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Kodak

ADVANCED
DATA BOOK

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KODAK
PHOTOGRAPHIC
PAPERS

KODAK PHOTOGRAPHIC PAPERS

This book is presented to help you understand photographic papers, select them appropriately, and use them well. In it, you will find an explanation of their properties and of the many factors involved in print excellence.

The best papers in the world don't produce top notch prints unless they're processed carefully, so a section has been included to outline step by step the print processing operations that give best results.

The characteristics of some individual Kodak papers are described in the Data Sheet Section of the book. Since printing color negatives has become so important, information about such products as Kodak Panalure Paper and Kodak Ektacolor Paper is also included in the Data section.

Other Kodak booklets describe the actual techniques of printing, as well as such related subjects as toning, ferrotyping, finishing, mounting, and various print-control methods. These booklets (listed below) are available from your Kodak dealer.

Developing, Printing, and Enlarging (Elementary)
Enlarging in Black-and-White and Color (Intermediate)
Professional Printing with Kodak Photographic Papers (Advanced)
Printing Color Negatives (Advanced)

KODAK PHOTOGRAPHIC PAPERS

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KODAK PHOTOGRAPHIC PAPERS

THE NATURE OF PHOTOGRAPHIC PAPERS

● In the early days of positive-negative photography, printing was rather simple. Simple, but severely limited. It was limited to contact prints, to negatives of proper contrast, and to just a few paper surfaces. Papers were erratic, too, from batch to batch.

The limitations of the simple "good old days" have been overcome. Excellent prints are now made by enlarging on fast papers. Excellent prints are made from negatives differing widely in contrast on papers engineered for the purpose. The present wide choice of tone ranges and surfaces in photographic papers allows prints well suited to subject matter and intended use.

Progress brings complexity. Today's papers would bewilder our photographic forefathers. They can bewilder you, too, unless you know something about the technology concerned. We have tried here to present just enough of that technology. You should know about the speed and contrast of papers, which we will describe under "photographic properties." You also need to know about surfaces, color of image, etc, described under "physical properties." While the following pages may seem a bit involved, we hope you will read them carefully in the interest of making excellent prints.

PHOTOGRAPHIC PROPERTIES

The photographic emulsion is usually made of light-sensitive silver salts suspended in gelatin. The chemical composition of the silver salts, the way they are formed, and the addition of special agents determine the paper's speed (sensitivity to light), printing grade, and image tone. The silver salts most often used are silver chloride and silver bromide. Silver chloride is less sensitive to light than silver bromide, so it's often used in slower papers. It also produces an image composed of smaller particles, which means that papers having a predominantly silver chloride emulsion can usually be toned more readily than silver bromide emulsions.

Speed doesn't depend only on the type of halide used. Many manufacturing controls are used in adjusting emulsion speeds. One such control is the use of dyes which give sensitivity to various parts of the

spectrum. These dyes are used, for example, to obtain a desirable speed relationship among the printing grades of several papers.

SENSITOMETRIC CURVES

As photographic paper is exposed to increasing amounts of light, it produces more and more density. This can be shown as a curve by plotting the reflection density of the developed image against the logarithm of the exposure. Such a curve is called a "D-log E curve" or a "sensitometric curve." Logarithmic values are used because the human eye tends to respond logarithmically rather than arithmetically to different intensities of light.

The graph below shows typical D-log E curves for the six different grades of a family of Kodak papers, all having a glossy surface. The maximum density tends to be the same for the different grades if the surface is the same, but the rate at which density increases with exposure is seen to be least for the grade 0 paper and greatest for the grade 5 paper.
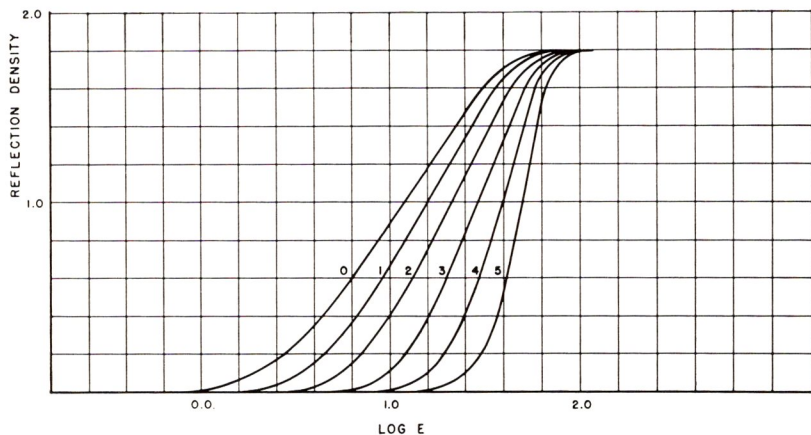
Sensitometric curves which represent approximately the characteristics of Kodak papers having a glossy surface.

Papers having semimatte or matte surfaces usually give sensitometric curves which are similar to those shown for the glossy papers, except that the maximum densities of the semimatte and matte papers are lower. If the curves for a grade 2 glossy paper, a grade 2 semimatte paper, and a grade 2 matte paper, all of the same emulsion type, are compared, they usually will be found to be similar to those shown in the next illustration.

EXPOSURE SCALE AND SCALE INDEX

The various printing grades of a paper need different ranges of exposures to produce the full scale of tones from white to black. The term "exposure scale" is used for the ratio between the exposure needed to give the faintest useful highlight tone and that required for a full black tone. Thus, a paper with an exposure scale of 1 to 20 will just reproduce all the tones in a negative in which the thinnest part of the image passes 20 times as much light as the densest part. Logarithmic units are usually used for expressing exposure scale, because they relate directly to the density difference (density scale) between the highest and lowest densities in the negative. An arithmetic exposure scale of 1 to 20 corresponds to a log exposure scale of 1.30.

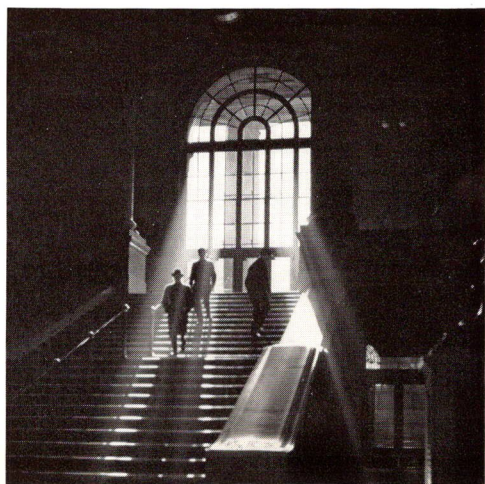Typical sensitometric curves for grade 2 Kodak papers with a glossy, semimatte, and matte surface, respectively.
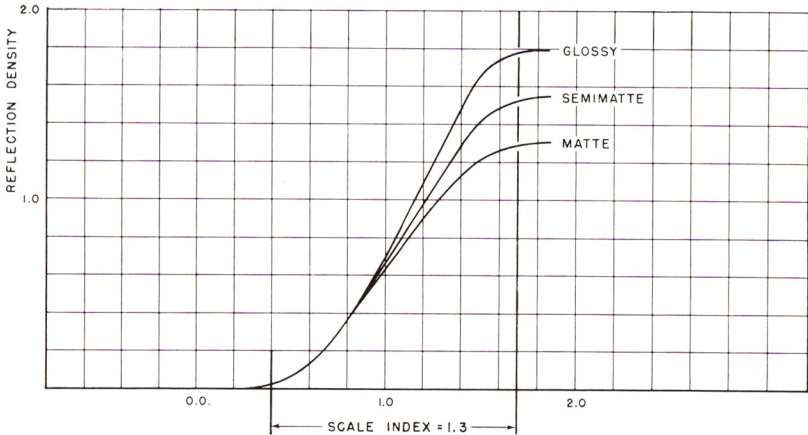
A scene such as this fog-bound ship, with a limited tonal range, can well be printed on a matte-surfaced paper.

A scene with heavy shadows and brilliant highlights, such as this shot of Grand Central terminal, is best printed on a glossy paper.

A method of determining log exposure scale values for the sensitometric curves of the papers is defined in the American Standard for Sensitometry and Grading of Photographic Papers, PH2.2-1953.* The accompanying diagram shows the log exposure scale interval indicated on the D-log E curve of a typical paper. It is the interval, on the log E axis, between two points A and B, which are found by the procedure specified in the standard. The log exposure scale is 1.48 for this particular paper.

Since the term "log exposure scale" is inconveniently long for general use, the American Standard recommends that the name "scale index" be applied to values of log exposure scale that have been rounded off for easy application in practical use. The values are rounded off to the closest figure following the decimal point. The log exposure scale of 1.48, from the D-log E curve shown in the diagram, would be rounded off to a scale index of 1.5.

The scale index is useful in the practical problem of fitting the paper to the negative and also in the more general problem of specifying paper characteristics.
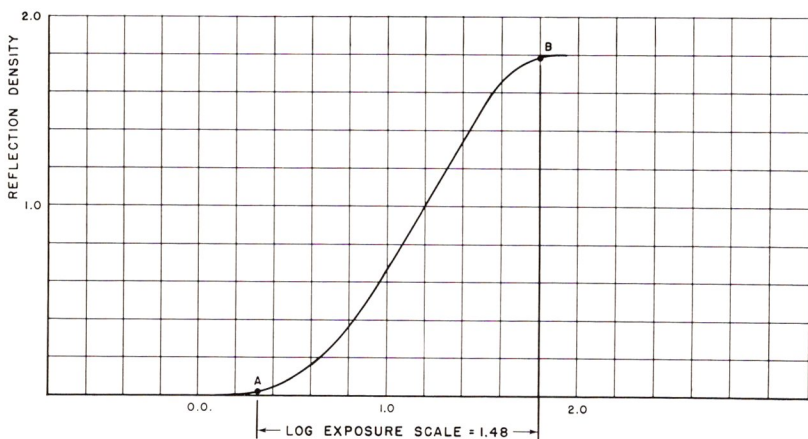
The derivation of the log exposure scale from the sensitometric curve. The scale index is obtained by rounding off the value of 1.48 to 1.5.

*American Standard for Sensitometry and Grading of Photographic Papers, PH2.2-1953, American Standards Assoc., Inc., 70 E. 45th St., New York 17, N.Y.

GRADE NUMBER AND SCALE INDEX

The grade numbers, 0, 1, 2, 3, 4, and 5, have for many years been used as an indication of the scale indexes and thus of the types of negative which can be printed successfully on each grade of paper. A negative having a very long density scale usually prints best on a grade 0 paper, which has a long scale index, while a negative having a very short density scale usually prints best on grade 5 paper, which has a short scale index.

For most of the Kodak papers there is a fairly definite relation between grade number and scale index, as indicated in Table I. Some papers do not follow these relations exactly, but the approximation is close enough for most purposes.

RELATION OF NEGATIVE TO PRINTING PAPER

You don't need a densitometer to make good prints or to choose the right grade of printing paper. But it's interesting to know that there is a relationship between the density scale of a negative and the scale index of the paper which is most likely to make the best print. This relationship was found experimentally by printing a large number of negatives on different grades of paper, then having many observers choose the most pleasing print. This experiment showed that the scale index of the paper should, on the average, be about 0.2 greater than the density scale of the negative. Table I shows this relation between the density scale of the negative and the scale index or grade number of the paper.

