




PHOTOGRAPHIC CAMERA

„ZORKI-4“

V/O "MASHPRIBORINTORG"

USSR

MOSCOW



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PURPOSE

The "Zorki-4" is intended for a wide range of versatile photography; it is used with equal success by skilled amateur photographers, camera men and scientists.

DESCRIPTION

The "Zorki-4" (Figs. 1 and 2) is a compact roll-film minicamera provided with a flash synchronizer and a self-timing device (automatic releaser).

The camera uses a standard perforated 35-mm motion picture film. The camera magazine accommodates 1.65-m length of film, sufficient for making 36 exposures, the picture size being 24 by 36 mm.

The camera is fitted with coated lenses of "Jupiter-8", "Jupiter-17" or "Industar-50" type. The focal length of the lenses is 5 cm.

The relative aperture of the "Jupiter-8" and "Jupiter-17" lenses is 1:2 and that of the "Industar-50" lens — 1:3.5.

Camera working distance, i. e. distance from lens to film — 28.8 mm.

Lens thread for screwing in is M39×1.

Thread for screwed-in light filters is CпM40.5×0.5.

Mounting diameter for sun-shades is 42 mm.

The view-finder and the range-finder of the camera are combined in the common field of view and coupled with the lens focussing mechanism. This feature ensures higher focussing accuracy at the moment a picture is being taken. For improving the range-finder performance, its optical system is enlarged, and a dioptrical focussing is provided to suit the operator's eye.

The camera lens is focussed by rotation of the lens mount; this action initiates automatic operation of the range-finder mechanism irrespective of the focal length of the interchangeable lens that might be used in place of the camera lens.

The camera is equipped with a curtain shutter providing for instantaneous speeds from 1/1000th of a second to 1 second, as well as long exposures.

OPERATION

Opening and Closing the Camera

Undo the two buttons of the case, and flap the cover down. Rotate the camera stand nut counterclockwise to unscrew it from the camera base plate, and draw the camera from the case.

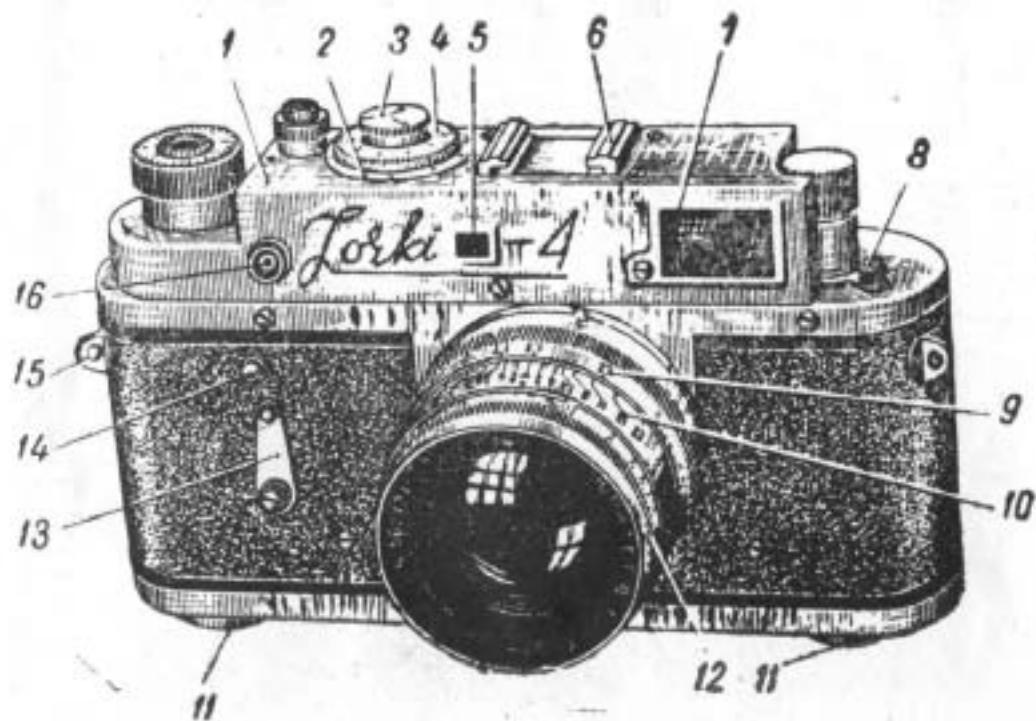


Fig. 1. "Zorki-4" Camera:

