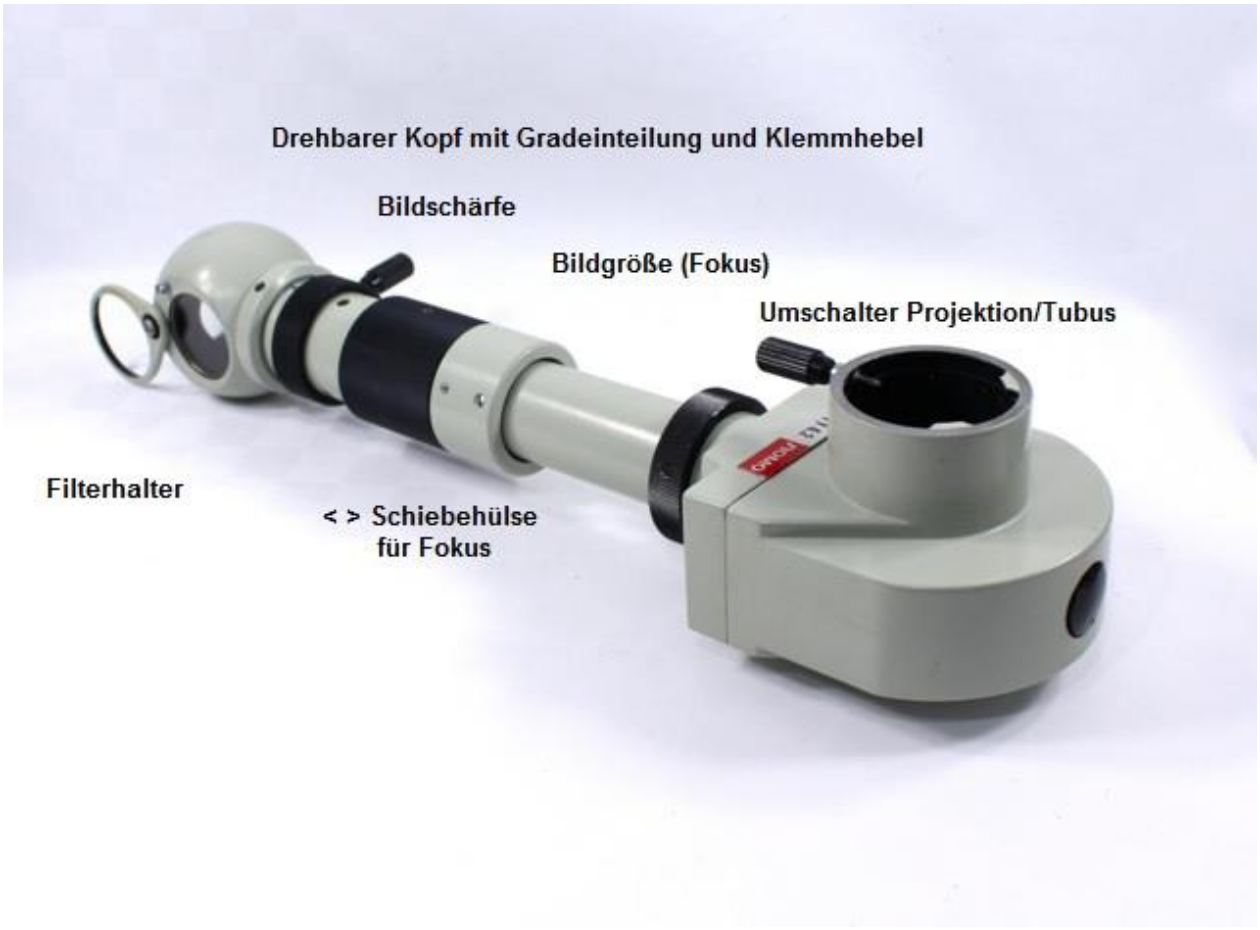
Zeichentubus LOMO RA-7 / ЛОМО РА-7

Der Zeichentubus besitzt vielfältige Einstellmöglichkeiten:
-Umschaltung zwischen 100% Projektion und Zeichenmodus
-Zoom-Funktion für den Projektionsteil
-Fokus-Funktion für den Projektionsteil
-um 360 Grad drehbarer Projektionsteil
Der Projektionsteil besitzt einen Filterhalter. Die entsprechenden Filter sind ebenfalls dabei.
Geliefert wird alles im dazugehörigen Holzkasten.
Der Zeichentubus besitzt die Carl Zeiss Jena Ringschwalbe und kann auch an diesen Mikroskopen verwendet werden.