TABLE I

Paper Grade Number	Scale Index	Density Scale of Negative Usually Suitable for Each Scale Index or Grade
0	1.7	1.40 or higher
1	1.5	1.2 to 1.4
2	1.3	1.0 to 1.2
3	1.1	0.8 to 1.0
4	0.9	0.6 to 0.8
5	0.7	0.6 or lower

PAPER SPEED

Photographic papers differ widely in their sensitivity to light, and thus in the amount of exposure required in printing. A means of numerical rating of their sensitivities or speeds can be helpful to the photographer by indicating the relative exposures required. Suppose, for example, that you have made a print on a grade 2 Kodabromide Paper, and

want to make another print from the same negative on Kodak Ekta-lure Paper. The speed numbers show that Ektalure Paper is about one fourth as fast as Kodabromide, so it will require an exposure about four times as long. This is perfectly straightforward so long as you are concerned only with papers having the same exposure scale, but becomes a little more complicated when you must compare papers of different scale indexes.

Shadow Speed. If you have a group of negatives which differ widely in density scale, and print each negative on the paper grade with the most suitable scale index, you usually get the best prints when the printing exposures are adjusted so that the extreme shadow area in each print has practically the maximum useful density that the paper can give.

For a given printer or enlarger set-up, the relative exposures for the various negative-paper combinations will be determined by the minimum density of the negative and the "shadow speed" of the paper. The shadow speeds, which are given in the paper data sheets, are inversely proportional to the exposures required to produce the maximum useful densities. They are determined by the formula — Shadow Speed $= \dfrac{10{,}000}{E_S}$ where E_S is the required exposure expressed in meter-candle-seconds.

Printing Index. When one negative is printed on different grades of paper, the best prints usually are those which reproduce the middle tones of the picture at about the same density. Because of the differences between the exposure scales of the papers, the relative exposures to make such prints are not directly related to the shadow speeds. Special numbers, called "printing indexes," are given for this situation. They are inversely proportional to the middle-tone exposures, according to the formula

$$\text{Printing Index} = \frac{10{,}000}{E_m}$$

where E_m is the exposure, expressed in meter-candle-seconds, required to produce the middle tone density of 0.60 on the paper.

Printing indexes are helpful in finding the new exposure when printing a given negative on a different paper or on a different grade of the same paper. For example, suppose that you have made a print on Kodabromide, grade 3, using a 20-second exposure. On examining the print in good light you decide that it is too contrasty and that a better print could be made on grade 2 Kodabromide. The exposure time for the second print is easily calculated from the printing in-

dexes for the two grades, as given in the data sheets in this booklet. The exposure times are inversely proportional to the printing indexes. Thus the exposure for grade 2 will be equal to the exposure found for grade 3 multiplied by the printing index for grade 3 divided by the printing index for grade 2, as follows:

$$20 \text{ seconds} \times \frac{2000}{3200}, \text{ or approximately } 12 \text{ seconds.}$$

Approximate printing index values and shadow speeds are also given in the instruction sheets packaged with Kodak papers.

DEVELOPMENT LATITUDE

Sometimes when you're developing a print, the image appears very quickly, and you have to shorten the developing time to avoid getting the print too dark. At other times the print may not seem dense enough after the recommended developing time has elapsed, and you leave it in the developer a little longer than normal. This ability of a paper to produce an acceptable print by juggling development times is called development latitude.

You normally shouldn't have to "juggle" developing times to get a good print, of course. The best possible prints are made by exposing the paper so that it reaches the density you want when the recommended developing time has elapsed. Acceptable prints can be made, however, throughout a reasonable exposure range.

Warm-tone papers, such as Kodak Opal, get progressively colder in image tone with increased development. Contrast also tends to change in such papers. The prints appear lower in contrast with overexposure and underdevelopment, and show higher contrast with underexposure and overdevelopment. Prints made on Kodak Velox and Kodabromide Papers show practically no change in either image tone or contrast throughout their wide development latitude.

COLOR SENSITIVITY AND SAFELIGHT EFFECTS

Black-and-white photographic papers usually are sensitive to ultra-violet, violet, blue, and blue-green light. This sensitivity does not cut off sharply, though. It decreases gradually as the color of light moves toward the red end of the spectrum. A darkroom safelight has to be a balance between adequate visibility and freedom from fogging. If the safelight recommendations in the Data Sheets are followed, especially with regard to lamp wattage and the working distances at which they are used, fogging of paper by safelight exposure can be avoided.

Bad cases of safelight fogging are easy to detect because the masked border of the paper will show evidence of fogging. It's important to realize that a safelight can degrade the quality of the print image without actually fogging the clear border. This is due to the combined effect of the safelight exposure plus the printing exposure. The safelight exposure alone may not be enough to cause fogging, but when it's added to the normal printing exposure, the safelight exposure becomes developable and shows up as veiled highlights and a lack of "snap" in a picture.

CONTRAST OF PRINTS

The contrast of a print depends on the character of the scene; on the type of film, its exposure, and processing; and on the kind of printing paper. This *subjective* contrast should not, incidentally, be confused with *objective* contrast which refers to the measurable brightness ratio of any two areas. For example, the objective contrast of two adjacent steps on a gray scale can be measured with a densitometer. Subjective contrast, such as the contrast of a print from a given negative, depends on the printing paper and its handling.

The contrast of a print is a rather complex characteristic to describe. For example, a print made on a G-surface paper is more contrasty when it is wet than when it is dry. A print from a given negative is less
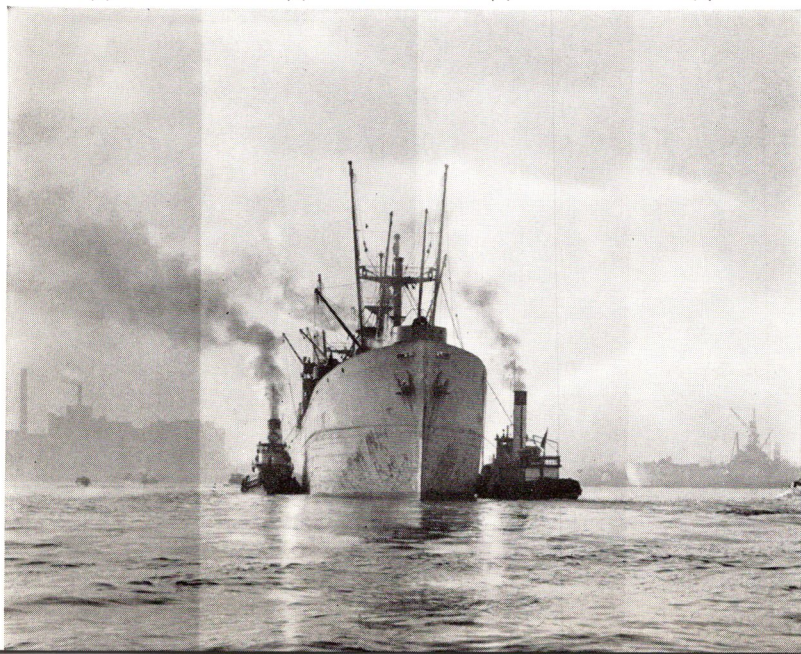
1. This area received 2 minutes of safelight exposure, plus negative exposure.
2. This area received 1 minute of safelight exposure, plus negative exposure.
3. This area received 30 seconds of safelight exposure, plus negative exposure.
4. This area received the negative exposure only.

contrasty when printed on Kodabromide Paper F-2 than when it is printed on Kodabromide F-3. A glossy print on No. 2 printing grade is more contrasty than a matte-surface print also on No. 2 printing grade. These are all correct uses of the word "contrast," yet they may be somewhat confusing examples unless the "two-dimensional" aspect of contrast is clear.

Contrast is a word which has two meanings. The two things which determine contrast are *gradient* and *range* (or *extent*). Technically speaking, the gradient is the rate at which the density increases with exposure. The range (or extent) is the total density range available in the print from light to dark. In other words, contrast can be increased by using a paper with a steeper gradient, a higher maximum density, or both.

CONTRAST OF PAPERS

Each sheet of photographic paper has a contrast capacity. This capacity is the product of gradient and density range. If you print the same negative on No. 1 and No. 2 printing grades of the same paper, the available maximum density is the same. But the print made on the No. 2 paper looks more contrasty. This is because the rate at which density increases with exposure is more rapid for No. 2 printing grade than for No. 1 printing grade. In other words, No. 2 printing grade paper reaches its maximum density sooner.

The exposure scale of the No. 2 printing grade is shorter. If the negative has a long density scale, the paper may not accommodate all the tones in the negative. Printing grades range in exposure scale from a long scale with a grade 0 to a very short scale with grade 5. No. 2 and 3 have exposure scales that are in the "normal" range — they fit most good negatives.

NEGATIVES FOR BEST PRINT QUALITY

The best prints are made from good negatives. We get no prizes for that statement. But what exactly *is* a good negative? Actually, it's hard to describe what a good negative looks like. It should have detail in the shadows with highlights that aren't blocked up from overexposure. From a convenience standpoint, a good negative is one that prints on a single grade of paper, preferably No. 2.

To get a little technical again, a negative that prints best on a grade No. 2 paper has a density scale between 1.0 and 1.20. This density scale also suits single contrast grade papers such as Kodak Opal Paper — another reason for aiming at such quality.

ADJUSTING NEGATIVE DEVELOPMENT

To some extent you can control negative development so that the majority of your negatives can be printed on No. 2 paper. If your aim is to get fine-grain negatives of average contrast which will enlarge well in a diffuse-type enlarger, the gamma should be approximately 0.7 to 0.8. Some prefer even lower gammas, in the neighborhood of 0.55 to 0.65, when using small negatives in condenser-type enlargers. To help translate these aim points into actual developing times, consult the Developing Computer in the Kodak Master Darkroom Dataguide.

