

**STEREOSCOPIC ZOOM
MICROSCOPE**

MBS-12

Maintenance manual

NOTES:

ATTENTION! The microscope optical head design can be somewhat differ from those described in this maintenance manual but this does not influence the performance and quality of the item.

9. PACKING REPORT

The stereoscopic zoom microscope MBS-12, serial No _____ has been duly packed at the Manufacturing factory in compliance with the requirements prescribed by the technical documentation.

Date of packing _____

Packer is made _____

43-05

1. DESCRIPTION OF USE AND PERFORMANCE

1.1 Purpose

The MBS-12 microscope is intended for observing solid objects in reflected light. Field of application: botany, biology, medicine, mineralogy, criminalistics, archeology, mechanical engineering, instrument making industry and other fields of science and technology.

Zoom optical system of the microscope provides continuous variation of magnification in scale range 1:10.

1.2 Technical specifications

1.2.1 Magnification, times, in the range	from 5 to 102
1.2.2 Linear field of view, mm, in the range	from 2.5 to 36
1.2.3 Eyepieces diopter adjustment, Dptr, within range	± 5
1.2.4. Operating distance, mm, not less	79
1.2.5 Illumination source	halogen lamp 12V/20W
1.2.6 Overall dimensions in operating state (disregarding illuminator), mm, no more	195 x 285 x 455
1.2.7 Weight of device, kg, not more	7.5
1.2.8 Gross weight of device in packing cardboard box, kg, not more	10

Information of precious and non-ferrous metals content

Aluminum – 4.53 kg
Brass – 0.31 kg

1.3. Microscope deliverables

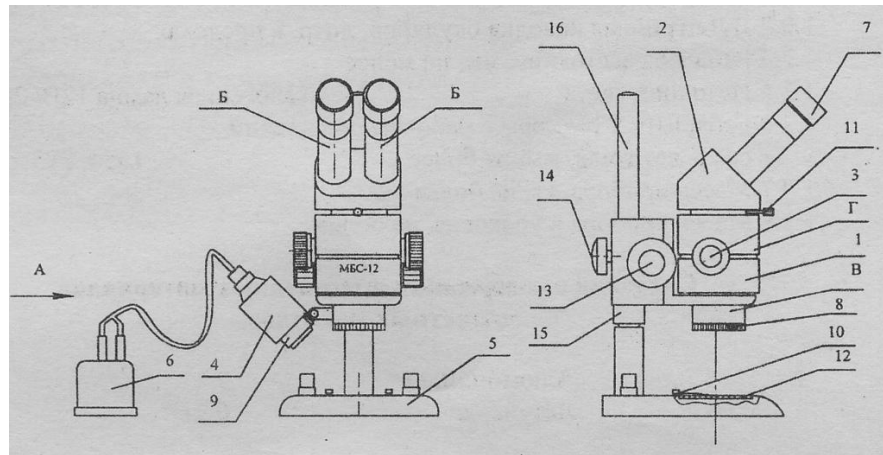
1.3.1 Holder with zoom system and head optical lens	1 pc
1.3.2 Binocular attachment	1 pc
1.3.3 Operating table	1 pc
1.3.4 Power supply unit	1 pc
1.3.5 Illuminator	1 pc
1.3.6 Eyepiece 10 ^x	2 pc
1.3.7 Eyepiece 10 ^x with scale	1 pc
1.3.8 Eyepiece 20 ^x	2 pc
1.3.9 Light filter	1 pc
1.3.10 Clamp	2 pc
1.3.11 Plate	1 pc
1.3.12 Flannel cloth	1 pc
1.3.13 Fused plug VP-1V 1.0 A/250 V	2 pc
1.3.14 Fused plug VP-1V 3.15 A/250 V	2 pc

- 1.3.15 Halogen lamp MR16 12V/20W 2 pc
- 1.3.16 Case 1 pc
- 1.3.17 Maintenance manual 1 copy
- 1.3.18 Packing box 1 pc

1.4. Design and operating principle

1.4.1. General View of MBS-12 is presented in Fig. 1.

A
Without holder (position 9)
And illuminator (Position 4)



- 1 – holder with zoom system; 2 – binocular attachment; 3 – zoom magnification handle;
- 4 – illuminator; 5 – operating table; 6 – power supply unit; 7 – eyepiece; 8 – fixation ring of illuminator bracket; 9 – illuminator bracket; 10 – clamp; 11 – binocular attachment fastening screw; 12 – plate; 13 – focusing handle; 14 – optical head fixation handle; 15 – stopper; 16 – stand.

Б - eyepiece tube; В - Head lens; Г - zoom system body

Fig. 1 – General View of microscope

The imagery in the microscope is provided by an optical system containing of the head lens B; zoom system installed in the body Г; tube lenses placed in the binocular attachment 2 and interchangeable eyepieces 7.

