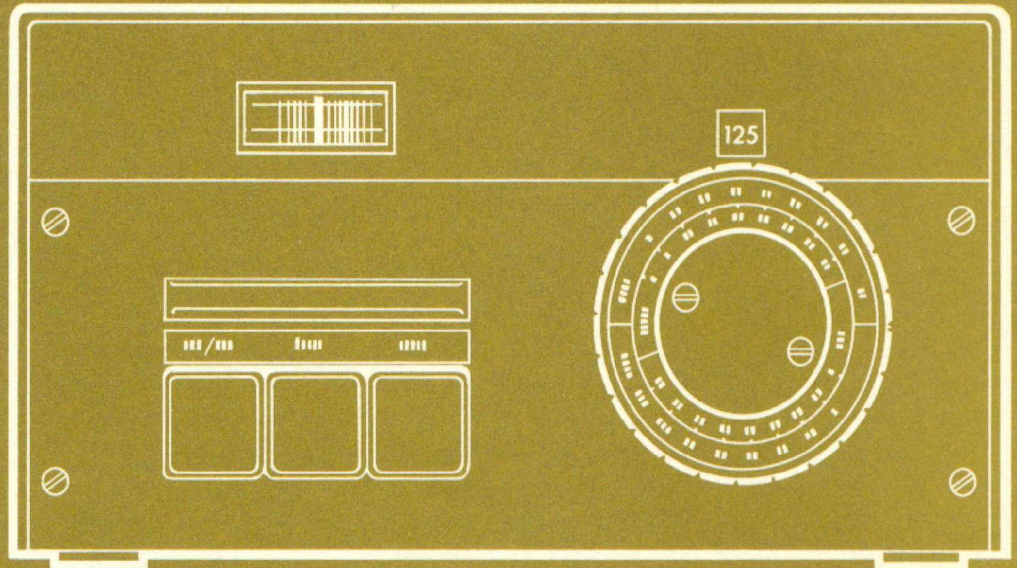


REICHERT
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Kam ES

Instruction Manual

We are constantly endeavouring to still further improve our instruments and to adapt them to the requirements of modern test and research methods. This involves, in certain cases, modifications in the mechanical and optical structure of our instruments. All descriptions and illustrations in catalogues and instruction manuals as well as specifications relating to the mechanical features and optical data **must not be regarded as binding.**

Instruction Manual for Electronic Camera System Kam ES

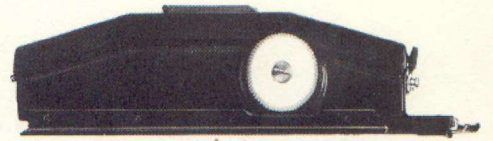
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Kam ES - Electronic Camera



