to an emulsion; most of them are almost unaffected by variations in the composition of a developer. With this appreciation, the entire subject of "fine-grain" processing, so popular only a few years ago, has now ceased to have any meaning or even interest. If you want fine grain, you must use a fine grained film; the developer composition has next to no influence on graininess. However—and this is important—the *use* of the developer does have some effect on grain; generally the higher the contrast of the developed image, the grainier, and likewise, the higher the density, the grainier. It is this reasoning that leads to current recommendations for low-gamma processing combined with minimum exposure. The former keeps the contrast down, the latter minimizes density, and a soft, thin negative has the finest grain structure possible with a given emulsion.

Actually, the huge number of negative developer formulas available never did serve any really useful purpose. It has become more and more evident in recent years that this multiplicity of formulas was really only a large number of variations on combinations of a few basic chemicals. The only function of a negative developer is to reduce the exposed grains of silver halide to a metallic silver image, and these hundreds of formulas merely represent many different ways of arriving at the identical end result. If a developer is chosen according to purpose and format, it is obvious that one or two developers for miniature films, a couple for roll films, and two or three for sheet films are all that is really necessary—the remainder merely make for confusion.

On the other hand, there is ample justification for a variety of developers for black and white papers. Variation in formula in the case of papers *can* have the effect of producing a variety of effects, mostly connected with the image tone or color of the silver deposit. On the other hand, paper emulsions always

develop to maximum contrast and there is almost no way in which variation of a developer formula can change the contrast of the final image.

Nonetheless, the number of useful formulas is still limited, and furthermore, there are few photographers today who will waste the time required to mix a developer from its basic ingredients. Many of them merely buy the packaged versions of the same developers—thus the familiar Kodak D-76 Developer is available in packaged form, and all that is required is to mix it with water. Many other numbered formulas are likewise available in ready mixed form. In addition, all the major manufacturers have trademarked developers for which the formulas are not available; examples are GAF's Hyfinol, Kodak's Polydol and Microdol-X, Agfa's Rodinal, and Dupont's 16-D.

Some photographers prefer to use packaged developers made by firms which do not manufacture films, and certain of these products are very popular indeed. For this reason, we have chosen a representative selection of such packaged developers and have given practically complete instructions for their use in this section.

One thing which the reader will find absent in this section is the subject of gamma and contrast index. The reasons for this significant omission are given below, under the appropriate heading.

Corresponding to the section on Black and White Processing is the following section on Color Processing; here, however, no formulas are given since none are available. Instead, we show, in highly condensed form, the recommended procedure for processing those color films and color printing materials, in the appropriate kits supplied by the respective manufacturer. This is necessitated by the fact that color films are still the subjects of patents. Since no two of them can be alike, it follows that each color film or printing medium can be processed only in its appropriate developers. Attempts at processing a color film of one manufacturer in the formulas of another will result only in total failure, and for this reason, no general procedures can be given at this time. With the instructions for the processing of color printing materials will be found some general data on the making of color prints, by reversal from transparency materials, and by straight printing from color negatives. Such processes as trichrome carbro, wash-off relief, etc. are substantially obsolete, and there is no good reason to include such material in an up-to-date manual; all of these antiquated processes are therefore omitted.

Up to this point, the book has been devoted to products and how to use them. The remaining three sections differ in that they contain more general information, useful to photographers in their work, but not necessarily referring to any specific product.

The section on Motion Pictures and Slides covers mainly the mechanical details, often needed and somehow difficult to find when needed. The size and shapes of the actual film formats — image areas, as photographed and projected, for 8mm, Super 8, 16mm, and 35mm, as well as for 2 x 2 and full size slides, are given followed by projection tables for all these different formats. Data on screens and their use, audience arrangements, etc. are given. There is a special discussion on standards for single frame filmstrips; these are widely used in education and industry.

The section on Optics contains, as might be expected, the usual tables and formulas for the use of lenses, calculation of relative aperture and effective aperture, and the use of supplementary lenses for closeup work. However, this section is entirely new in one respect: it contains a discussion of elementary lens design, which leads into lens aberrations, their evaluation and relative

importance. There is a short discussion of computer designed lenses and the significance of computer design to the working photographer. Reference is made to resolving power, the newer concept of acutance, and methods of lens testing.

The following section is a general data section, containing information which is less directly related to photography, but of considerable value to the working photographer. This includes tables of weights and measures, metric conversions, thermometer scales, specific gravities, and other general information.

