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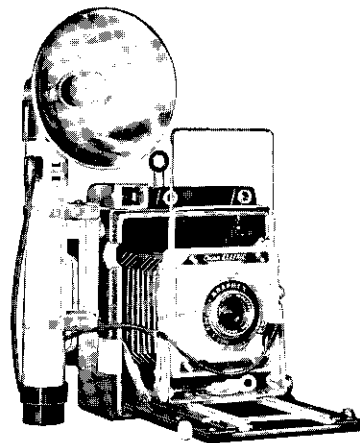
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Rochester, New York
14603, U.S.A.

A subsidiary of
The Singer Company



Pacemaker® Crown and
Speed Graphic® Cameras
Guidebook

graflex®

PACEMAKER GRAPHIC CAMERAS / 3 Sizes • 2 Models

The instructions in this manual are applicable to all Pacemaker Graphic Cameras. Although most illustrations are of the larger 45 size, the instructions are equally applicable to the smaller 23 and 34 Cameras. All directions, left and right, are from the operator's position behind the camera.

Every effort has been made to make your camera dependable, convenient and easy to use. The following pages will review basic operation and will explain the purpose and use of the many features built into the camera.

For those who wish more detailed information on lighting, exposure and other areas of photography, a bibliography has been provided on Page 30.

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Sports Viewfinder Frame

Sports Viewfinder
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Shutter Speed Window

Shutter Selector Slide

Graffite Mounting Bracket

Focusing Panel

Dark Slide Clip

Focal Plane Shutter Flash Fitting

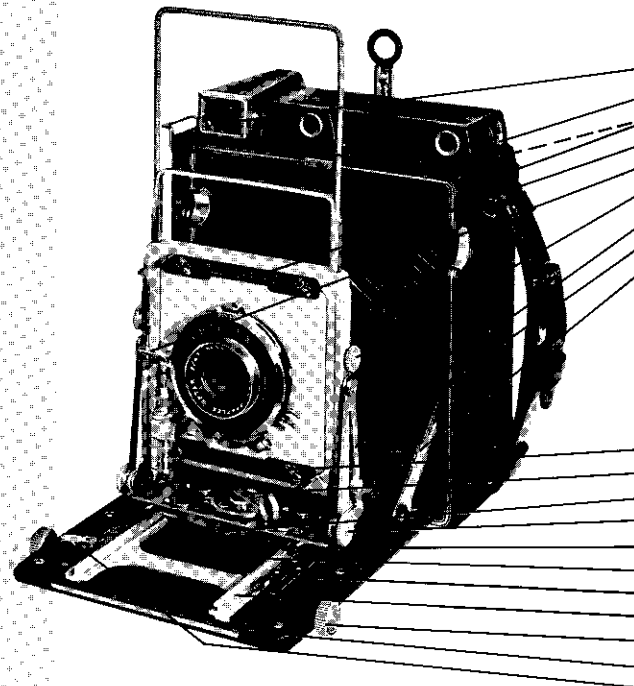
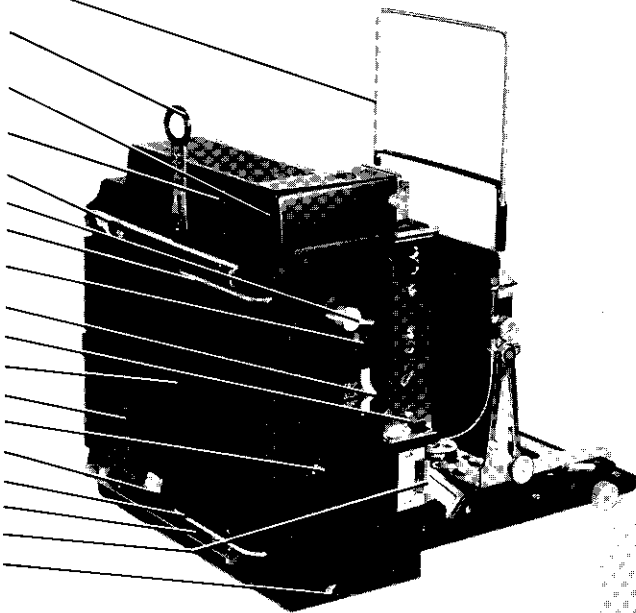
Focusing Hood Latch

Focusing Panel Release Arm

Slide Locks

Body Release

Speed Control Lever



Viewfinder Window

Rangelite Switch

Bed Release Button

Lensboard Slide Lock

Body Release Arm

Rising Front Lock Nut

Tripod Socket

Front Standard

Bed Brace

Lensboard Slide Lock

Front Standard Lock Lever

Lateral Shift Release

Tilting Front Lock Nut

Infinity Stops

Serial Number on this plate

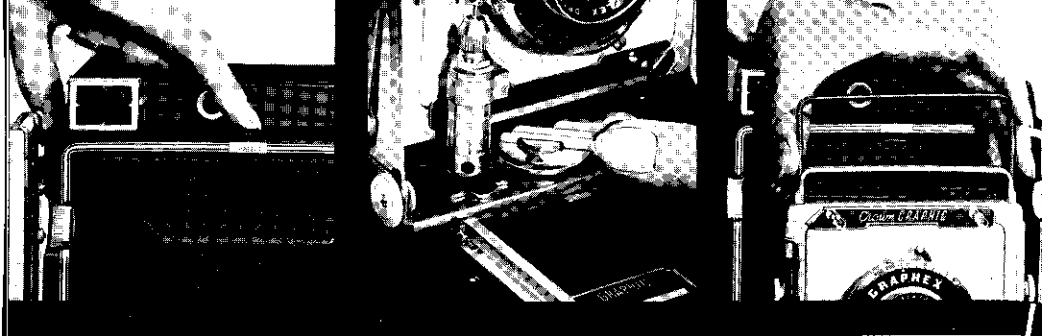
Focusing Scales

Track

Focusing Knobs

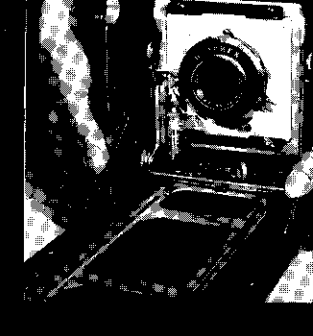
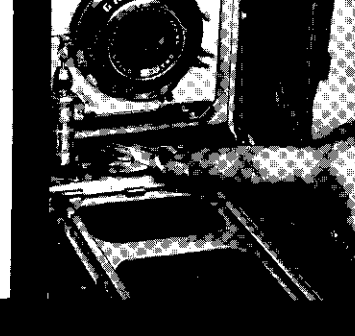
Camera Bed

