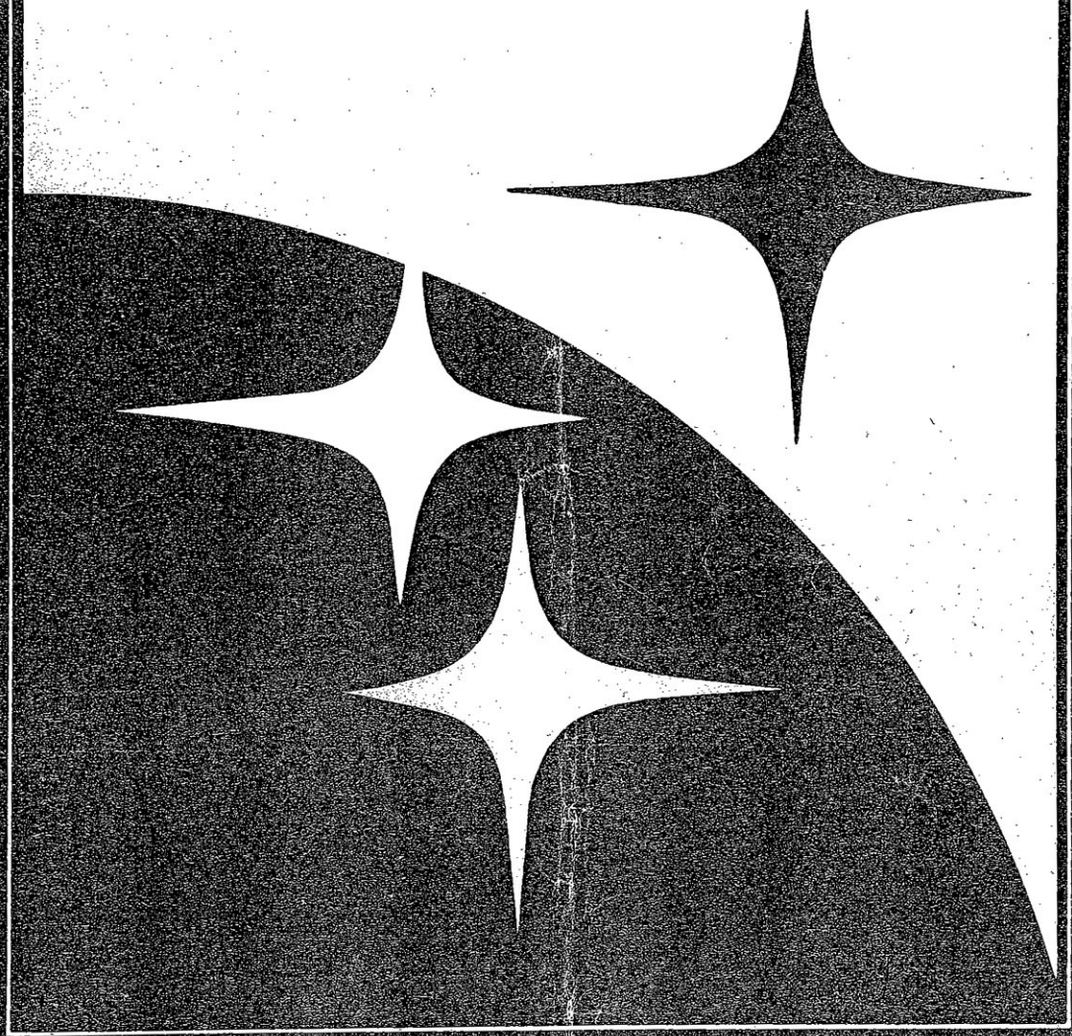
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AMATEUR ASTRONOMER TELESCOPE

Order-narjad No.

AMATEUR ASTRONOMER TELESCOPE

SERVICE MANUAL

3.807.003 РЭ

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The instrument is subject to continious development and improvement, consequently it may incorporate minor changes in detail from the information contained herein.

ATTENTION!

The telescope forms the inverted image like any astronomical instrument does.

The direct observations of the Sun are permitted only with the use of the black light filter.

1

GENERAL DIRECTIONS

The telescope is designed for visual observations of the celestial objects and phenomena which take place there.

The field of its application — astronomical circles and individual observations of the celestial objects.

