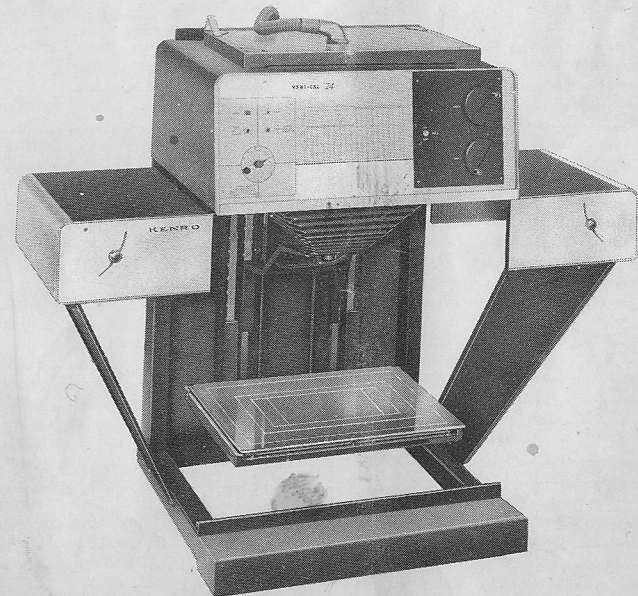


Illustrated
Operating Manual
For
KENRO "VERTICAL 18"
And
KENRO "VERTICAL 24"
CAMERAS



"Vertical 24" with Vacuum Back

Kenro Graphics, Inc.,

Cedar Knolls, N. J.

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STAYFLAT BACK

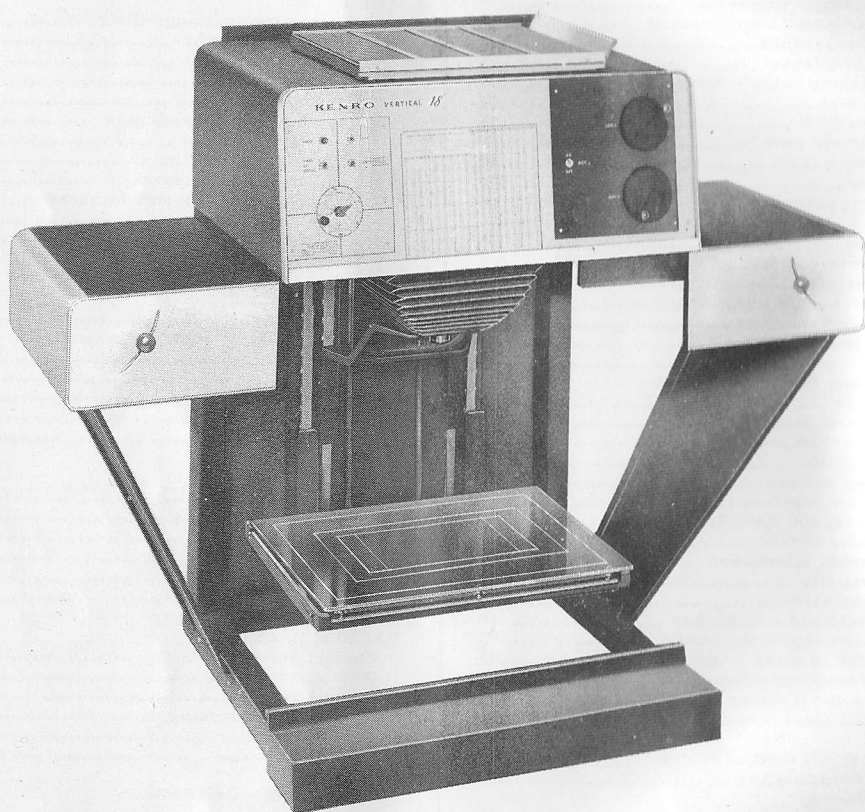
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VACUUM BACK

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"Vertical 18" with Stayflat Back

INTRODUCTION

Your new Kenro Camera is a fine precision instrument, the result of constant development and refinement of the vertical concept in camera design pioneered by Kenro Graphics more than a decade ago. It will produce accurately sized, professional quality line and halftone negatives, efficiently and economically, for many years to come — with a minimum of maintenance — if operating instructions outlined in this manual are carefully followed.

Kenro Cameras perform in a manner unique in the graphic arts and industrial reproduction fields due to a combination of in-built features exclusive with Kenro.

- The spring-loaded copyboard, which compensates for copy thickness so effectively that negative sizes never vary because of "thick" or "thin" original copy.
- The digital focusing system, which is not rendered useless by, but adapts readily to auxiliary lenses, accessory heads or new graphic arts processes for which you may wish to adapt your Kenro camera.
- The very important ability of Kenro Cameras to reset accurately to any previously used size.
- The automated simplicity of the Kenro Camera that makes it possible for anyone to become a skilled operator in a very short time.

It is these special features and the overall engineering excellence of the Kenro Camera — plus improved light sources and lens designs — that make it possible to put perfect jobs on press in 20 minutes or less, whether you use the Kenro "Vertical 18" or the "Vertical 24".

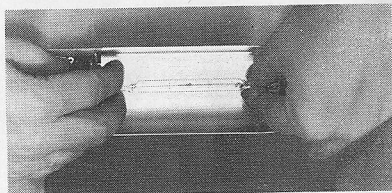
If this is your first Kenro Camera, or is in addition to other Cameras already at work in your plant, we know that you will profit through its dramatic ability to reduce negative costs by 50% to 75%, as compared to outside suppliers, or to improve production by 30% to 50%, as compared to conventional horizontal cameras. You also benefit from reduced space requirements and less operator fatigue through less waste motion when you use a Kenro vertical. We know your new Kenro will quickly stand as one of the most valuable pieces of equipment ever installed in your plant.

INSTALLATION

The Kenro "Vertical 18" Camera, employing a Stayflat Back, has been designed for installation either inside or outside a darkroom. All Cameras that are equipped with Vacuum Backs must be installed inside the darkroom. If you wish to reduce walking time and if fast production is a factor, a darkroom installation should be made regardless of what head is being used. Due to the compactness of design, installation inside the darkroom is very simple and does not require holing through a wall.

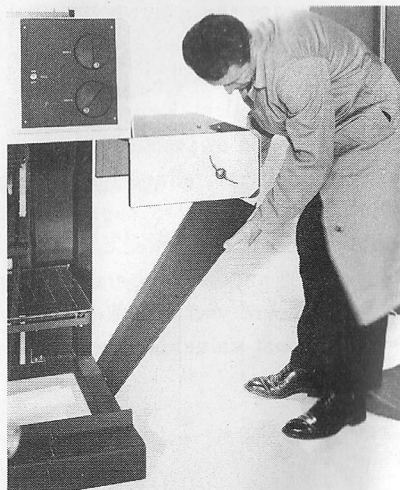
Unpack your new Kenro Camera carefully. Check off the parts and accessories against the packing slip. If any parts are damaged or broken, please notify the carrier so that he can make out a concealed damage report.

When the camera has been positioned, adjust the leveling feet to prevent the camera from rocking. Care should be taken that the back of the camera is not raised so high that the copyboard glass hold-down latch will not bypass the step-up plate.

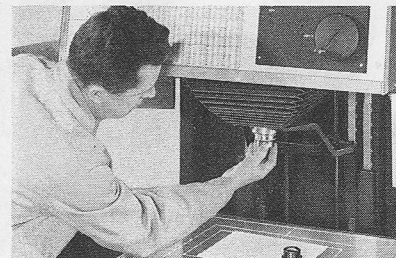


Install step-up plate by inserting the bolts through predilled holes in both ends. Before plugging lead cord into wall outlet, insert the 4 - 300 watt reflector flood lamps. If a camera model employing G.E. Quartzline lamps was ordered, the lamps can be installed or removed by holding the

lamp by the flat quartz section at one end of the tube and pushing the spring loaded porcelain socket towards the base. This separates the porcelain base and the lamp can be easily removed. Quartz is damaged by fingerprints. Handle lamps only by the flat end sections of the quartz tube. When lamps are installed, raise the lamp housings and secure them in position by fastening the nuts from inside the lamp housings to the studs on the side supports. Plug lead cord into a 115V, 60 cycle 15 amp AC line for the "Vertical 18" employing 300 watt reflector flood lamps. Thirty amps are required for cameras employing Quartzline and Intensity Booster. Be sure to connect the ground pigtail if a two prong adapter must be used. Electrical accessories such as the Vacuum Pump can be



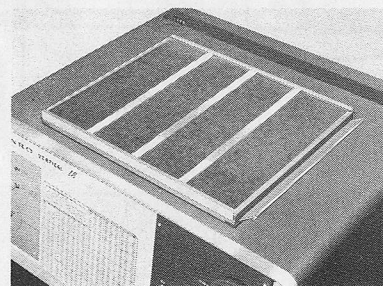
plugged into the electrical outlet located on the back right side of the camera. Other equipment which draws a substantial amount of current should be connected to a separate electrical outlet.



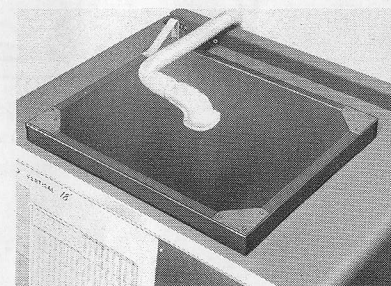
Depending on the accessories which you have purchased with your camera, you will find one or more lenses included. The standard lens, with its accompanying size and focus chart, is readily identified by its serial number which is the same as the serial number of the camera. Handle it gently by the barrel, being careful not to touch the glass elements with your fingers. Screw the lens into the lensboard, being careful not to cross the fine threads, and tighten to a snug, but not tight fit.