Track Lock



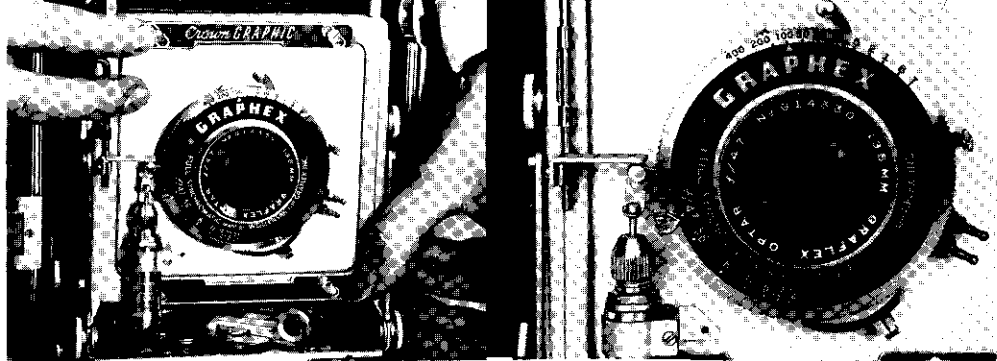
OPENING THE CAMERA:

1. Press the bed release button at the top center or top left corner of the camera body (appears as a bump in covering).
2. Lower door or bed until it locks in a horizontal position.
3. Swing the front standard lock lever out straight and pull it outward on the track to the infinity stops; these stops are hinged and should be in an upright position. Fold the infinity stops down to move the front standard beyond the normal working position. (See Page 9 about additional stops for multiple lens use.)
4. Relock the front standard.
5. The sports viewfinder frame may be lifted by pinching inward against the side of the extendable frame and pulling upward as far as possible. Swing the sports viewfinder eyepiece to an upright position. Adjust parallax for 6', 8', 15', or infinity. (See page 19 for use of optical viewfinder.) On 45 Cameras adjustment is on eyepiece —on 23 and 34 Cameras adjustment is on lower viewfinder frame.



CLOSING THE CAMERA:

1. Close the sports viewfinder frame. Press evenly on both sides or tap the top member with the flat of the hand.
2. Swing down the sports viewfinder eyepiece at the back of the camera.
3. If the front standard movements have been used, return them to normal as follows:
 - a. Drop the lensboard to the lowest position and lock.
 - b. Tilt the lensboard back to its normal, vertical position. Lock it.
 - c. Bring the shift of the front standard to neutral.
4. Rack the track back to the limit of its movement.
5. Unlock the front standard and push it back into the camera body. Lock it.
6. Press down on the bed braces to release and close the bed. It will lock closed with a click.



INTERCHANGEABLE LENSES

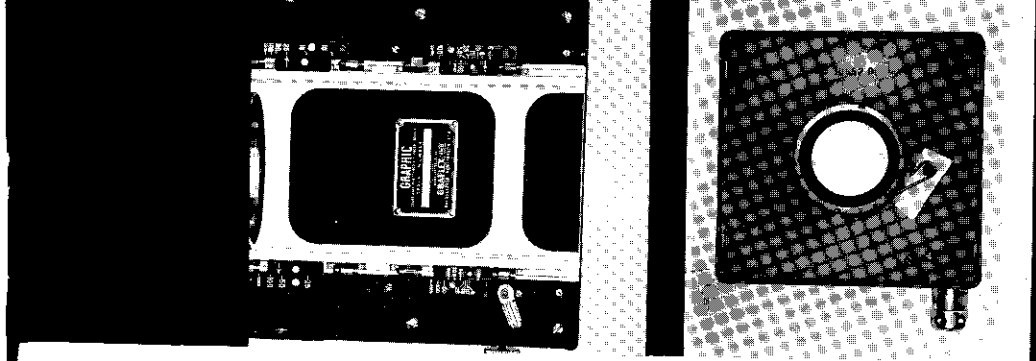
The long bellows extension of the Pacemaker Graphic permits a choice of lenses ranging from wide angle (short focal length) to telephoto (long focal length). These lenses are discussed on Page 28. A set of matching focusing scales and infinity stops should be installed for each lens; a rangefinder fitted to the camera must be adjusted for the lens normally used although the Graphic Rangefinder on the 45 models will accept cams matching all lenses normally used with the camera.

Lenses mounted on Super Graphic lensboard assemblies may be used on the Pacemaker Graphic 45 Cameras. Pacemaker Graphic 45 lensboards with raised bosses on the sides as

well as the top and bottom will fit the front of the Super Graphic although they will not allow the use of the internal electrical system of that camera.

CHANGING LENSES

1. To remove the lens and its board: slide both lensboard slide locks laterally to the full out position. Lift the lens and shutter assembly out.
2. To install a lens: insert the lensboard assembly with the shutter release toward the side of the camera as shown. The body release arm should engage the shutter release lever as shown. Press lensboard firmly into the front frame and slide both lensboard slide locks to the full "in" position.



INFINITY STOPS

A set of infinity stops must be correctly positioned for each lens used on the camera.

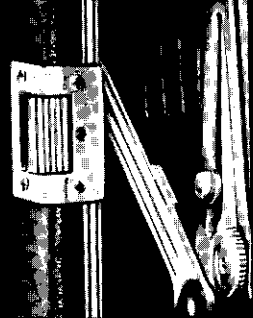
If infinity stops have not been factory installed, they must be very carefully located square with the film plane and locked firmly in place.