35 mm camera back of other makes



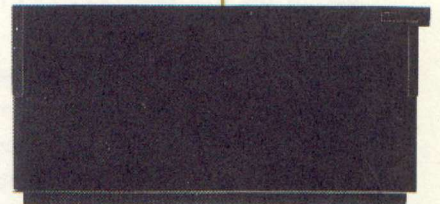
rollfilm back 6,5 X 9 cm



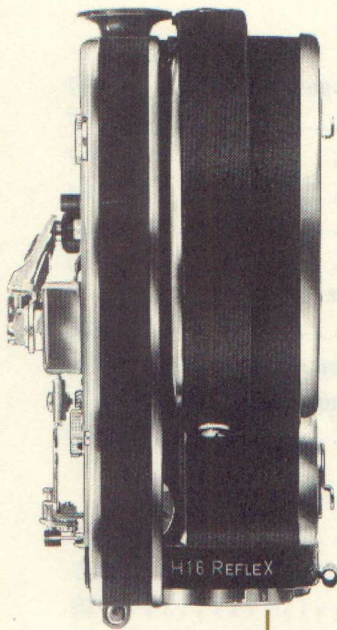
universal film holder 6,5 X 9 cm



lens flange 0,5 X



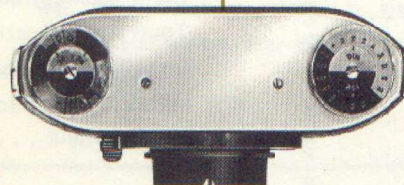
6,5 X 9 cm adapter



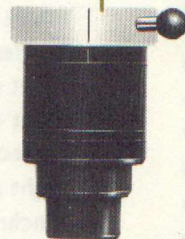
motion picture camera



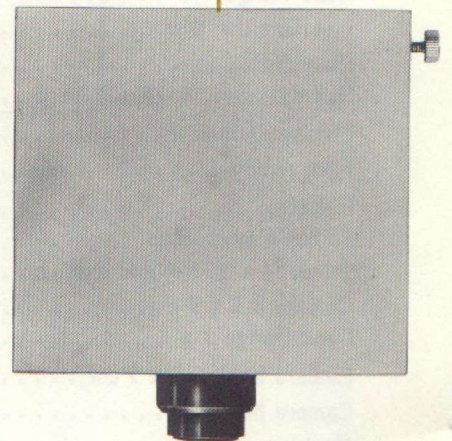
ciné objective 0,16 X



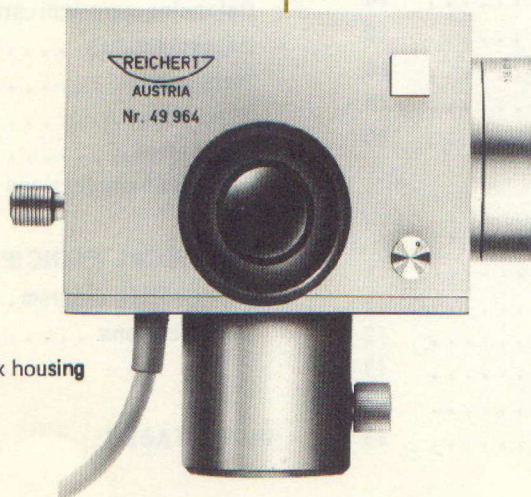
35 mm camera back



lens flange 0,5 X



camera housing with lens flange 1 X

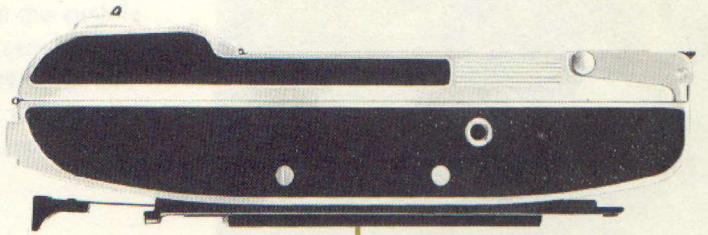


reflex housing

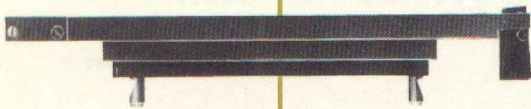
System for Photomicrography



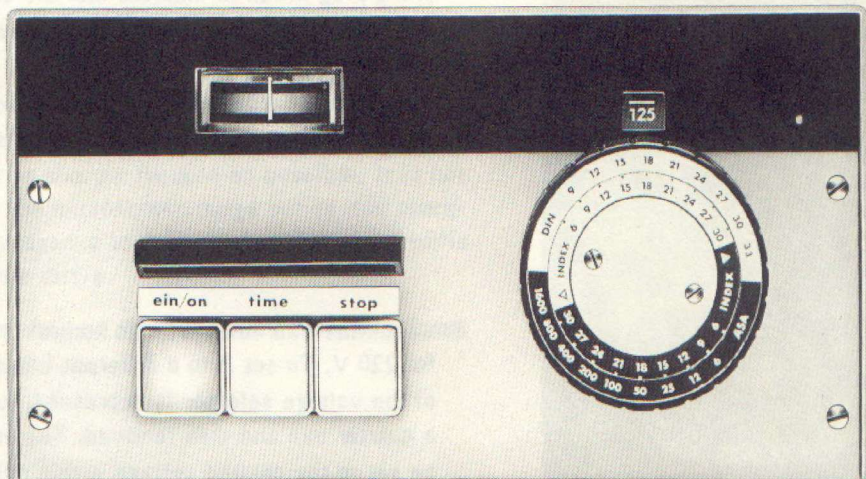
Polaroid® pack film camera back 227



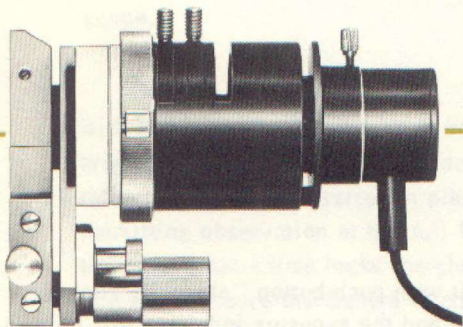
Polaroid® roll film camera back 226



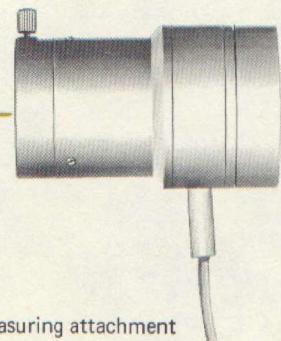
adapter for Polaroid® backs



control unit



projection attachment



measuring attachment

Set-Up Procedure

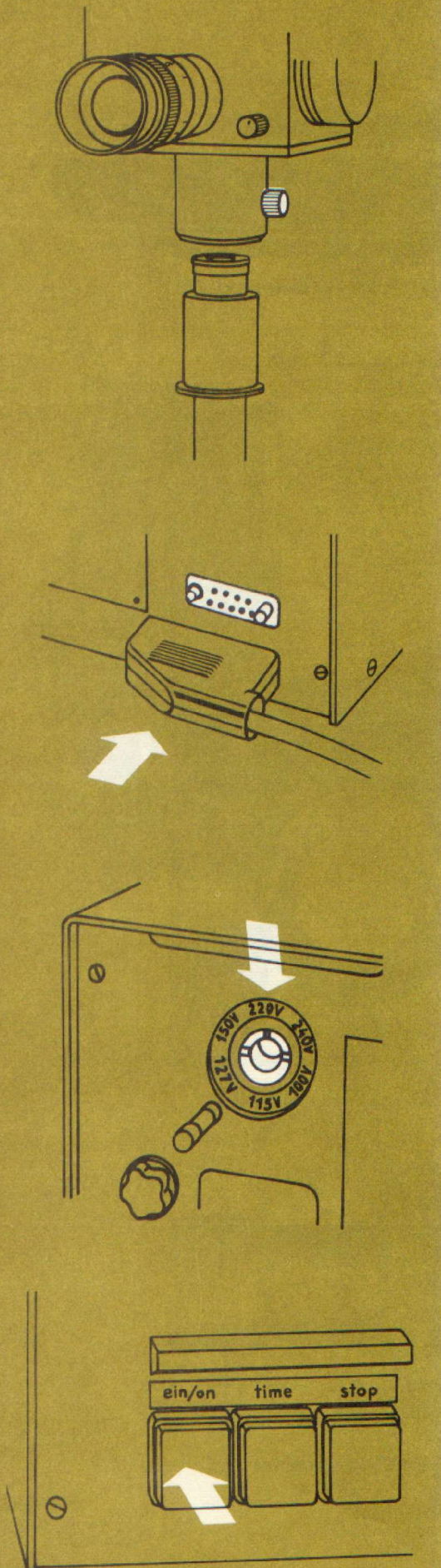
The operator is assumed to be familiar with the fundamentals of microscopy which are not, therefore, discussed in the following instructions.

1) The camera can be used on any microscope with an eyepiece tube of 25 – 35 mm dia. Remove the photo eyepiece, slide the adapter ring over the tube and insert the eyepiece again. Place the reflex housing in position and tighten it with the clamping screw.

2) Connect the reflex housing to the control unit with the multi-prong plug which is inserted into the corresponding socket at the back of the control unit. The connection is self-aligning and non-reversible.

3) Check the line voltage ! The control unit is normally adjusted for 220 V. To set it to a different line voltage the inner knob of the voltage selector is depressed, turned anti-clockwise by a quarter turn and then removed. The voltage selector can now be set to the desired voltage with a coin. For line voltages up to 150 V the fuse provided with the instrument (0,1 Amp.) is replaced by a 0,16 Amp. fuse. The control unit can then be connected to the line with the supply cord provided with the equipment.

4) Switch on the control unit with push-button "ein/on". The red cap of the push-button and the exposure indicator will light up.



- 5) The film speed is set on the control knob. The outer rim of the knob carrying the DIN-ASA scale is depressed and rotated to the left or right until the desired film speed is opposite the index mark corresponding to the frame size. When the knob is released the coupling is re-engaged. Films with sensitivities differing from the values engraved on the knob are set to the next higher or next lower number, e.g. :

ADOX KB 14 . . . 14 DIN (20 ASA)
 set to 15 DIN (25 ASA)

The speeds indicated by the film manufacturers contain nearly always a certain safety margin which may amount to several DIN. With black and white film the development has also a certain influence on the effective film speed. Therefore it is advisable to expose one film and develop it, and then to apply any corrections found necessary ; in this way the instrument adjustment made at the factory can be modified to suit special requirements.

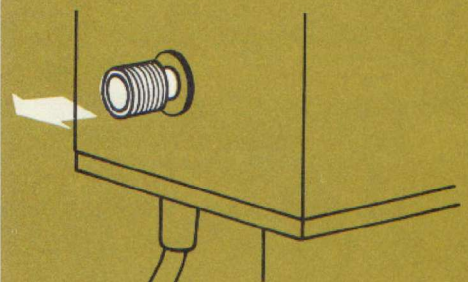
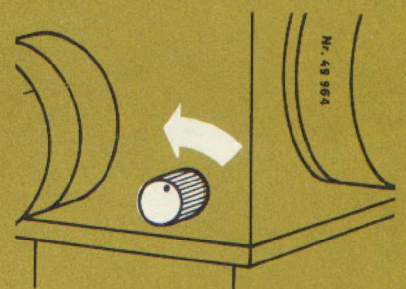
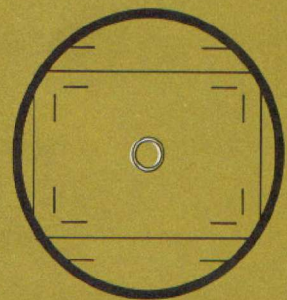
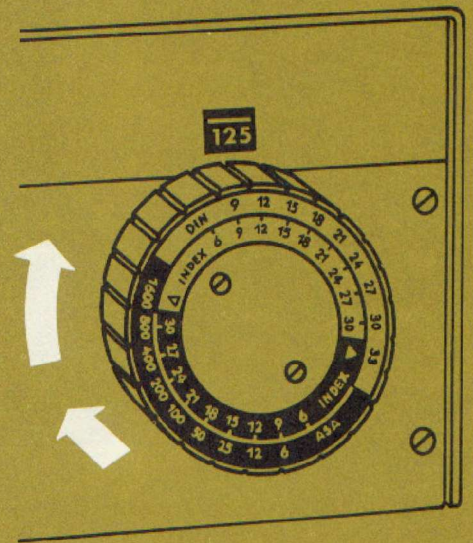
- 6) After removal of the dust cover the attachment cameras are mounted on the reflex housing and secured with the clamping screw at the back of the reflex housing (use a coin).

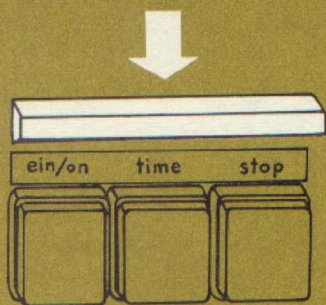
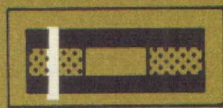
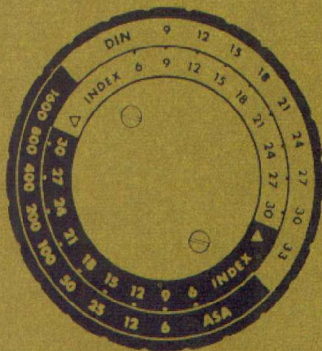
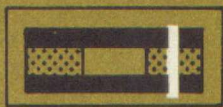
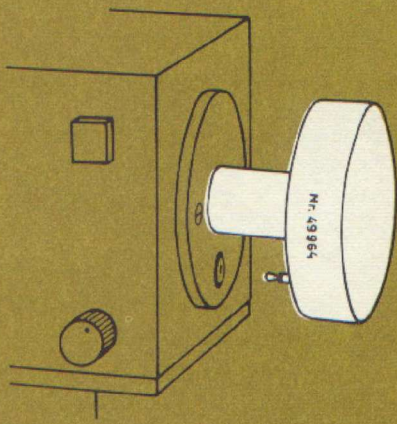
- 7) The focusing telescope of the reflex housing is adjusted by rotating its front element so that the lines of the double circle appear separate and as sharply focused as possible. It is not advisable to look at the microscopic image during this operation; it may be advantageous to defocus the microscope while focusing on the double circle.