Place the head on top of the camera after carefully unpacking it. Due to the fact that there are different heads such as - the Stayflat, Vacuum, Prismatic and many others, detailed photos showing installation and operation are covered by special technical bulletins included when camera heads used for special processes and methods are ordered.

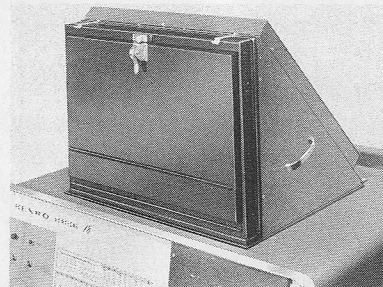
The following photographs show the various heads available for the "Vertical 18" and "24" cameras. Adapter frames are used so that all "Vertical 18" accessories may be used on "Vertical 24" cameras.



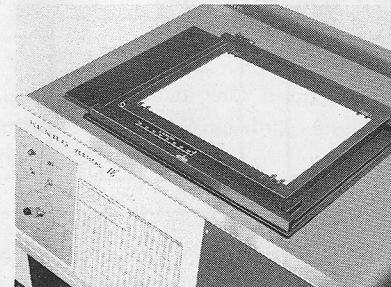
STAYFLAT BACK



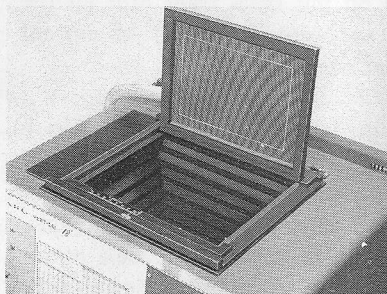
VACUUM BACK



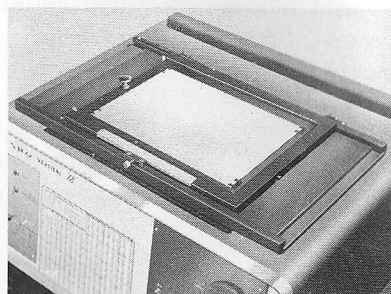
PRISMATIC HEAD 12 x 18



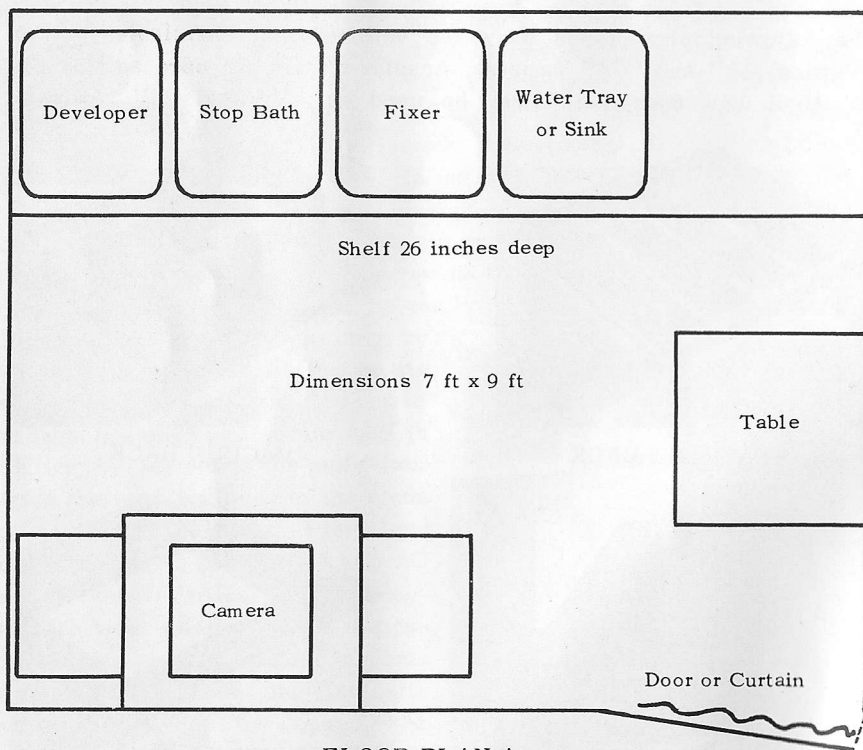
EKTALITH ADAPTER BACK



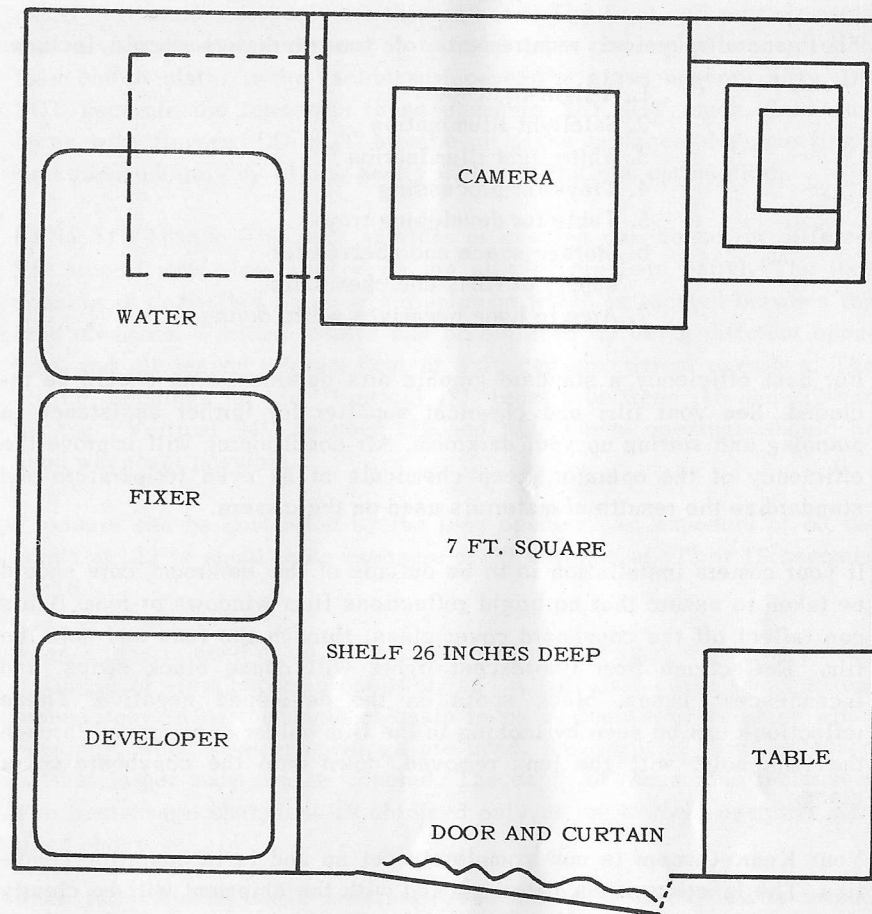
GEVACOPY BACK



XEROGRAPHIC BACK



FLOOR PLAN A



FLOOR PLAN B

Floor Plan A shows a typical, average size darkroom with the camera included. Floor Plan B shows the minimum space suggested for a darkroom installed unit. While conditions in plants will vary, these floor plans serve as a good guide in planning your own darkroom layout.

Quantity of present and future work should be a prime consideration in planning your installation. The darkroom should be large enough so that the operator can efficiently process the work flow, but not so large that steps and energy are wasted.

Basically, the darkroom should be designed so that it will handle only the photographic requirements of the plant. It is not advisable to include stripping or platemaking operations inside the darkroom.

Placement of electrical outlets, shelves, ventilation, air conditioning and other equipment should be considered in planning your installation. Your darkroom should be painted a light color such as light gray. *Do not paint it black.*

The general physical requirements of your darkroom should include:

1. A light-tight room
2. Safelight illumination
3. White light illumination
4. Trays for processing
5. Table for developing trays
6. Storage space and shelves for supply of films and chemicals
7. Area to hang negatives while drying

For best efficiency a standard graphic arts darkroom sink should be included. See your film and chemical supplier for further assistance in planning and setting up your darkroom. Air conditioning will improve the efficiency of the operator, keep chemicals at an even temperature and standardize the results of materials used on the camera.

If your camera installation is to be outside of the darkroom, care should be taken to assure that no bright reflections from windows or room lights can reflect off the copyboard cover glass, through the lens and onto the film. Reflections from fluorescent lights will cause black strips, and incandescent lamps, black spots on the developed negative. These reflections can be seen by looking in the film holder opening and through the lens hole, with the lens removed, down onto the copyboard cover glass.

Your Kenro Camera is now completely set up and is in operating condition. The function of each item packed with the shipment will be clearly explained under a specific heading in this book or technical bulletin covering its use.

LENSES

Your Kenro Camera is equipped with the highest quality lenses which are designed to produce optimum results and are manufactured to insure performance to fit the rigid requirements of the Graphic Arts.

The standard lens is always used on the "Vertical 18" between 3X enlargement and 1/3 size. On the "Vertical 24" the standard lens is always used between 2X enlargement and 1/2 size. Auxiliary lenses are only used to extend the range of the camera beyond that of the standard lens.

Auxiliary lenses are equipped with adapter rings to fit the lens flange mounted on the camera lens board.