Lieferumfang

1. Transportkiste
2. Filtersatz (Blaufilter klar, Gelbfilter klar, Blindscheibe, Grünfilter klar, Graufilter klar)
3. Zeichentubus RA-7



Der Zeichentubus wird an Stelle des vorhandenen Tubus in die Ringschwalbe eingesetzt.
Anschließend wird der vorhandene Tubus in die Ringschwalbe der Zeichentubus eingesetzt (vorzugsweise ein Monotubus).

Funktion Projektion:

Der Umschalter wird auf Beobachtung gedreht, so dass auf das Objekt scharf eingestellt werden kann. Anschließend wird der Umschalter auf Projektion gestellt, mit der Schiebehülse die Bildgröße ausgewählt und mit dem Drehring das projizierte Bild scharf gestellt. Es ist von Vorteil, wen der Raum dabei abgedunkelt wird.
Das Bild kann nun abgezeichnet werden.

Funktion Beobachtung:

Der Umschalter wird auf Beobachtung gedreht, so dass auf das Objekt scharf eingestellt werden kann. Nun wird die Mikroskopbeleuchtung heruntergeregelt bis man im Okular die Zeichenfläche sehen kann (hier ist es von Vorteil, wenn die Zeichenfläche hell beleuchtet ist).
Nun wird die Beleuchtung langsam in der Helligkeit hochgeregelt, bis ein Bild des Objektes erscheint.
Die Einstellung muss so erfolgen, dass sich Objektbild und Abbild der Zeichenfläche überlagern (die Spitze des Zeichenstiftes sollte deutlich zu sehen sein).

DRAW-PROJECTION DEVICE

PA-7

TECHNICAL DESCRIPTION
AND OPERATION INSTRUCTIONS

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TECHNICAL DESCRIPTION AND OPERATION
INSTRUCTIONS

1. DESIGNATION

THE DRAW-PROJECTION DEVICE PA-7 is designed to draw an enlarged object image observed through the microscope and to project this image onto a non-illuminated horizontal, vertical or inclined screen at investigations in zoology, biology etc.

While drawing, the researcher can simultaneously see the object, a sheet of paper and the sharpened end of a pencil.

While drawing, the object can be observed by means of monocular or binocular attachment.

The device can be put in receptacles for eyepiece tubes on microscopes «Биолам Р, С, Д, Л».

The draw-projection device PA-7 is produced in version У, category 4.2, i. e. for work in macroclimate regions with temperate climate in laboratory premises at air temperature from +10 up to +35° C, and in version Т, category 4.2, i. e. for work in macroclimate re-

gions both with dry and damp tropical climate in laboratory premises at air temperature from +10 up to +45° C.

2. SPECIFICATIONS

Distance from microscope optical axis to device projection mirror, mm	275.7
Projection mirror-to-screen distance, mm	230—250
Visible magnification of the pencil at work with 7, 10, 15 magnification eyepieces, with lenses pancratic system fixed in position for each eyepiece .	~1
Magnification for projection at 230 mm distance between projecting mirror and screen .	from 8 to 18
Overall dimensions, mm . .	360×92×78
Mass, kg	0.93

3. SET

The draw-projection device PA-7 comprises a body, a sleeve and a projection head with a mirror. The device set includes light filters and screening disk. Complete set of the device is given in its certificate.