The image is then focused so that it appears sharply in focus together with the double circle.

- 8) If the image in the focusing telescope is too bright, the light intensity can be reduced by swinging in a grey filter. When using long exposures the same grey filter reduces the extraneous light which could reach the film through the focusing telescope.

- 9) With low intensity specimens it may happen that the image brightness is not sufficient for focusing. In that case a fully reflecting mirror is inserted in place of the beam splitter, permitting observation at the full light intensity. This operation at the same time locks the shutter release. Immediately before the exposure the camera is changed over to the beam splitter, retaining the focus and releasing the shutter lock.





- 10) The exposure meter is designed as a plug-in unit and is mounted at the right side of the reflex housing.

Exposure measurement is on an integrating basis, i.e. it represents the mean value of all intensities in the specimen. This measuring method is nearly always successful in photomicrography since the majority of microscopic specimens exhibits very small brightness variations (low specimen contrast). Satisfactory results are obtained even with increased specimen contrast provided the bright and dark areas are evenly distributed. If the distribution varies greatly, the proportion of the specimen area is estimated and the exposure time is correspondingly shortened or extended.

- 11) The control knob on the control unit is used to adjust for optimum exposure time. The white pointer of the zero-indicator instrument should be in the green area. As an additional indication the scale lights up in this case. The direction of rotation of the control knob is chosen so that it is always moved from the particular red field where the pointer happens to be towards the green area. If the pointer is in the red field on the right, the exposure time is too long and the knob must be turned to the left (anti-clockwise); if the pointer is in the left red field, the exposure time is too short and the knob has to be turned to the right (clockwise).

The exposure time scale graduation is divided in a white range, from 1/125 sec to 1 min, and a red range, from 2 min to 1 hour.

The exposure times within the white range are electronically produced in the control unit for automatic operation, i.e. the shutter opens and closes automatically within this range, corresponding to the exposure time read-out. The exposure times within the red range are only an indication of the values required for optimum exposures as measured with the built-in exposure meter. They are not stored in the control unit and have to be operated manually by means of the "time" button.

- 12) The actual exposure is triggered by pressing the start button if white time values are read in the window. Appearance of the red values indicate that the shutter release bar blocked (see Section 11). During exposure the white pilot light on the reflex housing lights up indicating that the shutter is open.

Cameras

35 mm Camera Back "REMICA III"

1) Insert the lens flange, factor 0,5 x, into the reflex housing in such a way that the red line on the clamping ring points towards the operator and clamp the lens flange with the clamping screw (coin).

2) Depress the two latches on the camera back swing the cover out and lift it off. The frame counter visible underneath a small magnifying lens automatically returns to its initial position "A" each time the cover is removed.

3) Place the cartridge into the recess provided, with the protruding film strip pointing towards the take-up spool. Insert the end of the film strip in the slot of the take-up spool. Engage the tooth of the take-up spool with the second hole of the film perforation. Turn the take-up spool with its knurled rim until the film sits tight and the film perforation engages fully with the sprocket teeth.

Replace the cover by hooking one end into groove in camera back and swinging it shut with slight upward pressure until the latches engage.

Briefly depress transport lock key and wind the film one frame with the flat winding key. Repeat this procedure until the number "1" appears in the frame counter.

4) There are two dials on the bottom face of the "Remica III" camera back which can be set according to the type of film in use. The right hand dial lists the film speeds in DIN and ASA, the left hand dial records additional film data, such as :

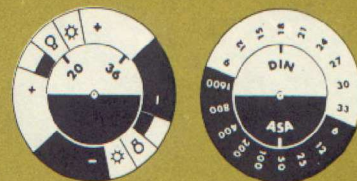
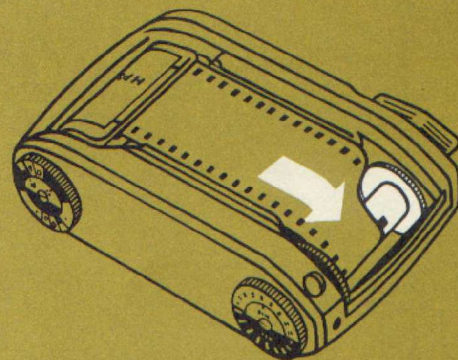
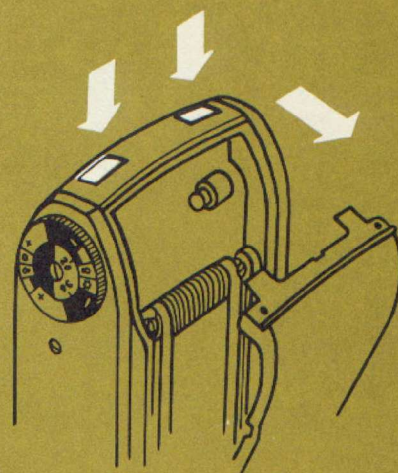
- Black and white film
- ☉ Indoor (artificial light) color film
- ☼ Daylight color film
- ⊕ Positive (reversal) film
- ⊖ Negative film

20 - 36 Number of exposures

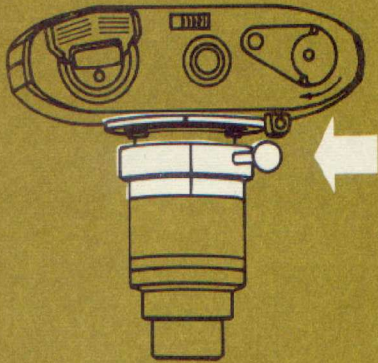
The illustration to the right shows the following settings :

Indoor type color reversal film, 20 exposures.

Film speed 18 DIN = 50 ASA.



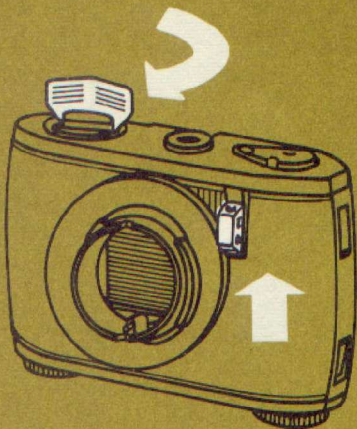
IMPORTANT ! The shutter on the reflex housing must be closed before fitting the loaded camera back into position.



5) Connection between camera back and lens flange.

The clamping lever on the lens flange has to be adjusted so that the two index marks on the ring are in line. The back is then placed on the lens flange in such a way that one of the two marks on the face of the back coincides with the red line on the clamping ring. Clockwise rotation of the clamping lever clamps the back to the lens flange and at the same time opens the shutter in the back.

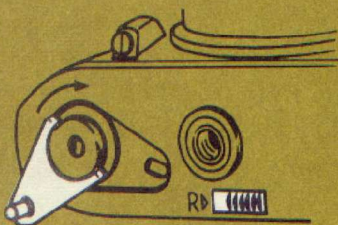
When several camera backs are in use at the same time the changeover takes place without any loss of film. Anti-clockwise rotation of the clamping lever releases the back from the lens flange, and the shutter automatically closes to prevent entry of stray light.



6) After each exposure the transport lock is depressed and the film is moved one frame with the winding key. The number of exposed frames can be read on the counter through the magnifier.

7) Unloading the camera back.

The exposed film must first be rewound into the cartridge. To do this the rewind lock is pushed in the direction of the arrow "R" which causes the rewind crank to jump out of its recess. Flip the crank back and rewind the film (turning the crank in the direction of the arrow). During the last stage of rewinding a slight resistance can be felt which has to be overcome to release the film from the wind-on reel. The handle is then folded back into its normal position, and the locking lever jumps back to "R". The cassette housing can now be opened and the cartridge removed.



8) Frame size 24 x 36 mm.

A reticle with lines for different film sizes can be seen in the focusing telescope.

The rectangle formed by the innermost lines corresponds to the frame size 24 x 36 mm.

9) Eyepieces.

All eyepieces of the PK series from PK 5 x to PK 16 x will fill the frame size completely.

Use of an existing 35 mm camera back.

