Enlarging *for the* Professional

EASTMAN KODAK COMPANY
ROCHESTER, N. Y.

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The Large Print

Enlarging has come into its own. The purchasing public is becoming more and more susceptible to projected prints, due in a large measure to the fact that Bromide papers, made specially for portrait enlarging, and improved apparatus which automatically maintains the highest optical efficiency of the camera, result in better work. And these improved materials and methods enable the photographer to make the most of a rapidly growing market.

This booklet presents the latest information on the subject, describes the various methods and will help you determine what apparatus and materials are best suited to your needs.

EASTMAN KODAK COMPANY

Rochester, N. Y.

March, 1923.

The Making of Projection Prints

WHILE the actual process remains the same, the term "projection print" to describe the enlarged image projected through a lens on the sensitive paper is coming to be generally used because it is associated with the more modern methods and materials.

The size of the projected image depends upon the distance between the lens and the sheet of sensitive paper—the further the paper is from the lens, the greater the enlargement. And as the distance between lens and paper is increased the distance between the lens and the negative becomes less, just as is the case when photographing an object at a distance.

Obviously an enlarged negative can also be made in the same manner as a large print by using a small positive and projecting the image on a film or dry plate instead of on a sheet of sensitive paper.

Projection by Artificial Light

Artificial light is at all times preferable to daylight because of its uniformity and because it may be used at all times. Until very recently, however, the use of condensing lenses has been necessary when making projected prints by artificial light.

With the introduction of the Eastman Projection Printer, the making of large prints has been so greatly simplified that not only have condensing lenses been dispensed with but focusing, which

required considerable time if enlargements were to be made to exact size, has also been made unnecessary. The Projection Printers are absolutely self-focusing.

The movements of the Projection Printer are vertical rather than horizontal and instead of a stationary camera and movable easel, a table acts as an easel and all of the movement is in the camera. The camera is attached to parallel arms and is counter-balanced so that it is readily moved up or down, increasing or diminishing the size of the picture image.

A cam and gear control the movement of the lens in relation to the negative. And this mechanism is so perfectly adjusted that there can be no movement of the camera which changes the size of the image, no matter how slightly, that does not also change the position of the lens to maintain a microscopically sharp image.

So projection printing with the Projection Printer is simply a matter of raising or lowering the camera until the image is the desired size. Adjustable masks in the negative holder quickly mask the negative or the print may be masked in the adjustable paper holder.

Detail showing camera, mechanism of automatic cam and adjustable paper holder on table.

There are also diffusing discs which may be slipped over the lens and which give pleasing softness without any increase in exposure. The No. 2 Eastman Projection Printer takes negatives 8 x 10 or smaller and will enlarge to 40 x 50 inches. The adjustable paper holder will mask prints from 3 x 3 to 17 x 20 inches.

The No. 1 Projection Printer takes negatives 5 x 7 or smaller, will enlarge to 40 x 56 inches and the adjustable paper holder will mask prints from 1½ x 2 to 15 x 21 inches.

The No. 2 Projection Printer is equipped with a 400 watt Mazda lamp and the Eastman Projection Anastigmat lens f.4.5, while the No. 1 Printer is equipped with a 250 watt Mazda lamp and the Eastman Projection Anastigmat f.8. With either equipment prints can be made with ample speed and one man can easily turn out twice as much work as with the ordinary enlarging equipment.

The Kodak Projection Printer is smaller in size but equally efficient and is specially suited to the needs of the amateur finisher. It will take negatives 3¼x 5½, 4 x 5 or smaller and the largest possible print is 24 x 32 inches. The paper holder with its masking device is identical with that of the larger printers and accommodates prints as large as 11½ x 14½ inches.

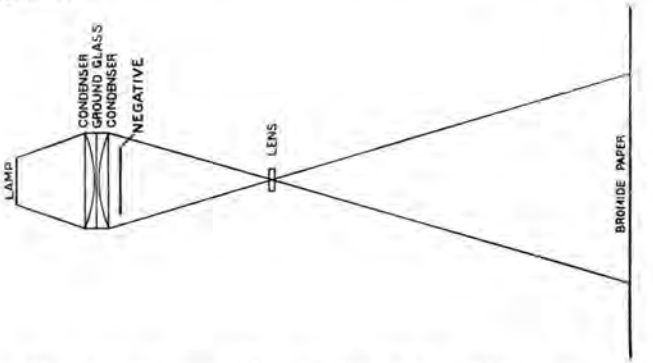
With the Kodak Projection Printer one can develop almost as much speed in making large prints as in printing by contact. The lens is the Kodak Projection Anastigmat *f*.6.3 and the lamp equipment the 100 watt Mazda C stereopticon type.

The Projection Printers are more fully described in special booklets which will be mailed free on request.

Projection by Artificial Light with Condensers

When condensing lenses are used a gas flame or the ordinary incandescent electric light is not suitable owing to the color of the light. In using condensers the R.O.C. Enlarging Back, (page12)

will answer, the condensers being placed back of the negative as shown in the accompanying diagram.



Condensers usually consist of two plano convex lenses enclosed in a metal rim or mount, the convex surfaces facing each other. By referring to the diagram it will be seen that their object is to collect as many rays of light as possible and bring them to a point in the front lens system. The diameter of condensers is a most important consideration, for unless they are large enough, the illumination will be hopelessly unequal. The diameter of the condenser must exceed the diagonal of the negative it is used with—for instance, a nine-inch condenser for a 5 x 7 plate. The position of the condenser in relation to the light is also important. For example, the back focus of a pair of nine-inch condensers is about 7 inches, and the point of light should be about that distance behind the condensers in order that a perfect cone of light may be

passed through the negative and converge on the enlarging lens. If the light and the condensers are too close together, a dark place will be seen near the center of the enlarged image; if too far apart, the margins of the image will show colored fringes. Also if the condensers are too close to the light they will be in danger of breaking from the heat especially if they fit tightly in the cell.

When two single condensers are combined the focus of the combination is about half of the single element; the focus of a pair of 9-inch plano convex condensers would be seven inches measured from the center of the combination, each lens being of fourteen inches focus. A sheet of ground glass placed between the condensers and the source of light affords a better diffusion of the light. Condensers mounted and unmounted can be purchased through your dealer.