LENS FITTING

Lens and shutter combinations may be mounted on lensboards by your local Service Dealer or Graflex Service Center. *Focusing scales* should be provided

and properly located for each lens. For cameras equipped with a Graphic Rangefinder each lens must be measured optically for exact focal length so that a matching rangefinder cam can be supplied with the lens. Be sure to identify and record each lens, matching cam and set of infinity stops for future reference. Lensboards with 8 raised bosses will fit Super Graphic Cameras but must be tripped externally.

Lenses mounted on Pacemaker 45 Lensboards may be used on the Graphic View through the use of the special Graphic View lensboard adapter.



TRIP
BACK
FRONT

TRIP
BACK
FRONT

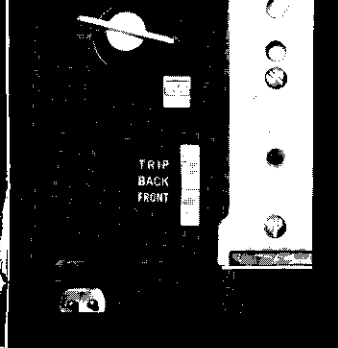
BODY RELEASE

The Pacemaker Graphic is equipped with a conveniently located body release. On Speed Graphic Cameras a selector slide is also provided. When the selector slide is in the "FRONT" position the arm on the front standard will engage the shutter release lever and trip the shutter. With the selector slide in the "BACK" position the focal plane shutter will be tripped.

To set the selector slide push *in* and *up* or *down* to the desired setting.

The selector slide may be used to release the focal plane shutter without firing a flash lamp and is useful when it becomes necessary to change shutter speeds. To release shutter push in and up as far as it will go. (Trip)

NOTE: When using the front shutter the focal plane shutter must be open and when using the focal plane shutter the front shutter must be open.



TRIP
BACK
FRONT

FOCAL PLANE SHUTTER

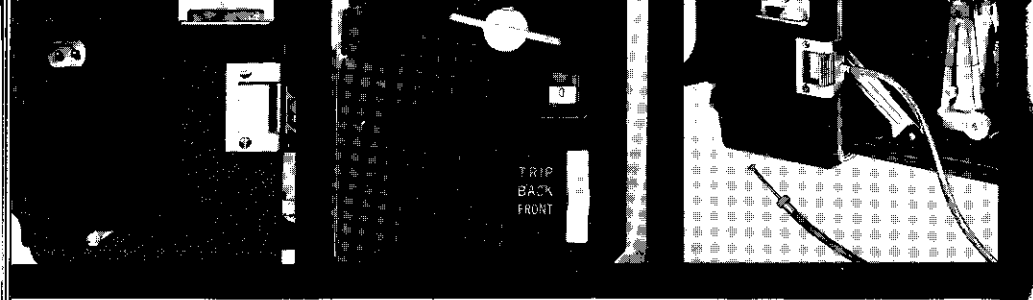
Pacemaker *Speed Graphic* Cameras are equipped with a focal plane shutter at the back of the camera. This shutter has a wide selection of accurate speeds in a generally higher range than between the lens shutters. It provides for the use of telephoto or other lenses which may not be mounted in shutters. Generally speaking, the focal plane shutter has more motion stopping ability than between the lens shutters. Where there is duplication of shutter speeds, either focal plane or front shutter may be used at preference of the user. If shutter speeds slower than $1/30$ of a second are required, use the front shutter.

To use the focal plane shutter:

1. Open the front shutter. (Set at "T" and open it or use Press Focus feature.)
2. Set the selector slide at "back."
3. Turn the shutter winding key until the desired shutter speed appears in the shutter speed window. With the speed control lever moved toward the back of the camera the mask in the shutter speed window will be raised to expose the following shutter speeds: 50, 250, 1000. With the lever moved forward a speed control governor is engaged and the following figures will be seen in the shutter speed window: 30, 125, 500. These numbers indicate the exposure time in terms of fractional parts of a second.

CAUTION: Do Not Wind The Focal Plane Shutter with the dark slide removed from the holder as the film will be exposed.

To maintain peak efficiency of the focal plane shutter, it is advisable to allow the curtain to run down to the open (O) or fully closed position before putting the camera away.



TIME EXPOSURES:

Time exposure may be made with the focal plane shutter.

1. Move the speed control lever toward the back of the camera to disengage the governor.
2. Wind or release the focal plane shutter until letter "T" appears in the shutter
3. Press the body release to allow the focal plane shutter to run down to the full open position.
4. Press the body release again to close the shutter at the end of the exposure time.

NOTE: It is preferable to release the shutter by means of a heavy duty metal cable release threaded into the cable release socket of the body release.

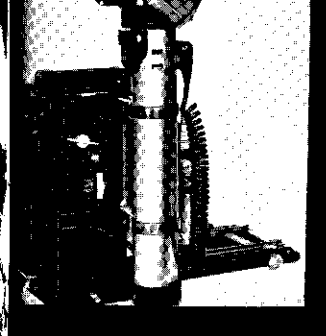
SPEED GRAPHIC 23 CAMERAS

Use #31 and #2A flash lamps at 1/1000, 1/500, and 1/250. No. 6 and FP 26 flash lamps may be used at 1/1000 shutter speed only.

FOCAL PLANE SHUTTER FLASH SYNCHRONIZATION

Since the length of curtain travel is different for each size of Pacemaker Speed Graphic Camera, the effective flash peak requirements vary. Hence, instructions for flash synchronization with the Speed Graphic 23 Camera vary slightly from those for the larger Speed Graphic 34 and 45 Cameras.

1. Attach the Grafite Battery Case to the camera.
2. Plug the Grafite cord into the synchronizer outlet on the camera and the shutter outlet in the battery case
Make the exposure by pressing the body release. (Do not press the switch button on the battery case.)