10) Replace the photo lens of the 35 mm camera by the corresponding lens flange.

11) Insert the lens flange with the camera attached to it in the reflex housing, rotate it so that it corresponds to the frame lines, and secure it with the clamping screw.

Photomicrography Camera 6,5 x 9 cm

1) The lens flange with camera factor I is placed on the reflex housing and aligned so that the long side of the camera housing is perpendicular to the focusing telescope. It is then secured with the clamping screw.

2) Next the 6,5 x 9 cm camera back is clamped to the camera housing.

Exposures are made either with the universal film holder for plate and film pack size 6,5 x 9 cm, or with the roll film back for roll films size 120. The operation of the roll film back is described in the Operating Instructions supplied with the back.

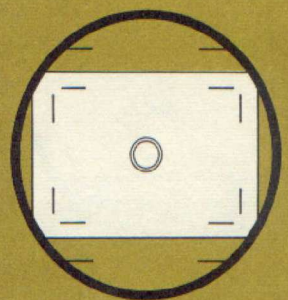
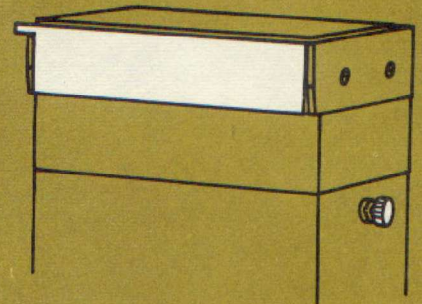
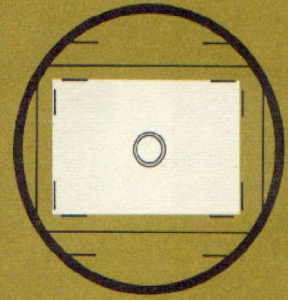
3) When inserting or changing the film holders the release strip must be pressed against the back; this releases the film holder lock.

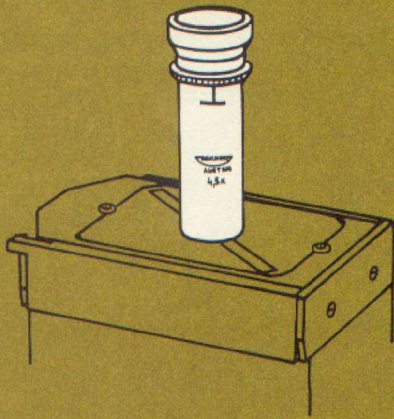
4) Frame size 6,5 x 9 cm.

The rectangle formed by the middle lines in the focusing telescope corresponds to the 6,5 x 9 cm frame size.

5) Eyepieces.

All eyepieces from PK 6,3 x to PK 16 x fill the frame size completely; the eyepiece PK 5 x cuts off a few millimeters at the corners.

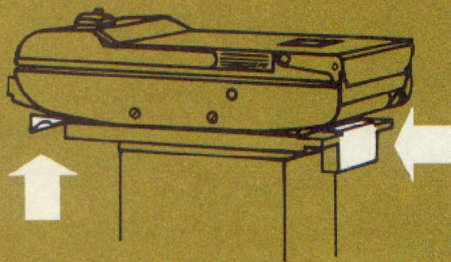




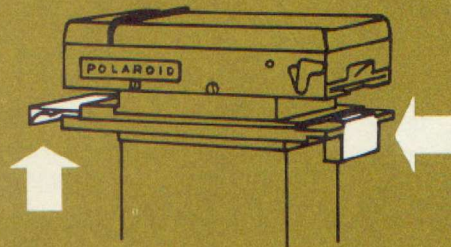
The microscopic image can be focused not only with the focusing telescope in the reflex housing but also by means of the focusing screen together with a focusing magnifier, available as an accessory.

- 1) Open the shutter of the reflex housing by pressing the "time" button.
- 2) Insert the focusing screen with its frosted side downwards into the groove of the camera back.
- 3) Focus the magnifier on the crosslines by sliding it in its spring mount.
- 4) Focus the microscopic image with the fine motion of the microscope so that it appears in sharp focus at the same time as the crosslines.

Photomicrographic Camera Polaroid 3¼" x 4¼"



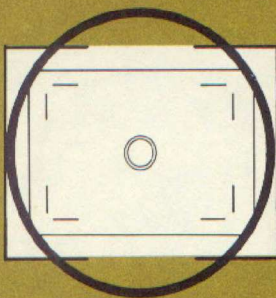
- 1) The lens flange with the camera factor 1 x is placed on the reflex housing and aligned so that the long side of the camera housing is set perpendicular to the focusing telescope; it is then secured with the clamping screw.



- 2) The Polaroid camera back is now attached to the camera housing, using the clamping screw at the side.

Either the Polaroid roll film back 226 or the Polaroid pack film back 227 can be used. Operation of the backs is described in the Instructions Manuals supplied with them.

- 3) When inserting the backs the dark slide must face away from the locking key of the camera back. After inserting the back in the guide it is locked with the opposite locking key.



- 4) Frame size 3¼" x 4¼".

The field of view visible in the focusing telescope lies within the long side of the frame size; the outermost boundary lines indicate its width.

- 5) Eyepieces.

All eyepieces from PK 6,3 x to PK 16 x fill the frame completely; the eyepiece PK 5 x renders a circular image inscribed in the long side.

Special Cases

Filters

With black and white photomicrography it is possible to include in the measurement with sufficient accuracy the most commonly used green filters (the absorption filter 2 mm VG 9 and the wide band interference filter), as well as the yellow filter. With all other filters (in particular blue and red filters) it is advisable to measure in white light and apply the necessary corrections subsequently. The multiplying factors for a few frequently used filters can be taken from the table below. For more critical applications it is advisable to carry out individual experiments in each instance.

FILTER FACTORS (low-voltage lamp)

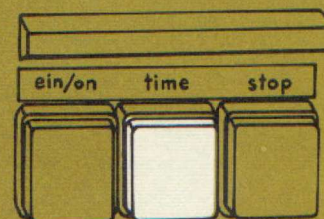
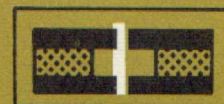
	BLUE 1 mm BG 12	GREEN 2 mm VG 9	GREEN inter- ference wide-band	GREEN 2 mm GG 11	RED 2 mm RG 1
ORTHOCHROMATIC (Perutz Silbereosin)	12	4	2	3	-
PANCHROMATIC (Ilford Pan F)	12	8	4	1,5	16

Exposure Factors

In microscopy there are techniques which make it necessary to work with very low illumination intensities. The resulting long exposure times have the disadvantage, quite apart from other problems of long-time photography, that the low illumination intensity available to the film during the exposure is insufficient to adequately sensitize the photographic emulsion. In this case the exposure time must be increased by a certain factor. This factor becomes larger as the illumination intensity is reduced, and has a different value for different films ("Schwarzschild effect", reciprocity failure). The equipment offers the following possibilities for compensate for such exposure extensions :

1) Rotation of the control knob in the appropriate direction until the desired exposure time is indicated; the pointer of the meter then indicates the intentional deviation from the optimum choice of exposure time.

2) The "time" button can be used to produce exposure times of any desired length. The shutter remains open (white signal) until it is closed by renewed pressure on the "time" button.



Use of the microflash on the Kam ES

Representing a camera system with exposure time indication, the Kam ES features a particularly simple solution for flash exposure. The flash is synchronized with any exposure time up to $1/125$ sec. The operation is as follows :

put the microflash equipment into operation according to the Operating Instructions,

connect the synchronizing cable to the camera,

switch on the control unit,

set the calibration time of the microflash on the scale according to the Instructions, using the control knob (e.g. 4 sec for black and white film at full power),

reduce the illumination with the neutral filters until green signal is obtained,

turn the control knob back to a short time, e.g. $1/125$ sec,

trigger the exposure and with it the flash by means of the "start" button.

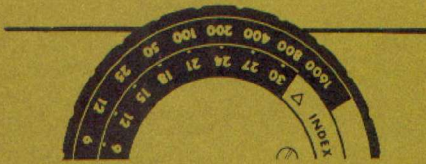
Measuring Attachment

The measuring attachment permits determination of exposure times in cases where use of the reflex housing is not desired, e.g. with large-size photomicrography on the Me F.