A required magnification factor is selected by changing of positioning of movable components of the zoom system rotating the handle 3 and by positioning of interchangeable eyepieces.

5. MAINTENANCE

5.1. In case of transportation or storage of the microscope at low temperatures conditions and transferring of it to a warm room keep 6 hours before unpacking.

5.2. Avoid of the microscope optical surfaces from dust or dirty. To clean dust use a clear cambric napkin or a fur brush. To clean dirty use a cambric napkin wetted by an alcohol.

In non operational time it is recommended to cover the microscope by a polyethylene case provided with the microscope.

5.3. In case if the halogen lamp is failed keep the safety precautions noted in point 2.3, disassemble the illuminator as it is noted in Figure 2. At first ease the fixture of the cord 6 by help of the bush 7 rounding it against clock hand, pull out the cord with the lamp 1 and the chuck 4, change the lamp in the chuck, push the cord with the lamp inside the body, fix the position turning the bush 7, tighten the seat flange 3.

To extend the life time of a halogen lamp there is recommended before setting in the chuck to clean the contact pins by a soft napkin wetted in an alcohol.

6. STORAGE AND TRANSPORTATION

The microscope must be stored in a room at ambient temperature within the range from + 5C° to + 40C°, at air humidity not more than 80% and in conditions where there are no dust air, corrosive vapors and gases.

The microscope can be handled by covered transport means at temperature from -50C° to +50C°.

7. WARRANTY

The factor of origin guarantees that MBS-10 microscope complies with the technical specifications IAZU.201131.004TU at condition when all operational instructions, storage, transportation and handling conditions are implemented.

Warranty period is 24 months from the date of the microscope setting to work but not more than 30 months from the date of shipment from a factory of origin warehouse.

8. ACCEPTANCE CERTIFICATE

The stereoscopic zoom microscope MBS-12, serial No. _____ meets the technical specifications and has been found fit for service.

QCD Representative

« ___ » _____ 200__

4 OPERATION PROCEDURE

4.1 General instructions

Place an object to the operating table of the microscope. Rotating the optical head per the stand 16 set an approximate operating distance from an object to the head lens. Fix the setting of the optical head using the fixation handle 14. Switch on the illumination. Focus the microscope on an object by rotation of the handle 13 at that the handles of magnification changing shall be set in a position correspondent to the maximum magnification (figure 5 on the handle 3).

Move the handle 3 to another extreme position correspondent of the minimum magnification of the zoom system at that time an image in the extreme position shall be sharp. Any insignificant defocusing that may be occurred at interim values of the zoom system magnification are compensated by vertical shifting of the microscope optical head using the handles 13.

4.2. Operation 10^x eyepiece with scale

The eyepiece has the diopter adjustment mechanism. In focal plane of the eyepiece there is set scale factor with step 0.1mm.

In order to roughly assess a linear dimensions of an object one of the eyepiece tubes of the microscope shall be set 10^x eyepiece with scale. Using the dioter alignment mechanism of the eyepiece there should be obtained a sharp image of the scale. Then turning the handle 13 of focusing system one shall align a sharp image of the object. . In the conversion table 2 there is noted how one scale factor is correspondent to a dimensional value of an object at the microscope magnification.

Table 2 - Conversion table of the microscope magnifications

Magnifications in approx. numbers noted on the handles of the zoom system, times	One scale division 0.1mm corresponds a measurement on an object
0.5	0.2
1	0.1
2	0.05
3	0.03
5	0.02

In order to determine approximate dimensions of an object (its linear dimensions) it will suffice to count the number of the division of the scale which are laid in the measured section of the object and multiply the obtained result by the number indicated in the conversion. Table corresponding to the magnification of the microscope at which the measurement is being performed.

Optical characteristics of the microscope (approximated values of magnification factors and field of views) with use of each pair of the interchangeable eyepieces are presented in Table 1.

Table 1 - Optical characteristics of the microscope

Characteristics of the microscope	Magnification of microscope.		Field of view, mm		Field of view, mm	
	10 ^x	20 ^x	10 ^x	20 ^x	10 ^x	20 ^x
Magnification of eyepiece,						
Magnification of objective part						
0.5	5	10	40	25		
1.0	10	20	20	12		
2.0	20	40	10	6	24	12
3.0	30	60	6	4		
5.0	50	102	4	2.5		

Approximate value of interim magnifications is defined as $\Gamma_m = \beta_{\text{lens part}} \times \Gamma_{\text{eye}}$;

where Γ_m is the microscope magnification;

$\beta_{\text{lens part}}$ is the lens part magnification (Head lens + zoom system)

Γ_{eye} is eyepiece magnification

Values of $\beta_{\text{lens part}}$ are noted in the scale of the handle 3 of magnification changing

1.4.2. Zoom system

IN order to slightly change the microscope magnification in each of two optical tracts forming a stereo imagery there is designed a zoom system that consists of two immovable components and two movable ones. Movable components are being shifted by guiding elements (clutch pins) with a complicated curvilinear profile. Clutch pins are moved by handles 3; range of shifting is limited by stoppers located inside the body.