1—camera top surface; 2—synchronization scale; 3—shutter speed dial; 4—shutter speed scale; 5—range-finder object glass; 6—attachment shoe; 7—range-and view-finder object glass; 8—view-finder focussing lever; 9—distance scale; 10—depth-of-field scale; 11—lock latch; 12—diaphragm scale; 13—delayed-action setting lever; 14—delayed-action release button; 15—strap eyelet; 16—camera socket, concentric

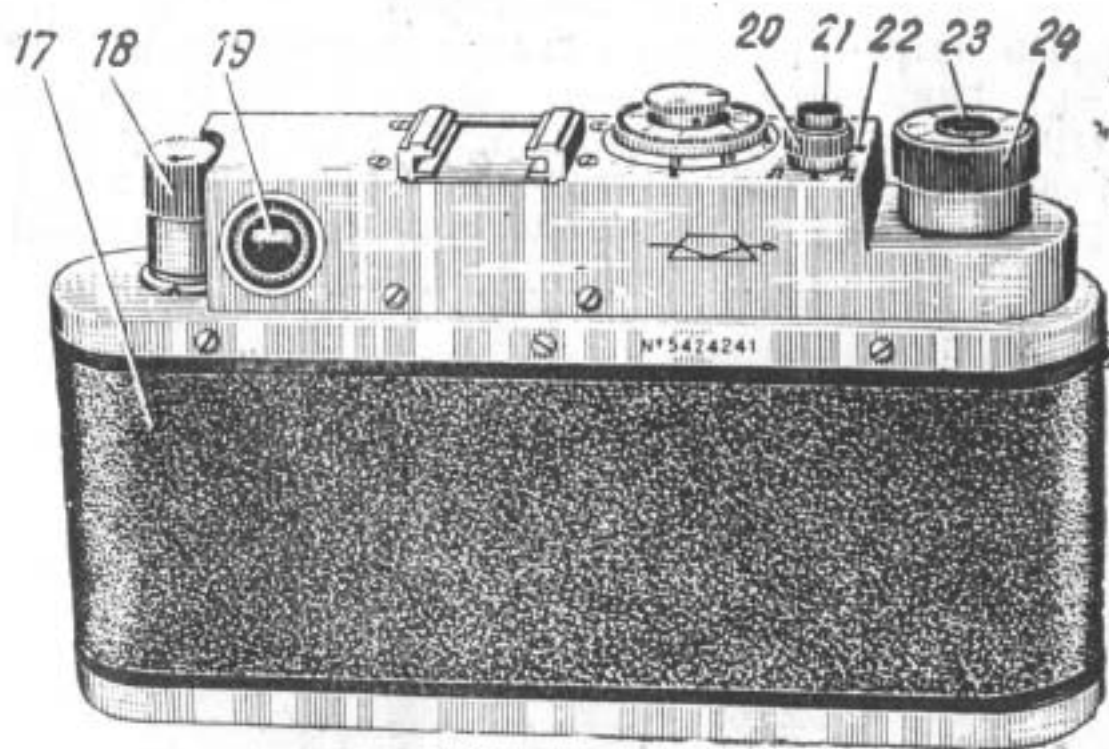


Fig. 2. "Zorki-4" Camera. View of Back Cover:

17—detachable back cover; 18—film reverse take-up knob; 19—range-and view-finder eyepiece; 20—shutter disengaging ring; 21—release button; 22—picture counting index dot; 23—picture counting dial; 24—shutter setting knob

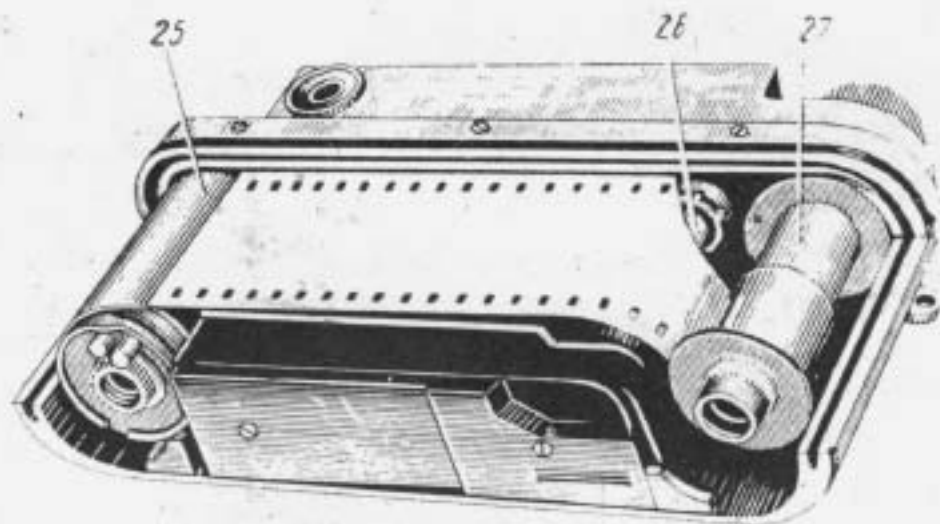


Fig. 3. Position of Magazine and Take-up Spool:
 25—magazine; 26—film transport sprocket; 27—
 take-up spool