If the photographer possesses sufficient mechanical skill he may mount the condensers himself, as follows:

Cut a piece of ¼-inch pine or poplar to a square about an inch larger than the diameter of the lenses. In the center of the board saw a circular opening the exact size of the lens. In another board of the same dimensions cut a circle a quarter inch less in diameter. Place these boards together with the grain running in opposite directions to prevent warping, place the lens in position and secure by means of a heavy wire bent in a circle the size of the opening. Mount the second lens

in the same way. The two lenses should be mounted together with their convex surfaces facing each other and a slight distance apart. A sheet of fine ground glass may be mounted between or behind them to aid in diffusing the light and to overcome any slight defect in the lenses. The combination should now be boxed up for placing in position.

In assembling the apparatus the following important points must be given consideration:

First, the planes of the condensers, negative, projecting lens and screen must be parallel.

Second, the centers should be in a single straight line.

Third, either the light or the condensers should be so mounted as to easily slide backward or forward, since every time the projecting lens is racked backward or forward, it necessitates a corresponding motion toward or from the light.

Enlarging by Daylight

There are a number of cameras especially constructed for enlarging by daylight, but such instruments naturally limit the size of the enlargements to the capacity of the camera, and cameras to make enlargements greater than 18x22 are not usually carried in stock. We illustrate (page 10) one of the best of this type of enlarging cameras, manufactured by the Folmer and Schwing Department of the Eastman Kodak Company.

The Crown Enlarging, Reducing and Copying Camera is furnished in four sizes; 8 x 10 and 11 x 14 14 x 17 and 18 x 22.

For professional use, where a large amount of work of varying sizes has to be regularly turned out, we advise fitting up a special room for the purpose, where the size of the enlargement is limited only by the size of the room.

Crown Enlarging, Reducing and Copying Camera

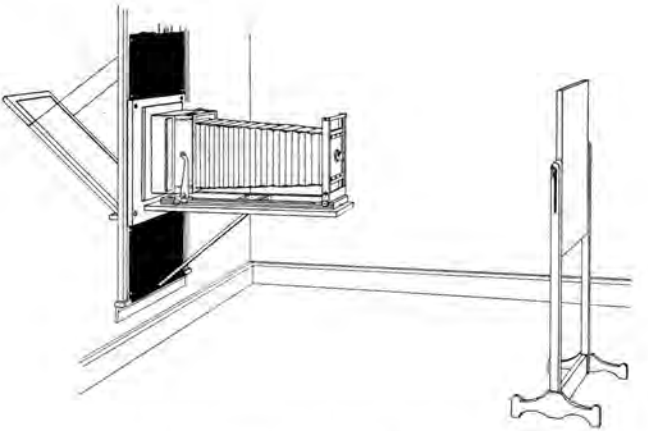
In many instances the regular dark-room can be adapted for the purpose, the camera and negative carrier fitting into an opening in the dark-room window, and utilizing the daylight outside for illumination.

For daylight enlarging by the above method, select a room, perferably one with a window opening to the north through which the light can enter without obstruction from trees or adjacent buildings.

The window should be provided with a tightly fitting shutter which can easily be removed when necessary for ventilating or cleaning the room.

A thoroughly satisfactory apparatus for the purpose is easily constructed by using the R.O.C.

Enlarging Back as shown in the accompanying diagram.



R. O. C. Enlarging Back fitted to view camera.

In addition to the window shutter the rest of the outfit consists simply of the Enlarging Back for holding the negative and ground-glass diffusing screen, to which is attached an ordinary reversible back view camera. The easel for holding the sheet of Bromide paper may be constructed as shown in the diagram, or modified to meet individual requirements. It will be seen that the window shutter must be provided with an opening to take the Enlarging Back to which the camera used for projection is to be attached.

A white reflector should be placed outside the opening in the window, at an angle of 45 degrees to reflect the light from the sky. This should illuminate the ground-glass screen evenly. No harm will result if the sun shines on the ground glass and reflector, provided it strikes evenly. If the light is too strong the lens can be stopped down.

Showing Back attached to View Camera

The foregoing outlines, in a general way, how the window shutter or screen and Enlarging Back are to be used.

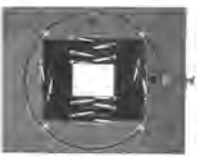
A camera of the ordinary reversible back, front focusing type such as the Eastman View Camera is best adapted for the purpose. It should have a strong and rigid front with rising and falling adjustment and a good sized lens board. In fitting the camera to the Enlarging Back the ground-glass focusing back should be removed, and the Enlarging Back used in its place. A strong shelf or table should be provided to support the camera in position when focusing. See that no light enters the room from the window opening.

Care must be exercised to keep the board holding the Bromide paper exactly parallel with the negative, providing guide rails or markers for the purpose.

The R. O. C. Enlarging Back is similar in construction to the back of the Revolving Back Enlarging Camera, is fitted with a full set of nested kits and diffusing glasses. It is made in 6½ x 8½ and 8 x 10 sizes, to fit the Eastman View Cameras. For Adapters to fit the Empire State, Century View, Premo View and R. O. C. Cameras an extra charge is made.

Revolving Back Enlarging Camera 8 x 10

One of the special features of this camera is that the negative carrier is fitted with a revolving attachment controlled by rack and pinion, which, with the sliding movement and the rising and falling front, permits accurate centering of the enlargement on the easel.



The negative carrier is fitted with a set of nested spring kits, taking all standard sized negatives from 8 x 10 down to 3¼ x 4¼. Film negatives included within the sizes given

may easily be enlarged from, the film being placed between two pieces of clear glass, after which they may be handled in the same manner as glass plates. The glasses used must be perfectly clear and free from scratches or bubbles. The spring fingers on the kits are attached with split rivets and the side of the kit is beveled to prevent the spring fingers extending into the opening and showing in the enlargement.

New Model Easel

Focusing is with rack and pinion controlled by a large wooden knob, and a binding nut securely locks the front of the camera when the correct focus has been secured.

Any suitable light may be used with the Revolving Back Enlarging Camera and when using an arc or other light in which the rays emanate from a point, condensers may be used if desired.