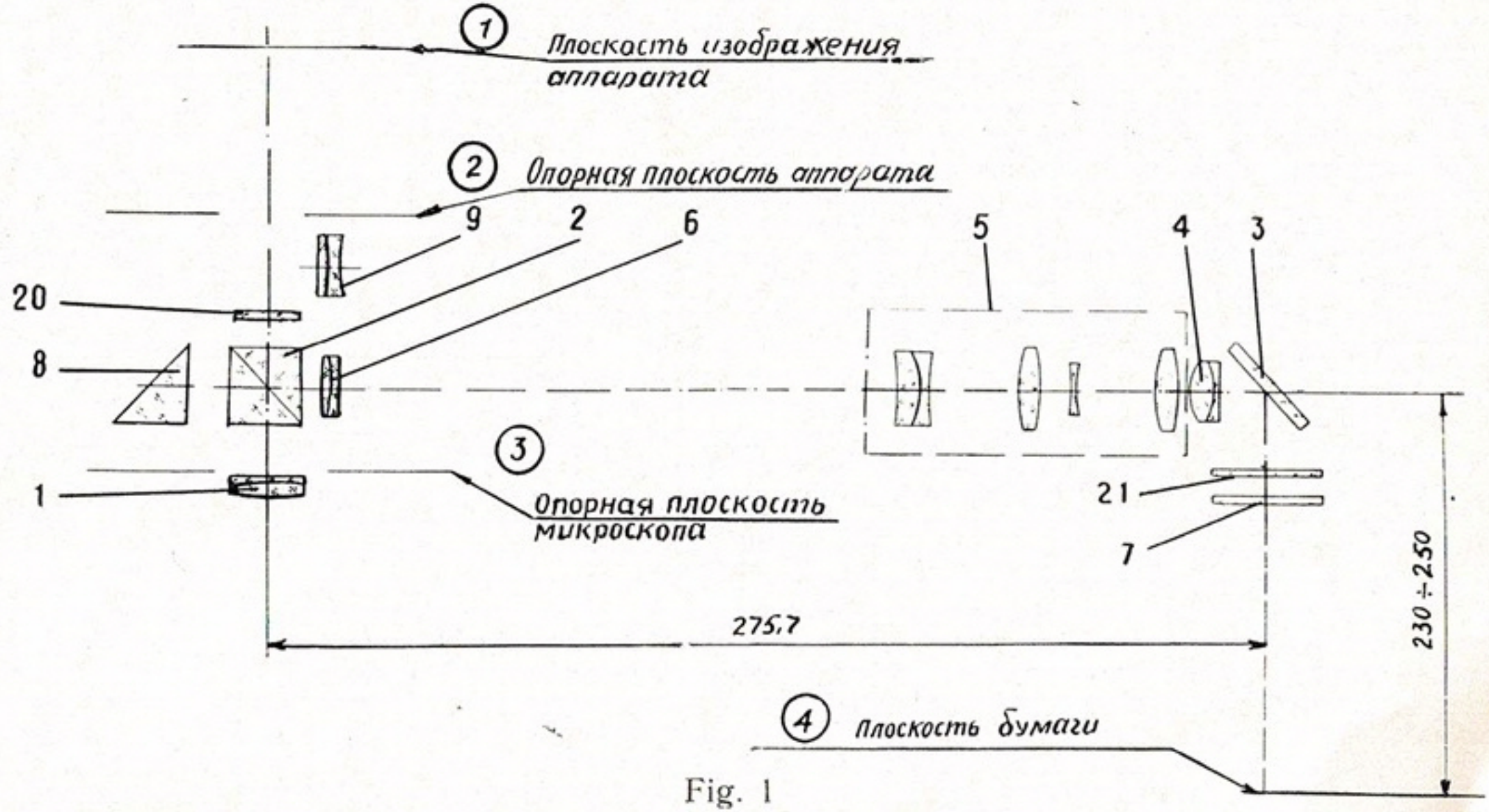

Fig. 1

1 — Device image plane; *2* — Device bearing plane; *3* — Microscope bearing plane; *4* — Paper plane

illuminance of paper image in the microscope field of view.

A screening disk can be introduced instead of the light filters for observation of only the object image in the microscope field of view.

When the device is used for projection, rectangular prism *8* with lens *9* is introduced instead of cubic prism *2* with lens *6* in order to project the object image onto the screen. In this case the image is projected by means of lens *1* and prism *8* with lens *9*, lens pancratic system *5*, focusing lens *4* and mirror *3* onto the screen.

Pancratic system of lenses *5* facilitates smooth variation of image scale.

General view of draw-projection device PA-7 is given in Fig. 2.

The device comprises body *10*, sleeve *11* and head *12* with mirror *3* (Fig. 1).