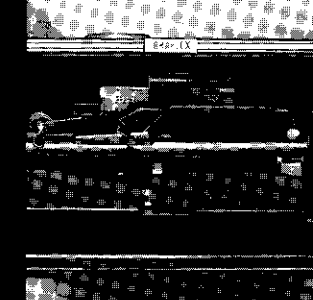
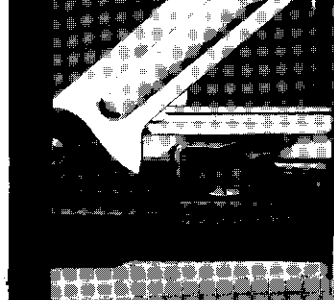
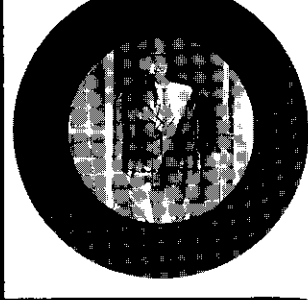
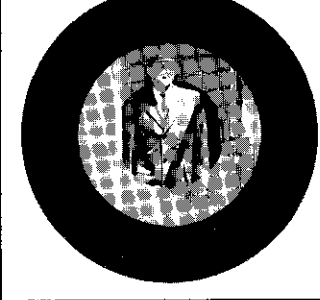
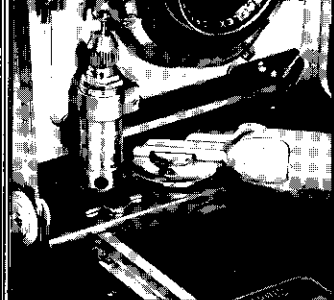
FOR SPEED GRAPHIC 34 and 45 CAMERAS

Use only the No. 31 and No. 2A flash lamps at shutter speeds of 1/1000 and 1/250 of a second. Synchronization can not be obtained at other instantaneous speeds. Speeds marked in red serve as a reminder that they are not to be used for flash synchronization.

All types of flash lamps as well as high speed electronic flash units may be used with the Time exposure setting by means of the built-in contacts. The curtain should be set for making a Time exposure as previously outlined. (See Page 12.) The lamp will be fired as the curtain reaches the full open position.

The Graflex focal plane shutter will not fire a flash lamp when the shutter curtain is wound or when the shutter is released with the shutter selector slide since a secondary switch connected to the body release makes it necessary to release the focal plane shutter by the body release in order to fire the flash lamp.

NOTE: If the focal plane shutter has not been used recently, the contacts may have become oxidized. To insure good contact wind and release the curtain occasionally, or at least a few times before using for flash.



RANGEFINDER FOCUSING TO USE:

1. Open camera as described on page 6.
2. Move the front standard against the infinity stops. Look into the rangefinder eyepiece and rack the track forward until the image of your subject as seen in the central, moving field exactly coincides with the larger stationary image. The field moves horizontally in the Graphic Rangefinder and vertically in the Kalart.
3. Lock the track. (Track lock not required on 23 Cameras.)

GRAPHIC RANGEFINDER AND EXTRA LENSES

The Graphic Rangefinder is an integral part of the Pacemaker Graphic Camera body and functions with interchangeable cams each

made to match a specific lens. *Cams for the Graphic Rangefinder may not be interchanged with those for the Super Graphic Rangefinder.* With the proper cam in position the rangefinder and parallax correcting viewfinder will indicate true focus and field coverage of the

(See Pages 22, 23, 24, 25, 26) are used].

KALART RANGEFINDER AND EXTRA LENSES

Additional lenses fitted to cameras equipped with Kalart Rangefinders must be focused by ground glass or focusing scale. The Kalart Rangefinder may be focused on the subject and the distance read from the focusing scale matching the lens for which the Kalart Rangefinder is adjusted and this reading transferred to the focusing scale for the lens being used.

TO CHANGE THE GRAPHIC RANGEFINDER CAM:

1. Open the camera and pull the front standard forward.
2. Rack the track forward about 2" (until the actuator bracket clears the plunger).
3. Hold down the rangefinder access door located under the top of the camera.
4. To remove the cam, pull the free end forward and out.
5. To fit cam into rangefinder, hold it with the long smooth edge facing the front of the camera. Slide the narrow end of the cam into the slot of the tube and under the rangefinder follower arm. Compression of the spring in the tube will hold the cam in place against the plunger. If the

slot appears to be filled, slide the point of the cam between the caps on the spring and plunger. Push the plunger over, or tip the camera upright and tap lightly. This will open a space for insertion of the cam.

6. Let the metal cover close; rack the track back as far as it will go; position the front standard against the infinity stops matching this rangefinder cam, and lens combination. The Graphic Rangefinder and automatic parallax correcting optical viewfinder will operate in synchronization with the focusing of the lens.
7. The Graphic Rangefinder will synchronize with all properly fitted lenses from wide angle to long focus telephoto, providing the matching cam and properly fitted infinity stops are used in each instance.

LIGHT BEAM FOCUSING FOR NIGHT PHOTOGRAPHY

When it is too dark to see the image clearly by looking through the rangefinder, this rangefinder may still be used to obtain proper focus by the projection of light from the two front windows of the rangefinder out to the subject. Focusing will cause one beam of light to move with respect to the other and when they coincide on the subject the lens is automatically in focus on that subject.

In the Graphic Rangefinder the Rangelite is built in as an integral part; the light can be turned on by pressing the red switch on the left side of the rangefinder housing. Two photoflash penlite batteries power the built-in Rangelite and must be installed at the time of purchase of the camera.

1. To install new batteries press in and to the left on the left end of the battery compartment cover at the back of the rangefinder housing.
2. Remove old batteries.
3. Insert two fresh photoflash penlite batteries side by side in the battery compartment. Position batteries so that they are lined in series, positive to negative as shown.

NOTE: Old batteries sometimes leak causing corrosion. Do not store the camera with old or well used batteries in place.