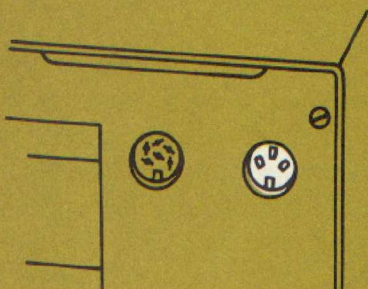
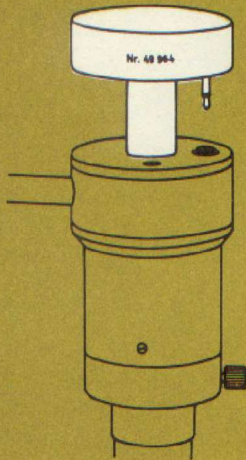
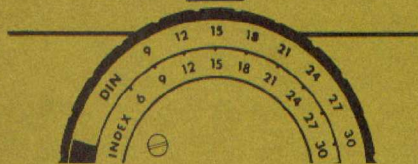
For this purpose the exposure meter fitted to the reflex housing is pulled out and inserted in the measuring attachment. The measuring attachment contains the same optical system as the one in the reflex housing, a socket for electrical connection to the photoresistor, as well as a cable with plug for connection to the 3-pole socket on the rear of the control unit.

A clamping screw in the base of the attachment permits its connection to any eyepiece. Exposure measurement is performed in the same way as was described previously. Do not forget to set the appropriate index numbers (see inner cover). The measured exposure times are then set on the respective camera shutter being used.

4



125



Index Numbers

On the Kam ES exposure measurement takes place in the reflex housing, i.e. behind the eyepiece. This arrangement automatically compensates for brightness variations resulting from change of eyepieces.

Other factors which influence exposure time, such as frame size and camera lens, are summarized in an index table on the rear of the control unit.

If exposure measurement takes place not in the reflex housing but by means of the measuring attachment (see above) it is necessary to additionally compensate for variable optical conditions in the measuring and exposure light paths, such as beam splitters, tube factors etc.

A detailed index table is included on the inside cover of the Operating Instructions.

Similar considerations apply to the use of the Kam ES on instruments of other manufacture.

Remote Operation

A socket is provided on the rear of the control unit for connection to a remote operating device (e.g. foot switch) which then takes over the function of the "start" button.

Total Magnifications

Two lens flanges with the following magnifications are used for photography with the Kam ES :

35 mm size : $f = 125 \text{ mm}$, camera factor $p = 0,5 \times$

Medium size : $f = 250 \text{ mm}$, camera factor $p = 1 \times$

The photomicrographic magnification is calculated from the formula :

$$M = M_{\text{Obj}} \times V_{\text{eye}} \times p$$

(Objective magnification x eyepiece magnification x camera factor).

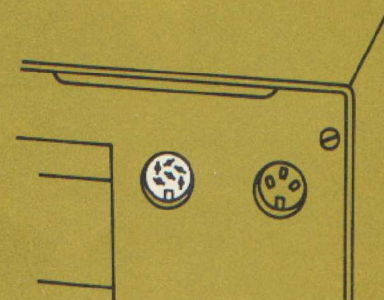
An exact determination of the magnification can be performed with a stage micrometer :

- 1) A photomicrograph of the stage micrometer is obtained.
- 2) The projected image is measured by placing a ground glass screen near the film plane of the camera back.
- 3) The distance d between the middle frame lines in the focusing telescope is read off on the stage micrometer and the magnification is then calculated as follows :

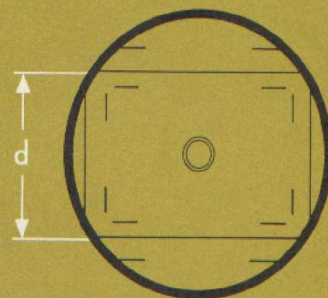
$$35 \text{ mm size } M = \frac{30}{d} \quad \text{Medium size } M = \frac{60}{d}$$

CAMERA	INDEX
24 x 36 mm	15
6,5 x 9 cm 3¼ x 4¼ in.	21
Cine 16 mm	△

REICHERT Type 650401
100-240 V
Fabr. Nr. 50-60 Hz
15 VA



$$M = M_{\text{Obj}} \cdot V_{\text{Ok}} \cdot p$$



Projection Attachment

The projection attachment is used to project into the camera any symbol which is to appear at any desired position on the film. The symbols (arrow, numbers) are reproductions on 35 mm film and are mounted in the conventional 5 x 5 cm transparency frames. This simplifies the preparation of additional transparencies to the user's own requirements.

After removing the metal cap on the back of the reflex housing the projection lens can be screwed into position, together with ring dovetail.

The projection attachment is mounted on the ring dovetail and clamped. The transparencies are inserted in the film stage and moved along a guide strip which can be height adjusted. If the adjusting range within the film stage is insufficient, the projection attachment can be rotated in the ring dovetail after loosening the clamping screw. A spring-loaded platen locates the transparencies in the desired position. In front of the transparency is a slide with a circular aperture and a slit aperture, which is secured with the clamping screw at the side. The focusing control is used to focus the transparency in the focusing telescope and consequently also on the film.

The illuminator is attached to the film stage with a union nut so that the filters can be lined up when the projection attachment is rotated. It consists of the lamp housing with fixed collector and the lamp holder with a 6 V/5 W bulb which is inserted in it and secured with a clamping screw. The following transformers can be used to operate the lamp :

Regulating transformer for low-voltage lamps 62 09 01
Step transformer 20 VA 62 05 01

The top of the lamp housing has three slots to accept the three filter holders supplied with the equipment :

1 filter holder 44 13 31 with green filter 2 VG 9
1 filter holder 44 13 31 with neutral filter N 4
1 filter holder 44 13 31 empty

Special combinations can be obtained with filter holder 44 13 31 and standard filters of 30,8 mm diameter.

The Kam ES provides a very simple method for determining the exposure time for the symbols to be projected on the film, since exposure measurement with direct time indication is featured.

Projection takes place through the beam splitter of the reflex housing in the following ratio : 20 % on the film, 80 % for observation.

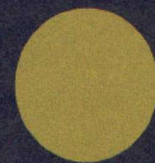
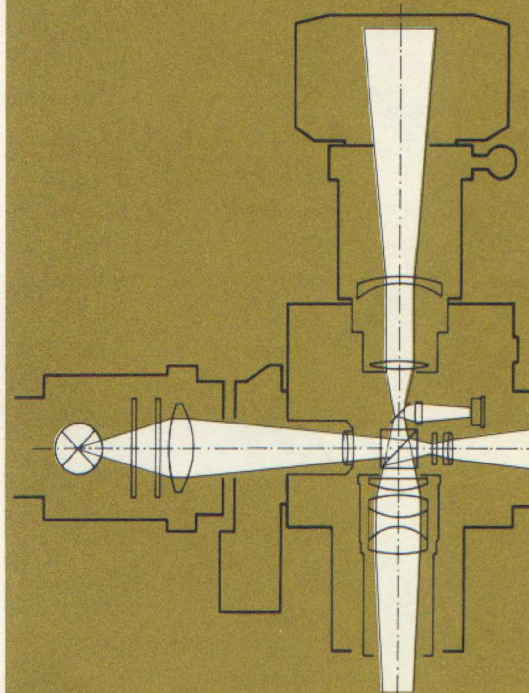
The mirror shutter located above the beam splitter diverts the light intended for the film towards the photo-resistor. No transparency must be in the beam during measurement, and the circular aperture must be inserted. Using the regulating transformer the light is adjusted to give at least the same exposure time as for the microscopic image. In order to ensure that the symbols are more readily visible it is advisable to choose the intensity about 2 – 4 steps higher, i.e. to set an exposure time which is 2 – 4 steps shorter. The degree of over-exposure depends on the particular working technique employed, especially the background on which the signs are projected. For example, an over-exposure of 1 step is sufficient when reversal film is used in combination with colored symbols; with black and white photography and a bright background 3 – 4 steps are necessary.

When projecting colored symbols by using filters (e.g. green) the exposure time can be measured with this filter. If the symbols on the transparency are colored, a further reduction in the exposure time of 1 – 2 steps must be allowed in the measurement with white light to take account of the absorption.