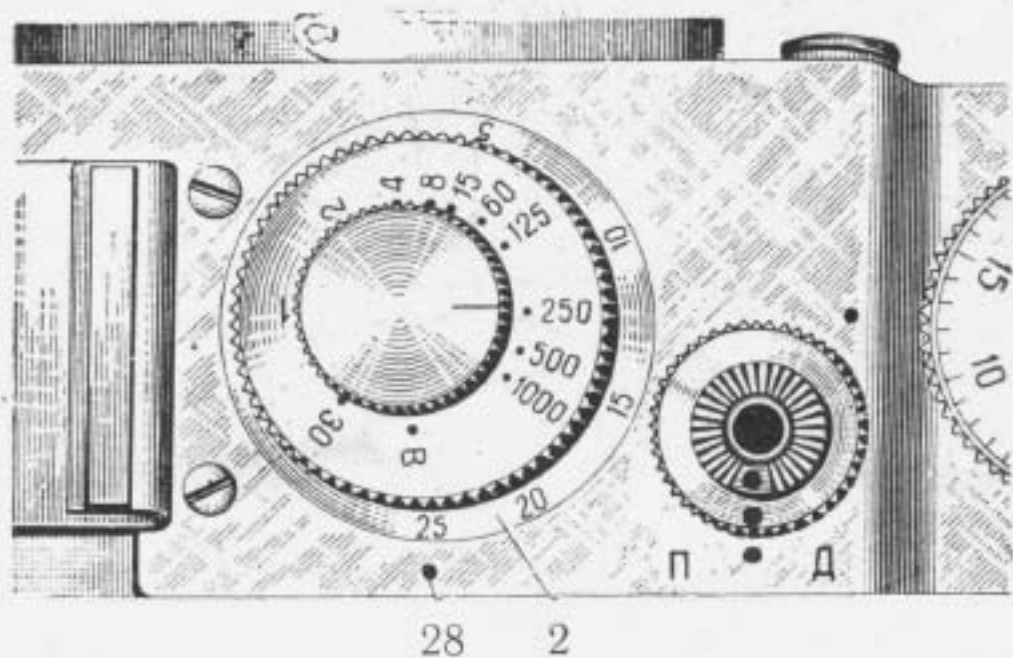


Fig. 4. Flash Synchronizer Setting:
 28—synchronization scale setting dot; 2—synchronization
 scale

Turn the camera upside down, lift the two camera latches 11 on the base plate with the finger nail, and give them half a turn as far as they will go. Slide back cover 17 downwards along its grooves, and then remove the cover from the camera.

Magazine 25 (Fig. 3) and take-up spool 27 are freely seated in their recesses to be easily withdrawn. When opening the cover, see that the magazine and take-up spool do not slip out of the camera.

The camera is closed and replaced in the reverse order. Upon inserting the camera in the case, tighten up the camera nut to prevent an accidental dropping-out of the camera and to close the case cover without applying undue force. Before closing the case cover, set the lens at " ∞ ".

Magazine Loading

The magazine 25 of the "Zorki-4" camera consists of outer casing, inner casing and central spool.

To open and strip the magazine, press the nickel-plated button and give the inner casing half a turn clockwise to align the side cutouts on the inner and outer casings. This done, the inner casing and the spool are easy to remove.

The further operations (loading and unloading) are done either by red light or in full darkness, depending on the film type.

Cut the film end shown in Fig. 6, and insert it into one of the spool slits, from the wider side. With the spool held so that its head is directed backward, the emulsion side of the film should face downward (Fig. 5. 1—emulsion).

Bend the film end appearing from the other side of the slit and pass it into the second slit from its narrower side. Fold the remaining end of the film thrice, and tighten the film so that the bent end is wedged in the slit (Fig. 5).

Holding the spool with its head directed inward roll film on to it with the emulsion side facing toward the spool stem by rotating the spool counterclockwise.