The Kalart Focuspot may be attached to the top of the Kalart Rangefinder to provide beam focusing. A connecting cord from it to a Graflite battery case with standard size D batteries will provide the electrical energy. Full instructions accompany each Focuspot.

PACEMAKER GRAPHIC

CROWN

SPEED MODEL FP

CAMERA NO. _____

LENS FOCAL LENGTH _____ #

NAME _____

(Please print.)

STREET _____

CITY _____

STATE _____

COUNTRY _____

Date Purchased _____

From _____

Dealer City _____

State _____

(dealer)

Country _____

The Camera will be used for (check one or more)

Press

Wedding

School

Commercial

Free Lance

Personal

Studio

Company

Other _____

I learned about the Pacemaker Graphic through:

Dealer recommendation

Advertising in _____

(publication)

Other way _____

(specify)

Other cameras I own are _____

Photographer's Signature _____

Occupation _____

IMPORTANT: Fill out this card completely and mail it once to Grafax, Inc., Rochester 3, N.Y. Warranty effective only if equipment is registered immediately by means of this card or suitable substitute. No postage necessary.

FIRST CLASS
PERMIT NO. 480
Sec. 34.9 P.L.&R.
ROCHESTER, N.Y.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN U.S.A.

Postage will be paid by—

GRAFLEX, INC.
3750 MONROE AVENUE
ROCHESTER, N. Y. 14603



TEAR ON DOTTED LINE

YOUR GRAFLEX WARRANTY:

To the initial retail purchaser of Graflex merchandise:

Skilled craftsmen have produced the Graflex merchandise you have purchased. They have built into it a level of quality and performance which will insure your enjoyment of its use.

Graflex merchandise is warranted by Graflex and the Graflex Dealer from whom you purchased the same, to be free from faulty materials and workmanship, except as hereinafter set forth. If any time during your first year of ownership, (90 days in the case of any electronic components and parts, including without limitation, tubes and projection lamps), any servicing is necessitated by faulty material or workmanship, it will be provided (or the equipment repaired at our option) without charge except for transportation charges by your nearest Graflex Service facility. Requests for servicing should be made through your Graflex Dealer; or if this is not convenient, the merchandise should be carefully packed in a stiff container with adequate packing (not excelsior). Attach name and address and any special instructions to the package, which should be adequately secured and fully insured.

THIS WARRANTY IS NOT APPLICABLE:

- A. To Graflex merchandise which in our judgment has been damaged, abused, or requires replacement of parts due to wear and tear from use, or for any reason other than faulty materials and workmanship. Such merchandise will be serviced at factory-established rates.
- B. To Graflex merchandise which has been tampered with or serviced by persons other than Graflex approved personnel.
- C. If adaptations or accessories of other than Graflex recommendations have been made or attached.
- D. Where the Graflex merchandise bears serial numbers, if it has not been registered with Graflex by means of the attached registration card or appropriate substitute within 60 days from date of purchase.

No liability is assumed for film which is damaged or is unsatisfactory for any reason (due to equipment malfunction or otherwise); nor is Graflex, Inc., obligated to replace such film.
EXCEPT AS EXPRESSLY SET FORTH HEREIN NO OTHER WARRANTIES ARE MADE BY GRAFLEX OR YOUR GRAFLEX DEALER WITH RESPECT TO GRAFLEX MERCHANDISE, INCLUDING, WITHOUT LIMITATION, WARRANTIES AS TO FITNESS FOR A PARTICULAR PURPOSE AND OF MERCHANTABILITY. No liability is assumed for expenses or damages resulting from interruptions in operation of equipment, nor for incidental or consequential damages of any nature.

In order that we may be able to pursue our continuing program of product improvement, Graflex reserves the right to make changes in design, or add improvements to any product without incurring any obligation to include such revisions in equipment previously produced.

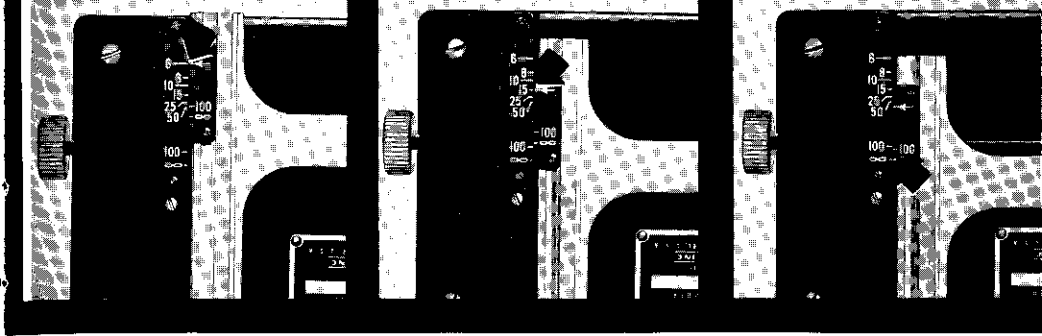
The warranties hereinbefore expressly set forth are made only to the *original retail purchaser*. Graflex's liability under the within warranty is limited to repair or replacement as hereinbefore provided.

SERVICE FACILITIES:

Graflex Approved Service Stations are conveniently located in all major cities. Contact your Graflex Dealer or write to the Manager, Graflex Service Sales, for the address of the Graflex Approved Service Station nearest you. Record below such serial numbers as your equipment bears for your insurance file and future reference.

Serial Nos.