To set the camera in position for enlarging, an opening 10½ by 10½ should be cut in the dark-room partition and the camera attached so the back will center over the opening. The light is placed outside the dark-room and the enlargement projected upon a movable easel inside the dark-room. By moving the easel back and forth en-

largements of any desired size may be made. The opening in the partition should be cut so that the center of the lens will be 48 inches from the floor, as this gives a comfortable working height.

The outfit includes the camera, revolving back negative carrier with a full set of nested spring finger kits, and one sheet of flashed opal glass, 11½ x 11½. The camera comes in one size only, 8 x 10, which takes all sizes of negatives up to and including 8 x 10.

The Lens

Broadly speaking, the lens that made the negative will make an enlargement from it of any size. But there may be other lenses more suitable for the purpose. The requirements are, a lens that will fully cover the negative, that has a flat field and will project an image free from distortion. The focal length of the lens also demands consideration; with a lens of extremely short focus it is difficult to secure evenness and sufficient illumination owing to the lens being too close to the negative. The lens should have a focal length of at least the diagonal of the negative. Undoubtedly the best type of lens for enlarging is an anastigmat, as it has great covering power, flatness of field and a large working aperture. Lenses of the rapid rectilinear type, whose working apertures are *f*.8 are well adapted for enlarging, though in subjects demanding extreme marginal definition they will require stopping down. Many pro-

fessionals possess portrait lenses with apertures of *f*.3 or *f*.4, and for portrait enlarging their rapidity is of practical value in lessening the time of exposure. For other than portrait work, the other lenses serve the purpose better.

While an enlarging camera carefully constructed along the lines mentioned in the foregoing pages will produce first-class results, we advocate, when possible, the purchase of a Projection Printer or other apparatus made specially for enlarging as the work may be done more efficiently and in the end with greater economy.

The Negative

An ideal negative for enlarging possesses the following qualities: Extreme sharpness of definition to the edges of the plate; clear shadows, full gradation between high lights and shadows and freedom from scratches, pin holes or spots, as all such imperfections are greatly magnified in enlargement. The negative should be fairly strong, and evenly balanced, neither excessively contrasty nor flat; one fully timed and fully developed.

Safe Light

An Eastman Safelight Lamp fitted with a series O Wratten Safelight will give the most brilliant illumination that is safe for handling bromide paper. A 10 watt lamp should be used and the light should be at least three feet from the developing tray. The dry paper should not be left ex-

posed to such a light for any length of time however. The safelight is perfectly safe for developing and reasonable handling of the paper but *any* Safelight will fog the sensitive material if reasonable precautions are not taken.

Exposure

Having arranged the apparatus, the next operation is that of focusing the enlargement. This does not apply to Projection Printers as the image is always in focus.

Place the negative upside down in the negative holder with the film side towards the lens, and mask the negative *so that no light may enter the camera except through the part to be enlarged.* Then shut out all light except that coming through the lens. An image more or less blurred will appear upon the easel. The easel and lens should be moved back and forth until an image of the desired size is obtained, then focus it sharply.

The image may be centered on the easel by means of the rising front of the camera, but *when condensers are used the lens must remain in the axis of the condensers and the adjustment of the negative obtained by raising or lowering the easel.*

When small negatives are used with large condensers, the lens may be moved up or down or sideways so long as it does not go outside the circle of uniform illumination.

Focus the image with the lens wide open, then for all subjects except bust pictures, stop down to

*f.*16 or more. Stopping down not only insures good definition, but by lengthening the exposure, permits greater control while exposing the paper, affording time to shade, or locally increase the exposure on any portion of the image.

When enlarging from portrait negatives, much greater softness and roundness can be secured by stopping down to f.8 or f.16 for one quarter of the exposure and completing the exposure with the lens wide open.

An Eastman Safety Cap will be found a great convenience. This device fits over the lens of the enlarging camera, the aperture containing the ruby glass being slid over the lens while focusing on the sensitive paper, and during the exposure the uncovered aperture comes opposite the lens. By the use of this cap the enlargement may be accurately focused on the sensitive paper without danger from light fog.

Before making an exposure see that the package of paper from which you are using is protected from the light. It is a good plan to have a large sized box with a tight fitting hinged cover in which to keep the paper until it is wanted. Such a box can easily be fitted with a compartment to hold the exposed paper until ready for development.

Test Exposures

In the making of enlargements, test strips should be used to determine the accuracy of the focus and proper time of exposure.

Place a narrow strip of paper diagonally across the paper easel. Cover two-thirds of the paper with a piece of cardboard and give the remaining third what you think will be a trifle under correct exposure. We will assume it is five seconds. Move the cardboard and give the next portion five seconds, then remove the cardboard entirely and expose five seconds. This will give exposures of fifteen, ten and five seconds.

Develop the test fully; at least for 1½ minutes, and choose the exposure which seems correct or make another test with different exposures. If the image flashes up in less than five seconds the print is over-exposed.

To shade any portion of the print during exposure stop down the lens to increase the necessary exposure, and hold the shade nearer the lens than the paper to obtain proper diffusion. In this way the character of the print can be greatly modified, detail being held in shadows, and by shading the shadow portions, printing detail in the strong highlights.

Bromide Paper

Bromide paper is coated with an emulsion very similar to that of a film or plate but very much less sensitive, so it may be handled in a stronger light than would be safe for films or plates. It has remarkable keeping qualities and when properly developed, fixed and washed, the image is as permanent as the paper support itself.

Eastman Portrait Bromide is a comparatively new product and has been made with only one thought—to offer the professional photographer a bromide paper specially suited to the requirements of portrait enlarging. It has exceptional gradation and fineness of grain and readily duplicates the quality of the contact print.

Artura Carbon Black Paper

Artura Carbon Black is a paper of the developing-out class, and while considerably slower in speed than the Bromide papers, possesses qualities that commend it particularly to the professional making high class portrait enlargements. Artura Carbon Black is specially suited for enlarging from professional portrait negatives as it fully preserves all the detail and delicacy of gradation of the original negative.