There are achromatic tubus lens *1*, cubic prism *2* with lens *6* and prism *8* with lens *9* in the body. There is flange *13* at the bottom of body *10* (Fig. 2). The flange is used for putting the device onto the microscope instead of monocular or binocular attachment, the latter being thereafter put into the nest at the top of the body and fixed with screw *14*. Head *12* with mirror *3* (Fig. 1) can be turned and

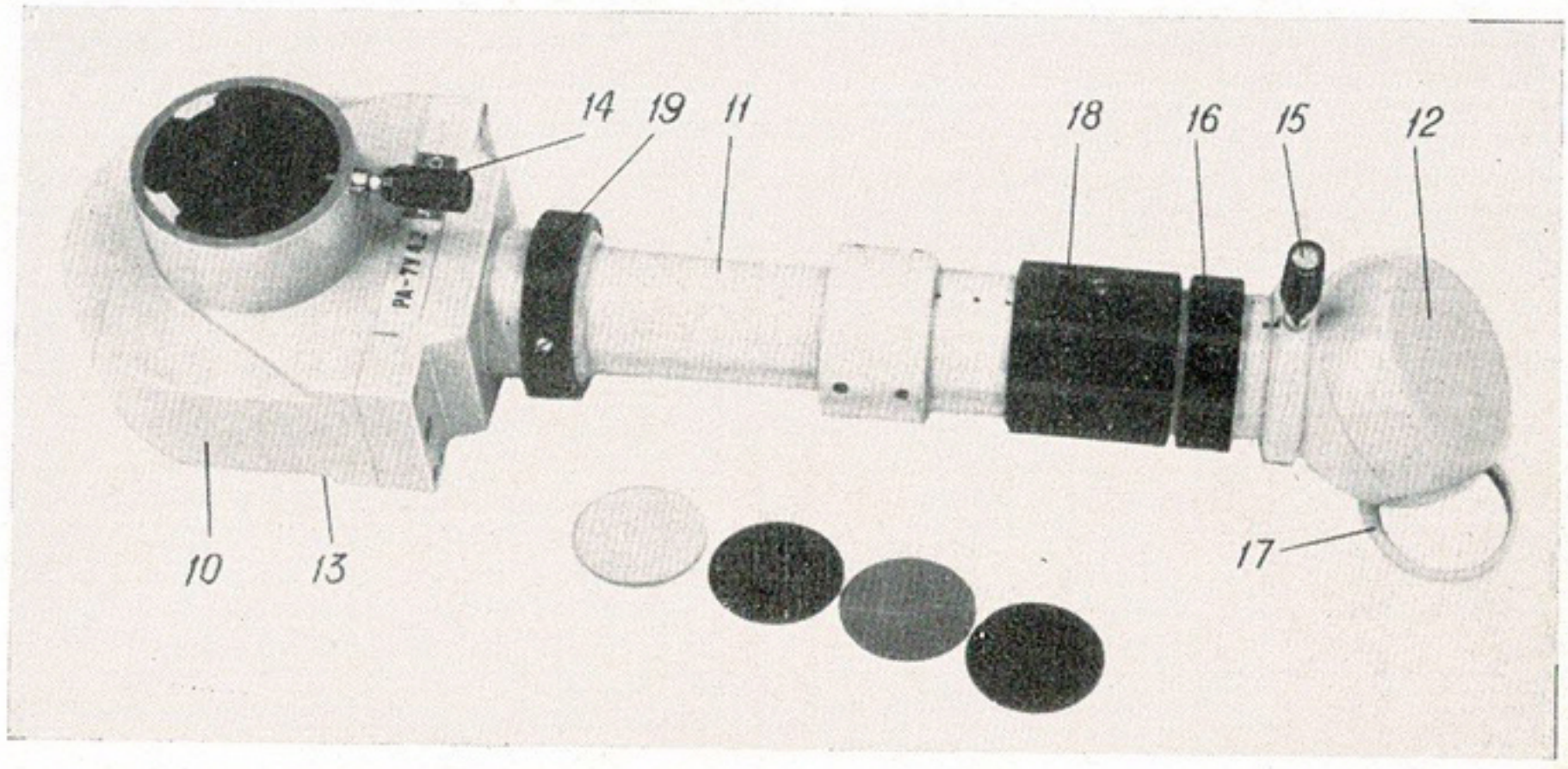

Fig. 2

fixed with screw *15* (Fig. 2) in a position required. Ring *16* is used to move lens *4* (Fig. 1) to obtain sharp image of the paper and pencil in the plane of eyepiece field diaphragm. Mount *17* (Fig. 2) receives changeable light filters or the screening disk. Ring *18* displaces pancratic lens system *5* (Fig. 1). By means of ring *19* (Fig. 2) cubic prism *2* (Fig. 1) with lens *6* and prism *8* with lens *9* are displaced which makes it possible to pass from drawing to projection and vice versa.