GRAFLEX, INC., Rochester, N. Y. 14603



focused at 6 ft.

focused at 15 ft.

focused at infinity

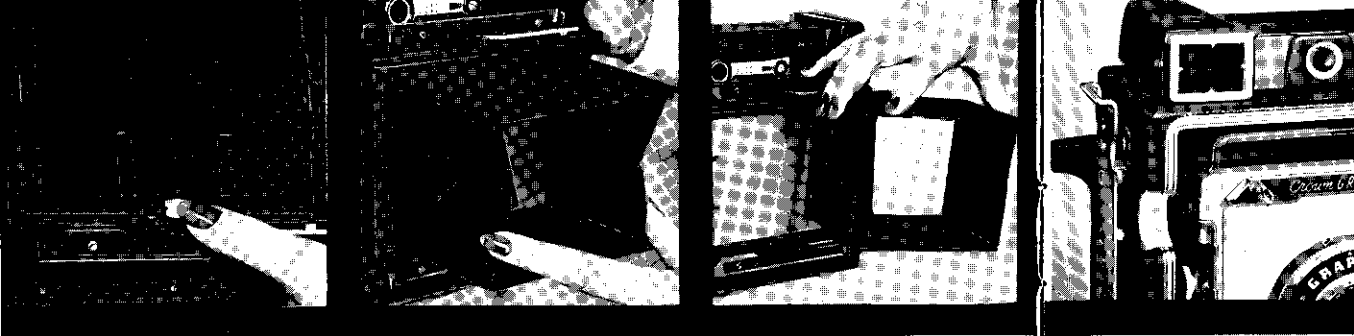
SCALE FOCUSING

A focusing scale, and index scale for each lens to be used on the Pacemaker Graphic should be installed on the bed and track along with a properly identified pair of infinity stops for each lens to be used on the camera. Be sure to use the proper set of infinity stops.

The focusing scales on Pacemaker Graphic Cameras are of the modified vernier type with one part carried on the camera bed and the other on the sliding track. The distances

indicated are from film position to the subject. Each focusing scale has been calibrated especially for the lens supplied with it. If this scale is used with any other lens, even of the same make, speed and focal length, out of focus pictures may result since lenses do vary somewhat from their indicated focal length. Each lens must have its own focusing scale, calibrated especially for it.

Focus on greater distances by matching the figures for the measured subject distance indicated on each scale. For shorter distances use the pointer at the front of the short index scale set opposite the figure representing the subject distance.



GROUND GLASS FOCUSING

Ground glass focusing through the lens is recommended for all critical photography, since it allows checking sharpness of focus, depth of field, composition and shape of the image as it is to be recorded on the film. The ground glass must be used whenever the front is tilted, shifted, or otherwise moved from the normal position. The focusing panel of the Pacemaker Graphic 34 and 45 Cameras have an Ektalite Field lens under the ground glass for a brighter image.

1. Press down the latch to open the focusing hood.
2. To close the hood, first press in on the side wings and up on the bottom panel;

then pull the top downward until it latches.

3. To remove the focusing hood (allowing the use of a magnifying glass over the entire ground glass area), lift up on the release latch while pressing sideward on either of the two catches holding the focusing hood onto the focusing panel. Lift the focusing hood off.
4. To reattach the hood, position over the ground glass and press until it snaps into place.
5. A dark slide clip is provided at the lower edge of the focusing hood of the 4 x 5 size.

NOTE: Focusing panels of Pacemaker Graphic 23 Cameras may be converted to include Ektalite at a Graflex Service Center.

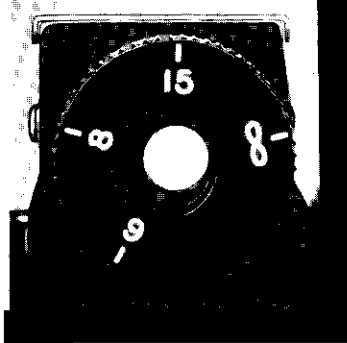
THE OPTICAL VIEWFINDER

This is built into the Graphic Rangefinder and has automatic parallax compensation. The optical finder is a separate item on other Graphics, all sizes.

The optical viewfinder is often preferred to the open frame finder in order to more clearly define the limits of the field since it may be fitted with masks of different sizes to correspond with the field coverage of various focal length lenses and different film sizes used with the camera. Both finders are used to best advantage when the eye is held as closely as possible to the rear element.

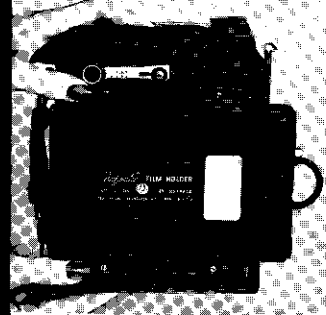
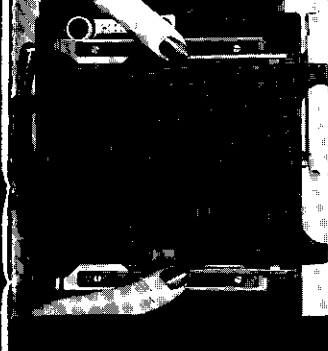
For *parallax adjustment*, set the eyepiece dial by placing the number which most closely corresponds to the distance from the subject opposite the line along the top center of the finder.

(See next page for Table of Masks for Optical Viewfinder)



OPTICAL VIEWFINDER MASKS

Interchangeable masks for the optical viewfinder are available to indicate the subject matter included by camera lenses of different focal lengths on different film sizes.



MASK SELECTION CHART

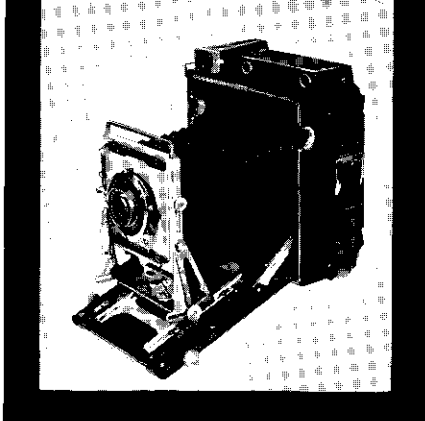
For various film sizes (not camera sizes)