If your negatives tend to print best on a No. 1 paper, then decrease the development time of the next negative to reduce the gamma by

Ideally, your goal should be to make all negatives so that they print on the same grade of paper—preferably grade No. 2. One of the best control guides to accomplish this is the Developing Computer in the Kodak Master Darkroom Dataguide, which is an easy-to-use dial calculator for determining the correct developing times for various combinations of Kodak films and developers.
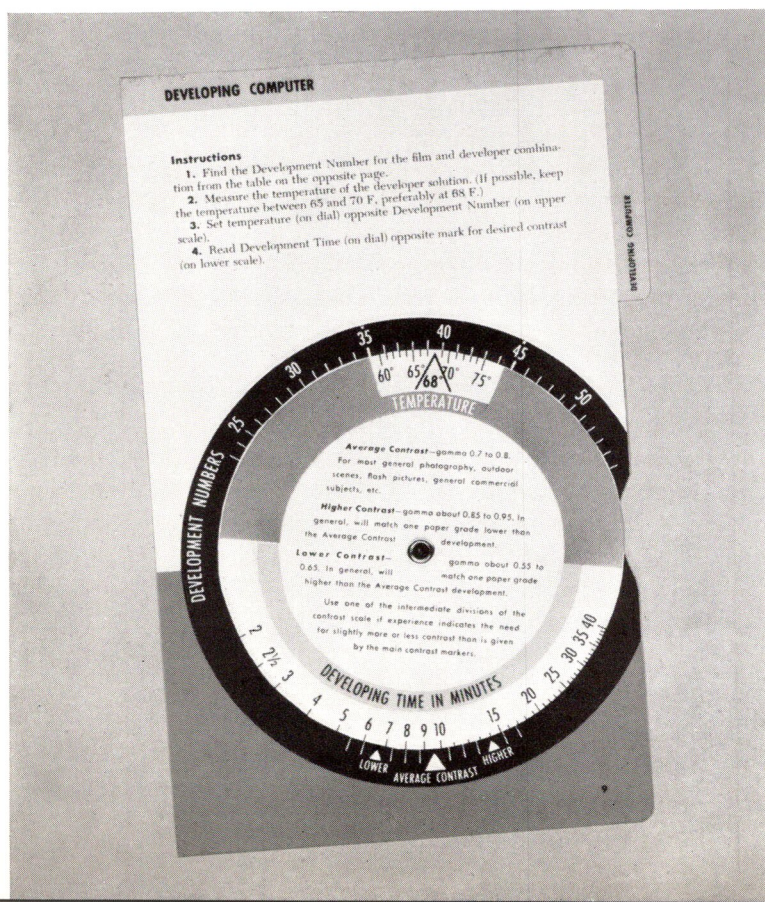
about 0.15. You can usually do this by shortening the developing time by one fourth. If your negatives print best on a No. 3 paper, increase the gamma of the negatives by about 0.15 by increasing development time about a third.

Negatives that are just plain underexposed require the so-called "salvage grades" of paper, that is, grades 4 and 5. Remember, though, an excellent print usually can't be made from a poor negative.

OTHER FACTORS AFFECTING PRINT CONTRAST

The way a print is made can affect its contrast. Contact printing produces about the same degree of contrast as an enlarger with a diffuse light source. A condenser enlarger, on the other hand, produces greater contrast than diffuse light sources. The difference may be as much as the difference between No. 2 and 3 grades of paper.

DEVELOPER AND DEVELOPMENT TIME

The contrast capacity of photographic papers is pretty much built-in — there's not much you can do to change it appreciably. Contrast can be changed within fairly narrow limits by variations in development time or developer composition. Kodak Selectol-Soft Developer, for example, is designed to reduce contrast slightly without loss of print quality. When used with papers for which it's recommended, Selectol-Soft Developer can change the exposure scale about one printing grade.

As we've already mentioned, prolonging processing time increases print density and gives the impression of more contrast. Underdevelopment gives the effect of less contrast. We repeat once more that it's best to pick an appropriate paper for your negative and to develop the paper for the recommended length of time. Over- and under-development can give you troubles in the form of mottle and stain.

VARIABLE-CONTRAST PHOTOGRAPHIC PAPERS

While the contrast of most photographic papers is fixed within narrow limits, recent advances have produced variable-contrast papers designed to give a wide range of contrasts. Some of these papers are Kodak Polycontrast Paper, Kodak Polycontrast Rapid Paper, and Kodak PolyLure Paper. In each case, the contrast is varied by means of filters used between the light source and the printing paper. The Kodak Polycontrast Filter Kit, Model A, can be used with the papers mentioned to provide seven different contrasts of paper, equivalent to printing grades from 1 through 4, in half-grade steps.

PC 1 FILTER   **NO FILTER**   **PC 4 FILTER**

A normal negative was used to make three prints, each of a different contrast, to illustrate the range of contrasts possible when using Kodak Polycontrast Paper with the Kodak Polycontrast Filter Kit. The print at the left was exposed through the PC 1 Filter, giving the equivalent of a grade 1 paper. No filter was used for the center picture to produce a normal print, the equivalent of a grade 2 paper. The print on the right was exposed through a PC 4 Filter to produce a contrasty effect, such as you would get with a grade 4 paper.

"Normal" negatives, which would regularly be printed on grade No. 2 paper, can be printed without a filter (although a No. 2 filter is included in the set so that uniform contrast steps will be available over the entire range). Variable-contrast papers are especially useful for casual darkroom enthusiasts who don't make large numbers of prints, because one box of paper provides all the contrasts usually needed. This eliminates the necessity for buying and storing several different boxes of paper to get a range of contrasts, and cuts the waste of having seldom-used grades spoil on your darkroom shelves.

PAPERS FOR PRINTING COLOR NEGATIVES

Color negatives are becoming increasingly important in all kinds of photography. Negatives from such films as Kodacolor and Kodak Ektacolor are the source of almost anything photographic. A color negative can be used to make a color print, a black-and-white print, or a color transparency.

Color prints can be made on Kodak Ektacolor Paper. This is a multi-layer paper designed for direct printing or enlarging from color negatives. The storage requirements for Ektacolor Paper are more critical than for most black-and-white papers. It must be protected against heat, for example, by storing it at temperatures of 50F or lower.

Making the color prints requires the use of filters, such as Kodak

Color Compensating Filters. For a detailed account of how to use Kodak Ektacolor Paper, see the Kodak publication, *Printing Color Negatives.* A Data Sheet for Ektacolor Paper appears in this booklet.

Making black-and-white prints from color negatives became practical with the introduction of Kodak Panalure Paper. It's possible to make passable prints on ordinary photographic papers, such as Kodabromide or Kodak Medalist Paper, but Panalure lets you make really excellent prints. The reasons are simple. The built-in orange mask of Kodacolor negatives acts almost like a safelight for ordinary papers, so exposures need to be very long. Also, black-and-white papers have no red sensitivity, so some of the color differences in the color negative don't register in the print. Reddish or tanned faces are rendered very dark, for example. Panalure Paper has a panchromatic emulsion that can record tone values correctly. Another advantage to using Panalure Paper is that it provides you with control over tonal rendition. You can use filters during printing to darken or lighten any color you wish. To darken a subject color, you use a complementary color filter in the enlarger. To lighten a subject color, you use a filter of the same color in the enlarger. If you wanted a dark, dramatic sky effect in the print, for example, you could use a red filter, such as the Kodak Wratten Filter No. 25 (A) over the enlarger lens while making the print. The effect would be in the same direction as using the same filter over the camera's lens with black-and-white panchromatic film.

Panalure Paper is available in one normal grade. Its speed is similar to Kodak Medalist Paper. Because it is sensitive to all colors of light, it should be handled in total darkness or with the Kodak Safelight Filter, Wratten Series 10 (dark amber). Other details can be found in the Data Sheet for Panalure in this booklet.

When color negatives are printed on regular paper (left), eyes appear too light, lips too dark, flesh tones unnatural. Printing the same negative on Kodak Panalure Paper (right) restores proper tonal relationships.
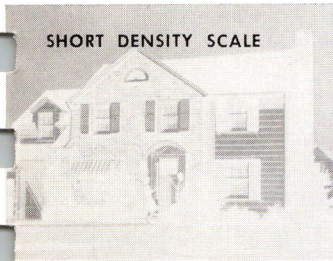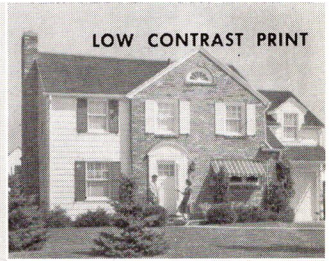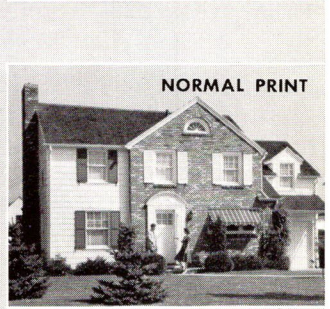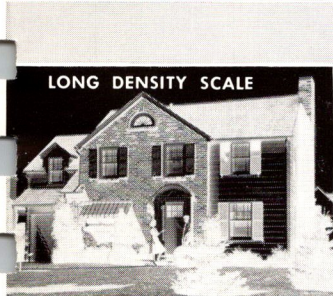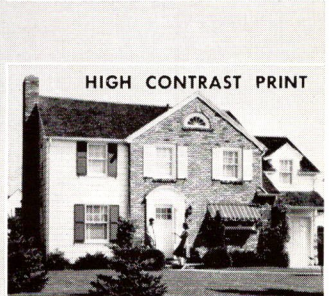
CHOICE OF PAPER GRADE

Picking the correct grade of paper is essential to good print quality. Compare the negative you want to print with the negatives in the illustration to see which one it resembles in density scale. Then follow the directions in the black arrow.

As the pictures show, a print without enough contrast looks muddy, while the print with too much contrast looks harsh. A print made on the wrong grade of paper may seem passable until you compare it with one made from the same negative on paper of the correct grade.

Remember that a wet print has more contrast and looks lighter than it will when it's dry. Also, darkroom safelight illumination isn't adequate for judging print quality.

SHORT DENSITY SCALE

LOW CONTRAST PRINT

PRINTED TOO LOW IN CONTRAST
TRY GRADES No. 3, 4, or 5

TO MAKE NORMAL CONTRAST PRINT
TRY GRADES No. 3, 4, or 5

TRY GRADE No. 2

PRINTED TOO LOW IN CONTRAST

NORMAL NEGATIVE

NORMAL PRINT

TO MAKE NORMAL PRINT
USE GRADE No. 2

PRINTED TOO HIGH IN CONTRAST

TO MAKE NORMAL CONTRAST PRINT
USE GRADE No. 0, or 1

TRY GRADE No. 2

LONG DENSITY SCALE

HIGH CONTRAST PRINT

PRINTED TOO HIGH IN CONTRAST
TRY GRADES No. 0, or 1

PHOTOMETRIC METHODS OF PRINT CONTROL

As we've already mentioned, you don't need a densitometer to make good prints. The fact remains, though, that a densitometer can be a very useful darkroom tool. A photometer or a densitometer, such as the Kodak Color Densitometer, Model 1, can be used to check negative exposure and development levels. It can also be used, as described in the following section, to help select the paper grade to fit a negative and the printing time to use.

USING THE DENSITOMETER

The density scale of a negative can help you choose the right grade of paper. To determine the density scale of a negative, read and record the shadow density and the highlight density. The difference between them is density scale of the negative. For example:

Highlight Density	1.62
Shadow Density	0.32
Density Scale	$\overline{1.30}$

Specular highlights from metal, glass, or plastic objects have no detail at all, so they shouldn't be considered as the "highlight" in the negative. The highlight you should measure is the brightest area where detail is to be retained. By consulting the Enlarger Computer in the *Kodak Master Darkroom Dataguide,* you can use these densities to find the recommended grade of paper. Or, you can relate the scale index of the paper to the density scale of the negative according to the chart on page 6. In the example shown here, a No. 1 printing grade would be best.