CLEANING: Lenses require little maintenance, but for long life and consistent performance, the lens should be kept clean at all times. The front and rear glass surfaces should be cleaned with a sable or

camel hair brush used only for this purpose. The front and rear elements can be unscrewed and cleaned on top of a table covered with a soft lintless cotton cloth, if the inside surface of the glass appears dirty. DO NOT separate the lenses in these elements. DO NOT touch glass surfaces with fingers. DO NOT breathe on glass surfaces. Remove finger marks immediately by wiping gently with soft lintless cotton cloth.

LENS SETTINGS: The lens aperture or opening can be set at different "f: stops" which are marked on the side of the lens barrel. The lens opening is controlled by an iris diaphragm which is located between the lens elements. Various results can be obtained by using different openings and all lenses perform best at only certain critical openings. The critical openings for the "Vertical 18" lens is between :16 and :22 and for the "Vertical 24" between :16 and :32. These openings should be used whenever possible.

Exposure can be controlled by the lens opening. An exposure of 60 seconds at :32 is equal to an exposure of 30 seconds at :22 or 15 seconds at :16.

When a lens is used at its wider openings (smaller number on lens barrel) its angle of view becomes narrower, and it will only cover small-dimensioned copy. Also the depth of sharp focus is decreased by using wider openings. When smaller openings are used, the angle of view increases so that larger copy can be covered. The depth of focus also increases. The best image sharpness is obtained only at the critical openings outlined above.

When full capacity same size negatives are being made, :22 is recommended for "Vertical 18" Cameras, and :32 for "Vertical 24" Cameras.

LIGHTING SYSTEMS

GENERAL: Two types of lighting systems are used in Kenro Cameras. Both systems incorporate the basic Kenro principle of four-corner lighting which minimizes, and in most cases eliminates, paste-up marks on the negative.

Proper copyboard lighting is not even illumination over the entire copyboard. Do not attempt to use a light meter for this purpose.

Correct copyboard lighting can be noted during development by watching the negative when it begins to turn solid black. The center and edges of the image on the negative should turn black at almost the same time if the copyboard is properly illuminated.

THE 300 WATT REFLECTOR FLOOD LAMP SYSTEM: This system is used in the Kenro "Vertical 18" Model V184. The four General Electric 300 watt Reflector Flood lamps located in the four corner sockets give excellent performances for material with a wide exposure latitude such as film negative work done in the average plant. Although the lamps are not guaranteed, their life is approximately 2000 hours. It is suggested, however, that these lamps be changed every six months as the tungsten burns off the filament and blackens the lamp, reducing the intensity of emitted light, requiring longer exposures. These lamps are available from any good electrical supply house.

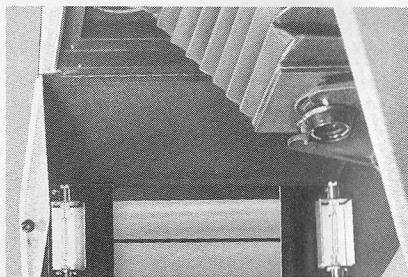
The center lamp socket in both lamp houses can be used for ruby bulbs which will permit setting up copy in the copyboard for cameras installed inside the darkroom. Two #2 blue photoflood lamps may be used in these sockets to produce added contrast for Kodak Magenta contact screen halftones.

A switch on the panel board operates either the two center lamps or the four corner lamps.

Many Installations use four N34 Sylvania medium beam photoflood lamps in the four corner sockets in order to shorten exposures. Installations using photoflood lamps should realize the life expectancy of these lamps is only six hours. During use, these lamps are continually losing intensity. Care should be taken to increase exposure time accordingly and under normal conditions photoflood lamps should be changed every month or after 300 exposures have been made.

It should be noted that the lamps can be moved in an arc thus raising or lowering the direction of the illumination. A general rule is to point the lamps toward the opposite side of the copy, setting up a cross lighting of the copy. Excellent lighting is obtained for all normal work by having the top of the lamp bulb about one and a half inches down from the top of the lamphouse. Watch the negative while developing and adjust lamps so that the edges and center of the negative turn black in a relatively even manner.

VERTICAL STATIONARY QUARTZLINE LIGHTING: This system, Patent Applied For, is used on the "Vertical 18" Model V185 and the "Vertical 24" Model V240 Cameras. It is a new concept of lighting developed by Kenro. It employs four General Electric 500WT3Q/CL Quartzline lamps and an Intensity Booster. This system gives the extremely even exposures necessary for positive-



to-positive processes and matrix transfer plate making methods. For film applications shorter, more even exposures than ever before possible with an incandescent system can be made. The color temperature of these lamps is excellent for Kodak Magenta contact screen halftones. The ratio of lamp life to intensity is greater than any other incandescent system available.

Although these lamps are not guaranteed, the lamp life on "normal" is approximately 2000 hours – on "high" intensity approximately 100 hours or about 16,000 exposures. The intensity of these lamps remains constant throughout the life of the lamp. The "high" and "normal" intensity is controlled by a switch on the panel board.

All focusing operations should be done on "normal" in order to conserve the life of the lamp and minimize the amount of heat generated. Exposures should be made on "high" with the exception of very fast material like Kodagraph Autopositive Projection Paper used in the Prismatic Head. The difference between the two intensities is about 1½ stops on the lens.

Each lamp is individually fused. The fuses are located on the lamp bracket near the lamp. The fuse should be examined everytime a lamp burns out. Should the upper portion of the lamp start to blacken, the lamp should be removed and put back with the dark end down. Burning the lamps on "low" for about five minutes will remove this dark coating and the original intensity of the lamp will be regained. *Unplug the camera lead cord when changing the lamps or fuses.*

The lamps can be moved in an arc permitting the light to be directed up or down. In general, an angle between 20° and 45° from vertical will be found most satisfactory. Proper copyboard lighting can be noted during development. If the center of the negative turns black and the edges don't, the lamps should be pointed down directing more light towards the ends of the copy.

Once the lamps are set no further adjustment of the lamps is required regardless of the size of the copy or the position of the copyboard. This unique Kenro feature will save operator time and mistakes.

FOCUSING BY THE PERCENTAGE METHOD

A size and Focus System, using a calibration chart, is supplied with your Kenro Camera which permits you to make sharp, accurately sized exposures without visually inspecting the image on the ground glass prior to exposure.

Before making an exposure it is necessary to find the percent enlargement or reduction that is required. This is done by using the PRO-

PORTIONAL CALCULATOR supplied by Kenro. If you use a calculator other than the one supplied by Kenro, be sure to check it for accurate readings. When the correct percentage is found, the proper lens and copy numbers found on the size and focus chart for the particular lens being used, can be set on the counters.

REDUCTIONS:

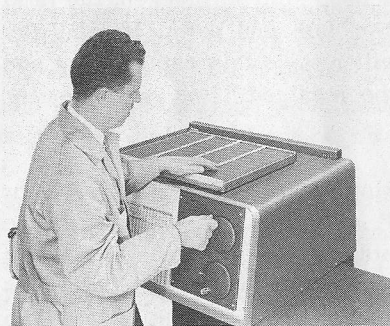
1. The original measures 10 inches.
2. The desired copy negative measures 5 inches.

Using the proportional calculator -

- A. Set 5 on the "copy size" scale under the 10 on the "original size" scale.
- B. At the lower right bottom of the scale the "size for reductions" arrow points to 50%.

ENLARGEMENTS:

Should it be required to enlarge an original measuring 5 inches to a copy negative measuring 10 inches, set 10 under the 5 on the "original scale" and the arrow at the center of the bottom scale marked "size for enlargements" indicates 200%.



Next, referring to the Size and Focus Chart for the lens you are using, set the numbers for the percent required on the copy and lens counters by turning the lens and copy handwheels until the correct numbers appear on the counters. Your camera now has been automatically sized and focused for the desired reduction or enlargement.

There will be many times when the percentage calculator will indicate in-between percents such as 68½%. When such cases arise, set the lens and copy counters for 68%. Using the lens handwheel only, set the lens counter half way between 68% and 69%. This counter reading should be recorded if a particular job requiring this in-between percent setting occurs often. Depth of focus will assure a sharp image on the negative for reductions. On enlargements it is advisable to check size and focus on the ground glass for in-between percent settings.

GROUND GLASS FOCUSING

A ground glass is used if manual focusing or visual inspection of the image is desired. Fit the ground glass on top of the camera or into the particular head being used. Always place ground glass on cameras with

the ground surface down. Open the lens aperture to :6.8 or :10, set the lens and copy counters for the percent enlargement or reduction desired and turn on the lamps. The master switch should be set "manual". Cameras employing the 300 watt Reflector Floods should have the "lamps" switched on "4 lamps". The "normal" position should be used for cameras employing the Quartzline lamps. When the lights are turned on the image can be seen on the ground glass. Dim light about the camera head improves the visibility of the ground glass image.

Always handle the ground glass by the edges as fingerprints will permanently dirty the ground surface.

When examining the image on the ground glass with the lens aperture wide open, the image on the outer edges will not appear sharp. When the lens is stopped down to :16 or :22 for exposure, the image will be sharp over the full area of coverage.

While focusing the camera using the ground glass and the lens aperture, wide open, the image should be made sharp about 2 inches out from the center of the ground glass. Do not perform focusing operations at the center section of the ground glass. The entire image will become sharp when the lens is closed down to :22 for exposure.

Magnifying Glass

If a magnifying glass is used to check sharp focus, a photoengraver magnifying glass which permits the adjustment of the eyepiece up and down must be used. A magnifying glass without this adjustment, such as a linen tester cannot be used because it cannot be set to coincide with the plane of the image that is being photographed.