Results

The great variety of surfaces and grades of the Eastman Bromide, P. M. C. Bromide and Artura Carbon Black papers enable the photographer not only to duplicate any effect to be had in contact printing, but also in many instances to greatly improve the quality by means of simple manipulation during exposure and development.

An enlargement from a good negative made on the proper grade of paper will equal in every respect a contact print made from an enlarged negative, and with a great saving of time and money.

What Paper to Use

Eastman Bromide Papers

Eastman Bromide Papers, since their introduction, thirty-five years ago, have been considered standard by the photographic public. The great variety of grades cover practically every photographic requirement.

EASTMAN PORTRAIT BROMIDE is especially adapted to enlargements from portrait negatives. The speed is slightly less than that of other Bromide papers but is ample for portrait enlarging. It is furnished in three surfaces and two colors of stock: D (white) and E (buff), Rough Matte; D (white) and E (buff), Rough Lustre; M (white) and O (buff), Old Master. The Old Master surface is specially pleasing for high grade portraiture, the rough texture lending a distinctive character to the print without the sacrifice of detail or brilliance.

VELVET BROMIDE is suited to negatives having broad shadows, the slight sheen of the semi-gloss surface gives the enlargement exceptional brilliancy in the shadows. Single weight, white stock, regular emulsion.

EASTMAN BRILLIANT VELVET BROMIDE is especially well adapted for enlargements from thin or flat negatives. It is furnished in single weight, white stock, contrast emulsion.

STANDARD BROMIDE PAPERS have a natural surface which is adapted to all kinds of enlarge-

ments, particularly copies on which art work is to be done. There are three different grades:

B—Single weight, smooth, semi-matte, white stock.

C—Single weight, rough, matte, white stock.

BB—Double weight, smooth matte, and CC, double weight, same surface as C, need no description. Their best use is for unmounted prints and large work.

MATTE-ENAMEL BROMIDE PAPER—Single weight, smooth matte surface, white stock. Adapted for work with crayon, pastel, India ink, oil or water colors.

ENAMELED BROMIDE PAPER—Single weight, glossy surface, white stock. May be ferrotyped to produce very high gloss.

ROYAL BROMIDE PAPER—For this grade a *medium weight* smooth buff colored stock is used. Enlargements on Royal Bromide are especially pleasing when the prints are toned or redeveloped to a sepia color. The natural color of the untoned print, however, is pleasing for some subjects, as the tint of the paper stock lends a warmth and softness of tone impossible to secure with any other grade of Bromide paper.

P. M. C. Bromide Papers

P. M. C. Bromide Papers are of excellent quality, are furnished in a variety of stocks and surfaces and in several grades in two degrees of contrast.

No. 1, Glossy, White stock, single weight, regular.

No. 2, Smooth, White stock, single weight, regular and contrast.

No. 3, Rough, White stock, single weight, regular and contrast.

No. 4, Glossy, Pense stock, single weight, regular.

No. 5, Matte, White stock, single weight, regular.

No. 6, Smooth, White stock, double weight, regular.

No. 7, Rough, White stock, double weight, regular.

No. 8, Rough, Medium lustre, Buff stock, double weight, regular and contrast.

No. 9, Semi-Gloss, White stock, double weight, regular and contrast.

No. 10, Glossy, White stock, double weight, regular.

Development

The best developer for Bromide paper is Nepera Solution, which should be diluted 1 part to 6 parts of water, or the following formula may be used if preferred:

Elon-Hydrochinon Developer

(Formula D 60)

Stock Solution

Note—Avoirdupois weight is the standard used in compounding all of the following formulae.

Dissolve chemicals in order named, stirring constantly:

Hot Water (about 125° F.)	16 ounces
Elon	45 grains
Sodium Sulphite (E. K. Co.)	1½ ounces
Hydrochinon	135 grains
Sodium Carbonate (E. K. Co.)	2½ ounces
Potassium Bromide	15 grains
Water to make	32 ounces

To develop, take stock solution, 1 part, water, 4 parts. The temperature of developer should be kept at 70° F.

This concentrated developer will keep indefinitely in full bottles, well stoppered.

E. K. Co. Sulphite and Carbonate are specified because of their exceptional strength and purity. If sodas of other make are used a greater quantity will be required.

Artura Carbon Black

ARTURA CARBON BLACK, while not quite as fast as Bromide, produces prints of great brilliancy and richness, and is splendidly adapted for making the highest class of enlargements.

CARBON BLACK is made in the following grades:

GLOSSY—Regular weight stock, smooth glossy surface.

STUDIO SPECIAL—Regular weight stock, smooth semi-matte surface.

MATTE—Regular weight stock, smooth surface (slight sheen or lustre).

ROUGH MATTE—Double weight stock, medium rough (lustre surface).

EXTRA HEAVY—Double weight stock, smooth, semi-matte surface.

GRADE D— Double weight, medium rough, absolute matte surface (no lustre).

BUFF—Double weight stock of delicate cream-buff tone, medium rough (lustre surface).

GRADE E SMOOTH—Double weight, buff stock, absolute matte surface (no lustre).

GRADE E ROUGH—Double weight, buff stock, medium rough, absolute matte surface (no lustre).

Artura Carbon Black must be handled in orange or red light. Plenty of light may be used, but it must be of a safe color. Any of the Safelight Lamps with a series O Safelight may be used.

Developer for Artura Carbon Black or Eastman Portrait Bromide Papers

(Formula D 49-50)

Hot Water (about 125° F.)	16 ounces
Elon	45 grains
Sodium Sulphite (E. K. Co.)	1½ ounces
Hydrochinon	165 grains
Sodium Carbonate (E. K. Co.)	1½ ounces
Potassium Bromide	30 grains
Water to make	32 ounces

To develop, take Stock Solution, 1 part, water, 1 part. The temperature of the developer should be 70° F.

The image should appear slowly and should develop up strong, clear and brilliant. Increasing the amount of Potassium Bromide given in our formulae is sometimes necessary to prevent grayish highlights.

Fixing

The fixing is of the utmost importance, as upon this depends in a large measure the permanency of the prints. Prepare the fixing bath with as much care and accuracy as is given to the preparation of the developing solution.

The following fixing bath is recommended for Artura Carbon Black and Bromide papers.