The telescope can operate normally at the temperature from 30 to minus 30 °C and relative humidity of maximum 80 per cent when it is fine.

When buying the telescope one should pay attention to the package safety ensured by the seal of the manufacturing plant. After unsealing the case one should check the compliance of the telescope serial number with the number shown in the service manual and the compliance of the complete set with that denoted in the list of enclosure which is glued to the inner side of the case cover. Prior to using the telescope one gets acquainted with the present service manual.

2

SPECIFICATIONS

Diameter of the primary mirror, mm, maximum	65
Focal length, mm:	
the mirror	502
the eyepiece	15.4
the eyepiece with Barlow lens	5.7
the eyepiece with Barlow lens and a sleeve	3.8
Telescope magnification (changeable with permissible deviation of ±5%)	×33 ×88 ×133
Resolution, ...″, minimum	2.5
Angle of viewfield at magnification:	
×33	1°15′
×88	25′
×133	15′
Diameter of the exit pupil, mm, minimum, at magnification:	
×33	2
×88	0.7
×133	0.47
Range of slow-motion control relative to the axes, ...°	±4
Minimum distance of observation, m	≈25
Overall dimensions, mm, maximum:	
length	520
width	400
height	1,260
Mass of the telescope, kg, maximum	9

3

STANDARD EQUIPMENT

The standard equipment is shown in the table.

Designation	Name	Qty
3.807.003	Telescope	1
8.120.692	Support	2
8.060.251	Tripod	1
6.890.030-08	Screwdriver	1
	Brush	1
6.230.017	Sleeve	1
5.932.148	Barlow lens*	1
5.940.295	Light filter*	1
3.807.003 РЭ	Service manual	1
4.161.775	Packing case	1

4

TELESCOPE DESIGN AND PRINCIPLE OF OPERATION

4.1. TELESCOPE DESIGN

The telescope consists of tube 1 (Fig. 1), the head of mounting 3, support 7 connected to tube 1 and tripod 8; support 7 rests against tripod 8. Two-component sighting device 2 is mounted on the tube for coarse focusing on the object to be observed. In inoperative position the inlet hole of the tube is closed with cap 12.

* Placed in the telescope eyepiece.

Support 7 is composed of two pipes which are connected by thread. Due to this fact the telescope can be mounted for a floor or desk variant of use and one may make use of one or two pipes respectively.

The head of mounting 3 is provided with the vertical and horizontal axes. The telescope tube 1 is fastened to the horizontal axis. Both axes have lock screws 10 which fix the axes in position and two screws 9, 11 of fine movements which make it possible to correct slightly the tube position as well as track the diurnal rotation of the celestial objects by moving the telescope slightly.

The seals are positioned on the mount of the primary mirror and secured by means of screws 1 and 2 (Fig. 5).

4.2. PRINCIPLE OF OPERATION

The principle of operation of the telescope is as follows. The rays enter the telescope tube, reflect from the primary mirror and after refracting by means of the diagonal mirror at 90° get in the eyepiece.

For setting the best image sharpness the focusing mount together with eyepiece 4 (Fig. 1) inserted in it travels along the optical axis with the use of handwheels 6. The smoothness of the tube run can be controlled. To perform this one holds the left handwheel by one hand and rotates the right handwheel clockwise with some effort relative to the left handwheel by the left hand. In case of necessity one may fix the tube in the chosen position by the denoted method.

Tracking the celestial objects is carried out manually.

