

INSTITUTE OF THEORETICAL PHYSICS AND ASTRONOMY

MOLÉTAI ASTRONOMICAL OBSERVATORY

THE 35/51 CM TELESCOPE OF THE MAKSTOV SYSTEM (ACT-452)



USER'S GUIDE

2005

MAIN TECHNICAL SPECIFICATIONS

The Maksutov telescope ACT-452 can be used for photometry and astrometry of stars, e.g., with a CCD camera. Its optics is of the Maksutov system with the Newtonian focus, it has a fork-type mounting. The telescope is computer-controlled.

| | |
|--------------------------------------|--------------------------------|
| Diameter of the main mirror | 51 cm |
| Meniscus diameter | 35 cm |
| Focal ratio | 1 : 3.5 |
| 26.8 x 26 mm CCD field | ~1.13 x 1.22 sq. deg |
| Guiding telescope objective: | |
| Front lens diameter | 14 cm |
| Focal distance | 130 cm |
| Guiding telescope holds two oculars: | |
| 1. Straight-view ocular field | 1.6 deg |
| 2. 90-deg-view ocular field | ~18 arcmin |
| Viewfinder (AT-1) objective lens: | |
| Diameter | 5 cm |
| Field of view | 11 deg |
| Corrections in right ascension: | |
| Raw correction speed | 25 deg/min |
| Medium correction speed | 7.5 deg/min (2.8 |
| deg/min) | |
| Fine correction speed | 7.5 arcmin/min (2.5 |
| arcmin/min) | |
| Limb partition | 1 min (15 arcmin} |
| Corrections in declination: | |
| Raw correction speed | 50 deg/min |
| Medium correction speed | 5 deg/min (2.8 deg/min) |
| Fine correction speed | 15 arcmin/min (2.5 arcmin/min) |
| Limb partition | 20 arcmin |

The play of both axes is eliminated using weights hanging on steel ropes. Transparent optical parts are made from ultraviolet-transmitting glass. There are two pointing ways to the target: from PC and manually. The raw, medium and fine corrections of positioning may be made by PC and by the handpaddle.

| | |
|------------------------------------|------|
| Year of manufacturing | 1962 |
| Mounted at the Molétai Observatory | 1975 |

STARTING OBSERVATIONS

1. Removal of the pavilion roof.

There are two pulley-blocks on the north-side wall of the pavilion (2p, 3p; Fig. 1). The rope coming out from one of them is attached to the roof and comes back to the second pulley. To slide the roof off, put the removable handle on the axis of the left (west-side) pulley (2p) and rotate it clockwise until the roof is completely away from the telescope. (To close the roof, take the handle from the left pulley and put it on the axis of the right one (3p). Rotating it counterclockwise, the roof is returned to its initial position).

2. Switching on:

2.1. Switch on the power supply.

The switch is on a wall at left-hand side above the two blocks of electronics (Fig. 2). The two signal lamps light up.

2.2. Switch on the telescope control computer (PC). **LINUX** Fedora is logged

2.3. Log in as **observer** (password: **maksutov**)

2.4. Launch the program **telescope**. The GUI (Graphical User's Interface) panel appears as shown in Fig. 2a. (All control programs are the same as for 165 cm telescope. They are prepared by R. Janulis).

2.5. To start hour tracking, click on the icon ►► (after Time adjusting)
The speed of the hour-engine is adjusted by choosing special parameter in the telescope control code. {The values of parameters are in registers R: R2: 22992; R3: 70; R4: 10; R5: 10; R6: 11. („Trackingadjusting“)}

2.6. If the telescope have been moved manually,

it is necessary, to set the telescope coordinate scale. Manually point the telescope to a bright star and set its coordinates. Then click on the star's icon (■ in section „Pointing“, right of „object RA, Decl“). You will be presented with the dialogue window. Fill in coordinates and click on OK.