Acid Fixing Bath for Artura Carbon Black and Bromide Papers (Formula F 1)

Water	64 ounces
Hypo	16 ounces

When thoroughly dissolved add the following hardening solution. Dissolve the chemicals in the order named:

Water	5 ounces
Sodium Sulphite (E. K. Co.)	1 ounce
Acetic Acid (28% pure) E. K. Co.	3 ounces
Potassium Alum	1 ounce

Prints should be rinsed, then quickly and thoroughly immersed in the fixing bath face up. Prints should be fixed in a freshly made bath from ten to twenty minutes. Keep the prints well separated during fixing. This bath should not be over-worked and should not be used at a temperature higher than 70°. Use a liberal quantity of fixing bath.

The above bath will fix thirty-two 16 x 20 prints or their equivalent, after which a fresh bath should be mixed.

Washing

After the prints are thoroughly fixed, they should be washed for one hour in running water or given twelve changes of water from one tray to another, allowing about five minutes for each change. The temperature of the water in winter should not be below 45 degrees Fahr., as ice cold

water may cause blistering. When running water is used for washing, the stream should not be allowed to fall directly on the prints, as it may cause breaks in the fibre of the paper, producing blisters. Place a tumbler or graduate in the washing tray and allow the water to overflow from it into the tray. To determine when the print is thoroughly free from Hypo, use the following test:

Potassium Permanganate	8 grains
Water (distilled)	8 ounces

Fill a glass with pure water to which has been added 3 or 4 drops of the above solution. Then take a couple of prints from the wash-water and allow the water from the prints to drip into the glass. If Hypo is present, the violet color of the water will change to a greenish tint in from one to seven minutes. In such a case return prints to the wash water until similar tests show that the Hypo has been eliminated.

Drying Prints

A very good method for drying prints so that they will lie flat is to place them face down on a clean glass to drain off the excess water. A blotter can be placed over the prints and a print roller used for this purpose.

The prints should then be placed face down on cheese-cloth stretchers until dry. (These stretchers may be constructed by making a frame work of light wood and tacking over it unbleached

cheese-cloth.) The backs of the prints should then be moistened by rubbing with a damp (not wet) sponge or tuft of cotton. It is important to moisten the entire backs of the prints to the edges as evenly as possible after which they should be placed between blotters or cardboards under pressure until dry.

Soft Effects in Enlargements

By using the Eastman Projection Printer with Diffusing Discs, pleasing quality can be obtained. Furthermore, a definite degree of diffusion can always be secured by this method. No extra exposure should be given when the Diffusing Discs are used on the Eastman Projection Printer, however, as the volume of light is in no way diminished.

Wonderful softness and breadth can be obtained in enlarging on Royal Bromide paper by making the enlargements through a silk bolting cloth screen. The screen breaks up the intensity of the blacks, and adds to the breadth of the half-tones. The bolting cloth is most conveniently used by stretching it over a frame and using it either in contact or ¼-inch from the paper so that it will give slight diffusion.

Vignetting

To vignette a projected print cut a hole the shape of the desired vignette in the center of a large piece of cardboard. The lens should be

stopped down to permit of a fairly long exposure. Move the vignetting board back and forth from the lens towards the bromide paper allowing only that portion of the image you wish to print to appear on the paper. The movement of the vignetting board should continue through the entire exposure. When it is necessary to give additional local exposure to print detail in a highlight this may be accomplished by using a card with a small opening, passing it over the portions requiring the additional exposure. Practically any amount of detail may be printed in by this method.

Quite frequently some portions of the print will require less exposure; in such cases a small piece of cardboard, cut the desired shape and stuck on the end of a knitting needle, may be used to screen that part of the image.

In enlarging from landscape negatives with blank skies it is frequently desirable to print in a cloud negative. Such double printing may be easily accomplished by printing in the cloud negative first and then the landscape proper. To secure proper blending a mask should be made conforming in size and shape to the landscape, cutting away the sky.

The cloud negative should be placed in position and the negative adjusted so the sky will occupy exactly its proper position on the sheet of paper. The foreground mask, being of the proper size

and shape, should be held at such a distance from the lens that its edge will conform with the sky line of the enlargement. During exposure the mask should be slightly raised and lowered to avoid making a sharp line, and to secure correct blending.

After printing in the sky, cap the lens and insert the landscape negative, having previously marked on the edge of the sheet of paper just where the sky line begins, then expose for the landscape, and develop the composite print in the usual manner.

Mounting

On Card. Prints may be mounted dry, using Kodak Dry Mounting Tissue. This is by far the most generally satisfactory method of mounting. Prints may be mounted solid on the thinnest mounts without the slightest cockle or curl and such prints will retain their good appearance and keep their shape after they leave the photographer's hands. For paste mounting, lay the wet print face down on a table covered with oilcloth or glass and squeegee off all the surplus water, then brush the back with good starch or Eastman photo paste, lay the print on the mount, cover with a clean piece of dampened cotton cloth and press into contact with a rubber print roller.

Cloth Mounting. Enlargements are mounted on cloth covered stretchers as follows: Take a frame, such as artists use for stretching canvas, and cover it with bleached muslin. Put the cloth

on dry, stretching it tight and tacking along the edges. Treat the print the same as for mounting with paste on a card. Give the cloth on the stretcher a coat of paste, lay the print on, then turn the stretcher and print over and lay face down on a table or glass and rub in contact. Turn the stretcher over again and cover with a clean piece of cotton cloth and rub in contact with the hand or a soft rag. Rub under the frame with a palette knife to remove what paste may have come through the back of cloth under the frame, or the inside edges of strainer will show through. When dry, the print will be stretched smooth and tight.

Glossy Prints

Plates for ferrotyping should be carefully selected—the heavy plates being most satisfactory because they are less likely to be damaged.

The plates should be cleaned with hot water as often as it is necessary to remove any particles of gelatine or paste which may have remained on them from previous use. They should then be dried with a soft cloth that will not scratch and lubricated with a solution of benzine and paraffin. The solution is made by dissolving 10 grains of paraffin in 1 oz. of benzine.

Wet a tuft of cotton with this solution and go over the plate thoroughly. Then polish with a very soft cloth such as canton flannel. There should be no visible trace of the lubricant remain-

ing on the plate. If there is it will show on the print.