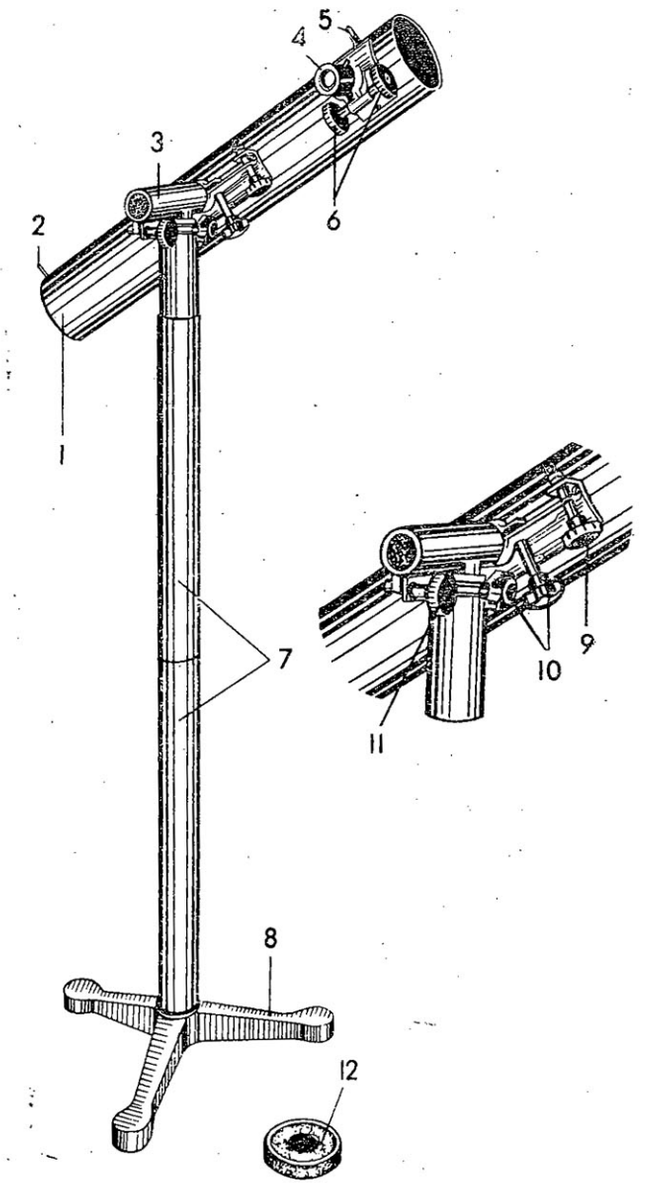


Fig. 1. General view of telescope

4.3. OPTICAL TRAIN

The telescope is provided with the Newton optical system (Fig. 2). The beam of rays enters the tube, falls on primary mirror 1 and after reflecting from it forms a cone of rays which reflects at 90° from diagonal plane mirror 2 and gets in eyepiece 3.

By putting the eyepiece in the focusing mount one obtains the magnification equal to ×33 (Fig. 3). If first the Barlow lens is inserted in the focusing mount and then the eyepiece is put in the Barlow lens one obtains the magnification equal to ×88. By inserting the Barlow lens, then the sleeve and the eyepiece in the focusing mount one obtains the magnification equal to ×133.

When observing the Sun in the telescope one should use light filter 5 (Fig. 2) which is inserted in the eyepiece mount from the side of the entrance pupil.

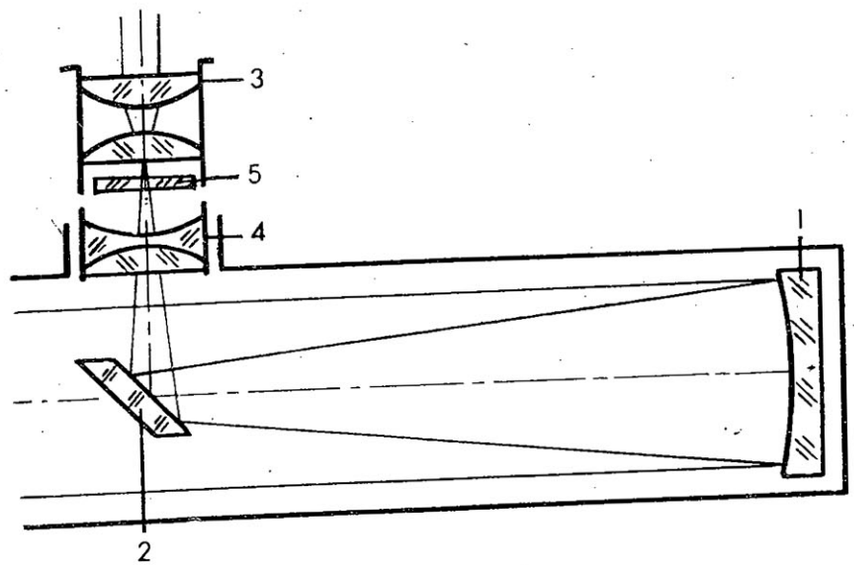


Fig. 2. **Optical train of telescope**

5

ORDER OF OPERATION

5.1. TELESCOPE ASSEMBLING

Open the case cover, remove the pipes of support 7 (Fig. 1), connect them by thread. Take out all the rest parts of the telescope, remove the insert on which the telescope and its parts are placed and remove tripod 8 (Fig. 1) which is positioned at the case bottom. Put the insert in its place.