Do not attempt to pull the film if you wish to tighten after rolling on the spool, as this is liable to cause scratches on the emulsion face of the film.

The film should be held by its sides so that no finger prints are left on its emulsion side.

Insert the film-loaded spool into the inner casing so that the spool head enters the opening in the casing bottom. Place the inner casing into the outer casing, leaving the film end free. Turn the inner casing in the outer casing counterclockwise (holding the magazine with the spool head backward) until the magazine lock

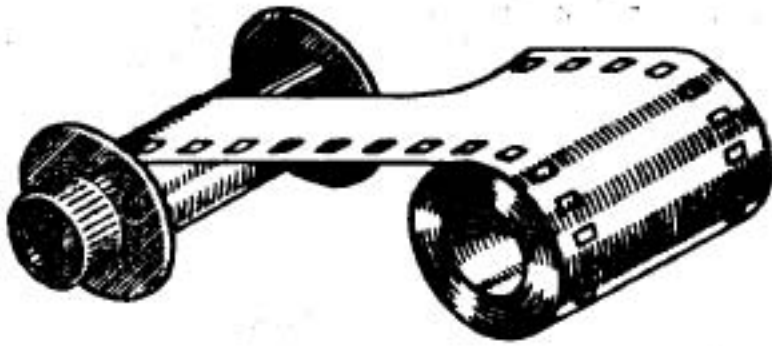


Fig. 5. Scheme of Film Fixing on Spool:
1—emulsion

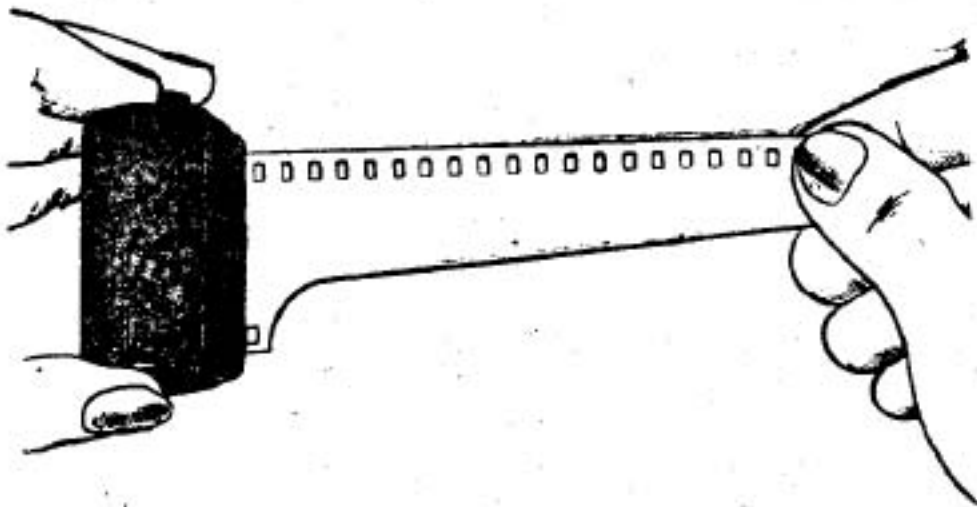


Fig. 6. Form of Film End Cut while Loading Camera

clicks. While doing this, see that the free end of the film does not sink in the outer casing altogether as the inner casing is being turned.

This done, the magazine may be handled by daylight.

Camera Loading

The camera may be loaded with film by daylight (bright sunlight is not recommended). Before loading see to it that the dot on the camera top surface, the dot on the shutter disengaging ring and the one on the release button are aligned.

Open the camera and remove the take-up spool. Draw a 10-cm length of the film free end from the magazine (Fig. 6), and attach it to the take-up spool inserting it under the