The prints which are to be ferrotyped should be taken directly from the wash water without draining and placed face down on the plates. If they are not to be mounted they can be placed close together, filling the entire plate.

A uniform glossy surface depends upon the prints being in perfect contact with the plates. Air bells can, for the greater part, be eliminated by using care in laying the wet prints on the plates.

Lay a cloth or a blotter over the prints and use a print roller to roll out the surplus water and insure perfect contact. The pressure should be light and the rolling all in one direction. Too much pressure may cause the prints to stick in spots.

If great quantities of prints are to be ferrotyped the plates may be run between the rubber rollers of a power wringer. An ordinary wash wringer will answer but in case the prints buckle, the rolls should be reversed so that the handle is on the upper roll.

The prints should be allowed to dry where there is a good circulation of air and if the plates have been properly lubricated the prints will raise when bone dry or may readily be stripped off.

If the prints stick it is because they were not sufficiently hardened in the fixing bath, were

washed in water that was too warm, were dried by heat or the plates were not sufficiently lubricated.

It is not advisable to dry ferrotyped prints too rapidly as they will not dry evenly and a portion of the print may leave the plate before the rest of the print is dry. Such a print will not lie flat and may have to be ferrotyped a second time.

There are several ways of backing or mounting ferrotyped prints but the one most commonly used is the muslin back. Pieces of muslin are cut slightly over-size, soaked in water and wrung dry. As soon as the prints have been rolled down on the plates they are given a good coat of paste, the muslin is laid on, rubbed down and the print and mount dry together.

If prints are to have a hinge they are so placed on the plate that the margin to be used as a hinge can be pasted to the plate. When thoroughly dry the muslin hinge as well as the backed print will strip from the plate, the hinge having a stiff paste filler with the same glossy surface as the print.

Eastman Photo Paste or a good starch paste will be found best for muslin backing.

Another material commonly used by commercial photographers for backing ferrotyped prints is Gummed Holland Cloth. With this cloth it is only necessary to wet the gummed surface and apply the cloth to the back of the print that has been placed on the ferrotype plate.

One of the advantages of this cloth is the fact that it does not ravel out along the edges of the print as is often the case with the muslin backing.

Another advantage is that glossy prints may be dry mounted to both sides of Holland Cloth that is not gummed. This cloth is used extensively by book binders and may be secured either plain or gummed as desired.

If it is desired to have heavy weight ferrotyped prints that will not curl they may be placed on the plates and a piece of backing paper mounted on the back of each print. As the coated side of the backing paper has considerable gloss, the backed print not only has a glossy surface but a glossy back as well.

Sepia Tones on Eastman Bromide Papers

Results secured with Royal Re-Developer are chemically identical with those obtained by the Hypo-Alum method; there can be no question of permanency, and there is no change from the original black and white in either detail or gradation. Re-developed Royal Bromide prints are particularly pleasing, but a Bromide print of any texture or surface will give a desirable result. The expense of the process is slight, as approximately three hundred 8 x 10 prints, or equivalent, can be re-developed with the contents of a 75-cent package of Royal Re-Developer and a print can be turned sepia in less than two minutes.

The following formula for Re-Developer will give satisfaction if pure, fresh chemicals are used.

Re-Developing Stock Solution (Formula T 7)

No. 1—Bleaching Solution

Potassium Ferricyanide	2½ ounces
Potassium Bromide	2½ ounces
Water	64 ounces

No. 2—Re-Developing Solution

Sodium Sulphide (not sulphite)	1½ ounces
Water	16 ounces

Prepare Bleaching Bath as follows:

Stock Solution No. 1	16 ounces
Water	16 ounces

Prepare Re-developer as follows:

Stock Solution No. 2	4 ounces
Water	32 ounces

Manipulation

Immerse print in Bleaching Bath, letting it remain until only faint traces of the half-tones are left and the black of the shadows has disappeared. This operation will take about one minute.

Rinse thoroughly in clean cold water as all chemicals must be removed.

Place in Re-developer Solution until original detail returns (for about thirty seconds). Immediately after the print leaves the Re-developer, rinse *thoroughly*, then immerse it for five minutes in a hardening bath composed of 1 ounce of the hardener recommended for the acid fixing bath, page 27 and 16 ounces of water. Remove the print

from this bath and wash for one half hour in running water. The color and gradation of the finished print will not be effected by the use of this bath.

Sepia Tones on Artura Carbon Black

Hypo-Alum Method (Formula T 1)

Sepia tones are easily obtained by toning in the following Hypo-Alum toning bath:

Boiling water (distilled or rainwater)	128 ounces
Hypo	16 ounces
Potassium Alum	4 ounces

After the bath has cooled, mix separately and add:

Water	1 ounce
Silver Nitrate Crystals	60 grains
Ordinary Table Salt	60 grains

It will take from eight to twelve hours to convert prints to a full sepia in a cold bath. By using the bath at a temperature of 120 degrees Fahrenheit, prints will tone in about 30 minutes.

Prints should be handled over constantly and kept off the bottom of the tray while toning in the hot bath. If the cold bath is used, prints may be left in the bath over night. The only precaution necessary is to use care in immersing the prints thoroughly and evenly. They should also be handled over occasionally during the first stages of toning to insure an even action of the toning bath.

Make black prints in the ordinary way but *make them a shade dark.* They should be *fully* and evenly developed. After they are fixed, rinse fairly well in fresh water and place, *face up*, in the toning bath.

After prints are toned, rinse in lukewarm water and swab with a tuft of cotton to remove any precipitate of alum, then wash one hour in running water.

Notes

Prints that are over exposed and under developed will yield a warm or yellow sepia. Using a toning bath that is not ripened with Silver Solution (see formula) will also cause prints to be weak in general appearance and tone.

Untoned spots are caused by not separating prints while toning.

Purple spots come from failure to thoroughly fix the black and white prints.

Waxed Prints

Brilliancy and depth are added to the shadows of prints by the use of Nepera Waxing Solution. If preferred the following preparation may be used:

2 ounces Spirits of Turpentine; 1½ ounces White Japan Drier.