3. Telescope pointing manually to the target (Fig. 3):

3.1. Release the declination fixation. The handles are on the delta axis, between the telescope's tube (on the right side) and the delta axis gearwheel cover (6; Fig. 3). Standing on the mirror side of the telescope, push the upper handle 6 away, and, if needed, pull the lower one nearer to you. Set the required declination value on the limb

(on the left side of the telescope) and fix it with one of the same handles. The finest partition on this limb is 20 arcmin. The limbs illumination switch 10 (Fig. 5) is on the hour angle limb

3.2. Calculate the hour angle of the object. (The difference between the sidereal time s and the right ascension α of the target: $t=s-\alpha$). Then release the hour axis of the telescope with the handle 7 (Fig.3), or with similar handle on the opposite side of the hour axis, and turn the telescope around the hour axis until the calculated value of the hour angle is reached. Fix the released handle of the hour axis.

Warning. The handle should not be rotated more than by one revolution. Prolonged rotating may damage the fixation mechanism !

The finest partition of the hour angle limb is 1 min (15 arcmin).

When the target star is rather bright, it is possible to directly point the telescope by releasing both the declination and hour angle handles and aiming the telescope at the target via the viewfinder, which has an ~11 deg field of view. If the sky background is dark enough, and the cross-hair of the viewfinder is not visible, the field can be illuminated using the switch 13 (Fig. 6).

3.3 The guiding star may be moved to the cross-hair of the guiding telescope (the guide) using the corresponding handpaddle (12, Fig.5). The guide has two oculars: for the straight viewing 14 (Fig. 6) – 1.6 deg field, and 90 deg viewing – 18 arcmin field. The cross-hair of the straight view eyepiece can be illuminated using the tumbler switch 15 (Fig. 6) and regulating the light with the rheostat 16.



Fig. 1. Roof off/on mechanism:

1p – steel rope; 2p – roof-off pulley-block; 3p – roof-on pulley-block; 4p – handle to rotate pulleys.



Fig. 2. Telescope electronics:

1 – The main power-on/off button; 2 – Safety fuses; 3 – Power on indicator; 4 – Power on individual switches.