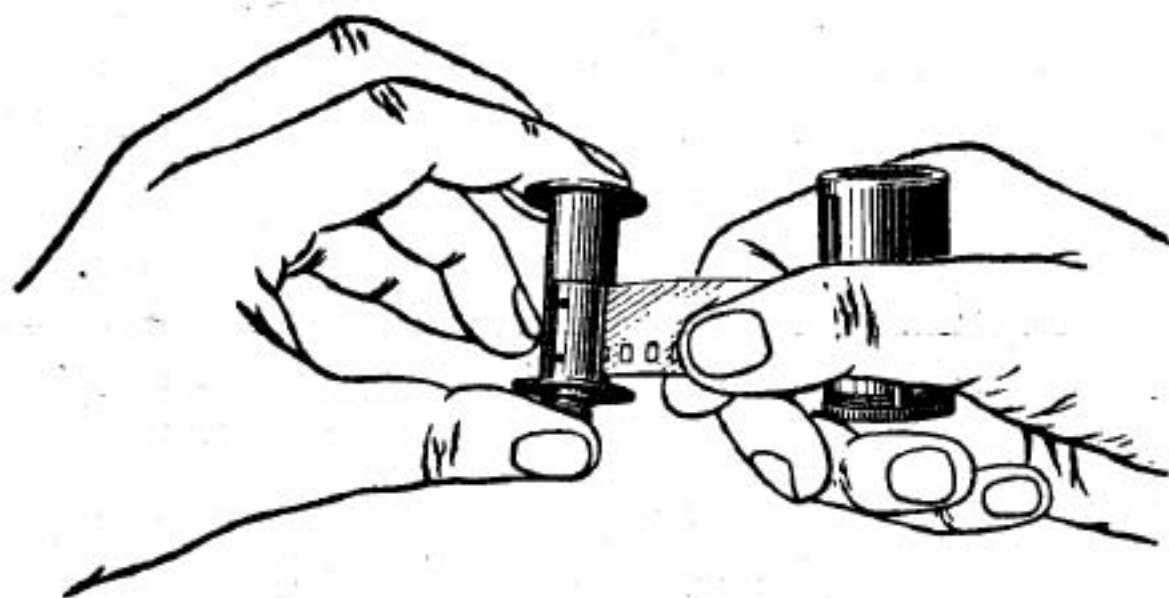


Fig. 7. Film Inserting into Spool

spool spring. Make sure that the film edge closely fits the spool flange. Fig. 6 shows the cut end of the film, as it is done by the Manufacturer.

Insert the magazine into the camera so that the pin fixing the magazine in the camera fits into the recess in the magazine outer casing projection. At the same time, put the take-up spool on its driver so that the film transport sprocket teeth engage the film perforation (Fig. 3).

Replace the camera back cover on its guide grooves, draw it all the way up to the top of the camera body and push it against the stop. While doing this, hold the perforated leader of the film on the sprocket with the thumb of the left hand. Give two latches 11 through half a revolution, and swing them downwards.

Upon closing the camera back, the magazine opens automatically to let the film freely pass through the magazine slits without scratching the emulsion layer.

Set and release the shutter three times pressing button 21 after each shutter setting; when doing so, watch whether the transport mechanism operates and whether reverse take-up knob 18 spins. If the reverse take-up knob fails to revolve, check the camera for correct loading with film. However, it should be remem-

bered that the failure of the knob to rotate is also likely to take place during the first few shots if the magazine was loaded with a film much shorter than the normal length. In this case, the reverse take-up knob will begin rotating only when the film tension on the magazine spool has become sufficient.

Rotating the picture counting dial 23 in any direction (holding it by the knurled surface) set the "0" mark of picture counting dial against counting index dot 22 on camera top surface 1.

This done, the camera is considered loaded.

Focussing

Focussing is done in the following manner: looking through range- and view-finder eyepiece 19 operate focussing lever 8 located below the reverse take-up knob to obtain better focussing of the view-finder and the sharpest image of the object viewed. A double image of the object will appear in the centre of the field of view, in a rectangular field differing in colour from the background. Turn distance scale 9, to superimpose the two images of the same object. This done, the lens is accurately set for the distance to the object to be photographed.

When focussing, make sure that the object stands in the centre of the above mentioned

rectangular field, but not at its right or left edge. Objects having sharp contours should be selected for focussing.

The lens distance may be set directly by distance scale 9 graduated in metres; in this case, the distance to the object photographed should be known or measured beforehand.

The view-finder combined with the range-finder in the common field of view, provides for simultaneous framing of the scene photographed. For correct framing, bring your eye as close to the range- and view-finder eyepiece 19 as possible and into the centre of it so that the yellowish-tinted rectangular field is in the centre of the view-finder field. Non-observance of this condition results in wrong framing of the picture.

The camera view-finder is designed for use with normal lenses having 5-cm focal length. All other lenses require view-finders with corresponding picture fields, or a multifoc view-finder intended for use with five different lenses characterized by different focal lengths. Attachment view-finders are inserted in shoe 6 provided on the camera top surface.

Exposure Speed Setting

The required exposure speed is set by exposure speed scale 4 (Fig. 1). Figures "1", "2", "4", "8", "15", "30", "60", "125", etc. marked on the exposure speed scale correspondingly

identify 1; 1/2; 1/4; 1/8; 1/15; 1/30; 1/60; 1/125 th, etc. of a second. Exposure speed may be hand-controlled when the scale is set at "B".