The magnifying glass must be prefocused on the bottom ground surface of the ground glass. Remember that no two person's eyes will focus at the same plane and each person should prefocus the magnifying glass before using it.

COPYBOARD LOADING

The copyboard on the Kenro "Vertical 18" and "24" Cameras is fitted with a selected polished plate cover glass which holds the copy flat to assure sharp focus and even lighting.



A spring latch and a spring loaded copyboard back maintain correct copy distance from the lens regardless of the thickness of copy which may vary from paste-ups on bristol board to thin typewritten pages and booklets up to ½" thick. When placing copy in the copyboard, always use

Line, autoscreen, and contact screen negatives, contact screen tints, contact film positives and contact paper prints can be made using the Vacuum Back.

The Vacuum Back consists of a vacuum platen, a ground glass, and a vacuum hose and pump. The lead cord of the vacuum pump may be plugged into the electrical outlet on the back right side of the camera. This outlet is controlled by the switch marked "ACC", near the camera handwheels.

If film or paper, to be exposed in a Vacuum Back, is cut from rolls, the roll film or paper should be ordered from your supplier with the emulsion rolled OUT. It is available from suppliers in this form for Vacuum Back use. Film rolled emulsion IN, will tend to curl off a Vacuum Back and difficulty will be experienced especially towards the end of the roll where the curl is tighter. In such cases tape or small industrial magnets will hold the film from curling off the Vacuum Back. Material with emulsion rolled OUT will not cause these difficulties.

The Vacuum Back is hinged to the Camera back. Loose pin hinges allow easy removal. The ground glass with ground surface facing the lens, sets into the top of the camera when the Vacuum Back is in the open position.

PRISMATIC HEAD

Pressure Type: If the Prismatic Head is the pressure type, it includes a removable pressure head, a ground glass, a special lens and dark slide. The pressure type can be used on cameras installed inside or outside a darkroom.

Vacuum Equipped: This Prismatic Head includes a vacuum platen, a ground glass, a vacuum hose, pump and a special lens. The lead cord of the Vacuum pump can be plugged into the electrical outlet on the back right side of the camera. This outlet is controlled by the switch marked "ACC" located near the lens and copyboard handwheels.

The Prismatic Head is used for the preparation of material for use on original paste-up layouts and customer proofs. It eliminates the usual intermediate film negative required in conventional cameras allowing direct one shot paper-to-paper exposures for enlargement, reduction, reversing and the tinting of type and line illustrations. It is also used to enlarge and reduce and make coarse screen Velox prints of continuous tone photographs or art work as well as customer proofs.

The Prismatic Head sets firmly into the top of the camera. Four thumb screws are used on the inside edges of the 18" x 24" model to hold it firmly in place. For inspection, a plain piece of ground glass is placed in the pressure models with the ground surface against the pressure glass mounted in the holder. On the vacuum models, the ground glass frame fits into the head when the Vacuum Back is open.

LOADING THE CAMERA HEAD

STAYFLAT BACK:



Film for line work and Autoscreen halftones is loaded in the same manner. Paper base material that is not coated on the back should not be used on the Stayflat glass. Use the clear glass in the film holder and place the material to be exposed between the clear glass and the pressure back, since the paper fibers will destroy the tacky adhesion of the stayflat coating.

DARKROOM INSTALLATION:

The metal slide in the film holder may be dispensed with for darkroom installations. With the stayflat glass in the UPPER GROOVE of the film holder, tacky side down and the spring back locked in place, film may be loaded by turning the film holder over on top of the camera so the tacky side of the stayflat glass is facing up. Under a red safelight the guide lines for standard film sizes can be easily seen.

Under red safelight, remove one sheet of line or Autoscreen film and a sheet of protective paper from the film box. If the film is not slip-sheeted with protective paper, cut a piece of light bond paper the size of the film you are using. Always handle film with a protective paper covering the emulsion side of the film. The protective paper will eliminate finger marks and scratches on the film emulsion. With the emulsion (dull or light colored) side of film facing up and covered with the protective paper, roll the film into the tacky surface between guide lines of the stayflat glass. Rub the protective paper lightly with one hand, while rolling down the film with the other hand. This eliminates air bubbles under the film. A sharp bend-up on one corner of the film will make removing the film much easier. After turning the Stayflat Back right-side-up and positioning it on the camera, a line negative or Autoscreen halftone can be exposed.

OUTSIDE DARKROOM INSTALLATION:

The same procedure is used as above, except that the protective metal slide must be used in the Stayflat Back to prevent fogging the film while carrying it between the camera and darkroom. Load the film inside the darkroom after pulling out the metal slide just enough to expose the guide lines. After loading the film as explained under "darkroom installation", push in the metal slide, carry the Back to the camera, place film holder in position on the camera and remove the slide before making exposure.

Small or odd size pieces of film can be used on the Stayflat Back in contrast to the standard sizes required for a Vacuum Back. *Before loading* a small or odd size piece of film, remove spring back, turn on camera lights, open lens aperture and place four pieces of red tape on the top side of the stayflat glass along the four sides of the image to be photographed. Replace the spring top and reset the lens to the recommended setting. In the darkroom, a small piece of film can be cut with scissors or cutting board and placed on the tacky side of the stayflat glass covering the area outlined by the red tape which is clearly visible through the glass under a red safelight.

LOADING CONTACT SCREEN:

Contact screens or tints up to 8 x 10 can be used by employing the pressure frame of the Stayflat Back. Remove the spring loaded pressure top and the coated stayflat glass. Insert the clear glass in the lower groove. On top of the clear glass place the contact screen or tint with the emulsion (dull side) up. Cover this with a piece of film with the emulsion (dull or light colored) side down. Replace the spring pressure top and place the head on the camera for exposure.

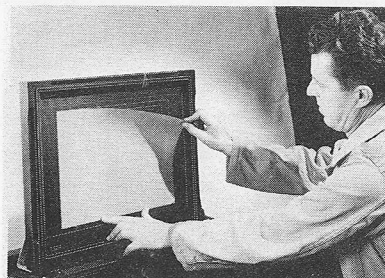
VACUUM BACK

The Vacuum Back can only be used when the camera is installed inside the darkroom.

Line Work and Autoscreen:

Raise the Vacuum Back on top of the camera and start pump. Under red safelight, remove a sheet of line or Autoscreen film from film box and place film inside the red lined area of the Vacuum Back so that emulsion (dull or light colored) side will face the lens when the back is closed. Be sure to handle film by the edges. A sharp bend up on one corner of the film will make it possible to easily remove the film without turning off the Vacuum pump. After closing Vacuum Back the Camera is ready for exposure.

Contact Screen:



Film is put on the Vacuum Back in the same manner as line and Auto-screen film so the emulsion will face the lens when the back is closed. After turning on pump and placing the film on the back, roll the contact screen (dull emulsion side) next to the film. The contact screen should be larger than the film and at least register

with the Vacuum Back guide lines for the next larger film size. This will assure good vacuum contact between the film and the screen. It is good practice to brush out the air bubbles between the screen and the film with a camel hair brush which is at least two inches wide.

Study the contact screen to be sure you know which side is the emulsion side. Under a bright light, the emulsion side gives a duller reflection than the back side. The emulsion of the screen should always be in contact with the emulsion of the film to prevent undercutting. Close Vacuum Back and expose.

PRISMATIC HEAD:

Direct positive or reverse paper as well as film can be exposed in this head. Contact screens as well as contact tints can also be used for right reading paper-to-paper or paper-to-film exposures.

PRESSURE BACK:

The pressure back on the Prismatic Head can be used on cameras installed inside or outside the darkroom.

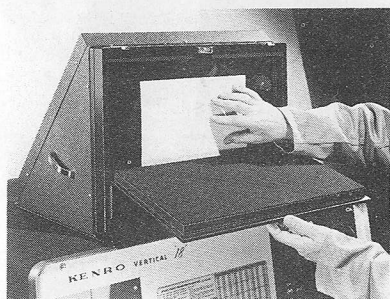
Inside Darkroom Installation:

The dark slide can be eliminated for inside darkroom installations. Open pressure platen, and under red safelight from a Wratten #1 safelight filter, place material to be exposed against the pressure glass with emulsion side against glass. The split pressure platen will keep smaller pieces of material in place. Close pressure platen and head is ready for exposure.



Outside Darkroom Installation:

With the dark slide pushed into the head through the slot on the right side of the back, remove the film holder from the Prismatic Head and inside the darkroom and under red safelight from a Wratten series #1 safelight filter, open the pressure platen. Place the material to be exposed with the emulsion side against the glass and close the pressure platen. Replace the film holder on the Prismatic Head and pull the dark slide before making exposure.



VACUUM BACK:

A Prismatic Head with a Vacuum Back can be used only on cameras installed inside a darkroom. Start pump and swing Vacuum Back open. Place material, so the emulsion side will face the lens when the back is closed on the vacuum back inside the red lines for the size of the material being used. After closing, exposure can be made.

EMUSLION SIDE OF PAPERS:

To find the emulsion side of paper material, examine both sides closely. The emulsion side is shinier than the back side. Place a piece of the material on a table, if the paper curls up, the emulsion is facing up. Put a corner of the material between lightly moistened lips. The emulsion side will tend to stick to one lip. Remember which side of the material was packed "up" in the box and after testing you will know if the material is packed emulsion "up" or "down".

OPERATION OF CONTROL PANEL



1. Before any electrical circuits will operate, time cycle pointer must be set in excess of 3 seconds. All circuits are relay controlled.
2. *Pilot Light* indicates when lamps are on or circuits are set for time cycle operation.