The Enlarger Computer mentioned above lets you determine the correct exposure time for making the print. The Computer is also useful for finding the exposure if the magnification or lens opening is changed.

Here's how to use the densitometer to check negative exposure. Make a reading of the clear edge of the film and record it. Make another reading from the shadow area of the negative — the lightest part of the negative where detail is required. Subtract the first reading from the second. If the difference is not at least 0.05, the negative is badly underexposed and can't produce a top-quality print. If shadow densities are consistently low, increase camera exposure. The negative will print better when this difference is in the neighborhood of 0.15 or 0.20.

Continued after Data Sheets

Data Sheets on KODAK Papers

In the pages that follow you will find technical data for the papers listed. In each case, the development recommendations are for tray development with continuous agitation. The developer names appearing in bold-face type are primary recommendations and the others are secondary. When both the Kodak Safelight Filter, Wratten Series 0C (light amber) and the Kodak Safelight Filter, Wratten Series 0A (greenish yellow) are listed, the 0C is recommended for greater safety.

The development times listed are for normal prints. If you intend to tone your prints, changes in development time are sometimes necessary. Here is a summary of suggestions.

Kodak Toner	Development
Hypo Alum T-1A	Increase time up to 50 %, depending on grade of paper
Sulfide Sepia T-7A or Sepia (packaged)	Usually no change required
Poly-Toner (packaged)	Usually no change required
Polysulfide T-8 or Brown Toner (packaged)	Some increase needed, depending on grade of paper
Rapid Selenium (packaged)	Slight reduction needed, depending on grade of paper
Gold T-21	Usually no change required
Blue (packaged)	Usually no change required

Kodak Panalure Paper

Kodak Ektacolor Professional Paper

Kodak Medalist Paper

Kodak Mural Paper

Kodak Ektalure Paper

Kodak Opal Paper

Kodabromide Paper

Kodak Velox Paper

Kodak Azo and Illustrators' Azo Papers

Kodak Athena Paper

Kodak Aristo Paper

Kodak Resisto and Kodak Resisto Rapid Papers

Kodak PolyLure Paper

Kodak Polycontrast Paper

Kodak Polycontrast Rapid Paper

Data—KODAK PANALURE Paper

Purposes: This is a fast panchromatic enlarging paper for making high-quality black-and-white enlargements from Kodacolor or Ektacolor negatives. With reduced illumination it can be used to make contact prints.

Tone: Warm-black.

Grade, Speed, and Scale Index Value: Supplied in one grade only for normal color negatives. Approximate Scale Index — 1.1, Shadow Speed — 1000, Printing Index — 2500.

Tint, Brilliance, Surface, Weight, and Symbol:

Tint	Brilliance	Surface	Single Weight Symbol	Double Weight Symbol
White	Glossy	Smooth	F	
White	Fine-Grained	Lustre		E

Safelight Recommendations: Kodak Safelight Filter, Wratten Series 10 (dark amber), used in a suitable safelight lamp *with a 15-watt bulb, kept at least 4 feet from the paper.* Exposure to the safelight should be kept to a minimum until the paper has been in the developer at least 30 seconds.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Dektol or D-72	1:2	1½	1 to 3	Normal Tones
Selectol	1:1	2	1 to 3	Warmer Tones
Selectol-Soft	1:1	2	1 to 3	Lower Contrast

Rinsing: Rinse 5 to 10 seconds, with agitation, in Kodak Indicator Stop Bath or Kodak Stop Bath SB-1 at 65 to 70 F (18 to 21 C).

Fixing: Use Kodak Fixer, Kodafix Solution (diluted 1:7), Kodak Rapid Fixer (diluted 1:7), or Kodak Fixing Bath F-5 or F-6 at 65 to 70 F. For two-bath method, fix 3 to 5 minutes in each bath; for single bath, 5 to 10 minutes.

Washing: After fixing, transfer the prints, with or without rinsing, to a solution of Kodak Hypo Clearing Agent. Treat single-weight prints at least 2 minutes and double-weight prints at least 3 minutes with agitation at 65 to 70 F (18 to 21 C). Then, with agitation and normal water flow, wash single-weight prints at least 10 minutes and double-weight prints at least 20 minutes.

Prints not treated in Kodak Hypo Clearing Agent Solution should be washed for at least one hour in running water at 65 to 70 F (18 to 21 C).

Drying: All surface water should be removed with a viscose sponge to minimize drying cockle. Then place print on cheesecloth stretchers, between clean white photo blotters, or on a belt dryer. The F surface can be ferrotyped.

*Data—*KODAK EKTACOLOR Professional Paper

Purpose: This is a multilayer paper designed for making *full-color* prints and enlargements from Kodacolor or Ektacolor negatives. For complete information on the use of this paper, consult the Kodak Color Data Book, "Printing Color Negatives."

Grade, Surface, and Weight: Kodak Ektacolor Professional Paper is available in one "normal" grade, double weight only. It has a high-lustre surface.

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 10 (dark amber), used in a suitable safelight lamp *with a 7½-watt bulb, kept at least 4 feet from the paper, and used for not more than 4 minutes.*

Storage: High temperatures or humidities may produce undesirable changes in Kodak Ektacolor Professional Paper. Protection against heat must be provided by storing the paper in a refrigerator at 50 F or lower.

Processing: Chemicals for tray or tank processing are supplied in prepared form in the Kodak Color Print Processing Kit, Process P-122, available in 1- and 3½-gallon sizes.

The Kodak Rapid Color Processor, Models 11 and 16-K, can process a sheet of this paper in less than 8 minutes with Kodak Color Processing Chemicals CP-5.

A black-and-white print made from a color negative on Kodak Panalure Paper can reproduce the colors of a sunset in their correct tonal relationships.

Data—KODAK MEDALIST Paper

Purposes: This is a truly versatile high-speed enlarging paper. The speeds of the contrast grades, from high to low, are similar. The contrast may be modified through variations in exposure and development.

Tone: Warm-black, ideal where something warmer than Kodabromide Paper is needed.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
1	500	2000	May be varied with development time within the "useful" range (see below).	High
2	650	2000		Normal
3	800	2000		Low
4	1000	2000		Very Low

Tint, Brilliance, Surface, Weight, Symbol, and Grade:

Tint	Brilliance	Surface	Single Weight Symbol and Grades	Double Weight Symbol and Grades
White	Glossy	Smooth	F, 1, 2, 3, 4	F, 2, 3
White	High Lustre	Smooth	J, 2, 3	J, 1, 2, 3, 4
Cream White	Lustre	Fine Grained		G, 1, 2, 3, 4
White	Lustre	Fine Grained		E, 2, 3
Cream White	Lustre	Silk		Y, 1, 2, 3

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C or 0A.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Dektol or D-72	1:2	1	¾ to 2	Normal Tones
Ektonol, Selectol, or D-52	1:1	2	1½ to 4	Warmer Tones
Selectol-Soft	1:1	2	1½ to 4	Lower Contrast
Versatol	1:3	1	¾ to 2	Normal Tones

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK Mural Paper

Purposes: This is an enlarging paper created specifically for giant photomurals. To withstand the folding and handling often necessary in processing large prints, it has extra strength and abrasion resistance.

Tone: Warm-black, slightly warmer than Kodabromide . . . well suited to mural work.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
2	650	2000	1.3	Normal
3	800	2000	1.1	Low

Tint, Brilliance, Surface, and Weight: R (cream white, lustre, tweed), Single Weight.

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C or 0A.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Ektonol, Selectol, or D-52	1:1	2	$1\frac{1}{2}$ to 4	Normal Tone
Ektonol, Selectol, or D-52	1:3	4	3 to 8	Large Murals
Selectol-Soft	1:1	2	$1\frac{1}{2}$ to 4	Lower Contrast
Dektol or D-72	1:4	2	$1\frac{1}{2}$ to 4	Cooler Tones
	1:2	1	$\frac{3}{4}$ to 2	Cooler Tones

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK EKTALURE Paper

Purposes: This paper is designed for portrait photographers and for production printing where speed as well as quality is important. With reduced illumination it can be used for contact printing. Ektalure has a brown-black image tone. It is supplied in one printing grade for negatives of normal contrast, and in six surfaces.

Tone: Brown-black, a bit warmer than Opal Paper.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
Normal	320	800	1.2	Normal

Tint, Brilliance, Surface, and Symbol: Double Weight

Tint	Brilliance	Surface	Symbol
Cream White	Lustre	Fine-Grained	G
Cream White	Lustre	Tweed	R
Cream White	Lustre	Tapestry	X
Cream White	Lustre	Silk	Y
Cream White	High Lustre	Fine-Grained	K

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C or 0A.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Ektonol, Selectol, or D-52	1:1	2	1½ to 4	Normal Tones
Selectol-Soft	1:1	2	1½ to 4	Lower Contrast

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK OPAL Paper

Purposes: Opal has ample speed for enlarging with fast equipment. It is ideal for projection prints and can be used for contact prints from paper negatives or from original negatives of normal contrast, by using reduced printing illumination. Opal is excellent for exhibition prints and portraits.

Tone: Brown-black; Opal's warmth of image tone can be controlled within certain limits by varying the exposure and development time. It responds quite well to developer manipulation.

Grade and Scale Index Value: Opal is supplied in one grade only for normal negatives. Approximate scale index 1.3.

Speed: Shadow Speed — 200, Printing Index 650.

Tint, Brilliance, Surface, and Symbol: Double Weight

Tint	*Bril-liance*	*Surface*	*Symbol*	*Tint*	*Bril-liance*	*Surface*	*Symbol*
Cream White	Lustre	Smooth	B	Cream White	Matte	Suede	V
Cream White	Lustre	Fine Grained	G	Cream White	Lustre	Silk	Y
Cream White	Lustre	Rough	L	Old Ivory	Lustre	Tapestry	Z
Cream White	Lustre	Tweed	R				

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C or 0A.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	*Dilution*	*Recommended Time in Minutes*	*Useful Range in Minutes*	*Purpose*
Ektonol, Selectol, or D-52	1:1	2	1½ to 4	Warm Tones
Selectol-Soft	1:1	2	1½ to 4	Lower Contrast

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODABROMIDE Paper

Purposes: Kodabromide is an enlarging paper well suited to the making of exhibition prints which require brilliant and rich blacks. Its speed makes its use practical with any type of enlarger. Additional features include a long-scale emulsion, five grades, wide latitude in exposure and development, and a physically hardened emulsion, all of which make it ideal as a general-purpose enlarging paper. Kodabromide F Grade 1, N, or A, single weight, are recommended for positives and negatives for the paper negative process.