Attention!

1. Turn the handles 3 smoothly, do not apply jerky forces in the extreme positions.
2. Do not turn the handles 3 in mutually antithetic directions.

1.4.3. Head lens

The lens B is attached to the body Γ by a screw joint and when in operation shall be tighten to stop.

1.4.4. Binocular attachment

Additional (tube inside) lenses and Schmidt prisms are installed in the binocular attachment **2**.

Setting up of an interpupillary distance to fit eye base of an observer is carried out by bringing together or pulling apart of eyepiece tubes Ξ . The binocular attachment **2** is fastened to the body Γ using bayonet joint with fixture by a screw **11**. In operation condition the screw shall be tighten to stop.

The interchangeable eyepieces are installed in the eyepiece tubes.

1.4.5 Microscope table

On the stand **16** of the microscope table there is fixed the optical head by the fixation handle that always should be tighten. which should always be tightened.

The microscope focusing to an object is made by handles **13** turning of the optical head relative to the microscope table along the guide "dovetail" (Fig. 1).

Attention! Never turn the handle **13** in mutually antithetic directions.

To prevent an accident dropping of the optical head of the microscope on the stand there is the stopper **15** fixed in the required position using a clamping screw. The table has a round window where the plate **12**, two holes for the clamps **10** and three holes for the substage ST-12 are installed in. ST-12 is not a deliverable item of this microscope and is procured separately. One of the side of the plate **12** is painted in white color and intended for viewing at dark objects, the other one is black that intended for viewing of light objects.

1.4.6. Illuminator

The illuminator **4** is installed in the slot of the bracket **9** and allows illuminating of an object with different sides. The bracket **9** is fixed in a proper position with help of screw ring **8**.

A disassembled illuminator is presented in Fig. 2 and consists of lamp **1**, body **2**, seat flange **3**, chuck **4**, spring **5**, cord **6**, and bush **7**.

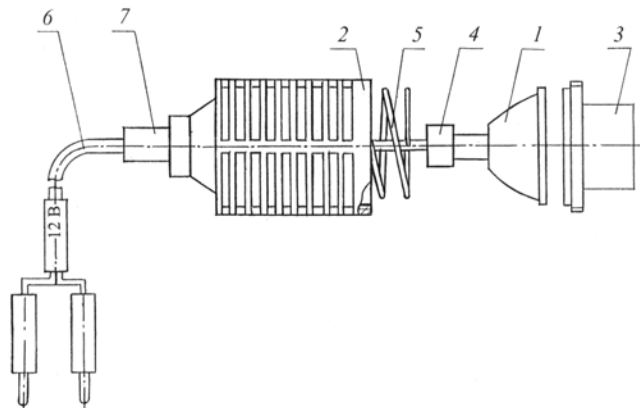


Figure 2 – Illuminator

The deliverables of the microscope composes a light filter that is screw jointed to the seat flange **3** of the illuminator.

The illuminator power can be controlled changing lamp power voltage.

1.4.7. Power supply unit

The power of the illuminator lamp is provided through the power supply unit **6** (Figure 1) from AC points of 220 V using the cord with the plug of the side ground contact. The cover of the power supply unit has a connector of 12V for the illuminator switching on (by means of two prongs). The side walls of the power supply unit have a toggle switch, a lamp voltage regulator handle, holders of safety devices (of fused plugs) of 1.0A and 3.15A.

2 SAFETY PRECAUTIONS

2.1 The microscope is intended for indoor operation under conditions of absence of increased electrical danger. The conditions increasing the mentioned danger are:

- a) increased humidity and dustiness of air;
- b) current-conducting floor: metal, brick, reinforced-concrete;
- c) temperatures above 40°C.

2.2 Regularly, before connecting the microscope to the power mains, the safety of the cord insulation, power supply unit and illuminator should be checked.

2.3 The lamp and the fused plugs (safety devices) are required to be changed when the illuminator and the power supply unit are switched off.

3 PREPARATIONS FOR USE

If the instrument is delivered indoors from cold, unpack it six hours after bringing it inside.

After unpacking the instrument is needed to be prepared for the operating and assemble the microscope to the status noted in Figure 1.

In doing that the binocular attachment **2** is to be jointed to the body Γ of the zoom system using the crew **11**.

The selected eyepieces 10^x and 20^x are installed in the tubes Ξ binocular attachment priory having set the zero diopter value in scale of the eyepiece.

The illuminator **4** is installed in the slot of the bracket **9** and is connected via two prongs to the power supply unit **6**. The plate **12** and two clamps **10** are positioned at the operating table **5**.