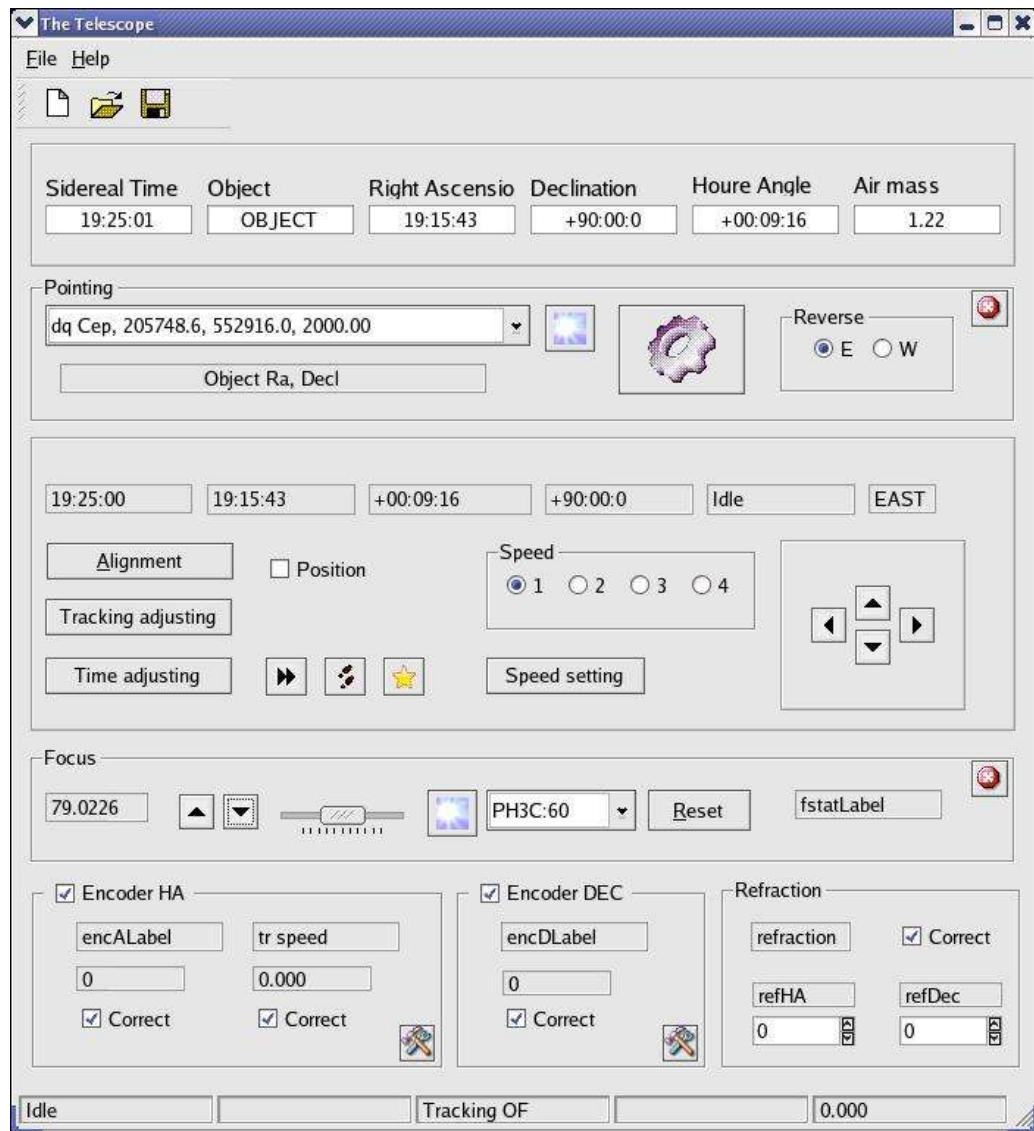


Fig. 2a. GUI panel of the telescope control program (from R.Janulis).