Apply evenly with canton flannel, and rub into the surface.

EASTMAN KODAK COMPANY
Rochester, N. Y.

Price List

Eastman Bromide Papers

(Excepting Eastman Portrait Bromide)

Single Weight				Double Weight BB and CC only		
Dozen	½ Gro	Gross	Size	Dozen	½ Gro	Gross
$.50	$2.60	$4.90	5 x 7	$.60	$3.25	$6.15
.55	2.90	5.50	5 x 8	.70	3.65	6.90
.60	3.10	5.85	3½x12	.75	3.85	7.30
.60	3.10	5.85	5½x 7¾	.75	3.85	7.30
.65	3.65	6.60	6 x 8	.85	4.35	8.25
.80	4.10	7.90	6½x 8½	1.00	5.20	9.90
.90	4.55	8.70	7 x 9	1.10	5.70	10.90
1.00	5.20	9.90	7½x 9½	1.25	6.50	12.40
1.10	5.85	11.15	7 x11	1.40	7.35	13.95
1.10	5.85	11.15	8 x10	1.40	7.35	13.95
1.40	7.30	13.90	9 x11	1.75	9.15	17.40
1.70	9.00	17.10	10 x12	2.15	11.25	21.40
2.10	11.00	21.00	11 x14	2.65	13.80	26.25
2.40	12.50	23.85	12 x15	3.00	15.65	29.80
3.15	16.55	31.50	14 x17	3.95	20.70	39.40
4.20	22.00	42.00	16 x20	5.25	27.55	52.50
4.50	23.65	45.00	17 x20	5.65	29.50	56.25
5.25	27.55	52.50	18 x22	6.55	34.45	65.65
6.30	33.00	63.00	20 x24	7.90	41.35	78.75

Special cut sizes at practically proportionate prices on orders amounting to $1.00 list or more.

Rolls

Single Weight		Double Weight
$ 2.55	10 foot rolls (20 in. wide), per roll	$ 3.20
5.10	10 foot rolls (40 in. wide), per roll	6.40
7.65	10-yard rolls (20 in. wide), per roll	9.60
15.30	10-yard rolls (40 in. wide), per roll	19.20

Any width up to 40 inches other than the above is furnished in rolls not less than 10 yards in length.

Eastman Portrait Bromide

D (White), Rough Matte; E (Buff), Rough Matte
D (White), Rough Lustre; E (Buff), Rough Lustre
M (White), Old Master; O (Buff) Old Master

Double Weight Only

Size	Doz.	½ Gross	Gross
4 x 6	$ .30	.....	$ 2.80
4¼x 6½	.35	.....	3.50
5 x 7	.45	$ 2.50	4.40
5 x 8	.50	2.80	5.00
6 x 8	.65	3.45	6.25
6½x 8½	.75	4.05	7.50
7 x 9	.80	4.70	8.75
7½x 9½	.90	5.25	10.00
7 x11	1.00	5.95	11.25
8 x10	1.00	5.95	11.25
9 x11	1.25	7.20	13.75
10 x12	1.50	8.75	16.90
11 x14	2.00	11.55	21.90
12 x15	2.25	13.25	25.90
14 x17	3.00	17.50	33.75
16 x20	4.00	23.15	45.00
17 x20	4.25	24.85	48.75
18 x22	5.00	29.40	57.50
20 x24	6.00	35.00	68.75

10 ft. rolls (20 in. wide), per roll	$ 2.25
10 ft. rolls (40 in. wide), per roll	4.50
10 yd. rolls (20 in. wide), per roll	5.85
10 yd. rolls (40 in. wide), per roll	11.70

Artura Carbon Black

Regular Weight				Double Weight		
Dozen	½ Gro	Gross	Size	Dozen	½ Gro	Gross
$.30	$1.50	$2.65	... 5 x 7 ...	$.35	$2.00	$3.50
.30	1.75	3.00	... 5 x 8 ...	.40	2.25	4.00
.40	2.10	3.75	... 6 x 8 ...	.50	2.75	5.00
.45	2.50	4.50	... 6½x 8½ ...	.60	3.25	6.00
.50	2.85	5.25	... 7 x 9 ...	.65	3.75	7.00
.60	3.25	6.00	... 7½x 9½ ...	.75	4.25	8.00
.60	3.60	6.75	... 7 x11 ...	.80	4.75	9.00
.60	3.60	6.75	... 8 x10 ...	.80	4.75	9.00
.75	4.35	8.25	... 9 x11 ...	1.00	5.75	11.00
.90	5.30	10.15	...10 x12 ...	1.20	7.00	13.50
1.20	6.80	13.15	...11 x14 ...	1.60	9.25	17.50
1.35	8.15	15.55	...12 x15 ...	1.80	10.85	20.70
1.80	10.40	20.25	...14 x17 ...	2.40	14.00	27.00
2.40	14.00	27.00	...16 x20 ...	3.20	18.50	36.00
2.55	15.00	29.25	...17 x20 ...	3.40	20.00	39.00
3.00	18.00	34.50	...18 x22 ...	4.00	23.50	46.00
3.60	21.50	41.25	...20 x24 ...	4.80	28.00	55.00

$ 1.25	10-foot rolls (20 in. wide), per roll	$ 1.65
2.50	10-foot rolls (40 in. wide), per roll	3.30
3.35	10-yard rolls (20 in. wide), per roll	4.35
6.70	10-yard rolls (40 in. wide), per roll	8.70

NOTE—Special cut sizes at practically proportionate prices on orders of a dozen or more amounting to $1.00 list or more.

Any width up to 40 inches other than listed is furnished in rolls not less than 10 yards in length.