Exposure speeds are set only with the shutter fully set up (by turning shutter speed dial 3).

The shutter speed dial may be turned over the scale only in the direction of figures: "1", "2", "4", "8", "15", "60", "125", "250", "500", "1000", letter "B", figure "30" and back again.

Rotation of the dial in the interval between 30 to 1 is prohibited.

To set the required shutter speed, pull up shutter speed dial 3 and turn it until the index line plotted on the dial comes aligned with the figure on the scale denoting the exposure time selected. Release the dial and see that it is fixed in this position.

The shutter speed dial must be set only in a fixed position and without any pressure. This is especially important when setting times of 1/60 sec and more, as otherwise the shutter can be damaged.

To avoid damages by accidental shocks, it is recommended before closing the carrying case to set the shutter speed dial to a time other than between 1/60 and 1 sec.

Changing the shutter speed dial position with the shutter non-set up or setting it to a non-fixed position makes the shutter curtain caught and the shutter wedged.

If an exposure speed exceeding 1 sec is required, the index line of the shutter speed dial should be set opposite letter "B". In this position, the shutter stays open as long as release button 21 is held depressed. When considerably delayed exposure is needed, the release button 21 must be secured in the depressed position by turning it so that the dot provided on the button moves toward letter "Д" until a stop is reached. To release the shutter, turn the button in the opposite direction to align the index dots on the button and camera top surface 1.

In order to avoid failure of the shutter mechanism, it is important that the above rules should be strictly followed. It should be also remembered that when exposure speeds of 1; 1/2; 1/4; 1/8; 1/15 and 1/60th of a second are used, shutter speed dial 3 is fixed somewhat higher as compared to other shutter speed settings. More than that, in such cases, the shutter setting requires additional effort which is consumed by the additional delayed-action mechanism spring; when the shutter speed dial is being reset for a shorter exposure time, the delayed-action mechanism is heard operating.

Shutter Setting and Film Transport

The shutter is set by turning shutter setting knob 24 all the way clockwise.

While the shutter is being set, the film is simultaneously transported for the next exposure, and picture counting dial 23 advances one division. The shutter is released by depressing shutter release button 21.

Note. The shutter release button middle portion is provided with taper thread which receives flexible releaser.

Lens

The "Zorki-4" camera normally operates with lenses of 5-cm focal length and 28.8 mm working distance. The lens opening degree (diaphragm) is set by rotating ring 12 on the lens. Lens opening operation should take place prior to focussing.

Changing the Lenses

All interchangeable lenses designed for cameras of "Zorki" type can be screwed into the lens mounting of the "Zorki-4".

It is not advisable to remove the lens from the camera unless it is absolutely necessary.

When it is required to screw out the lens (for example, to replace it with another lens characterized by a different focal length or relative aperture), the camera lens should be first set at the shortest distance obtainable (the lens with a focal length of 5 cm should be set at 1 m

by the distance scale); then the lens is removed from the camera by turning it in the counter-clockwise direction. The lens should be unscrewed very carefully in order to avoid damage to the thread. The camera with the lens removed should be protected against penetration of dust and other foreign particles.

When screwing the lens into the camera, the distance scale should be set at the shortest distance.

It should be taken into consideration that any replacement of the standard camera lens calls for adjustment of the new lens to fit the camera.

Flash Synchronizer

Use of flash bulbs requires a device synchronizing the flash with the shutter operation. For this purpose, the "Zorki-4" camera is equipped with a synchronizer. When flash bulb (or electronic flash) are made use of, one end of the connecting cord running from the flash kit should be plugged into flash synchronizer socket 16.

Single-action lamps (flash bulbs) of different types have different parameters. One of these parameters is the lamp inertia, i. e. the time period which passes between the moment the contacts are energized and the moment the lamp

produces about half the maximum luminous energy it is capable of. Usually this time is called the half-peak time; it is measured in milliseconds and specified in the flash lamp Certificate.

This certified value should be set on flash synchronization scale 2 by turning the scale until the corresponding figure comes opposite dot 28. Fig. 4 shows the synchronization mechanism setting for a flash bulb with a half-peak time amounting to 25 milliseconds.

When using a multiple-action (electronic) flash, it should be remembered that the half-peak time of this flash is practically equal to zero. Therefore in this case "0" of the synchronization scale 2 should be set opposite dot 28 on the camera top surface.