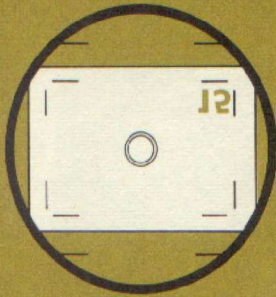
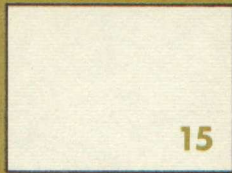
Under certain conditions it may happen that the brightness of the projection lamp is insufficient to achieve the desired degree of over-exposure. In these cases the brightness of the microscopic image has to be reduced sufficiently (e.g. with neutral filters) until the desired relationship between the exposure times of the specimen and the symbols has been achieved.

After determination of the exposure time the transparency with the symbols can be inserted in the film stage, focused and then photographed.

When projecting numbers on the film it is necessary to use the slit aperture instead of the circular one. By displacing the aperture slide the slit aperture is moved to the desired position within the field of view of the focusing telescope and therefore that of the film frame. The width of the aperture is dimensioned in such a way that only one number is registered at a time. By moving the transparency along the guide strip one number after the other can be projected. If the numbers have to appear in a different position relative to the film frame the guide strip can be moved up or down after loosening the clamping screws.



1 2 3 4



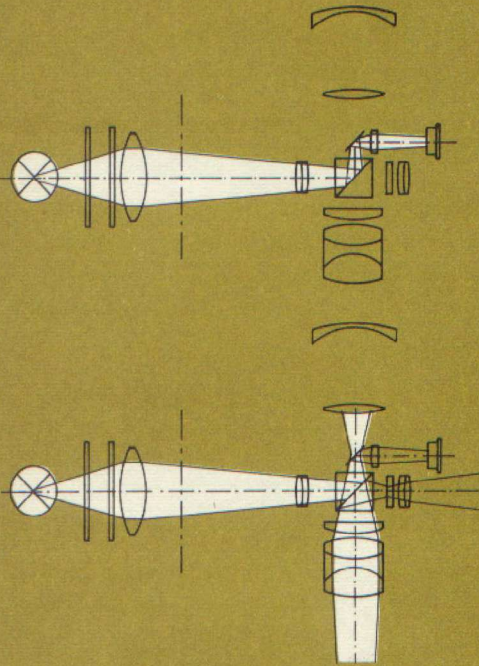
The image position of the symbols in the focusing telescope and in the camera is not the same because of multiple rotation in the light path.

To ensure that the projected symbols appear upright and unreversed on the finished illustration (e.g. in the right bottom corner), the image in the focusing telescope must be upside down (symbol at the right top). The microscopic image and the symbols are therefore rotated about a horizontal axis (top to bottom) while the lateral positions (left to right) remain unchanged.

Photomicrography of a specimen together with projected symbols can therefore follow the procedure indicated below :

- 1) Start the **Kam ES** in accordance with these Operating Instructions; let the measured exposure time be 1 sec, for example.
- 2) Fit the desired camera (camera back and lens flange) in position.
- 3) Mount the projection attachment on the reflex housing, connect the lamp to the transformer and switch on (do not exceed 6 V !)
- 4) Set the aperture slide so that the circular aperture allows the light to pass into the reflex housing.
- 5) Switch off the microscope illumination or pull out the beam splitter (100 % mirror) so that no light from the microscope is included in the measurement. Then adjust the brightness of the projection lamp so that an exposure time of $\frac{1}{2}$ - $\frac{1}{8}$ sec is indicated depending on the specimen.
- 6) Switch on the microscope illumination or slide the beam splitter into its working position.
- 7) Place the transparency with the symbols on the film stage, readjust the exposure time to give a green signal (1 sec.).
- 8) Adjust the symbol to be projected by means of the focusing control so that it is sharply in focus together with the specimen.
- 9) Exposure.

Apart from this procedure there are also a number of other possibilities, as e.g. measuring the brightness of the projection lamp with the neutral filter N 4 supplied. During the exposure the filter is removed from the lamp housing, corresponding to an over-exposure of the symbols by 4 steps.



Cinemicrography

The standard reflex housing accepts accessories for motion picture work. The camera is mounted on a stand or on an optical bench, mechanically separated from the microscope so that camera vibrations are not transmitted to the microscopic image. Motion picture cameras have their own shutters, and the special shutter in the reflex housing is therefore opened with the "time" button.

Objectives

A cine objective with a factor $p = 0,16$ is supplied for movie work. Each objective is marked with an reference number :

55 05 01 . . . for 16 mm movie cameras with "C" thread (1" x 32 tpi), e.g. "Bolex H 16", "Bell & Howell 16", Pathe Webo M 16"

55 05 02 . . . for "Movikon 16"

55 05 03 . . . for "Arriflex 16"

In place of these special objectives it is possible to use most of the standard lenses with focal lengths 50 mm and longer.

Frame size 16 mm film : 7,5 x 10,3 mm (projector 7 x 9,6 mm).

The illustration on the right shows the circle inscribed in the frame size. Its diameter corresponds approximately to the narrow side of the 35 mm frame size.

Eyepieces

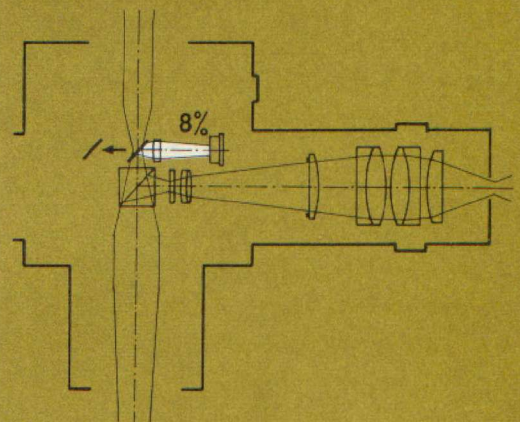
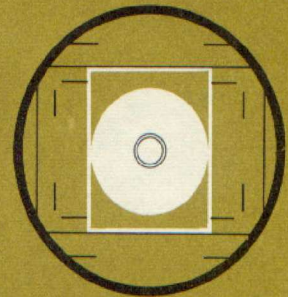
All eyepieces of the PK series from PK 5 x to PK 16 x will completely fill the frame.

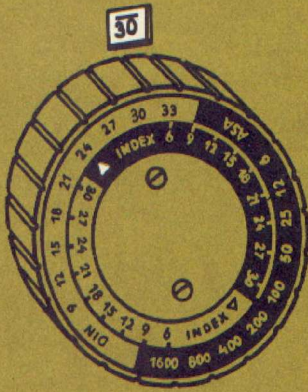
Exposure measurement.

The exposure measurement for motion picture work is performed in the opposite manner to the usual procedure. The shutter time of the movie camera is given by the speed in frames second and the sector aperture (see camera Operating Instructions); the intensity of illumination must therefore be adjusted to suit this exposure time.

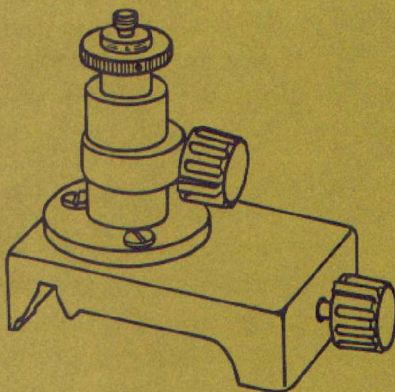
The actual measurement takes place not with the fully reflecting mirror which moves out of the light path when the "time" button is operated, but with the cine mirror which diverts 8 % of the light to the photoresistor.

For this measurement the control knob for setting the film speed carries 2 triangular sign (DIN and ASA) as cine index.





$$M = M_{Obj} \cdot V_{Ok} \cdot P$$



Procedure

The film speed is set opposite the index ▲.

The control knob is set to the required exposure time (e.g. 1/30 sec).

The illumination is adjusted so that the pointer of the meter is within the green field; the scale then lights up.

The reflex housing provides two important basic requirements for good cinemicrography :

- 1) continuous monitoring of focus and specimen position through the focusing telescope,
- 2) checking the correct exposure time during the actual cine exposure by indication on the meter.

Projection attachment

Symbols etc. can be projected on movie films with the projection attachment. Its use has been described in detail on pages 14 to 16.

Light attenuation equipment

All filters including polarization filters can be used for attenuation of the illumination on black and white films.

With color films it is advisable to use only the neutral filters with reference numbers 02 44 53 – 02 44 56.

Total magnifications

The procedure for determining the total magnification is described on page 13.