Connect tripod 8 with support 7 by thread. For a floor variant of use two sections of the support are used, for a desk variant of use one section is used.

The head of the mounting is connected with the support by thread.

Check the operation of lock screws 10 of both axes. Fixing the axes in position check the operation of screws 9, 11 of slow-motion along both axes. The quali-

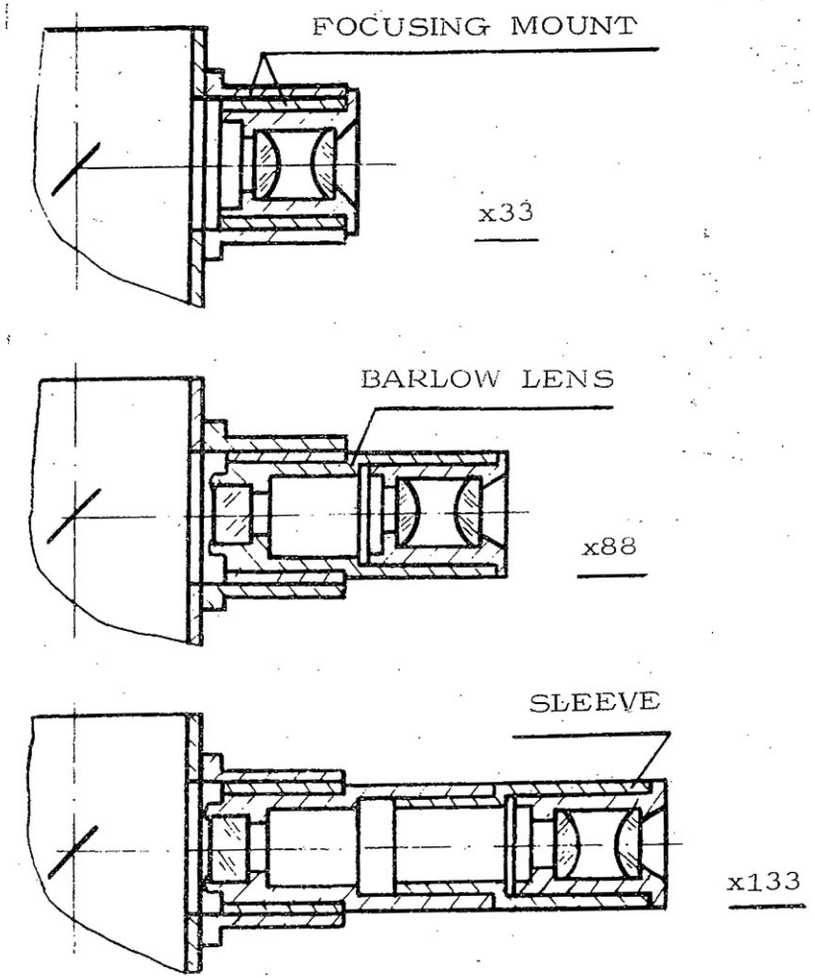


Fig. 3. **Diagram of setting magnification**

ty of the optical image can be checked only out of doors by the very distant objects after removing preliminarily the black light filter from the eyepiece from the side of the entrance pupil.

5.2. OPERATION WITH TELESCOPE

The telescope forms the so-called telescopic inverted image. Prior to observations at night train in operation with the telescope in the day time using the local objects. First use the low magnifications without the Barlow lens, then the magnification can be increased by using the Barlow lens. The low magnifications are used when the object brightness is insufficient or when the large viewfield is required. Usually it occurs in observations of star clusters, nebulae, comets, the Sun and the Moon. The great magnifications are used in observations of the details of the Moon and the Sun surface, in observations of the planets an so on. One should keep in mind that in observations of the local objects in the day time the image quality is distorted very much with haze or currents of warm air, therefore one has to use only low magnifications.

The telescope mirror is sensitive very much to the sharp fluctuations of temperature, therefore in winter after putting the telescope out of doors keep it for 10—15 minutes idle in order to make the mirror acquire the ambient temperature, then begin the observations.