The "Zorki-4" camera is provided with a blocking device which provides for installation of the bulb in the flash unit irrespective of whether the shutter is set up or not, i. e. before or after shutter setting.

Synchronization scale 2 is set irrespective of the shutter setting, too.

The "Zorki-4" camera may use only shutter speeds of 1/30th of a second and slower, and hand-controlled time exposures "B" when photographing with either flash bulbs or electronic flash.

Flash photography with too slow shutter speeds is usually undesirable as too large an amount of unnecessary light enters the camera (after the flash) which doubles the image of the photographed object on the film. Therefore, when taking flash pictures, shutter speed dial 3 should be set at "30".

Self-Timing Device (Automatic Releaser)

The self-timing device will be used whenever it is desired that the picture should be taken with a delay and without direct operation by the photographer. Thus, when the photographer is taking his own picture in a group portrait, he mounts and lays the camera, sets the shutter and the self-timing device; then the photographer actuates the delayed-action mechanism having enough time to take his place in the group to be photographed.

To set the automatic releaser for operation set the shutter by means of shutter setting knob 24 and move delayed-action setting lever 13 all the way counterclockwise.

Then press delayed-action release button 14 at the desired moment so that the shutter should be automatically released with a 9 to 15-second delay. Upon the shutter released action, the delayed-action setting lever will return to its initial position.

The shutter can be set with the automatic releaser mechanism both set and released. However, it is recommended first to set the shutter and the selected shutter speed, and only then to wind up the self-timing device. To avoid undue wear of the self-timing device spring, it is recommended to set it up only when required; in all other cases it should be kept released.

Should the shutter speed dial be set opposite letter "B", the exposure speed will be not faster than one second with the self-timing device set in operation. As this exposure time varies for different cameras, it is advisable to check it with the aid of a stopwatch.

The self-timing device of the "Zorki-4" camera can be operated together with a flash unit.

Taking the Picture

When preparing to take a picture:

1. Load the camera. If it is loaded and several exposures have already been made, look at the picture counter to see if there is unexposed film left. Make sure the shutter mechanism is engaged.

2. Remove the cap from the lens. If the camera has a sliding lens, pull it out and lock it in the working position.

3. Set the lens opening depending on the depth of field desired. If necessary, fit a filter or lens shade on the lens.

4. When taking flash pictures, connect the flash unit to the camera, check for reliable plugging, and set the flash synchronization scale as has been described above.

If the exposure is being made without a flash unit, set "0" of the synchronization scale against the dot on the camera top surface.

5. Set the shutter by turning the shutter-setting knob fully clockwise.

6. Determine the correct exposure and set the exposure speed by pulling the shutter speed dial up and positioning it opposite the desired division. The dial should sink down and be fixed in the selected position. **The shutter speed will be set only after setting up the shutter mechanism.**

7. Observing through the view- and range-finder eyepiece, lay the camera on the object to be photographed. Take a position off the object to obtain adequate framing of the photographed object within the view-finder field.

8. Focus the lens operating the range-finder mechanism.

9. Take the shot by smoothly pressing the shutter release button to avoid jerking of the camera.

The above mentioned procedure is true for instantaneous exposures when the camera is hand-held and no flexible releaser is used.

When taking pictures with the camera in the carrying case, see that the camera case cover

does not get between the object and the lens. This is vital when photographing with the camera held vertically.

This will bring you success:

absolutely stable position of the camera;

correctly selected lens opening and shutter speeds;

proper depth-of-field setting.

The photographic lens produces differently defined presentations of objects located at various distances from the lens.

The distance to the object is measured along the lens optical axis between the film plane (in practice, the camera back wall) and the object plane perpendicular to the lens axis. At every lens setting, the distance shown by the index mark against scale 9 corresponds to the sharpest focussing conditions. The objects located closer or farther will be defined with a discernity which is ever-deteriorating as the object-focusing plane distance increases.

Nevertheless, with certain limits this phenomenon does not appreciably affect the picture. To determine these depth limits, it is recommended to make use of depth-of-field scale 10. The scale consists of paired graduations symmetrically spaced on either side of the index mark; the graduations are marked with the lens opening numbers. Against these graduations on distance scale 9 will be always indicated two

distances within which all objects are presented with sufficient sharpness on the picture; these two distances are called the close and far limits of depth of field.

For instance, the lens is focussed to a 2-m distance and lens opening set to "11", then graduations "11" of scale 10 will be aligned with two distance positions of scale 9 amounting to approximately 3 m and 1.5 m. In this case, the image will be sufficiently sharp within distances ranging from 1.5 to 3 m.