Installing the Cine equipment on the "Me F"

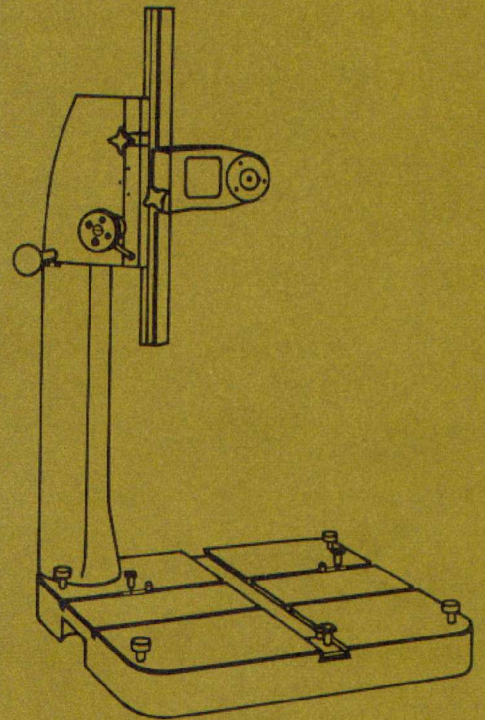
Cinemicrography requires the use of the swing-out deviating prism with photographic tube which is located on the right side of the microscope body.

The camera support is placed on the optical bench. After releasing the clamping screw the threaded pin can be pulled out and fitted into the tapped hole on the cine camera which is normally used to mount the camera on a tripod. The camera is now moved towards the opening in the reflex housing until the distance to the lens is 1 to 2 mm.

The camera is now aligned to the optical axis. If it is too high or too low, the height has to be corrected with the knurled nut after loosening the grub screw. After correct height alignment the grub screw is tightened and the threaded pin secured with the clamping knob. If the camera is offset to one side, adjustment is carried out with the 3 screws on the upper part of the support. After correct alignment the camera support is moved carefully towards the reflex housing until the objective contacts the housing; it is then withdrawn 1 to 2 mm and clamped in this position.

Installing the Micro-Cine equipment on the camera stand

- 1) Place the vertical column on the base plate and secure it from underneath with the 4 bolts supplied.
- 2) The base has 4 anti-vibration mounts which can be relieved of load or completely neutralized by means of 4 locking screws. The mounts are engaged by unscrewing these screws.
- 3) Place the microscope with the reflex housing on the base plate and provisionally adjust the microscope stops.
- 4) Remove the rail carrier and place the small rubber roll supplied into the bearing provided in a recess in the swing-out head; its purpose is to prevent the rail with the film camera attached to drop on the microscope if the clamp should be released inadvertently.
- 5) Release the clamping lever on the underside of the swing-out head and adjust the position of the rail carrier with the hand wheel so that the index mark is halfway between the two limit marks (about 40 mm movement). Tighten the clamping lever again.
- 6) Insert the guide rail into the guide so far that it cannot hit the microscope when the camera is swung out by means of the ball handle; then secure it with the clamping knob.
- 7) Slide the camera bracket on the rail and secure it by tightening the clamping knob.
- 8) Attach the movie camera (arranged vertically) with the knob on the camera bracket.
- 9) After releasing the clamping knob, lower the camera bracket with the camera until the lens is 2 to 3 mm above the reflex housing. Then tighten the clamping knob again.
- 10) Move the microscope on the base plate so that the lens is aligned as accurately as possible to the opening in the reflex housing.
- 11) Release the clamping lever at the hand wheel, carefully lower the camera with the hand wheel until the lens enters the opening without touching the housing. Clamp it in this position.
- 12) Secure the microscope on the base plate with the locating stops.



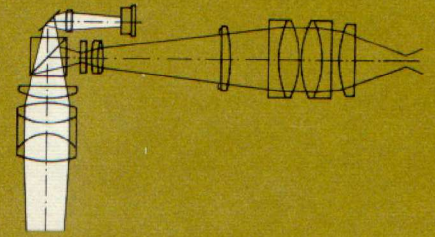
Description of the Reflex Housing

1) The beam splitter is mounted on a slide and can be swung out of the light path. Normally 20 % of the light is used for observation and 80 % is transmitted to the camera. The high proportion of light available for photography makes it possible to work with short exposure times. The image in the focusing telescope is however still bright enough for convenient focusing and observation. For specimens with very low intensity a fully reflecting mirror can be inserted in place of the beam splitter to permit observation at full light intensity (100 %). In this case no light reaches the film and the camera is therefore electrically locked to prevent taking a photograph.

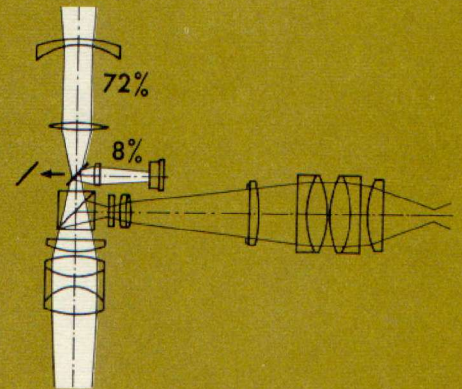
2) Because of the focusing telescope on the reflex housing the camera can be used on all microscopes. The magnification factor of the focusing telescope is 1,6, so that the image can be accurately focused even at low magnifications. The telescope also carries a rubber eye cup which locates the optimum observation position for users with normal eyesight. Observers wearing spectacles can fold the cup back and in this way continue to wear glasses during photomicrography. A correction of ± 5 diopters is provided to compensate for vision differences. The picture sizes and a double circle for focusing are visible in the focusing telescope. A swing-out grey filter is placed in the actual light path of the focusing telescope. It controls light intensity during observation, and conversely excludes any extraneous light during prolonged exposures.

3) The special electromagnetic shutter has two tasks : on operation of the "start" button the shutter opens for the duration of the measured exposure time and closes again automatically. Through its optimum location in the exit pupil of the eyepieces its dimensions could be chosen so advantageously that a minimum exposure time of 1/125 sec with complete freedom from vibration can be obtained.

4) A part of the special shutter consists of a fully reflecting mirror. In its resting position, i.e. when the film is not being exposed, this mirror diverts all the light through an optical system to the light detector. The detector is designed as a plug-in unit containing a photoresistor (cadmium sulphide type). Because all the light is used for measurement the sensitivity of the instrument has been increased to such an extent that exposures times up to 1 hour are possible, depending on the film speed.



5) A glass plate is rigidly fixed in the light path in front of the fully reflecting shutter mirror. While the shutter with the mirror is swung out during the exposure, a small portion (8 %) of the light is simultaneously reflected to the light detector. This arrangement permits measurement and monitoring of the correct exposure time during the actual exposure, a feature of special interest for cinemicrography.

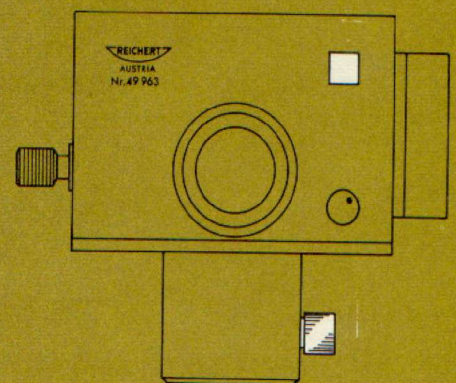


6) The projection attachment serves to image symbols, numbers etc. onto the film. It can be fastened to the rear of the reflex housing (see page 14).

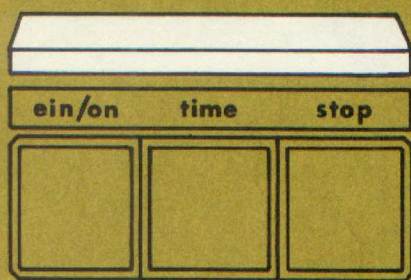
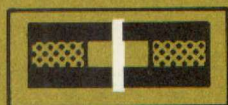
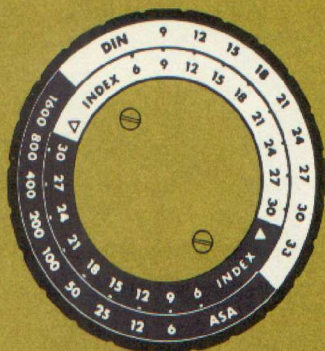
7) The white pilot lamp located in front of the reflex housing indicates that the shutter is open.

8) The synchronizing contact for the micro flash unit is located on the rear of the reflex housing. The shutter is synchronized as X-contact for all exposure times up to 1/125 sec.