3. *Start Button*: When the master switch is set on **TIMER** the start button automatically starts the exposure cycle. After the exposure cycle is completed the timer will reset for the next exposure.

4. *Master Switch*: The master switch has three positions. **UP** is for automatic timer cycles which are activated by the start button. The **CENTER** position is **OFF** and when this switch is in the **DOWN** position the lights are controlled manually and will remain on for focusing operations or manual exposures.

5. *Light Selector Switch*: On cameras employing the 300 watt Reflector Flood lamps the **UP** position controls the center lamp socket in both lamp houses and the **DOWN** position controls the four corner sockets.

On cameras employing the Quartzline system the **UP** position is for high intensity — the center position is **OFF** and the switch is in the **DOWN** position for normal intensity.

Caution: The lamp selector switch should not be changed from 2 lamps to 4 lamps or from high to low intensity unless the master switch is in the center **OFF** position.

EXPOSING FILM

This section on film exposing is based upon the use of normal "lith" type films. Some manufacturers are producing extra fast litho films and the manufacturer's instructions should be followed for these extra fast materials. Kodak type 3 and Dinoc Hi-gram are considered normal. Chemco type - X is considered fast. Dupont, Gevaert, Ansco and other manufacturers also offer excellent films for Graphic Arts use.

Halftone screens vary in speed. Every contact screen whether from the same manufacturer or not will require slight corrections in exposure times. The exposures given in this instruction book should be considered as a guide or starting point from which variations can be made to improve the quality of results.

The exposures for the Prismatic Head are based upon Kodak Autopositive Projection paper for positive-to-positive copies and Kodalith Ortho paper for reverse copies. There are many other papers available to make reverse copies which require shorter exposures than Kodalith Ortho paper but this material is developed in the same developer used for films.

Regardless of the materials being used, exposures of less than 15 seconds are not generally recommended by manufacturers of photosensitive materials. Reciprocity failure and variations of current voltage and different reflective qualities of the copy can cause inconsistent results.

EXPOSURE GUIDE

Exposure times will vary slightly according to speed of different films.

Procedure	Line	Autoscreen	Contact Screen	Prismatic Head
1. Set timer* 300 wt. lamps Quartzline	30 seconds 15 seconds	36 seconds 18 seconds	2 minute 12 seconds 1 minute 6 seconds	12 seconds ** 9 seconds
2. Set lens	f:22 Use f:32 and double exposure time for full 17 x 22 negative on "Vertical 24" Camera.	f:22	300 wt. lamps - f:11 Quartzline - f:22	f:32
3. Set lamp switch 300 wt. lamps Quartzline	4 lamps high	4 lamps high	4 lamps + high	4 lamps normal
4. Set master switch	Timer	Timer	Timer	Timer
5. Flash ex- posure	None	On top of copy glass, cover the entire copy with a clean unwrin- kled piece of yellow stripping paper, placing the edge of the flash paper to the dotted center - line of the developing scale so the flash paper runs through the center of the 1-2-3-4-5 squares.		
6.	Remove darkslide from stayflat and pressure film holders			
7. Press start button	Yes	Flash 6 sec. with 300 wt. lamps - 4 sec. with Quartzline.	Flash 12 sec. with 300 wt. lamps - 6 sec. with quartz- line.	Yes
		After pressing start button, make a flash exposure by exposing only the yellow paper. Count off seconds outlined above and quickly remove flash paper and expose the copy for the remainder of the exposure time.		
8.	Replace darkslide into stayflat and pressure film holders.			

Footnotes:

*a. See section on enlargements - page 38

**b. These exposures for Kodagraph Autopositive Projection Paper. For reverses using Kodalith Ortho Paper (or similar) use f:22 - 45 seconds for 300 wt. lamps or 30 seconds with Quartzline on high intensity.

† Contrast can be added to Kodak Magenta Screen halftones by the use of a "bump" exposure as outlined in Kodak instructions. Contrast can also be added and exposures shortened by substituting four Sylvania N34 medium beam photoflood lamps.

Line Work: Line work includes all type matter, line drawings, printed matter and solid copy. EXCLUDES continuous tone artwork, air brush and photoprints.

Halftones: Includes all continuous tone artwork, air brush work and photoprints.

When all exposure steps are completed your timer will automatically turn off the lights after the selected exposure and reset so that additional repeat exposures may be made by merely pressing the start button.

THE FLASH EXPOSURE

The flash exposure for halftones is made by covering the entire copy with a white or yellow piece of clean paper which is placed on top of the copyboard cover glass. The paper should be large enough to extend beyond the copy so it will cover the lower half of the Kenro Developing Scale. The edge of the flash paper should run through the center of 1-2-3-4-5 squares of the scale. Registration dashes can be found on the developing scale for this purpose.

Yellow paper is recommended if exposures are being made on HIGH intensity with the Quartzline lamps. White paper can be used if the 300 watt lighting system is being employed. Due to the fact that the flash exposure is relatively short, do not use coated stock for the flashing paper. It will reflect too much light and make the exposure control of the flash exposure too critical.

The flash exposure is made in order to assure clean printing black areas. Solid black areas in a halftone look good, but if any larger than the size of a ten cent piece, tend to muddy the entire picture or "pick" leaving white spots in the black printing areas. This is because no water, in the case of offset printing, is being carried in that area of the plate. By flashing halftones with a white or yellow piece of paper, a small black dot is forced into the film, where otherwise, the black area of the copy could not expose the film, and that unflashed area would be clear in the finished negative, like the clear area in a line negative, and print in solid black ink.

Flash Dot Size:

The size of the dot made by the flash exposure is found on the finished negative in lower half of square #5 on the Kenro Developing Scale. The dot should be solid black and round, *not square*. The dot size is good if, while examining square #5 with a magnifying glass on the light table,

there is room enough to visually place a third imaginary black dot in line (on a 45° angle) between two existing black dots. However, if with this size dot the black area of the picture fills in on the plate, the size of the dot should be enlarged by increasing the flash exposure about 20%, or the exposure to burn-in the plate should be reduced if this dot burns-out on the plate.

DEVELOPING - GENERAL

GENERAL RULES TO FOLLOW CLOSELY FOR FILM:

1. All solutions must be between 68° - 72°F. Best temperature is 68°.
 2. In hot climate, where temperature is above 70°F., add 1 part water to 1 part A and 1 part B.
 3. Develop as many negatives as is convenient at one time.
 4. With proper temperature, fresh developer, and emulsion side of film exposed at the proper lens aperture, a faint image should begin to appear in 30-45 seconds.
 5. Films of various manufacturers have different emulsion speeds. Change exposures to assure image appearing within 30-45 seconds. If exposures must be changed, double or cut the exposure time in half. This will assure visual difference in the time it takes for the image to appear.
 6. There is no necessity to develop right after exposure. Place exposed films in a light tight box and develop as many line exposures at a time, as convenient. Wait 30 seconds before starting next film in developer. This will give you 30 seconds at the end of the developing to check the developing scale before putting each negative into the fixer.
- Develop halftone negatives one at a time in fresh developer.
7. To process single negatives in an 8" x 10" tray, use at least 8 oz. A and 8 oz. B developer. Use at least twice that amount for continuous multiple developing. Mix A and B in tray just before processing because this type developer weakens in the tray by oxidation.
 8. Never develop more than 4 minutes.
 9. Change developer as soon as it begins to turn brown. Fresh solutions are inexpensive.
 10. Change or freshen by adding more fixer when clearing action begins to slow.

11. An acid stop bath between developer and fixer will preserve life of fixer.
12. Never let fixer drip into developer. Two drops will kill developer.
13. Negatives can be left a half hour or more in fixer.
14. White light can be turned on when milky backing on negative, in fixer, has disappeared. This takes approximately one minute.
15. Wash 1-2 minutes in running water, or soak negatives in a tray of clean fresh water.
16. To assure even drying always blot excess water bubbles from negatives with blotters, newspaper, or squeegee both sides before hanging up.
17. Ruby red bulbs are not safe. Use a filter type safelight recommended by the film manufacturer.

GENERAL RULES TO FOLLOW CLOSELY FOR PRISMATIC HEAD:

Materials:

- (A) If Papers with "lith" type emulsions are used follow procedure for film developing because the emulsions are the same.
- (B) If Kodagraph Autopositive Projection Paper and Autopositive Projection developer is being used, these rules should be followed:
 1. Ruby red bulbs are not safe.
 2. A red filter Wratten #1 must be used.
 3. Temperature of developer must be 72° - 74°F.
 4. No fixing after developing is required.
 5. The longer the exposure the whiter the background.
 6. Under-exposure causes grey backgrounds.
 7. Over-exposure causes the black areas to become grey.
 8. Care should be taken that no room light reflects on the copyboard causing shadows. Such shadows will cause uneven exposures.
 9. Be sure to have your film supplier demonstrate any materials you will be using.

10. Paper materials usually come in standard and extra thin weight. Standard weight is recommended.

FILM DEVELOPING

LINE WORK:

When ready to start developing, immerse film quickly, emulsion side down. To avoid uneven development, eliminate air bubbles under film by gently raising the film out of the developer and turn it over in the tray, emulsion up, and rock the tray causing the developer to wash over the film so the emulsion side of film is thoroughly and evenly saturated. Continue to gently rock tray for about one minute. A faint image should appear in 30-45 seconds (check paragraphs 4 and 5 under "General Rules" if image does not appear in 30-45 seconds). *Do not touch emulsion.* As you continue to develop your negative, watch for the image of the developing scale to appear.