P. M. C. Bromide

Single Weight				Double Weight		
Dozen	½ Gro	Gross	Size	Dozen	½ Gro	Gross
$.35	$1.70	$3.25	5 x 7	$.40	$2.15	$4.10
.35	1.90	3.65	5 x 8	.45	2.40	4.55
.45	2.30	4.40	6 x 8	.55	2.90	5.50
.50	2.80	5.25	6½x 8½	.65	3.45	6.55
.60	3.05	5.80	7 x 9	.75	3.80	7.25
.65	3.45	6.60	7½x 9½	.85	4.30	8.25
.75	3.90	7.40	7 x11	.95	4.85	9.25
.75	3.90	7.40	8 x10	.95	4.85	9.25
.95	4.85	9.25	9 x11	1.15	6.05	11.55
1.15	6.00	11.40	10 x12	1.45	7.50	14.25
1.40	7.35	14.00	11 x14	1.75	9.20	17.50
1.60	8.35	15.90	12 x15	2.00	10.45	19.90
2.10	11.00	21.00	14 x17	2.65	13.80	26.25
2.80	14.70	28.00	16 x20	3.50	18.40	35.00
3.00	15.75	30.00	17 x20	3.75	19.75	37.50
3.50	18.40	35.00	18 x22	4.40	22.95	43.75
4.20	22.00	42.00	20 x24	5.25	27.55	52.50

Special cut sizes at proportionate prices on orders of a dozen or more amounting to $1.00 list or more

P. M. C. Bromide Paper in Rolls

Single Weight		Double Weight
$ 1.70	10-foot rolls (20 in. wide), per roll	$ 2.10
3.40	10-foot rolls (40 in. wide), per roll	4.20
5.10	10-yard rolls (20 in. wide), per roll	6.30
10.20	10-yard rolls (40 in. wide), per roll	12.60

Any width up to 40 inches, other than the above, furnished in rolls not less than 10 yards in length.

Enlarging Cameras and Supplies

Eastman Projection Printer No. 1, for projection prints from 5 x 7 and smaller negatives. Complete, including Eastman Projection Anastigmat lens, *f*.4.5, 7½ inch focus, set of three Diffusing Discs, Paper Holder and two Lamps $450.00

Eastman Projection Printer No. 2 for projection prints from 8 x 10 and smaller negatives. Complete including Eastman Projection Anastigmat Lens *f*.4.5, 10 inch focus, set of two Diffusing Discs, Paper Holder and two Lamps 675.00

Kodak Projection Printer for projection prints from 3¼ x 5½, 4 x 5 and smaller negatives, complete including Kodak Projection Anastigmat lens *f*.6.3, 5⅛ inch focus, Paper Holder and Lamp 200.00

Crown Enlarging, Reducing and Copying Camera, 8 x 10 . . . . . 85.00

Do., 11 x 14 . . . . . 93.00

Do., 14 x 17 . . . . . 125.00

Do., 18 x 22 . . . . . 183.00

R. O. C. Enlarging Back for 6½ x 8½ and 8 x 10 Eastman View Camera or Century View Cameras 13.50

When fitted to Empire State, R. O. C. or Premo View Cameras an additional charge of $3.00 net will be made. When fitted to View Cameras other than specified above, an additional charge of $6.00 net will be made.

Revolving Back Enlarging Camera, 8 x 10, without lens, including revolving back negative carrier with 6½ x 8½, 5 x 7, 4 x 5, 3¼ x 4¼, spring finger kits, and one sheet of flashed opal glass, 11 x 11. Focal capacity 22 inches . . . 35.00

Where there is an Excise Tax, prices above include it.

Eastman Safety Cap No. 1, for lenses 1½ to 2¼ inches in diameter	$1.00
Eastman Safety Cap No. 2, for lenses 2¼ to 3 inches in diameter	1.25
Eastman Safety Cap No. 3, for lenses 3 to 3⅞ inches in diameter	1.75
New Model Easel complete with sheet of 20 x 20 in. glass, six nested kits 20 x 20 in. outside, with openings: 16 x 20, 14 x 17, 11 x 14, 10 x 12, 8 x 10, 6½ x 8½	19.50
Eastman Thermometer	.75
Ferrotype Plates, 10 x 14, Light, each	.20
Do., 10 x 14 Heavy, each	.30
Do., 14 x 20, Heavy, each	.65
Do., 18 x 24, Heavy, each	1.00
Nepera Solution, 16 ounce bottle	.84
Do., ½ gallon bottle	2.24
Do., 5 gallon jug	17.50
Royal Re-developer, per package	.75
Elon, per pound	7.00
Tozol, per pound	5.50
Hydrochinon, in moisture-proof cans, per pound	2.15
Potassium Bromide, can, per pound	.55
Eastman Carbonate of Soda (desiccated), 1 lb. bottle	.40
Do., 5 pound bottle	1.35
Eastman Sulphite of Soda (desiccated), 1 lb. bottle	.45
Do., 5 pound bottle	1.40
Nepera Waxing Solution, 4 ounce bottle	.30

All prices are subject to change without notice.

Trade Printing

On any of the different grades of Bromide and Artura Papers.

Sizes	Black and White		Extra Chg. for Sepia
	Unmtd.	Mtd. on Card	
4¼x 6½	$ .45	$ .55	$ .15
6½x 8½	.55	.75	.15
8 x10	.80	1.00	.15
10 x12	1.00	1.40	.15
11 x14	1.35	1.75	.15
14 x17	1.65	2.25	.20
16 x20	2.00	2.75	.20
18 x22	3.00	3.75	.20
20 x24	3.25	4.00	.20
22 x27	4.00	5.00	.35
25 x30	5.00	6.25	.35
24 x36	5.75	7.25	.35
30 x40	8.00	10.00	.35
30 x50	10.00	12.50	.35

All prints are mounted on card, unless otherwise specified. No charge is made for packing.

The prices listed above apply to prints from good original negatives only. Any atlerations or changes in negatives are made at the owner's risk, and an additional charge will be made for such changes.

Prints on Double-weight paper will be charged for at the same rate as Single-weight prints, mounted on card.

Embossed Prints on Bromide Papers

The price of Embossed Prints with Bromide Margins is the same as the regular price of the print plus 40 per cent, where the margin is 4 inches or less, and the regular price plus 50 per cent. where the margin is 5 inches. The size of print is calculated from the inside of margin.

Small sized Projected Prints are made with a margin proportionate to their sizes.

Terms

The prices herein are strictly net, except to regular dealers who carry our goods in stock.

All prices are subject to change without notice.

For convenience we recommend that purchases be made from your dealer, as by so doing both time and transportation charges are saved.

EASTMAN KODAK CO.,
Rochester, N. Y.