For good observations the telescope should be mounted on the even platform. Avoid vibrations and sharp impacts.

5.3. ADJUSTMENT

The primary mirror of the telescope requires adjustment every now and then.

This simple operation is as follows. Remove the Barlow lens and the eyepiece from the focusing mount and look at the reflection of the primary spherical mirror in the diagonal mirror. The reflection of the diagonal mirror together with the support is seen in it. This reflection must be positioned at the centre of the primary mirror as shown in Fig. 4. If the reflection is displaced the adjustment is necessary.

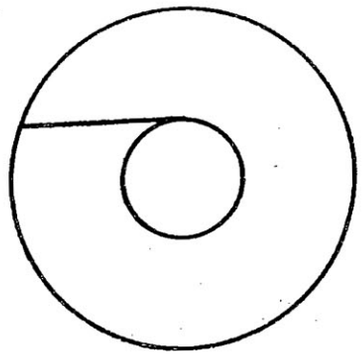


Fig. 4

Rotate one of the three adjusting screws 1 (Fig. 5) with the help of a screwdriver from the standard equipment after unscrewing preliminarily the respective clamping screw 2. In doing so observe the movement of the image of the diagonal mirror in the primary mirror. It is required to choose the screw and the direction of the rotation so that the reflection of the diagonal mirror displaces to the centre. Only in this position of the mirrors the telescope forms a sharp image. After setting the mirror tighten the clamping screws 2.

All screws of the telescope are secured with a drop of butvar-phenolic adhesive БФ-4. Use a drop of alcohol to undo the screw.

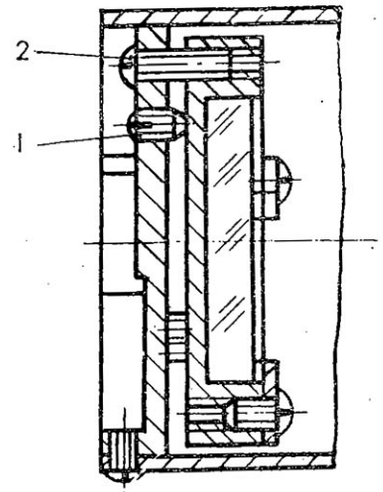


Fig. 5. **Mirror in mount**

6

MAINTENANCE

For keeping the telescope serviceable check its technical condition and carry out its maintenance.

6.1. Clean the aluminized mirrors with a soft brush available in the standard equipment. Do it carefully to avoid scratches.

If some fat spots appear on the mirror surface wash the mirrors. To perform this remove mirror 1 (Fig. 2) from the tube by undoing preliminarily the screws fixing the mount to the tube. Without removing the mirror from the mount wet it carefully and plentifully with alcohol with the help of a cotton wool tampon and wipe it slightly; then put the mirror under a stream of pure water and dry it. The drops of water are removed with a blotter by touching them slightly with a blotter corner.

The diagonal mirror is cleaned in the same way.

The lenses of the eyepieces are wiped with a dry linen napkin. The fat spots are removed with a cotton wool tampon impregnated with alcohol.

One should dismantle the optics only in case of necessity. In non-operating position the telescope tube must be constantly closed with cap 12 (Fig. 1).

6.2. Lubricate the two interperpendicular axes of the head of mounting 3 regularly once in two years with vaseline oil.

7

RULES OF STORAGE

It is recommended practice to store the telescope in the heated premises with relative humidity of maximum 80 per cent, at an ambient temperature from 5 to 40 °C.

The impacts and sharp shaking should be avoided.

It is forbidden to store the telescope together with acids, alkalies, matters which liberate moisture or chemically-active gases and vapours.

8

POSSIBLE DERANGEMENTS AND METHODS OF THEIR ELIMINATION

8.1. The viewfield is dark — a dark light filter is not taken out of the eyepiece from the side of the entrance pupil.

8.2. At great magnifications the observations are difficult due to the unsharp image of the star. It may take place in case of the great disturbance of the atmosphere. Point the telescope to the zenith and observe the stars. If they are seen sharply perform the observations at the more calm nights.

9. ACCEPTANCE CERTIFICATE

The telescope, serial No. . . 0110 . . , is found fit for service.

Date of manufacture 04-96