The first noticeable reaction, in about 1½-2 minutes will be square No. 1 turning black, followed by No. 2 - good density has begun forming. The key to the highest possible density is square No. 3; when it turns solid black, remove film from developer. Fix until clear and rinse negative in clean water.



This example shows square No. 3 solid black. Square No. 3 should be solid black for good average copy such as repro proofs, original line drawings, etc. The longer a negative is developed, the less opaquing will be required. Do not allow square No. 4 to begin to turn grey. If it does begin to turn, the clear areas of the negative will start to veil over and type will appear ragged, and fine lines will be filled in.

For fine line copy ...when square No. 3 turns half black, developing is completed. This would include such copy as...Grey type...Newspaper pick-ups... and reductions to very small sizes. Less developing, so that square #3 is only half black, will keep letters clear and open.



The brand of film you use might require a slight variation of the above; as example, Square No. 3 may only need to be 7/8 solid black to produce a perfect negative from perfect copy. Examine a finished negative with your magnifying glass. See that the edges of the type are sharp and clear and that the characters have about the same width as the copy. If they are wider, increase development by increasing the solid blackness of square

No. 3 or if they are narrower and appear ragged, chewed or filled in, decrease solid blackness of square No. 3.

The Kenro Developing Scale is the key to consistent quality control. By developing until the same degree of blackness appears on the scale of each negative a constant character weight or line thickness can be attained negative after negative regardless of developing time, slight temperature variations and exhaustion of the developing solutions.

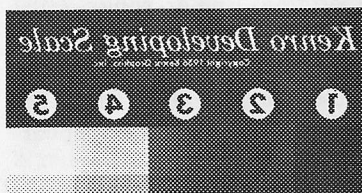
Rocking the tray while developing, as previously described, is an important factor; but tends to spread the black area of the negative into the clear areas. To keep fine line copy and pick-ups of already printed halftones only rock developer pan for first minute allowing film to develop without rocking thereafter.

Fine Line Developer is also available and should be discussed with your film supplier, as it affords many advantages on "pick-up" and fine line work.

CONTACT SCREEN HALFTONES:

The same general procedure followed for line developing is also applied to halftone developing with these exceptions:

1. Develop halftones one at a time in fresh developer.
2. Developing scale squares 1 and 5 are the important ones and key to developing as well as exposure adjustments.



Proper balance between highlight window in Square No. 1 and shadow dot in Square No. 5 is all that is required for good halftone negatives.

After immersing film in the developer, image should appear in 30-45 seconds. Watch only square No. 5 and as soon as a band or grey stripe appears across the center of square No. 5, your developing can be considered complete. You will find it helpful to examine this band with a magnifying glass while developing to assure a SOLID black dot. As soon as this dot turns solid black, fix and rinse the negative.

Examine the negative with a magnifying glass on a light table. Notice that, in square No. 5, one half of square has a small black dot (made by flash exposure) and the other half is clear or has a ghost dot which will burn away under the arc light (black area of copy cannot reflect enough light to expose film). This flash dot in square No. 5 is called a shadow dot. This assures a clean printed halftone on an offset press, because water will be carried on the plate in the black printed areas. The flash

dot should be small enough so that a dot of the same size can be placed in line (on a 45° angle) between two other dots without touching. If dot is too big, decrease flash exposure; if too small, increase flash exposure. Under-developed dots will be ghost grey and will burn away when making the plate. The flash dot should be SOLID black. Temperature of developer must be approximately 68° F.

The flash exposure (shadow dot) in square No. 5 must be in balance with the highlight window in Square No. 1. When examining square No. 1 with a magnifying glass, there should be a clear, open, small round window. This window should not be veiled. If the window is veiled, reduce developing time. The general tendency of operators, however, is to under-develop halftone negatives. This results in too large a highlight window in square No. 1 and a flat grey printed result. If the windows in square No. 1 are veiled, the resulting printed picture will print solid chalky white in these areas.

A GENERAL RULE FOR HALFTONE WORK IS TO GIVE:

- A. The shortest possible flash exposure. This produces a solid black pinpoint shadow dot in square No. 5.
- B. The copy exposure should be as long as possible without veiling highlight window in square No. 1.
- C. Give full development to all halftones.

AUTOSCREEN HALFTONES:

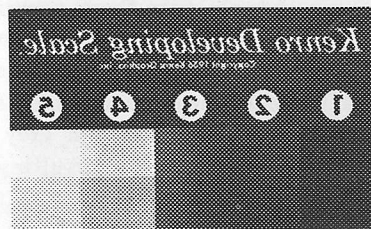
Developer can be used straight (equal parts A and B). A diluted formula of 1 part A, 1 part B, 1 part water can also be used. The diluted formula requires slightly longer development, but seems to improve the dot formation of the negatives. Make test negatives to determine your correct exposures and techniques.

Immerse film in developer and rock tray for approximately 1½-2 minutes until image is fairly dense. Then, "still develop" (no rocking) until grey band or stripe appears across square No. 5. Make sure film is resting on the bottom of the tray, completely covered by developer. Examine band with magnifier, while developing, to assure a SOLID black dot. As soon as this dot becomes solid black, fix, rinse and examine with magnifying glass on light table.

1. Examine the flash dots in the lower half of square No. 5. Assure yourself that there is more than enough room between the rows of dots to visually place another same size dot, at a 45° angle between them.

2. If there are no solid flash black dots, increase flash exposure 1 or 2 seconds.
3. If there are ghost dots (not solid black) increase development 5-10 seconds.
4. If dots are too big, either the flash exposure or developing time must be reduced. To determine which of these steps is to be taken:

Examine square No. 1 for your highlight window. You will notice that square No. 1 also has a band running through the center. This is caused by the flash exposure. The windows in the darker half (caused by the addition of the flash exposure) should be open, clear, round, small and not veiled.



1. If the windows of the darker half of square No. 1 are veiled and those in the lighter half are open, reduce the flash exposure 1 or 2 seconds. If your next test negative (with a reduction in the flash exposure) results in no dots at all in square No. 5, it will be necessary to retain your first flash exposure and reduce developing time approximately 5 seconds. This is done in order to keep the highlight window in square No. 1 open.
2. If the windows in both sections are veiled, but the dot in square No. 5 is good you must reduce copy exposure approximately 5 seconds. A good rule for Autoscreen film is that the flash exposure should be approximately $1/7$ the exposure given to the copy.

Once you have established your own exposure technique, there will be no reason to change.

HALFTONE SUMMARY:

Once you have balanced the highlights with the shadows on the developing scale by test negatives, you have captured the entire latitude of your film. Every halftone from that point on will fall into this latitude within the tone scale range of the original copy, resulting in the greatest possible detail.

You will encounter other halftone theories. One, for example, finds the blackest black and the whitest white in the original copy. These tones are called the shadow area and the highlight area, and exposure is computed by these densities. This theory can also be adopted to your methods if good results are obtained.

However, it must be remembered that the tones of the original copy cannot be stretched like a rubber band (i.e., calling a light gray tone a white and a dark tone a solid black) without losing the full tonal scale of the film.

WHAT IS A GOOD HALFTONE NEGATIVE:

A good halftone negative is one which gives a good reproduction on your press. You may find that your shadow dot in square No. 5 should be much larger or a lot smaller than discussed above. It should be just big enough so that on the press run your blacks don't print solid and tend to fill up. You may also find that the highlight window in square No. 1 should be pinched up very small, so that on the press run, it gives a nice small black dot in the white printed areas. Test negatives and printed results determine a good halftone negative. The hallmark of a good photographer is his ability to reproduce the original with the greatest clarity and accuracy.



No matter how good your temperature control is or how accurate your developing and exposure times are, "halftones", to quote an old phrase, "are

always made in the tray". There are still so many variables it is impossible to make automatic halftone negatives.

Proper temperature approx. 68° and a developing time of 2-4 minutes are rather wide latitudes, between which excellent halftones can be made.

The key to making good halftone negatives lies in the Kenro Developing Scale while the key to printing a good halftone picture from a good halftone negative lies in platemaking procedures and press adjustments.

When you place an exposed halftone negative in the developer, watch the clock. A faint image will appear in 30-45 seconds indicating the exposure time and the temperature of the developer are about right. Continue rocking the tray and in about two minutes you will notice the lower half of square #4 getting darker than the upper half. Small dots caused by the flash exposure are beginning to turn black. About 30 seconds later the lower half of square #5 is beginning to turn dark and the band across squares #4 and #5, caused by the flash exposure, can be clearly seen.

Take the negative out of the developer and quickly check the dots in the lower half of square #5 with your engravers magnifier. If the dots are grey and not solid black more developing is required. Repeat the above in about 5 seconds, and as soon as the dots are solid black, quickly put the negative in the fixer. There is about 30 seconds from the time faint band appears in the lower half of square #5 until the dots become solid black.

It is better if you can examine the dots while the negative is in the developer. Taking the negative out can cause developing streaks to appear on the halftone.

Place the negative on a light table and use your engravers magnifying glass to compare squares #5 and #1 of the negative with the above example of how the scale should appear on halftone negatives. The chart below will be helpful in making corrections so that the negative will appear like the above sample.