Tone: Neutral-black, uniform through all grades and especially uniform for a wide range of development times.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
1	1600	5000	1.5	High
2	1250	3200	1.3	Normal
3	1000	2000	1.1	Low
4	800	1250	0.9	Very Low
5	650	1000	0.7	Extremely Low

Tints, Brilliance, Surface, Weight, Symbol, and Grade:

Tint	Brilliance	Surface	Single Weight Symbol and Grades	Double Weight Symbol and Grades
White	Glossy	Smooth	F No. 1, 2, 3, 4, 5	F No. 1, 2, 3, 4, 5
White	Lustre	Smooth	N No. 1, 2, 3, 4	N No. 1, 2, 3, 4
White	Lustre	Fine Grained	E No. 1, 2, 3, 4, 5	E No. 1, 2, 3, 4, 5
			(Light Weight)	
White	Lustre	Smooth	A No. 1, 2, 3, 4, 5	
Cream White	Lustre	Fine Grained		G No. 1, 2, 3, 4, 5

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C or 0A.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Recommended Time (in seconds)	Useful Range (in minutes)	Purpose
Dektol or D-72	1:2	90	1 to 3	Normal Development
Versatol	1:3	90	1 to 3	Normal Tones

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK VELOX Paper

Purposes: Velox is the ideal contact printing paper for making album prints. This paper has a uniform tone throughout all grades. It is ideal for making prints from a variety of negatives of different density scales.

Tone: Blue-black, uniform through all grades.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
1	32	100	1.5	High
2	20	50	1.3	Normal
3	16	32	1.1	Low
4	10	20	0.9	Very Low

Tint, Brilliance, Surface, and Weight: F (White, glossy, smooth), Single Weight.

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0A or 0C (for greater safety).

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Recommended Time in Minutes	Useful Range in Minutes
Dektol or D-72	1:2	1	¾ to 2
Versatol	1:3	1	¾ to 2

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK AZO and Illustrators' AZO Papers

Purposes: Azo is a contact printing paper maintaining a uniformly high quality over a range of six grades. For this reason, it is suitable for printing when negatives vary widely in contrast. Somewhat warmer in tone, Illustrators' Azo, a contact paper designed primarily for the illustrator and commercial photographer, is available in four grades.

Tones: Azo yields a neutral-black image tone. Illustrators' Azo has a warm-black image tone.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
0*	16	80	1.7	Extremely High
1	12	64	1.5	High
2	10	40	1.3	Normal
3	10	32	1.1	Low
4	8	20	0.9	Very Low
5*	6	12	0.7	Extremely Low

*Not available in Illustrators' Azo.

Tint, Brilliance, Surface, Weight, Symbol, and Grade: Kodak Azo

Tint	Brilliance	Surface	Single Weight Symbol and Grades	Double Weight Symbol and Grades
White	Glossy	Smooth	F	F
			No. 0, 1, 2, 3, 4, 5	No. 0, 1, 2, 3, 4
White	Lustre	Fine Grained	E	E
			No. 0, 1, 2, 3, 4	No. 1, 2, 3, 4
Snow-White	High Lustre	Fine Grained		D
				No. 1, 2, 3, 4
White	Lustre	Smooth		N
				No. 1, 2, 3, 4

Tint, Brilliance, Surface, Weight, Symbol, and Grade: Kodak Illustrators' Azo

Tint	Brilliance	Surface	Single Weight Symbol and Grades	Double Weight Symbol and Grades
White	Glossy	Smooth	F	
			No. 1, 2, 3, 4	
White	Lustre	Fine Grained	E	E
			No. 1, 2, 3	No. 2

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0A or 0C (for greater safety).

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Recommended Time in Minutes	Useful Range in Minutes	Purpose
Dektol or D-72	1:2	1	¾ to 2	Cold Tones
Ektonol, Selectol or D-52	1:1	2	1½ to 4	Warm Tones
Selectol-Soft	1:1	2	1½ to 4	Lower Contrast
Versatol	1:3	1	¾ to 2	Cold Tones

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK ATHENA Paper

Purposes: Athena is a contact printing paper with qualities of brilliance and fine gradation which make it especially suitable for portraits.

Tone: Athena yields a brown-black image tone. Slightly warmer tones result from overexposure, and slightly colder tones from underexposure and overdevelopment.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
0	8	32	1.7	Extremely High
1	6	25	1.5	High
2	5	16	1.3	Normal
3	4	8	1.1	Low

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C or 0A.

Tint, Brilliance, Surface, Symbol, and Grade: Double Weight

Tint	Brilliance	Surface	Symbol and Grades
Cream White	Lustre	Smooth	B No. 1
Cream White	Lustre	Fine-Grain	G No. 1, 2, 3
Cream White	Lustre	Silk	Y No. 0, 1, 2, 3

Development Recommendations: (68 F or 20 C)

Kodak Developer	Dilution	Recommended Time (in minutes)	Useful Range (in minutes)	Purpose
Ektonol, Selectol or D-52	1:1	2	1½ to 4	Warm Tones
Selectol—Soft	1:1	2	1½ to 4	Lower Contrast

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK ARISTO Paper

Purpose: Aristo is a contact printing paper of moderate warmth. It is particularly suited for portrait photographs.

Tone: Warm-black; somewhat warmer than Azo, but not as warm as Athena.

Grade, Speed, and Scale Index Value:

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
1	12	64	1.5	High
2	10	40	1.3	Normal
3	10	25	1.1	Low

Tint, Brilliance, Surface, and Symbol: Double Weight

Tint	Brilliance	Surface	Symbol and Printing Grades
Cream White	Lustre	Fine Grained	G No. 1, 2, 3
Cream White	Lustre	Silk	Y No. 1, 2, 3

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0A or 0C (for greater safety).

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Recommended Time (in minutes)	Useful Range (in minutes)	Purpose
Ektonol, Selectol or D-52	1:1	2	1½ to 4	Warm Tone
Selectol-Soft	1:1	2	1½ to 4	Lower Contrast

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK RESISTO
and KODAK RESISTO Rapid Papers

Purposes: Resisto and Resisto Rapid have a water resistant base. Prints can be processed completely in seven to eight minutes and dried in less than ten minutes if hung freely in the air. Dimensional changes are small, and Resisto Papers are valuable for map making or color-separation positives.

In photographic characteristics, Kodak Resisto N, for contact printing, is similar to Velox Paper; Kodak Resisto Rapid N, for enlarging, is similar to Kodabromide Paper. Both Resisto Papers yield a neutral-black image tone.

Surface and Weight: Both Resisto Papers are supplied in the N surface (white, lustre, smooth) and on single-weight stock.

Grade, Speed and Scale Index Value: Kodak Resisto

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
0	50	200	1.7	Extremely High
2	20	50	1.3	Normal
3	16	32	1.1	Low
5	8	12	0.7	Extremely Low

Grade, Speed, and Scale Index Value: Kodak Resisto Rapid

Grade	Shadow Speed	Printing Index	Approximate Scale Index	Negative Density Scale
1	1600	5000	1.5	High
2	1250	3200	1.3	Normal
3	1000	2000	1.1	Low
4	650	1000	0.9	Very Low

Safelight Recommendations: For Resisto Paper use the Kodak Safelight Filter, Wratten Series 0A. For Resisto Rapid Paper, use only the Series 0C.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Recommended Time in Minutes	Useful Range
Dektol or D-72	1:2	1	*
Versatol	1:3	1	*

Rinsing: Rinse for about 5 seconds in Kodak Indicator Stop Bath or Kodak Stop Bath SB-1 with thorough agitation at 65 to 70 F (18 to 21 C).

Fixing: 2 minutes at 65 to 70 F (18 to 21 C) with continuous agitation in a fresh solution of Kodak Fixer, Kodafix Solution (diluted 1:7), Kodak Rapid Fixer (diluted 1:7), or in Kodak Fixing Bath F-5 or F-6.

Washing: 4 minutes at 65 to 75 F (18 to 24 C). Use running water and agitate.

Drying: For fast drying, remove water with blotters or soft sponge or cloth. Then keep print in motion over moderate heat. Heated belt-type dryers are not recommended. To keep dimensional changes low, do not use heat. Do not ferrotype.

Mounting: Kodak Rapid Mounting Cement is the only adhesive recommended for mounting Resisto Papers. Ordinary mounting adhesives such as Kodak Dry Mounting Tissue will not adhere to the water-resistant base.

*Any processing step prolonged beyond recommended times will allow the base to absorb moisture, and drying will not be so rapid.

Data—KODAK POLYLURE Paper

Purposes: This is a variable-contrast, warm-tone, projection-speed paper especially designed for portrait photographers, particularly when complete control of negative contrast is not possible. With reduced illumination, it can be used for contact printing. It is supplied in one grade, but its printing contrast can be varied over a wide range by exposure through suitable filters, such as those supplied in the Kodak Polycontrast Filter Kit (Model A). PolyLure maintains image tone with hot drying.

Light Source: This paper should be printed by exposure to a tungsten Photo Enlarger Lamp, such as the No. 302 or No. 212. Other light sources require the use of light-source correction filters in addition to Kodak Polycontrast Filters.

Tone: Brown-black.

Filter, Speed, and Scale Index Value:

Filter*	Shadow Speed	Printing Index	Approx. Scale Index
PC1	160	500	1.4
PC1½	160	500	1.3
PC2	160	500	1.2
PC2½	160	400	1.2
PC3	160	320	1.1
PC3½	125	250	1.0
PC4	64	125	0.9

*White-light exposure (exposure with no filter) would have a *shadow speed of 250, printing index of 650, and approximate scale index of 1.2.*

Tint, Brilliance, Surface, and Symbol:

Tint	Brilliance	Surface	Single Weight Symbol	Double Weight Symbol
White	Glossy	Smooth	F	F
Cream	Lustre	Fine-Grained		G
Cream	Lustre	Tweed		R
Cream	Lustre	Silk		Y

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C (light amber), used in a suitable safelight lamp *with a 15-watt bulb, kept at least 4 feet from the paper.* A Series 0A Safelight Filter must *not* be used.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Selectol	1:1	2	1½ to 4	Normal Tones
Ektonol	1:1	2	1½ to 4	Normal Tones
D-52	1:1	2	1½ to 4	Normal Tones
Selectol-Soft	1:1	2	1½ to 4	Lower Contrast

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK POLYCONTRAST Paper

Purposes: This is a variable-contrast paper suitable for making high-quality enlargements. With reduced illumination, it can be used for contact printing. It is especially useful in the commercial, industrial, photofinishing, and school photographic fields.

Light Source: This paper should be printed by exposure to a tungsten Photo Enlarger Lamp, such as the No. 302 or 212. Other light sources require the use of light-source correction filters in addition to Kodak Polycontrast Filter.

Tone: Warm-black, somewhat warmer than Polycontrast Rapid.

Filter, Speed, and Scale Index Value:

Kodak Polycontrast Paper is available in one grade only, but its printing contrast can be varied over a wide range by exposure through suitable filters, such as those supplied in the Kodak Polycontrast Filter Kit (Model A).

Filter*	Shadow Speed	Printing Index	Approx. Scale Index
PC1	250	1600	1.6
PC1½	400	1600	1.4
PC2	400	1600	1.3
PC2½	400	1250	1.2
PC3	400	1000	1.2
PC3½	320	800	1.1
PC4	200	400	1.1

*White-light exposure (exposure with no filter) would have shadow speed of 500, printing index of 2000, and approximate scale index of 1.4.