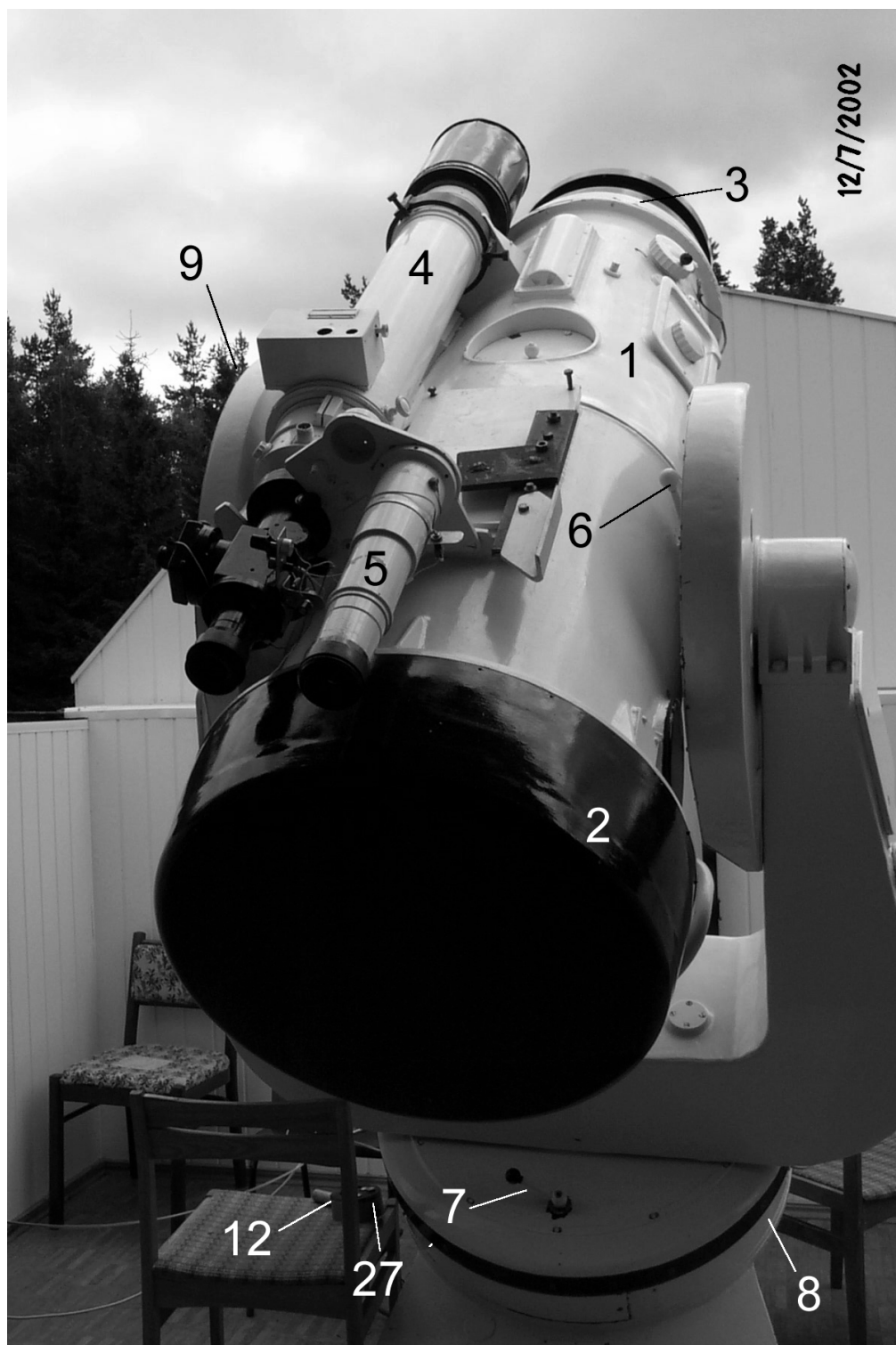


Fig. 3. General view of the telescope ACT-452:

1 – The tube; 2 – main mirror cover; 3 – meniscus holder; 4 – guiding telescope; 5 – viewfinder; 6 – declination fixation handle; 7 – hour angle fixation handle; 8 – hour angle (t) limb; 9 – declination limb.

3.4. To direct the star image to the 90 deg viewing narrow-field eyepiece, rotate the big handle 17 (Fig. 6) till the dead end. The cross-hair illumination of this eyepiece can be regulated with the rheostat 19 or can be switched off temporarily by pressing the red button 20.

To use the straight viewing ocular again, rotate the above mentioned handle 17 in opposite direction till the dead end.

3.5. Guide focusing may be performed with the handle 21.

The handpaddle (Fig. 5) has four buttons: 24 is for the declination and 25 is for the hour angle. There are three speed options which may be switched with the switch 23 of the handpaddle

4. Pointing to the target using GUI panel (PC)

When the coordinate scale is set on, pointing to the program star may be done by entering its coordinates. To enter new target coordinates, click on the star icon (☐ in Pointing section, at right-hand side from the line with object RA and DEC, on Fig. 2a) and after that a dialogue window will appear. Fill in the new coordinates and click OK to accept input or Cancel to discard. Click on the gear icon (⚙ in the same Pointing section) to point the telescope to the entered coordinates. During the movement of the telescope some information is displayed on the status bar of GUI panel. The pointing is accomplished when Tracking is indicated. If you need to cancel pointing, click on the icon „Cancel“.

The coordinates of earlier observed stars may be found on drop panel by clicking on the arrow at right of the „object RA, DEC“ bar. They can be used when pointing the telescope to object repeatedly.

5. CCD focusing

To change the focus, click on ▲ or ▼ (in the Focus section), or click on star icon (☐ in Focus section) to input focus position – the dialogue window will appear. Some defined focus positions are given for different filters. To select one – click on ☐

in the middle of the Focus section.

Focusing speed may be changed by setting the mark on the scale (slower – to the left, faster – to the right).

6. There are 4 correction speeds of the telescope position from PC. The correction speed is set by marking „Speed setting“ button (in the middle of GUI). Correction speed from the handpaddle and PC are independent and different.