All the objects standing closer than 1.5 m or beyond 3 m will appear out of focus in the picture.

The farthest limit of depth of field may come to coincide with the " ∞ " (infinity) mark or even pass beyond the distance scale range. In such cases, all objects confined between the close limit of the depth of field and infinity will stand sharp in the picture. It should be remembered that the depth of field is reduced considerably as the lens opening is increased.

The wider the lens opening and the closer the sharp focussing plane to the camera, the smaller the depth of field.

Camera Unloading

After making approximately 36 exposures, shutter setting knob 24 will resist rotation and

stop the shutter operation. This indicates that the whole of the film has been exposed and it is time to re-spool it back to the magazine.

Cover the lens with the cap, and aligning the dot on the release button with that on camera top surface 1 press release button 21.

Disengage the shutter setting mechanism by turning disengaging ring 20 so that its dot moves toward letter "Π" until a stop is reached. This done, pull the reverse take-up knob up and rotate it in the direction of the arrow until the film is released from the take-up spool (this is indicated by an increase of effort applied for extracting the film from the take-up spool). Remove the camera back cover.

Note. While the camera latches are being released, the magazine is automatically closed.

Remove the magazine and keep it closed and intact until the film is to be developed.

Engage the shutter setting mechanism by rotating shutter disengaging ring 20 in the opposite direction to align the dots on the ring and camera top surface 1. Set and release the shutter to check the work of the mechanism. Replace the camera back cover, or load the camera with a spare magazine.

CARE OF THE CAMERA

Protect the camera (especially the lens) against impacts, jolts, dust, moisture and sharp temperature fluctuations. Do not touch upon the lens coated optical surfaces with your fingers.

Coated optical surfaces may be damaged due to careless cleaning. To minimize cleaning, prevent the optics from fouling.

Keep the camera in the carrying case with the shutter and the self-timing device released.

Whenever possible, keep the camera with the lens screwed in; isolate the camera interior from dirt. When not in use, the lens should be capped.

Moisture adversely affects both the mechanical elements of the camera and, more so, the coated surfaces of the optics; therefore, when operating the camera, keep it off rain or snow. When changing from cold to warm ambient conditions, do not open the camera case immediately upon entering a warm room to prevent fogging of the exposed optics. Let the camera and the lens warm up with the camera case closed.

Remember that the camera is a complex and delicate instrument, especially the lens.

The camera may be adjusted or repaired only by highly qualified experts. Any re-assembly

and re-adjustment of the camera should be followed by a most thorough check-up thereof.

Cleaning the Coated Optical Surfaces

Remove dust from coated optical surfaces with clean, soft fatless hairbrush. If no brush is available, use a stick (match) with cotton wool on it or a clean, well-washed flannel, cotton or cambric cloth; these should be applied carefully, without undue pressure.

Stains (such as finger-prints, fog traces, and the like) should be best removed with a stick-seated cotton wool wad lightly soaked in rectified alcohol, petroleum, sulfur-based ether, or a mixture of these. Clean the optical surfaces in circular movements, gradually passing from the lens centre to the periphery. If no cotton wool wad is available, operate with a clean, well-washed flannel, cotton or cambric cloth lightly soaked in one of the above mentioned liquids.

Remember that any cotton wool, cloth or felt may contain hard particles which can damage the coating of the optical element, and even the glass. Therefore, having unfolded the cleaning cloth, apply its inner side to the glass to be cleaned.

If the lens surface coating is damaged, due to careless handling of the coated optics or

through other reasons, still such a lens will conduct more light and produce a more contrast image than any uncoated lens of the same type.



COMPARATIVE SENSIBILITY TABLE

for photographic emulsions of normal contrast ($\gamma=0.8$ to 1.0)
in GOST, ASA and DIN grade units.

GOST	11	16	22	32	45	65	90	130	180	250	350	500
ASA	14	20	28	40	55	80	110	160	220	320	450	650
DIN	12-13	14	15-16	17	18-19	20	21-22	23	24-25	26	27-28	29

C O N T E N T S

Purpose	3
Description	3
Operation	4
Opening and Closing the Camera	4
Magazine Loading	8
Camera Loading	11
Focussing	13
Exposure Speed Setting	14
Shutter Setting and Film Transport	16
Lens	17
Changing the Lenses	17
Flash Synchronizer	18
Self-Timing Device (Automatic Releaser)	20
Taking the Picture	21
Camera Unloading	24
Care of the Camera	26
Cleaning the Coated Optical Surfaces	27
Comparative Sensibility Table	29

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