Tint, Brilliance, Surface, Weight, and Symbol:

Tint	Brilliance	Surface	Single Weight Symbol	Double Weight Symbol
White	Glossy	Smooth	F	F
White	High Lustre	Smooth	J	J
White	Lustre	Smooth	N, A (LW)	N
Cream-White	Lustre	Fine-Grained		G

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C (light amber), used in a suitable safelight lamp *with a 15-watt bulb, kept at least 4 feet from the paper.* Because the paper depends on blue and yellow light exposures for contrast control, safelight exposures should be kept to a minimum to avoid unwanted quality changes. A Series 0A Safelight Filter must *not* be used.

Development Recommendations: (at 68 F to 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Dektol or D-72	1:2	1½	1 to 3	Normal Tones
Versatol	1:3	1	¾ to 2	Normal Tones

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

Data—KODAK POLYCONTRAST Rapid Paper

Purposes: This is a variable-contrast, projection-speed paper suitable for making high-quality enlargements. It is especially useful in the commercial, industrial, photofinishing, and school photographic fields.

Light Source: Same as for Polycontrast.

Tone: Warm-black.

Filter, Speed, and Scale Index Value:

Filter*	Shadow Speed	Printing Index	Approx. Scale Index
PC1	500	2500	1.6
PC1½	800	2500	1.4
PC2	800	2500	1.3
PC2½	800	2500	1.2
PC3	650	2000	1.2
PC3½	500	1600	1.1
PC4	320	800	1.1

*White-light exposure (exposure with no filter) would have shadow speed of 1000, printing index of 4000, and approximate scale index of 1.4.

Tint, Brilliance, Surface, Weight, and Symbol:

Tint	Brilliance	Surface	Single Weight Symbol	Double Weight Symbol
White	Glossy	Smooth	F	F
White	Lustre	Smooth	N	
Cream-White	Lustre	Fine-Grained		G
Cream-White	Lustre	Silk		Y

Safelight Recommendation: Kodak Safelight Filter, Wratten Series 0C (light amber), used in a suitable safelight lamp *with a 15-watt bulb, kept at least 4 feet from the paper.* Because the paper depends on blue and yellow light exposures for contrast control, safelight exposures should be kept to a minimum to avoid unwanted quality changes. Safelight exposures under these conditions should not exceed 3 minutes. A Series 0A Safelight Filter must *not* be used.

Development Recommendations: (at 68 F or 20 C)

Kodak Developer	Dilution	Development Time in Minutes		Purpose
		Recommended	Useful Range	
Dektol or D-72	1:2	1½	1 to 3	Normal Tones
Versatol	1:3	1	¾ to 2	Normal Tones

Rinsing, Fixing, Washing, Drying: See data sheet for Kodak Panalure Paper.

PHYSICAL PROPERTIES

Among paper properties termed "physical," image tone, surface, weight, and coating of the paper stock are especially important.

IMAGE TONE

The color of the silver deposit in the finished print is referred to as "image tone." If brownish, the print is said to be "warm" in tone, and if blue-black, it is described as "cold." These differences in color are caused by variations in size and condition of the silver grains which form the image, and they are controlled by the emulsion composition and the conditions of development. Kodak Velox Paper normally develops to a cold, blue-black image, while Kodak Azo, Opal, and Athena Papers, with normal handling, are progressively warmer in image tone.

Kodak papers are here grouped according to warmth of tone.

TONE	KODAK PAPER
BLUE-BLACK	Velox Velox Rapid Velox Unicontrast Rapid Velox Premier
NEUTRAL-BLACK	Ad-Type Azo Super Speed Direct Positive Kodabromide Resisto Resisto Rapid
WARM-BLACK	Polycontrast Rapid Medalist Illustrators' Azo Aristo Mural Polycontrast Panalure
BROWN-BLACK	Opal Ektalure Illustrators' Special Portrait Proof Athena PolyLure

The warmth of tone of the papers listed as "Warm-Black" or "Brown-Black" can be varied considerably by changes in the developer. Kodak Dektol Developer and Kodak Developer D-72 produce comparatively cold tones, while Kodak Selectol Developer, Kodak Selectol-Soft Developer, and Kodak Developer D-52 yield warm tones.

SURFACE CHARACTERISTICS

Texture, or surface roughness, largely determines the fineness of detail that the print can reproduce — the smoother the surface, the finer the detail.

1. *Smooth* paper has no noticeable surface pattern to interfere with the rendition of fine detail. This surface is best for small prints.
2. *Fine-Grained* paper has a slightly pebbled surface which adds richness to a print without much loss of definition. It is generally satisfactory for exhibition prints, views, and portraits of young people.
3. *Rough* paper has a noticeable texture which tends to subdue fine detail and emphasize the larger masses and planes of the subject. It is often useful for character studies, portraits of elderly people, and landscapes not dependent upon fine detail for interest.

Gloss, or surface sheen, largely determines print density scale — the glossier the surface, the blacker the maximum density and the greater the possible range of tones in the print.

1. *Glossy* (smooth) paper exhibits maximum density scale and fineness of detail. It should be used for prints intended for reproduction and for those in which extremely fine detail is important. For best results it should be ferrotyped.
2. *High Lustre* surfaces offer the maximum reflection scale possible without ferrotyping. It falls between the glossy and lustre surfaces in scale.
3. *Lustre* surfaces, with a somewhat shorter density scale than glossy papers, are generally more pleasing for exhibition and general use.
4. *Matte* surfaces have the shortest density scale and subdue the overall contrast of the print. This is often desirable with high-key pictures and "atmospheric" landscapes.

Tint refers to the color of the paper stock. Some Kodak papers are supplied with a cream-white and old-ivory tinted stock, whereas others are supplied with a white stock only.

1. *White* should usually be used for cold-tone subjects. It is recommended for snow scenes and seascapes, for high-key subjects, and for prints to be toned blue.
2. *Cream White is* probably the best choice for general use. It is suitable for both sunlighted and artificially lighted scenes.
3. *Old Ivory* is buff in color. It is effective in giving warmth and sunniness to all subjects. It adds richness to sunsets, to scenes suggesting lamplight or firelight, to character studies of elderly people.

SPECIAL SURFACES

Silk paper, with a clothlike, glossy texture, is effective for still lifes and many snow and water scenes. It has a cream-white tint.

Tweed paper, with a very rough, lustre surface, is recommended only for subjects requiring great subordination of detail. Imparting restraint and dignity, it is most effective in large print sizes. It is available in a cream-white tinted stock.

Tapestry paper has an extremely rough, lustre surface which greatly subordinates detail and is suitable only for large prints and massive subjects.

Suede paper has a smooth, extremely matte surface. Its short density scale suits many high- and low-key pictures including both portraits and pictorials. Framed without glass, this paper shows no surface reflection. It is supplied in cream-white.

Thickness. Depending on thickness of paper stock, most Kodak papers are classified as Single Weight or Double Weight. Single-weight paper is satisfactory for small prints. Double-weight paper is preferable for larger prints. Some papers are furnished in light weight for special purposes.

Papers identified by the letter A are intended for purposes which frequently involve folding and mailing. They are made to allow folding without cracking.

WHAT SURFACE TO CHOOSE?

The following is a brief description of each type of Kodak paper surface, with some of its most common applications.

Surface A is a smooth, lustrous surface on a white, light-weight folding stock. It is used frequently for French-fold greeting cards, prints to be attached to reports and theses, salesmen's sample picture books, and paper negatives.

Surface B is smooth, cream-white, lustre, particularly appropriate for portraits of small heads where it is desirable to preserve fine detail.

Surface C is the matte counterpart of B. It, too, is used for small portrait heads, but it is also recommended for high-key pictures where the matte surface adds a feeling of delicacy.

Surface D is a fine-grained, high-lustre, "snow-white" surface which is ideal for snow scenes and the production of Christmas cards.

Surface E is a fine-grain lustre on white stock. It is usually preferred where a commercial paper of a non-glossy type is indicated. It preserves a great amount of detail. Its white stock tint makes it acceptable to the engraver, and its lustre finish makes it desirable as an all-round paper.

Surface F is Kodak's glossy surface — the general favorite for pictures to be reproduced photomechanically, such as commercial photos, news photos, etc. It is also widely used for exhibition prints, because of its ability to reproduce a maximum of detail with brilliance. The F surface is by far the most popular paper in both the commercial and photofinishing fields.

Surface G is the outstanding favorite for portraiture. It is adaptable to the majority of subjects and is often considered a happy balance in cases where a more appropriate surface is not at hand. This surface is the popular favorite for oil coloring.

Surface J is a smooth, high-lustre white. Designed for the illustrator, its high-lustre surface preserves detail and produces brilliance which facilitates the making of quality photochemical reproductions.

Surface K is the high-lustre counterpart of G and is designed for the same purposes as G, although it imparts a feeling of greater brilliance and life to the picture. It is not recommended for oil coloring.

Surface L, being rough, is intended for reasonably large heads or other subjects where fine detail is not important. The rough texture adds a certain ruggedness to the print and makes large-size photographs appear somewhat richer than if printed on a smooth surface.

Surface N is a commercial surface which has been especially designed for retouching on the print. It accepts strong penciling. Being quite smooth, it also preserves fine detail.

Surface P is the old-ivory counterpart of G and is used for the same purposes except that it is recommended for subjects with warmth, such as fireside scenes, sunsets, etc. The old-ivory tint is also felt by many photographers to add stature to portraits of men, particularly older men.

Surface R is the very popular tweed surface. It is effective in minimizing the need for fine retouching and is especially good for breaking up large areas with its tweedlike texture. This surface has proven very popular for portrait proofing and for photomural work.

Surface V is the popular suede which simulates the appearance of suede leather. The extreme matte tends to tone down some detail, and the deep suede effect adds considerable depth to subjects. The suede surface is practically reflection-free and looks very well with almost any type of lighting. It has been of considerable interest to television advertisers in their attempts to eliminate surface glare. It has also been adapted by several outstanding photographers for highest-quality wedding photographs.

Surface X features a lustre tapestry surface, the same as Surface Z except on a cream-white base.

Surface Y simulates silk and is extremely popular for wedding photography because of its brilliance and clothlike texture. Its brilliance also makes it a very attractive medium for expressing brightness in such pictures as snow scenes, seascapes, greeting cards, etc.

Surface Z is extremely coarse-textured and canvaslike. It is a heavy surface designed for the printing of heavy subjects. Its major use is for subduing large masses and it is very effective for extremely large heads of men. Opal Z is frequently oil-colored with opaque oils, which gives much the effect of an oil painting on canvas.

To retain the sun-through-the-smoke effect, try Opal P which has an old-ivory paper base.

DIMENSIONAL STABILITY

The term "dimensional stability" refers to two different properties. One has to do with the magnitude of changes in size; the other with the uniformity from one sheet to another.

Paper is not a dimensionally stable material. All photographic papers undergo small but measurable changes in size as a result of processing and drying, and of variations in relative humidity. In a dry condition, the sheet of paper will be smaller than it will be in a more moist condition. Moreover, when passing from a dry condition to a wet condition and back to the same dry condition, the sheet may not return to its original dimensions. Since paper guides on exposing equipment do not change size with changes in humidity, a sheet of paper may be too large or too small for the guides under some conditions. To cope with this situation, paper is usually cut in equilibrium with average humidity conditions, and the equipment guides are adjusted accordingly. Once a sheet of paper is cut, the dimensions may increase or decrease as much as 0.3 percent for each 10 percent change in relative humidity.