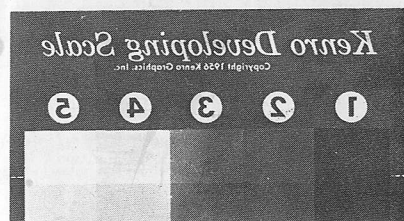
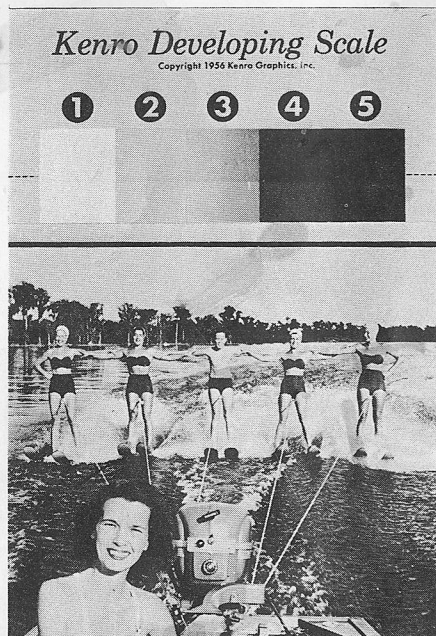
When referring to this chart make sure developer is 68° f. and the developer is fresh.

Dot formation in Square #5	Dot formation in Square #1	Remedy
None or ghost gray	None or veiled	Increase flash exposure 50%
None or ghost gray	Square or too big	Increase developing time
None or ghost gray	O.K.	Increase flash exposure 25%
To big or square	Square or too big	Reduce flash exposure 50%
To big or square	None or veiled	Decrease developing time
To big or square	O.K.	Reduce flash exposure 25%
O.K.	Square or too big	Increase photo exposure 25%
O.K.	None or veiled	Decrease photo exposure 25%

NOTES FOR HALFTONE EXPOSURES

NORMAL EXPOSURE

Examine the negative developing scale of a normal halftone exposure with a magnifying glass. About 30 seconds before developing was

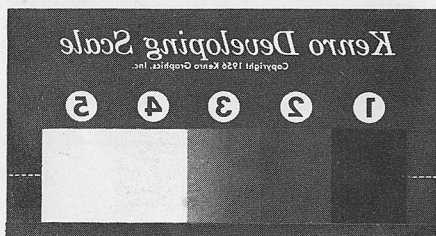


complete, a gray band appeared across the lower half of square #5. A magnifier was used to watch these dots and as soon as they turned solid black the negative was quickly put into the fixer. The flash was good because the dots in the lower half of negative square #5 are small, round, and solid black. Also, there is room

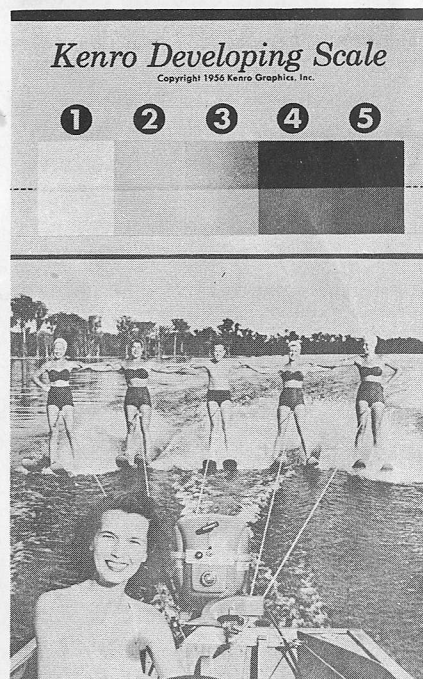
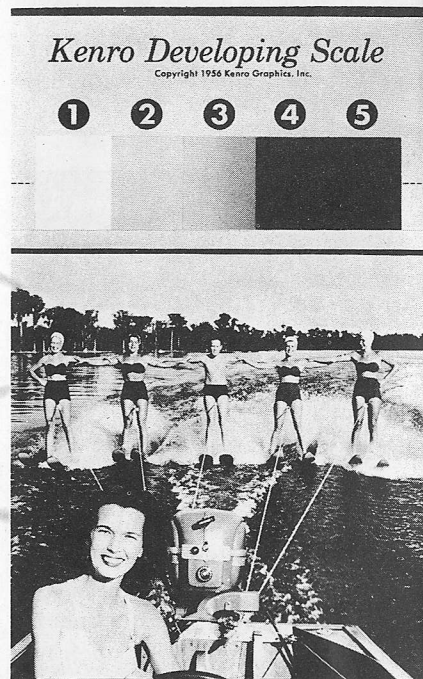
enough between these dots (on 45°) to place another dot of the same size. The developing time and detail exposure are good because in the lower half of square #1 the window is small, round, and clear. Compare the dots in the negative with the printed results to determine the loss of dot structure through platemaking procedures and press adjustments and make necessary corrections.

SOLID WHITE OR SOLID BLACK

The example at below shows how the same photo would look with solid white and solid black printed areas. Solid black areas are made by elimi-



nating the flash exposure. Solid white areas are made by either increasing the developing time until the windows in square #1 become veiled, or by adding a "bump" exposure. A "bump" exposure is made by removing the screen after making a normal halftone exposure and exposing the copy, similar to a line shot for about 3 seconds.



When developing this type of negative use a magnifier to make sure the windows in square #1 are veiled, and that solid black dots do not appear in square #5. To make this effect the original photo must contain solid white and black areas.

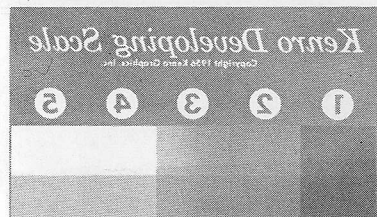
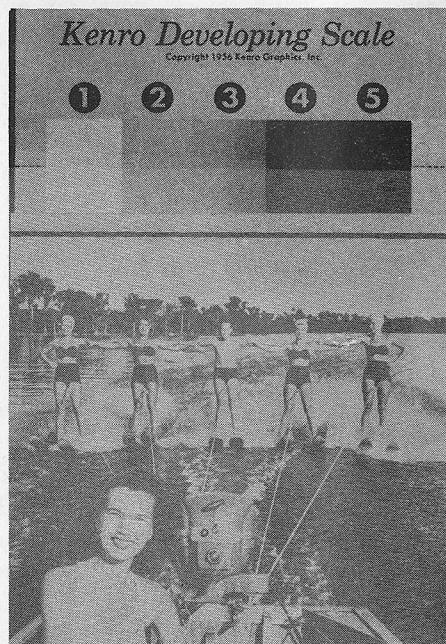
OVER FLASHING

The example below left shows how too much flash exposure grays the black printing areas. By examining the dots in square #5 in the below negative, the dots are found to be much too big. There is not room enough between these dots (on 45°) to place another dot of the same size. In order to make sure the flash exposure was too long and that the trouble is not over development, examination of square #1 shows a good small, round, clear window. This indicates proper development. By reducing the flash exposure about 25% the dots in square #5 will become much smaller and square #1 will not be effected because the developing time will remain the same.



UNDERDEVELOPING

The example below shows the results of underdeveloping as well as too much flash exposure. Underdeveloping can be caused by removing



the film from the developer too soon, or using the developer which is exhausted or too cold. Underdeveloping grays the white printed areas. By examining in the above negative, square #1, it can be seen that the window is much too big. The large window is not caused by underexposure because a faint image appeared on the neg-

ative 30-45 seconds after being put into the developer. More developing time is required to close the window in square #1 so it is small, round, and clear. There was also too much flash exposure. By reducing the flash 50% the dots in square #5 would be smaller and take a longer time in the developer before they turned solid black. The longer developing time would allow proper formation of the windows in square #1.

DEVELOPING PRISMATIC HEAD MATERIALS

MATERIALS:

(A) If litho emulsion paper is being used follow instruction for line negatives. The emulsions are the same. Use the Kenro Developing Scale as a guide.

(B) If Kodagraph Autopositive Projection Paper is used,

1. Immerse the paper quickly into the developer making sure the back of the paper as well as the emulsion side is covered with developer quickly.

2. If the black areas are spotted or mottled the paper was not immersed in the developer properly.
3. After the paper is immersed in the special developer the emulsion side of the material turns completely black. Allow one minute in developer.
4. Remove the material from the developer and rinse the emulsion side under a faucet or fine spray. Excess emulsion will be rinsed away leaving the copy ready for washing and drying.
5. White room light may be turned on while the copy is being rinsed under a faucet.

GENERAL SUGGESTIONS

PAPER PRINTS:

Paper prints can be made of negatives using the pressure type film holder or the vacuum back.

Pressure Back:

Remove the spring pressure back and the stayflat glass. Insert the clear glass and place negative or stripped-up job on the glass reading WRONG. Place a piece of litho emulsion paper over the negative with the emulsion (shiny) side facing the negative and replace spring pressure back.

Vacuum Back

After starting vacuum pump, place a piece of litho emulsion paper on the vacuum back in the center area with the emulsion (shiny) side facing out. With the negative reading RIGHT, cover the paper. The paper must be about 1" smaller than the negative on all sides so a vacuum will be created between the negative and the paper.

Exposure:

Expose approximately 5 seconds 18" away from a 100 watt bulb. Use paper print developer for 1 minute — fix and wash. Standard litho developer is also suitable but takes longer to develop. Or use exposing procedure under "Film Positives".

FILM POSITIVES:

Film positives can also be made by following the procedures for Paper Prints by substituting litho film for the paper except: Place the negative in the film holder reading RIGHT and against the film on the Vacuum back reading WRONG. (This Will assure emulsion to emulsion contact with the plate.)