Two protective glasses *20* (Fig. 1) and *21* are provided in the device.

5. MARKING

Each device bears inscription «PA-7», production version (У 4.2, for example), Manufacturer's trade mark and item number the two first digits of which stand for the last two digits of the year of device output.

6. INSTALLATION PROCEDURE AND PREPARING FOR OPERATION

For operation with the device, the following auxiliaries are necessary: a microscope to be put onto the operation table; an illuminator if

the researches are conducted on microscopes which have not built-in illuminators; a desk-lamp for drawing.

Microscope auxiliaries are installed as per microscope description.

Object image studies while projecting it onto the screen should be conducted in darkness.

7. OPERATION PROCEDURE

For setting the draw-projection device onto the microscope, proceed as follows: take binocular or monocular attachment off the microscope, install the draw-projection device in its place and fix it with a screw, insert the attachment into the device socket and tighten with screw *14* (Fig. 2).

7.1. Adjustment for drawing

7.1.1. Insert the cubuc prism into the path of rays for which aim turn ring *19* up to stop in the direction from the observer.

7.1.2. Insert screening disk into mount *17*.

7.1.3. Adjust the microscope as per its description.

7.1.4. Take the screening disk from mount *17*.

7.1.5. Bring the pancratic lens system by means of ring *18* into the extreme left position if work is conducted with eyepiece 7×, into the extreme right position if work is conducted with eyepiece 15× and into the middle position — for work with eyepiece 10×.

7.1.6. Put a sheet of paper onto the table under head *12*. The sheet of paper should be illuminated evenly. Use for convenience purpose the desk-lamp with a reflector.

7.1.7. Obtain the most sharp paper and pencil image displacing the focusing lens by means of ring *16*. Cut the light from the illuminator as it can hinder to obtain the sharp image of paper and pencil due to reduced contrast.

7.1.8. While observation through the eyepiece, it is necessary to see simultaneously the object, the paper and the pencil; that's why it is recommended to make even the illuminance of both images. Obejct image illuminance can be varied either by means of putting a neutral light filter into the mount under microscope condenser or by changing the light source brilliance by means of a rheostat in the lamp power unit. Illuminance of paper sheet with the pencil can be changed either by shifting the desk-lamp or putting the neutral light filter into mount *17*.

7.2. Adjustment for projection

7.2.1. Adjust the microscope as per its description.

7.2.2. Introduce the rectangular prism into the path of rays, turning for this aim ring *19* towards the observer up to stop.

7.2.3. Turn head *12* so that object image is projected onto horizontal, vertical or inclined screen, and fix the head with screw *15*.

There will be an enlarged object image on the screen.

Image scale can be varied smoothly by turning ring *18*.

Object image magnification β is determined with help of an object-micrometer (is not included into the complete set of device PA-7) which is essentially a glass plate with dash-lines per 0.01 mm. Object-micrometer should be placed on the microscope stage, then get sharp image of the dash-lines on the screen and mark extreme dash-lines with the pencil; distance m (in millimetres) between them is to be measured with a rule; count the number of intervals n (in 0.01 mm) between the extreme dash-lines and find magnification scale β from the formula

$$\beta = \frac{m}{n\ 0.01}\ .$$

8. MAINTENANCE, STORAGE, SHIPMENT

8.1. Maintenance and storage

To ensure trouble-free operation of the device, wipe it periodically with a soft clean, dry rag, after thorough removing the dust.

Special care should be paid to keeping all the optics clean. Don't touch optical part surfaces with fingers. Dust from optics outer surfaces should be removed first with a soft brush thoroughly washed in ether, thereafter the optics should be wiped with clean cotton wool slightly wetted in pure benzine or ether.

Work over, put the device into its stowage case.

8.2. Shipment

If necessary to move to another premises, the device and accessories should be put into casing. The device and accessories should not displace at jolting.

All kinds of closed transport allowed.