9) The clamp on the lower part of the reflex housing permits rotation of the entire camera unit on the photographic tube, so that the frame can be oriented in the most suitable position relative to the specimen.



Description of the Control Unit



1) The control knob is used to adjust the camera for best possible exposure time. Correct exposure time is indicated by lighting up of the scale of the zero-indicator on the control unit. DIN and ASA scales are arranged on the outer circle of the control knob. They are set opposite the index numbers on the inner circle.

2) The zero-indicator is divided into three areas :

red left : exposure time too short, insufficient light

green : optimum exposure time, range 3 DIN units

red right : exposure time too long, too much light.

In addition to this pointer indication the scale itself lights up when the pointer is within the green field.

3) The exposure times are visible in a window above the control knob. The camera can be set to any exposure time independently of the green light, i.e. any exposure time can be set optionally by the operator.

4) The "start" button triggers the exposure, i.g. the electronically controlled shutter makes an exposure in accordance with the exposure time setting. The exposure can be triggered only :

when the beam splitter is in its working position

when the white exposure time scale is visible in the window.

5) The "time" button permits exposures of any duration, corresponding to the "T" position of a conventional shutter.

6) The "stop" button is used to interrupt an exposure while it is in progress.

7) The following connections are located on the rear panel of the control unit :

socket for the camera cable,

socket for the line cord,

voltage selector for 100-115-127-150-220-240 V, with fuse

socket for remote shutter operation (e.g. foot switch) and pulse

contact (contacts 1 - 2 closed for the duration of the exposure)

socket for the measurement attachment.

Electrical Principle

With the **Kam ES** in rest position 80 % of the light impinge on the photoresistor which together with a transistorized linearizing component is arranged in a bridge circuit. Using a number of resistors in series this linearizing component is adjusted to the characteristic curve of the photoresistor. The resistors are actuated by a rotary switch so that the current determined by the photoresistor corresponding to a given illumination is compensated by the linearizing component. A transistorized amplifier measures and amplifies the bridge current and converts it to a plus/minus indication on a zero-indicator, combined with a light signal.

Apart from this measuring unit the control unit contains a monostable multivibrator which serves as a timer. Its timing resistor-capacitor combinations are arranged to produce the geometrical exposure series comprising the following values :

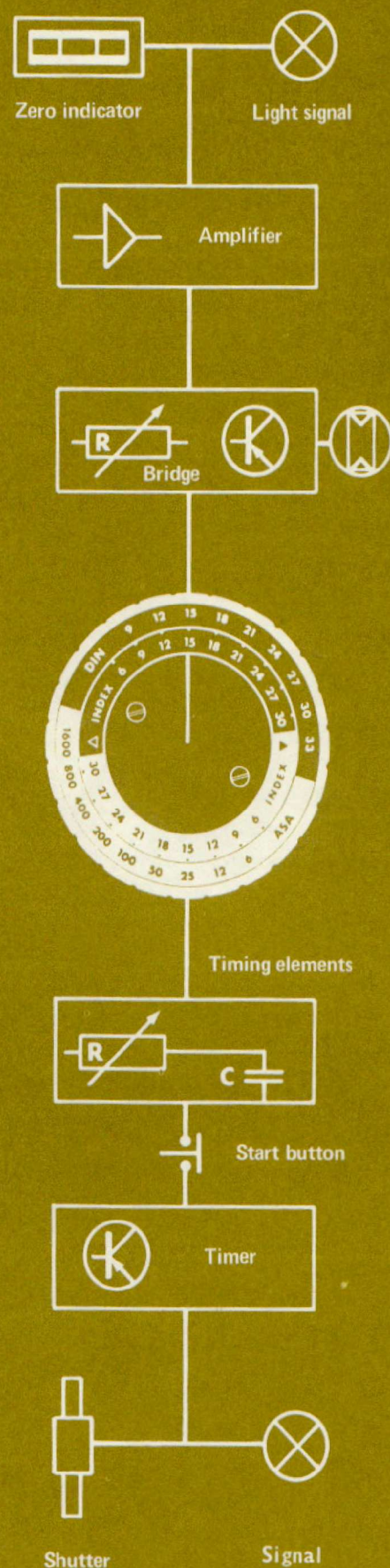
1/125-1/60-1/30-1/15-1/8-1/4-1/2-1-2-4-8-15-30 sec - 1 min

These circuit combinations are actuated by a second rotary switch whose control knob carries the transparent scale with the exposure times and the DIN-ASA scale. It is mounted on the same shaft as the knob for the switch of the linearizing component resistors of the exposure meter which carries index numbers for the various film sizes arranged in such a way that their relative position results in an appropriate change of the exposure time. Both knobs are interconnected mechanically by a coupling which is calibrated in such a way that a given object brightness corresponds to a certain optimum exposure time. Changing of the mechanical coupling provides a simple means for taking into account both film speed and film size.

Rotating the control knob thus performs two functions simultaneously :

- 1) determination of specimen brightness (zero-indication).
- 2) the photographic equipment is provided with the optimum exposure time corresponding to this brightness, the pre-set film speed and the film size.

Using the "start" button the shutter timer can now be activated. The timer opens the shutter for the duration of the pre-set exposure time; during this time a white pilot light lights up on the reflex housing.



Specifications

Line voltage	100/115/127/150/220/240 V \pm 10 %	
Line frequency	50 – 60 c/s	
Power input	15 VA max.	
Fuses	220 – 240 V . . . 0,1 amp. 100 – 150 V . . . 0,16 amp.	
Film speed	9 to 33 DIN (6 to 1600 ASA)	
Exposure times	1/125 sec to 1 min (geometric DIN series)	
Measuring range	1/125 sec to 1 hour	
Flash contact	X contact for all exposure times	
Sockets	remote operation ("start" button) measuring attachment impulse contact 30 W, 1 amp. max.	
Camera backs	35 mm back "REMICA III" medium size 6,5 x 9 cm (2½" x 3½") Polaroid roll film back 226 Polaroid pack film back 227	
Camera lenses	camera factor p = 0,5 x, focal length f = 125 mm camera factor p = 1 x, focal length f = 250 mm camera factor p = 0,16 x, focal length f = 42 mm	
Registration	projection attachment for imaging symbols etc. into camera, with bulb 6 V/5 W, Osram 6251	
Weight	control unit	2,25 kg (5 lb)
	reflex housing	1,0 kg (2,2 lb)
	"REMICA III" with 0,5 x lens flange	0,5 kg (1,1 lb)
	1 x lens flange	0,6 kg (1,3 lb)
	6,5 x 9 cm adapter	0,4 kg (0,9 lb)
	Polaroid adapter	0,25 kg (0,55 lb)
	Polaroid back 226	1,5 kg (3,3 lb)
	Polaroid back 227	0,9 kg (2 lb)
	projection attachment	0,65 kg (1,4 lb)

Index Values for Kam ES

Measuring attachment mounted	Photography		Index
	on	with	
on the tube used for photography (or the corresponding inclined monocular body where there is no beam splitter)		miniature camera $p = 0,5 \times$	15
		medium-size camera $p = 1 \times$	21
		cine camera 16 mm $p = 0,16 \times$	
on any monocular body		built-in camera, horizontal or vertical bellows camera, bellows length	
		250 – 350 mm	21
		350 – 450 mm	24
	450 – 550 mm	27	
on "Me F2" with monocular body or photographic tube of swing-out deviating prism		built-in camera	
		camera factor $p = 1,5 - 1,9 \times$ $p = 1,9 - 2,2 \times$	24 27
on binocular body of "Me F2"		built-in camera	
		camera factor $p = 1,5 - 1,9 \times$ $p = 1,9 - 2,2 \times$	18 21
on binocular body of microscopes such as : Zetopan, Diapan etc.	vertical photographic tube	miniature camera $p = 0,5 \times$	9
		medium-size camera $p = 1 \times$	15

It is essential to use the same eyepiece for measurement and photography :

Index values for low-power photomicrography on the "Me F2"

Measuring attachment mounted	objective	Photography with	Index
		built-in camera	
on photographic tube of swing-out deviating prism with PK 5 x eyepiece	Dallmayer $f = 25,4 \text{ mm}$	camera factor $p = 1,5 - 1,9 \times$ $p = 1,9 - 2,2 \times$	15
	Neu-Polar $f = 50 \text{ mm}$		18
	Neu-Polar $f = 100 \text{ mm}$		



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