Cutting is in conformance with American Standards and in most sizes is from one direction of the grain.

It is sometimes necessary to use several sheets of paper when making an unusually big enlargement. The separate prints must be uniform in any size changes they undergo so that they will match when the large composite print is assembled. The dimensional changes will be closely similar for consecutive sheets of Kodak papers taken from the same box, and thus will permit close matching of the prints. Maximum fidelity is obtained when the paper is used in the same direction (either machine or cross direction) for each separate print, and when processing and drying are done under identical conditions.

Kodak Resisto and Resisto Rapid Papers have a water-resistant base. Although they are not completely dimensionally stable, when processed as recommended they retain their original size better than other photographic papers.

PERMANENCE

With recommended processing, including recommended washing procedures, prints made on Kodak papers can be expected to last for many years without undergoing noticeable change. Residual silver salts in the print in time cause staining. Accordingly, for prints which

are to be stored for many years, it is advisable to use two fixing baths, the second being freshly made (see "Fixing," page 26).

Kodak Hypo Clearing Agent is a washing aid that helps you wash prints more rapidly and more completely than you can using water alone. See page 27.

Very small traces of hypo retained in prints greatly accelerate the rate of fading of the image. When complete removal of the last traces of hypo is important, prints should be treated in Kodak Hypo Eliminator HE-1. For further increasing the permanence of a print image, Kodak Gold Protective Solution GP-1 can be used. Formulas for these solutions are found in the Kodak Data Book, "Processing Chemicals and Formulas," which also contains sections on *Testing for Hypo* and *Testing for Silver Salts.* In addition, to help insure maximum life, prints should be stored in a cool, dry place which is free from all chemical and paint fumes.

Kodak Dry Mounting Tissue and Kodak Rapid Mounting Cement are recommended for use with photographic prints. Mounting materials, both adhesives and supports, not specially made for photographs may contain harmful substances.

PROCESSING

DARKROOM ILLUMINATION

SAFELIGHT LAMP RECOMMENDATIONS Minimum distance from lamp to work area is four feet			
NAME	DESCRIPTION	KODAK SAFELIGHT FILTER WRATTEN SERIES	BULB SIZE
Brownie Darkroom Lamp, Model B	Screws into light socket.	0 (Yellow) Plastic Cup	7-watt
Kodak 2-Way Safelamp	Two sided. Screws into light socket.	0A, 0C, 1A, 10 3¼ x 4¾-in.	15-watt
Kodak Darkroom Lamp	Parabolic, hung on drop cord over bench or sink.	0A, 0C, 1A, 10 5½-in. circle.	15-watt
Kodak Adjustable Safelight Lamp	Parabolic, on standard. For use on a table or mounted on a wall.	0A, 0C, 1A, 10 5½-in. circle.	15-watt
Kodak Utility Safelight Lamp, Model C	Suspended from ceiling by chains. With Accessory Bracket, used on table or shelf, or mounted on wall.	0A, 0C, 1A, 10 10 x 12-in.	25-watt at ceiling, 15-watt used on table or shelf

Most Kodak Enlarging Papers should be handled and developed by the light of a Kodak Safelight Filter, Wratten Series 0C (light amber) used in a suitable safelight lamp with a 15-watt bulb kept at least 4 feet from the paper. Safelight suggestions for individual papers are given in the Data pages of this booklet.

DEVELOPERS

Some photographers are never happy unless they're manipulating chemicals and processing times for the "magic" combination that will give them better results. We don't want to discourage any budding chemists, but the fact remains that processing according to the manufacturer's recommendations gives more certain results than "home brews" or off-beat processing techniques. Consider this: Every manufacturer wants you to get the best possible results from his products.

In the photographic field, Kodak and other major manufacturers spend large amounts of money in exhaustive and continuing research programs designed to find the best possible ways to handle their products. Such recommendations are published in data sheets and booklets like this one.

Recommendations for the use of Kodak Dektol Developer, Kodak Ektonol Developer, Kodak Selectol Developer, and Kodak Developers D-72 and D-52 appear in the Data Sheets. Other developers which can be used are Kodak Universal M-Q Developer (supplied in convenient packets), Kodak Versatol Developer, and Kodak Selectol-Soft Developer.

Development Time. Excellent prints are possible only when the printing exposure produces proper print density in the normal developing time. A common cause of "muddy" prints is underdevelopment. You naturally tend to pull out a rapidly darkening print before full development, but the image you get is poor in tone, lacking in contrast, and often mottled from uneven development.

Some papers, such as Kodak Medalist and Kodabromide, have more development latitude than others and require less critical exposure.

Overdevelopment, especially in an overworked solution, causes the formation of developer oxidation products which are likely to cause yellow stain. Oxidation also results from other causes, such as exposing the developing print to air. Even slight processing stains degrade print quality. Exhausted developers make it difficult to judge print quality accurately because of the dark color of the solution.

Uniform Development. The developing tray should be a little larger than the print. This allows proper agitation and convenience in handling the prints. Kodak trays are made with this need in mind. For example, an "8 by 10-inch" tray actually measures about 9 by 11 inches. For best results, slip the print edgewise and face up into the developer solution. Make sure it's covered quickly and evenly. Agitate the solution by rocking the tray or keeping the prints in motion. It's important to keep the prints completely immersed during development to avoid stains from oxidation.

STOP BATH

After development, immerse the print for about 5 to 10 seconds in a stop bath, such as Kodak Indicator Stop Bath or Kodak Stop Bath

SB-1, at 65 to 70 F (18 to 21 C). Agitate the print continuously to make sure it's well treated. If the stop bath is made much stronger than the Kodak SB-1 formula, or if you leave prints in the stop bath considerably longer than necessary, a mottled, "soaking" effect may result.

The Kodak Testing Outfit for Print Stop Baths and Fixing Baths provides a simple test for determining definitely when the stop bath is exhausted. Kodak Indicator Stop Bath, which you buy as a concentrated liquid, changes color when it's neutralized. When it turns dark in color, you automatically know it's exhausted and ready for discard.

FIXING

Transfer the print quickly to stop and fixing baths without stopping to examine it. After the prints have been rinsed carefully in the stop bath, fix them for 5 to 10 minutes at 65 to 70 F with agitation in an acid hardening fixing bath. You could use a solution prepared from Kodak Fixer or made from the formula for Kodak Fixing Bath F-5 or F-6. F-6 is recommended for general use because it has less odor. F-5 is good if prints tend to stick to your ferrotype plates, belts, drums, or drier, or if they soften in the toning bath. Kodafix Solution (diluted 1:7) and Kodak Rapid Fixer (diluted 1:7) are also recommended. As single baths, these solutions will fix about 8,000 square inches of prints per gallon — 100 8 x 10-inch prints, 400 4 x 5-inch prints, etc.

By far the best and most economical system is to use two fixing baths in succession. A two-bath system gives a much more permanent print and lets you use the fixing solution for many more prints.

Here's how it works. Have both baths at 65 to 70 F. Fix the prints, with frequent agitation, for 3 to 5 minutes in the first bath. Drain them for five seconds, then fix for 3 to 5 minutes in the second bath.

The two baths are "good" for two hundred 8 x 10-inch prints or their equivalent in other sizes, per gallon of the first bath. After that many prints have been fixed, throw away the first bath, put the second in its place, and mix a new second bath. The new two-bath setup is ready for two hundred more prints. After three more such changes (when you have fixed one thousand 8 x 10-inch prints or their equivalent in other sizes), throw away both baths and start over again. In any case, solutions shouldn't be kept longer than a week.

Avoid prolonged fixing or fixing at high temperatures, especially with warm-tone prints, because the bath tends to bleach the image and change its tone.

WASHING

Papers are washed to remove the fixing solution from both the emulsion and the paper base. If the hypo isn't removed, it will gradually transform the black silver image into a white or yellowish one. Dissolved silver salts carried from the fix also have to be removed or clear areas of prints will yellow. If you don't treat your prints in chemicals designed to accelerate washing, wash them for at least one hour with agitation and adequate water flow. Don't soak prints overnight in wash water, though, because bleaching and stains may result.

Kodak Hypo Clearing Agent can be used to reduce washing time and to obtain more complete washing. Transfer the prints, with or without a previous rinse, to the clearing agent solution. Treat single-weight papers at least 2 minutes, with agitation, at 65 to 70 F. Double-weight papers should be treated for at least 3 minutes. Wash single-weight papers at least 10 minutes and double-weight papers at least 20 minutes with agitation and normal water flow. If you maintain the water temperature at 65 to 70 F, a higher degree of stability can be obtained than you get with normal one-hour washing without the Hypo Clearing Agent Treatment. Here's a real bonus — when you use Kodak Hypo Clearing Agent, your water temperature can be as low as 35 F.

Prints not treated in Kodak Hypo Clearing Agent Solution should be washed for at least an hour in running water at 65 to 70 F. Water warmer than that tends to soften the emulsion and doesn't shorten washing time by much. Don't let the stream of water fall directly on the prints. When washing in a tray, place a tumbler or graduate in the tray and let the water overflow from it into the tray. The wash water should move fast enough to fill the washing container 10 to 12 times an hour, and it should keep the prints moving. Trays should not be so loaded that prints mat together and prevent proper washing action. The Kodak Automatic Tray Siphon converts any ordinary tray into an efficient print washer which assures proper movement and agitation of prints during washing.

TESTING FOR HYPO AND SILVER SALTS

Even small traces of hypo (fixing bath) retained in prints accelerate the rate of image fading. If you're interested in checking your prints for hypo, you can do so by following the procedure outlined in the Kodak Data Book, "Processing Chemicals and Formulas."

If prints don't receive proper fixing, or if they're fixed in a used bath

containing dissolved silver compounds in any quantity, some silver salts will be retained in the paper. These salts are very difficult to remove by washing. Eventually they may discolor and cover the prints with a brownish stain of silver sulfide. The remedy, of course, is adequate two-bath fixing and thorough washing. When testing for residual hypo, also check your prints for silver salts. You can check by using the procedure outlined in the Kodak Data Book, "Processing Chemicals and Formulas."

Prepare papers with an "F" surface for ferrotyping by wiping them carefully with a wet viscose sponge to remove foreign material that is sticking to the wet emulsion. Then transfer the prints to the drum or tin along with a good quantity of surface water. Contact between the paper and the drum is obtained by the roller pressure. (Note: We normally don't recommend ferrotyping of the "J" surface.)

If you don't plan to ferrotype your prints, dry them in a Kodak Photo Blotter roll, a print dryer, on clean cheesecloth, or between clean blotters on plastic screen stretchers. Press the print between blotters to remove excess water before drying.

If your prints curl after drying, you can flatten them by dampening their backs with water (or equal parts of alcohol and water), and redrying them between blotters under heavy pressure for two or three hours. Using Kodak Print Flattening Solution minimizes curling and cracking of the emulsion.