Photographic tables in this section include several for flash-lamp exposures, a table of film speed conversions, and others. General discussions are included covering such matters as reflected-light, incident-light, and spot-type exposure meters, and the special problem of the built-in exposure meter. There are also tables of filters, darkroom safelights, color temperatures of light sources, and other useful information.

The final section is one on Graphic Arts Materials; like the sections on black-and-white, color, and motion-picture films, it is largely composed of data pages for the particular types of films and papers used in the photomechanical trades. The purpose of this, however, is not to supply data for the use of engravers and lithographers; the presence of this section recognizes that the creative photographer, in his search for exotic effects, often makes use of materials not originally intended for general photography. Therefore, the materials listed, and the data supplied for them, are those which the general photographer would find most useful, and information on their use in photomechanical fields (such as, for instance, exposures through halftone screens) is kept to the minimum.

The section concludes with some directions for the carrying out of procedures having considerable creative potential; equidensity production with Agfacontour film, the making of Tone-Line positives, and the use of color proofing materials for special types of prints, are covered at some length.

## **Page Numbering And Indexing**

The page numbering of this book represents a completely new approach to the problem of handling a publication in sectional form.

You will notice that the pages of each section are numbered from page 1, and the pages of the various sections are distinguished by a prefix of two or three letters. Thus, the pages of this introduction are numbered from IN-1, IN-2, and so on. The section on black-and-white films is numbered from BWF-1, BWF-2, and so on. The same applies to all the other sections, and in all cases, the prefixes are self-explanatory.

The choice of this system of numbering was arrived at after examining a number of different books in this format. It was obvious from the beginning that straight-through numbering, as in an ordinary book, would simply not do; it makes it impossible to revise a complete section without badly upsetting the numbering sequence. On the other hand, a decimal system, such as numbering the pages of Section 1 from 1-00, 1-01, etc. Section 2 from 2-01, 2-02, etc. while workable, makes for clumsy indexing, and in addition, the number gives no idea to the reader of what information might be contained on a given page.

That is, a page numbered CF-5 necessarily refers to Color Films, whereas if the same page were merely numbered 3-05, one would not get any idea of content, only of location.



The adoption of this system of numbering goes hand in hand with another step forward in books of reference. In general, when a book of several hundred pages has to be indexed by subject and there are a number of subjects on each page, the overall Index becomes bulky and difficult to use. In some extreme cases, it has gotten to the point where the average reader is unable to locate things altogether.

The unique "data page concept" around which *Photographic Lab Handbook* is built, reduces the indexing problem to one of manageable proportions in one simple step. Since all necessary data for any given film are to be found on a single page, and since it is no longer necessary to refer to one section for exposure data, another for illumination information, a third for filters, and a fourth for processing times, there is no further need for a great many index entries for a single film.

Then, since the book is divided into sections for black-and-white films, color films, motion-picture films, photomechanical films, and photographic papers, a further simplification has been made. Each section is separately indexed, and all entries for specific data pages will be found in the sectional indexes. These listings are not duplicated in the *Master Index*, since it is obvious where they are to be found, and the reader can refer directly to the index for the section in question. Thus the bulk of the *Master Index* is reduced to a mere 10 pages or less.

The presence of the *Master Index* as well as Sectional Indexes does not mean that the reader must necessarily look up each item twice. In most cases, because of the logical arrangement of the volume, it is not necessary to refer to the *Master Index* at all. Section BWF covers black-and-white films; if data for such a film are desired, one can go directly to the index for that section. The same applies to Section CF; if color film information is needed, and to Section PP, if one wants to find data on a given photographic printing paper. Only when material other than film or paper data is required, is it necessary to refer to the *Master Index*, and in most cases, then, the *Master Index* will pinpoint the item directly. In a very few cases, such as formulas for developers and other processing baths, the *Master Index* will list a group of pages and the desired formula will most likely be found within this group. To eliminate even this small amount of searching, though, the reader can refer directly to the Index for Section BPR or CPR.

## Gamma And Contrast Index

For many years, a great deal of emphasis was placed on gamma as a measure of development contrast, and some of the discussion of the subject tended to generate more heat than light. Photographers tended to use gamma in many incorrect ways: often as a measure of negative contrast or in various attempts to relate the subject contrast, negative contrast, and paper exposure scale into one homogeneous "system." Many such systems have been proposed, few have survived.

The reasons for the failure of these diverse systems are various, and we should like to clear up the numerous misconceptions that led to some proposals, as well as to evaluate those that show some promise. We cannot, in the limited space available here, explain the fundamentals of sensitometry or do any more than to define gamma as "the slope of the straight line portion (correct exposure portion) of the characteristic curve." For further explanation