Mask Catalog Number	2 1/4 x 2 1/4 Picture Size	2 1/4 x 2 3/4 Picture Size	2 1/4 x 3 1/4 Picture Size	3 1/4 x 4 1/4 Picture Size	4 x 5 Picture Size
	FOCAL LENGTH OF LENSES IN MILLIMETERS				
9105-4		70— 84	78— 82	114—121	127—149
9105-3		86— 90	83— 98	122—133	150—162
9105-2		92—101	100—114	135—152	164—168
9105-9		103—125	116—127	154—178	170—216
9105-10		127—138	129—152	179—203	217—241
9105-11		140—162	154—191	205—216	243—267
9105-8		164—191	192—197	217—305	268—343
9105-7		192—227	198—241	307—352	344—381
9105-6		229—267	243—302	354—406	383—429
9105-5		268—305	303—330	408—508	431—508
9105-12	100—114				
9105-13	243—302				
9105-14	116—127				
9105-15	129—152				
9105-17	154—191				
9105-20	78— 90				
3060 W.A. Adaptor		47— 69	47— 75		82— 98

FOCUSING PANEL

1. To remove the focusing panel, press down on the knurled edges of both focusing panel release arms. Slide across camera about 1/4" and lift off. Accessories such as the Graphic Roll Holders, Graphic Polaroid Back, Graflarger, etc., can now be attached and held into place by the slide locks.
2. Release the slide locks by sliding to the left. By sliding firmly to the right, any attachment can be held firmly in position.
3. To reattach the focusing panel release the slide locks. Place the focusing panel approximately in the normal position and slide it 1/4" to engage the release arms; it will snap into place.

FRONT STANDARD ADJUSTMENT



The Pacemaker Graphic has three important adjustments to shift, rise and tilt the lens and shutter. Each movement may be used independently, or with the others. Watch the ground glass image for the improvement or correction that each movement contributes to the appearance of the image. All focusing and composing must be done on the ground glass. Remember that some lenses, notably short focal length lenses, may not adequately cover the entire negative with a clear, sharp image when moved or tilted from the normal position.

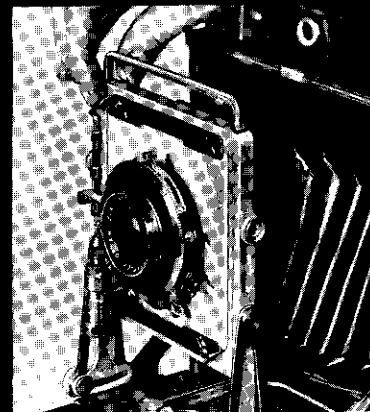
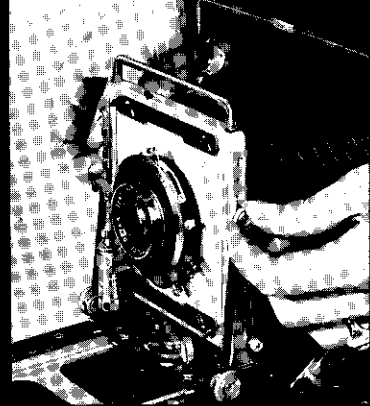
It is generally desirable to keep the back of the camera parallel to the subject, unless special effects are desired. The area which will be included in sharp focus (depth of field) will be generally parallel to the lensboard. Turning a lens toward a plane at an angle to the camera will bring more of that subject into sharp focus on the film. Note the subject matter not included on this plane or area may not come into sharp focus, even though closing the diaphragm will help somewhat.

RISING FRONT

The rising front of a Pacemaker Graphic permits raising the lens above its normal position and is useful for vertically centering the image. Bringing the top of a building into the picture area without tilting the camera will "straighten up" a tall building and remove unwanted foreground.

1. Loosen both rising front lock nuts. Compose and focus your picture on the ground glass—lift the lensboard frame as needed.
2. Tighten the rising front lock nuts before taking the picture.

NOTE: Short focal length lenses may not cover the entire negative, inclusive of the corners when they are raised, tilted or otherwise shifted from the normal position.



SIDE SHIFTING FRONT

The side shift permits laterally centering the image without swinging the camera, which changes perspective and may cause undesirable distortion.

1. Release the front standard lock.
2. Press down on the lateral shift release and slide the front standard left or right as desired, while observing the effect on the ground glass image.
3. When the adjustments are about as you want them by ground glass inspection, tighten the front standard lock slightly, recheck the adjustments and then lock each securely.

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TILTING FRONT

The tilting front changes the location of the plane of sharp focus and is thus often considered to provide control over depth of field. When tilted back, it is useful for photographing areas above the camera.

To Tilt:

1. Loosen the tilting front lock nuts.
2. Tilt the lensboard backwards (outward at the bottom) as desired while checking the appearance of the image on the ground glass.

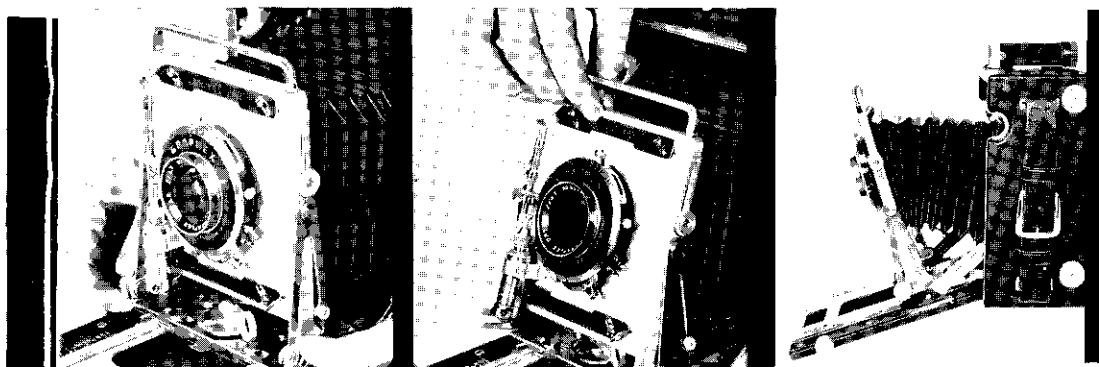
3. Tighten the lock nuts securely before taking the picture.

DROP BED

The drop bed of the Pacemaker Graphic Camera is used for three important functions:

1. To provide downward or forward tilt of the lens (see next page).
2. To lower the lensboard—the opposite effect of “rising front” (Page 23).
3. To eliminate cut-off when wide angle lenses are used.