Cleanliness is very important in drying prints. A piece of dirt or lint on the drying surface can mar an otherwise perfectly processed print.

TONING

You can choose from various papers to get the warmth of image tone you prefer in the print. You can vary the warmth of tone of such papers as Kodak Azo and Medalist by the choice of developer. Using Kodak Selectol and D-52 Developers, for example, gives you warmer tones on such papers than Kodak Dektol and D-72 Developers.

If you want a more strongly colored image, you can tone the picture. Kodak Poly-Toner is a concentrated solution that can be used to produce a whole range of reddish brown to warm brown, simply by varying the dilution. A number of packaged Kodak toners are available. Or, you can mix your own using the information published in the Kodak Data Book, "Processing Chemicals and Formulas."

The final hue of a tone print is influenced by emulsion type, age, and storage conditions of the paper, processing variations prior to

toning, and variations in toning procedure. Successful toning is dependent on careful print processing such as full development, use of a fresh fixing bath, Kodak Hypo Clearing Agent, and adequate washing prior to toning. For more complete information on toning, see the Kodak Data Book, "Professional Printing with Kodak Photographic Papers."

RECOMMENDATIONS
FOR TONING KODAK PAPERS IN KODAK TONERS

Kodak Paper	Hypo Alum Sepia T-1a	Sepia or Sulfide Sepia T-7a	Brown or Poly-sulfide T-8	Gold T-21	Rapid Selenium	Poly-Toner (1:24)	Blue
Ad-Type	X	X	P	NR	X	P	NR
Aristo	X	X	X	P	P	P	X
Athena	X	X	X	P	P	P	X
Azo	X	X	P	NR	X	P	NR
Ektalure	X	X	X	P	P	P	X
Illustrators' Azo	X	X	X	P	P	P	X
Illustrators' Special	X	X	X	P	P	P	X
Kodabromide	X	P	NR	NR	NR	NR	NR
Medalist	P	P	P	NR	X	P	X
Mural	P	P	P	NR	X	P	X
Opal	X	X	X	P	P	P	X
Panalure	P	P	P	X	X	X	X
Polycontrast, Polycontrast Rapid	P	P	P	NR	X	X	P
PolyLure	X	X	X	NR	P	P	P
Portrait Proof	X	X	X	P	P	P	X
Velox	P	P	X	NR	NR	NR	X
Velox Premier	X	X	X	NR	NR	NR	X
Velox Rapid	P	P	X	NR	NR	NR	X
Velox Unicontrast Rapid	P	P	X	NR	X	NR	X

P—Primary recommendation.   NR—Not Recommended.
X—Although not a primary recommendation, a tone can be secured which may be an application for special purposes.

Other Kodak Printing Materials

• In addition to the papers described in detail in this book, there are many Kodak papers and positive materials for special purposes. A few of these products are discussed below.

Kodak Illustrators' Special Paper has a full-scale, brilliant emulsion of the quality and speed of Kodak Ektalure Paper. It is a fine medium for commercial illustration and reproduction purposes, and the surface is well suited to retouching. It is supplied in single weight, double weight, and in a white, lustre, fine-grained surface.

Kodak Ad-Type Paper for contact printing has the same speed as Kodak Azo Paper. It is designed to fold without cracking and is an excellent medium for photographic greeting cards. Ad-Type Paper is coated on white, lustre, lightweight, smooth stock, and is supplied in six printing grades. It is also available in a ledger-type stock of good strength in four printing grades.

Kodak Studio Proof Paper is a smooth, white, single-weight, printing-out proofing paper which requires sunlight or extremely brilliant artificial light for printing. It is supplied in surface F.

Kodak Portrait Proof Paper, which is single weight and has a tweed, lustre surface, is normally intended for making proofs from professional portrait negatives. It is slightly slower than Kodak Ektalure Paper. This is a developing-out, not a printing-out, paper.

Kodak Velox Premier Paper is a high-speed product especially designed for printing miniature negatives with diffused light sources.

Kodak Velox Rapid Paper is suitable for optical printers. It enables photofinishers to produce enlargements from miniature negatives of the same quality and tone as Velox contact prints. It hasn't sufficient speed for use with conventional enlargers.

Kodak Velox Unicontrast Rapid Paper is a long scale paper for photofinishing roll printing and processing.

Kodak Super-Speed Direct Positive Paper provides a direct positive image by chemical reversal and is useful for making prints directly from transparencies. It can also be used in the camera. The emulsion is orthochromatic and has a short exposure latitude.

Kodak Resisto Rapid Pan Paper is designed for making three-color separation positive prints with appropriate filters from Kodak Ektacolor and Kodacolor negatives.

MATERIALS FOR INDUSTRIAL USE

Materials for Drawing and Document Reproduction — The duplication of drawings, documents, and records is an indispensable part of business and industrial operations. The Eastman Kodak Company makes a line of photographic materials especially for this purpose. These materials, which are high-contrast emulsions coated on film and paper supports, offer the user a large range of products for doing almost any type of drawing- and document-reproduction job. These materials are available through Kodak Graphic Reproduction Dealers.

CONTACT MATERIALS FOR ROOM-LIGHT HANDLING

Kodagraph Autopositive Paper, Extra Thin and Translucent — High-contrast papers for making positive copies from positive originals. They are primarily used for reproducing engineering drawings.

Autopositive Paper, Translucent, has 30 percent greater print-back speed when used as an intermediate and is more translucent and more durable than Autopositive Paper, Extra Thin.

Kodak Autopositive Film (Estar Base) has the same unique photographic properties as Autopositive Paper — excellent for the restoration of worn drawings, as well as for reproduction of extra-fine detail, as in maps. The Estar base provides very high strength, great tear resistance, and extremely good dimensional stability.

Kodagraph Repro-Negative Paper, Extra Thin — For making either black-on-white intermediates from blueprints and other negative originals or negatives of drawings. It can be handled in room light and exposed on standard reproduction equipment in the same manner as Kodagraph Autopositive materials.

CONTACT MATERIALS FOR DARKROOM HANDLING

Kodagraph Contact Paper — Available in four different paper stocks — Standard, Extra Thin, Fine-Line, Translucent. It is a high-contrast paper for reproducing drawings and documents. The Fine-Line stock has a baryta undercoat permitting the recording of extremely fine detail. The Translucent stock is especially suitable for making duplicate copies of engineering drawings.

PROJECTION-SPEED MATERIALS FOR DARKROOM HANDLING

Kodagraph Projection Paper, Standard, Extra Thin and Translucent — For making high-quality enlargements from microfilm and

other reduced-scale negatives. It can be handled under a Kodak Safe-light Filter, Wratten Series 1A.

Kodagraph Fast Projection Paper, Standard and Extra Thin — For making high-quality enlargements from microfilm and other reduced-scale negatives where short exposure time is essential. Reproductions on the Extra Thin stock are suitable for making additional copies in blueprint and direct-process machines and are less bulky, reducing filing space.

Kodagraph Autopositive Projection Paper, Standard and Extra Thin — Are high-contrast papers that can be used in a copying camera for making positive copies of documents, microfilm positives, and other originals. The Extra Thin paper has a thin base for extra translucency.

Kodagraph Projection Positive Paper — Is a projection material that prints directly to a positive. Exposure can be made with an enlarger or projection printer, or in a process camera.

KODAK PHOTORECORDING PAPERS

Kodak Linagraph papers and films are designed to record crisp, black line images on clean backgrounds with all leading makes of photographic-recording instruments. They are supplied in a wide range of photographic and mechanical specifications.

Kodak Linagraph 480 Paper — Made expressly for seismographs with sensitivity adequate for a good record in all photographic paper seismography.

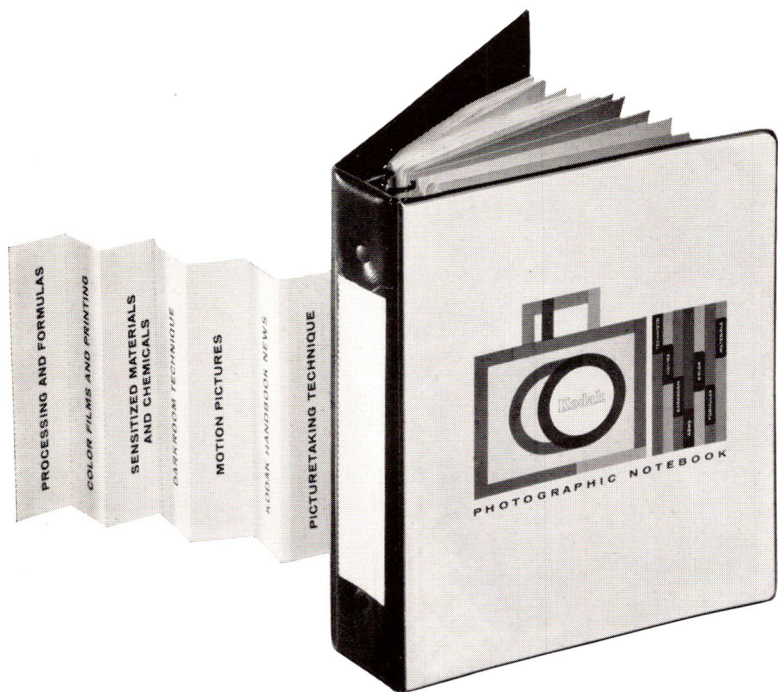**Kodak Linagraph 483 Paper** — Same emulsion as 480, but on an extra-thin base.

Kodak Linagraph 697 Paper — For recording traces on blue-emitting cathode-ray tubes.

Kodak Linagraph 809 Paper — A favorite paper for general oscillographic use. Has strong, ledger-type paper base.

Kodak Linagraph 1127 Paper — Of all recording papers, the most sensitive to tungsten light. Valuable for recording traces from green-emitting cathode-ray tubes.

Kodak Linagraph 44 and 77 Papers — Are photorecording papers used with galvanometer oscillographs. Linagraph 44 Paper is for use at low to relatively high writing speeds, and Linagraph 77 Paper is for extremely high writing speeds.

Kodak Linagraph Direct Print Paper — Is a print-out photorecording material used with oscillographs to provide an immediately visible record without chemical processing.

Labels on the strips:
PROCESSING AND FORMULAS
COLOR FILMS AND PRINTING
SENSITIZED MATERIALS AND CHEMICALS
DARKROOM TECHNIQUE
MOTION PICTURES
KODAK HANDBOOK NEWS
PICTURETAKING TECHNIQUE

PHOTOGRAPHIC NOTEBOOK

BUILD YOUR OWN
PHOTOGRAPHIC HANDBOOK

A photographic handbook tailored to your own personal interests and needs can be yours with the new **Kodak Photographic Notebook.** It has a transparent pocket on the backbone into which can be inserted an appropriate title strip. A page of printed, card-weight strips is supplied with the Notebook. The extra-large binder rings will easily hold six Kodak Data Books, plus your personal notes and a number of small pamphlets. A set of tabbed separator pages for indexing and a supply of blank note paper are included. A registration card entitles you to receive periodic notification of new or revised Kodak publications.