Expose:

Place the film holder or vacuum back on the camera ready for a normal exposure. Set the lens at :22 and the lens counter at 1000 and the copy counter at 900. Cover the Copyboard with a white bond paper and give normal line exposure. Develop in litho developer — fix and wash. Exposing in this manner, using the camera, undercutting will be eliminated and a sharp positive film will result.

DIRECT PRODUCT HALFTONES:

Direct halftones of small parts, break away sections, box tops, etc., can be made on the Kenro Camera due to the versatility of the horizontal copyboard. By blocking a piece of glass about 1½" above the copyboard most shadows are eliminated. Place objects on top surface of copyboard glass. A 17" x 22" copyboard area at ½" size will be an 8½" x 11" page.

To completely eliminate shadows for jewelry, etc., surround the objects with a tall ring of thin ground acetate. Various backgrounds may be placed under the copyboard glass. Part numbers, nomenclature, etc., may be typed on a piece of paper and placed near the various items. Daubing bright parts (e.g., chrome) with putty will eliminate bright reflections. In order to get proper size and focus, set lens and copy counter for desired size. Using the ground glass lower copyboard until sharp focus or proper size is attained. Do Not change lens position.

Depth of sharp focus can be increased if necessary by closing the lens down to :32 or :45.

The following exposure factors* will be helpful:

LENS SETTING f: 22

Color of Object	Autoscreen	Contact Screen
Yellow-Green	1.5	1.5
Average	.1	.1
Bright	.5	.5

Dark or black objects should have flash exposure. Hold paper above objects and keep it moving to assure even lighting.

*Multiply the normal Autoscreen or Contact screen exposure by the exposure factor above to get the proper exposure for direct product halftones.

FILTERS

Filters can be used on Kenro Cameras. The simplest way to use them is to place a 2" square gelatin filter inside the bellows on top of the lens. Filters and filter adapters that fit over the lens barrel and filter holders to hold the individual filter are available through a graphic arts chemical and film supplier.

The filter chart below will be helpful in separating various printed colors from an original line copy. Your standard emulsion is Ortho material. As a general rule, if no filters are available and there is good contrast between black type and colored paper, double the standard exposurer time and develop until the negative background is as black as square #3 on the developing scale.

TO PHOTOGRAPH AS BLACK ON			COLOR OF ORIGINAL	TO PHOTOGRAPH AS WHITE ON		
BLUE-SENSITIVE MATERIAL	ORTHO MATERIAL	PANCHROMATIC MATERIAL		BLUE-SENSITIVE MATERIAL	ORTHO MATERIAL	PANCHROMATIC MATERIAL
(KODAK WRATTEN FILTERS TO USE)				(KODAK WRATTEN FILTERS TO USE)		
Not Recommended	Yellow (No. 9) Green (No. 58)	Green (No. 58)	Magenta	None	Blue (No. 47) Magenta (No. 30)	Red (No. 25) Magenta (No. 30) Blue (No. 47)
None	None or Green (No. 58)	Green (No. 58) Blue (No. 47)	Red	Not Recommended	Not Recommended	Red (No. 25)
None	Blue (No. 47) Magenta (No. 30)	Blue (No. 47)	Yellow	Not Recommended	Yellow (No. 9) Green (No. 58)	Yellow (No. 9) Green (No. 58) Red (No. 25)
None	Blue (No. 47) Magenta (No. 30)	Red (No. 25) Blue (No. 47) Magenta (No. 30)	Green	Not Recommended	Yellow (No. 9) Green (No. 58)	Green (No. 58)
Not Recommended	Not Recommended	Red (No. 25)	Cyan	None	None Green (No. 58) Blue (No. 47) Magenta (No. 30)	Green (No. 58) Blue (No. 47)
Not Recommended	Yellow (No. 9) Orange (No. 16) Green (No. 58)	Green (No. 58) Red (No. 25)	Blue-Violet	None	Blue (No. 47) Magenta (No. 30)	Blue (No. 47)

NOTE: These are not the only filters which can be used to produce the desired effects. Practical experience will show which variations of the suggested filters can be used with certain hues of the original colors.

FILM AND FILTER COMBINATIONS EASTMAN KODAK COMPANY

FILTER FACTORS

When using colored filters over the lens, the amount of light reaching the film is reduced depending on the color and density of the filter being used and the exposure must be increased to offset the loss of light. A filter factor is a number which you multiply the normal (no filter) exposure by in order to arrive at the correct exposure for a particular filter.

Filter factors are supplied by the film manufacturer, not the manufacturer of the filter.

FILTER FACTORS

	K-1	K-2	K-3	G	R	G	B
Filter #	6	8	9	15	25	58	47
Factor	1.5	1.7	2.5	5.4	—	5.4	10.5

The above factors should only be used as a guide. The Developing Scale can be used to make a further exposure corrections, as explained under paragraphs #4 and #5 of General Developing — film.

EXAMPLE:

Standard line exposure is 30 seconds. Using a #9 filter the exposure would be 2.5 x 30 seconds or 75 seconds.

ENLARGEMENTS:

When making enlargements the amount of light falling on a very small area is spread over a larger area on the film. (As example 1" square copy over 2" square film). Because of this difference in intensity it is necessary to increase the exposure time.

The following exposure factors show how exposure time increases with size of enlargements:

These factors are approximate and depend on emulsion speeds of various manufacturers materials.

Enlargement	Factor
2 x f:22	3.5
3 x f:22	4.5

REFLOWING STAYFLAT:

Stayflat solution may be purchased from your local lithographic supplier. It is available in either clear or matte finish. The *matte* finish is recommended because the resulting coating is similar to ground glass and allows visual inspection of the image. If stayflat is not available from your supplier in an aerosol spray can, proceed as follows:

To reflow stayflat glass:

1. Remove old stayflat with a razor blade. Wash glass clean, using Bon-Ami or some similar type cleaner.
2. Mask a 1/2" margin on all four sides using 1" masking tape. (Mask clean side of glass, not side with register lines). Bend overhanging edge of masking tape up on all sides to prevent stayflat solution from dripping. Press inside edge of tape down to prevent solution from undercutting.

3. Before flowing stayflat solution:

- A. Shake stayflat can well and let stand for 1-2 minutes to eliminate air bubbles.
 - B. Have level surface cleared to place glass on while stayflat sets and dries.
4. Hold glass shoulder high in left hand, like a tray. Start pouring stayflat solution across back edge of glass and tip glass slightly forward so that solution flows very slowly forward, adding new solution along left and right edges as necessary. Glass may be rocked from side to side to assure full coverage.
 5. Place glass on flat surface and let set approximately one hour. Run razor blade around inside edge of tape and remove.

INITIAL SUPPLIES

The following minimum supplies are recommended. Your film supplier will be glad to offer additional helpful suggestion for your specific installation.

- 3 trays 16" x 20" (For negatives up through 12" x 18")
- 3 trays 20" x 24" (For negatives up through 18" x 24")
- 1 tray 8" x 10" (For developing small halftones)
- 1 thermometer
- Safelight and white light (Do not use ruby bulbs)
- 1 funnel
- 1 magnifying glass (lithographer's or photoengravers)
- 1 electric timer
- 1 graduate or measuring tumbler 8 or 16 oz.
- 3 one gallon plastic bottles (for solutions)
- Litho film for line work; 10" x 12" and 12" x 18" for "Vertical 18" cameras; 18 x 24 for "Vertical 24" cameras
- Autoscreen film and or Contact screen
- Litho developer
- Fine line developer (two extra gallon bottles)
- Litho fixer (powder or liquid)
- Stop bath if suggested

SERVICE

You will find your graphic arts supplier and film manufacturer's field technicians available and willing to assist you in every possible way. They will keep you up-to-date on all new developments and techniques. Kenro Graphics will also assist you by mail.

Please address your correspondence to:

*Technical Services Dept.
KENRO GRAPHICS, INC.
Cedar Knolls, New Jersey*

To expedite correspondence please include:

1. Original Copy
2. Negative with Kenro developing scale
3. Exposure time and lens setting
4. Temperature of solution
5. Developing time
6. Printed results

DIFFICULT LINE SHOTS

It is sometimes possible to make an excellent line negative from a copy that is gray, has no contrast between image and paper and just won't make a negative. When processed in the normal manner, the type fills in before the background turns solid black.

1. First make normal exposure.
2. Underdevelop negative (Type should be relatively clear with the background as dark as possible)
3. Dry negative.
4. Make paper print (#4 paper or litho emulsion paper)
5. Fix and dry print.
6. Make new exposure using paper print as original copy.
7. Process new negative in normal manner.

RUBY SET UP LAMPS

On the "Vertical 18" cameras with 300 watt lighting systems copyboard loading can be speeded up in darkroom if center sockets are not being used. Two ruby lamps can be screwed into the center sockets of the lamp housing. These lamps can be turned on by switching right hand switch from 4 to 2 position and pressing start button. You can then proceed to load your copyboard while other negatives are being developed.

COPIES FROM CARBON OR TISSUE PAPER

Higher quality negatives can be made from copy on tissue or thin translucent material by backing up the copy with a white or black piece of paper. Use black back up paper if printed both sides. (Increase exposure 10%). Use white paper under copy that has solid black lines such as India Ink etc.

Use black paper under copy that has gray type such as typewriter originals and carbons (increase exposure 10%).

MAINTENANCE

Very little maintenance is required on Kenro Cameras. A very light coating of vaseline on the screw threads is recommended. Glass should be kept clean by using a weak solution of ammonia and water. *Do not use glass cleaners and waxes.* Clean lens according to directions under lenses.

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