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USING THE DROP BED:

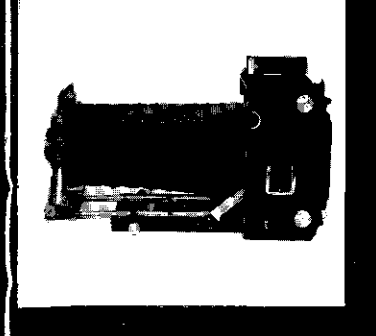
1. Rack the track *all* the way back.
2. Press downward with your thumbs on both bed braces and snap the bed into the lowered position.
3. To raise the bed, first rack the track back.
4. Press on the bed braces to unlock, and allow the bed to raise.

Sometimes the subject matter lies below the level of the camera and it is desirable to shift the lens downward:

1. Drop the bed as directed above. Be sure track is racked back, first.
2. Loosen the tilting front lock nuts slightly and tilt the lensboard backward at the top as far as possible.
3. Loosen the front rising lock nuts. Raise the lensboard as necessary to bring the image into proper alignment and perspective.
4. Check sharpness of image and tighten all lock nuts.

SUGGESTED BED POSITION WHEN WIDE ANGLE LENS IS USED

Lens	Crown "23"	Speed "23"	Crown "34"	Speed "34"	Crown "45"	Speed "45"
47mm	Drop	—	—	—	—	—
65mm	Normal	—	Drop	—	Drop*	—
80mm	Normal	Normal	Normal	Drop	—	—
90mm	—	—	Normal	Normal	Normal	Drop
100mm	—	—	Normal	Normal	Normal	Normal



BELLOWS EXTENSION

Double bellows extension of the Pacemaker Graphic permits the use of telephoto lenses and long focal lenses—also permits the making of 1:1 copies with normal lenses.

1. To extend bellows, tip the infinity stops down, release the front standard lock, pull forward and relock. Rack the track forward as needed.
2. Unless using front adjustments, use care to make sure that the front standard is square with the track. (Lensboard parallel to film plane.)

When the lens is focused upon subjects closer than $3\frac{1}{2}'$, it is necessary to recalculate the "f" number in order to determine correct exposure.

1. Divide the marked focal length of the lens into the bellows extension you are using to determine the "bellows extension factor."
2. Opposite the "bellows extension factor" on the chart below you can locate the ratio of the image size between the image and the object you are photographing.
3. Use the exposure factor to determine the correct exposure just as you would use a filter factor. If the factor is 4, increase your exposure two full stops beyond normal.

Bellows Extension Factor	Ratio of Image to Object Size	Exposure Factor
1.125	1:8	1:25
1.25	1:4	1:5
1.5	1:2	2:25
1.75	1:1.5	3:0
2.0	1:1	4:0

Example: Normal focal length lens (4x5 Camera) equals 152mm (6"). "Bellows Extension Factor" for close-up equals 304mm (12"); $12 \div 6$ equals "Bellows Extension Factor" of two which in turn requires "Exposure Factor" of 4; assuming a normal aperture of $f/22$ for the photo, you would use $f/11$ and get a correctly exposed negative image the same size (1:1) as the original object.

ACCESSORY LENSES

Basically, there are 3 groups of lenses: Normal, Wide Angle and Telephoto.

All lenses, regardless of the focal length or design, have standard diaphragm openings and require no change in exposure calculations.

The angular field of view and the size of the image are important essentials in selecting a lens, although maximum aperture or speed is a consideration.

A normal lens usually has a focal length equal to either the long side or diagonal of the film area. Its maximum aperture or speed may vary greatly, but $f/4.5$ is usual. These lenses have a medium angular field for general purpose work.

A wide angle lens is especially designed to include a greater angular field of view and has a short focal length. It has great depth of field, but even so is generally used at the smaller diaphragm openings. These lenses permit only limited use of the front standard movements. These lenses will usually come to focus with the front standard on the rear sliding track.

Telephoto lenses are also especially designed and constructed. They have a very narrow angular field of view, maximum diaphragm openings of around $f/5.6$ and produce a much larger image than a normal or wide angle lens at the same camera subject distance. They are particularly suited to portrait, scenic and sports photography. They require less bellows extension than normal lenses of the same focal length. Consequently, the 25cm (10"), 270mm ($10\frac{1}{2}$ ") and the 38cm (15") telephoto lenses can be used on the Pacemaker Graphic 34 and 45 Camera, providing magnifications of $2\times$ and $3\times$ respectively over the size of the image produced by standard 127mm (5") lens.

When using telephoto lenses, insert Mask Cat. No. 9101 into the open framefinder (45 cameras only), or proper mask in optical viewfinder (see Page 20). Insert the bottom end first and then slip the coiled wire top of the finder into the groove at the top of the mask.

CARE OF YOUR CAMERA

You have purchased a fine camera, carefully designed, produced and tested. It should give you long and most satisfactory service. Protect it from dust and dirt and avoid rough handling; and if possible, keep the camera closed and in the carrying case when it is not in use.

Do not attempt to make any repairs to the shutter and never oil a camera shutter. If it needs attention, turn it over to a competent camera mechanic. Remember that, on general principles, it is a good idea to have the complete camera checked over every few years to keep it in tip top shape.

The surface of the lens has received a special hard coating, which will reduce internal reflections and help you make better negatives. Clean the lens carefully, with smooth, easy motions using a camel's hair brush or lens tissue. Moisten the tissue with a drop or two of lens cleaner, but do not apply the cleaner to the surface of the lens.

Your Graflex Dealer is ready to be of service in discussing your camera and its use, and over-the-counter discussions of your pictures will be very helpful to you. The Graflex Consumer Correspondence Department is also at your service to assist you in getting the most out of your Graphic Camera. Do not hesitate to write about any photographic problems which you may have. Should such questions relate to the making of pictures, be sure to send in your negatives and such exposure data as you may have available.