7. Filter wheel control is performed by qfasu (Filter And Shutter control Unit) programme. Panel is shown in Fig. 3a.

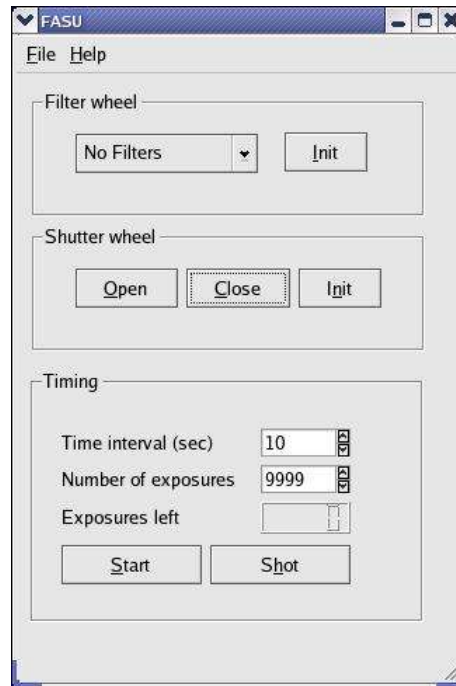


Fig.3a. Panel of the filter and shutter control program (from R.Janulis).

8. FINISHING OBSERVATIONS

8.1. Point the telescope to the South horizon (declination about -22 deg, hour angle = 0) and, if it was done manually, tighten both the RA and the DEC handles carefully.

8.2. Switch-off the electronics (in the equipment room or at the telescope).

8.3. Slide the roof on. Put the handle 4p (Fig.1) onto the right pulley-block axis and rotate the block counterclockwise while the roof reaches the dead end. The rotating must be slowed down near the end of closing not to bang the roof too hardly.

9. IN CASE OF POWER FAILURE

9.1. If after a cut-off power supply reappears, switch on everything again.

9.2. If power supply does not reappear, let's wait.

9.3. In the case of emergency switch out the equipment (by the switch on the western wall of the dome or within the equipment room (1 on Fig. 2.)).

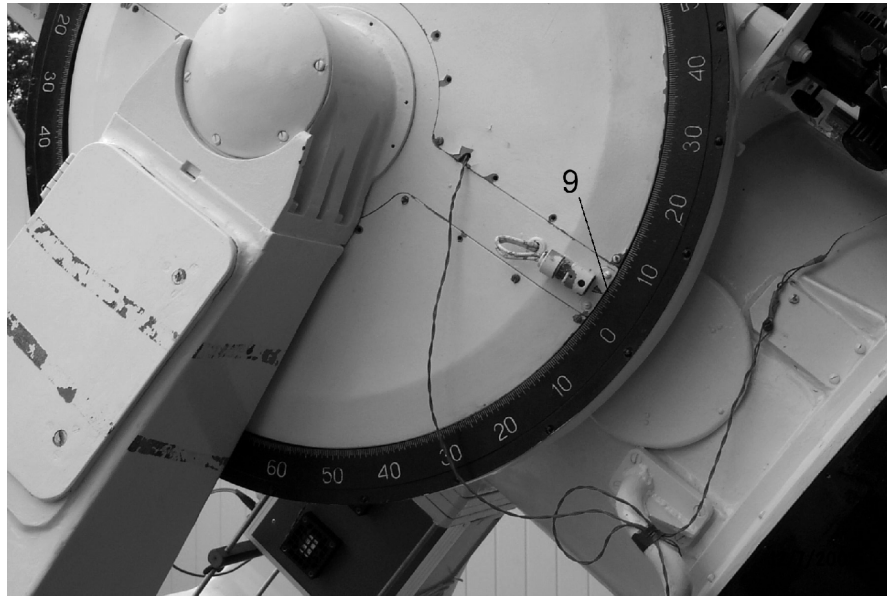


Fig.4. Limb of declinations (9). The smallest partition is 20 arcsec.

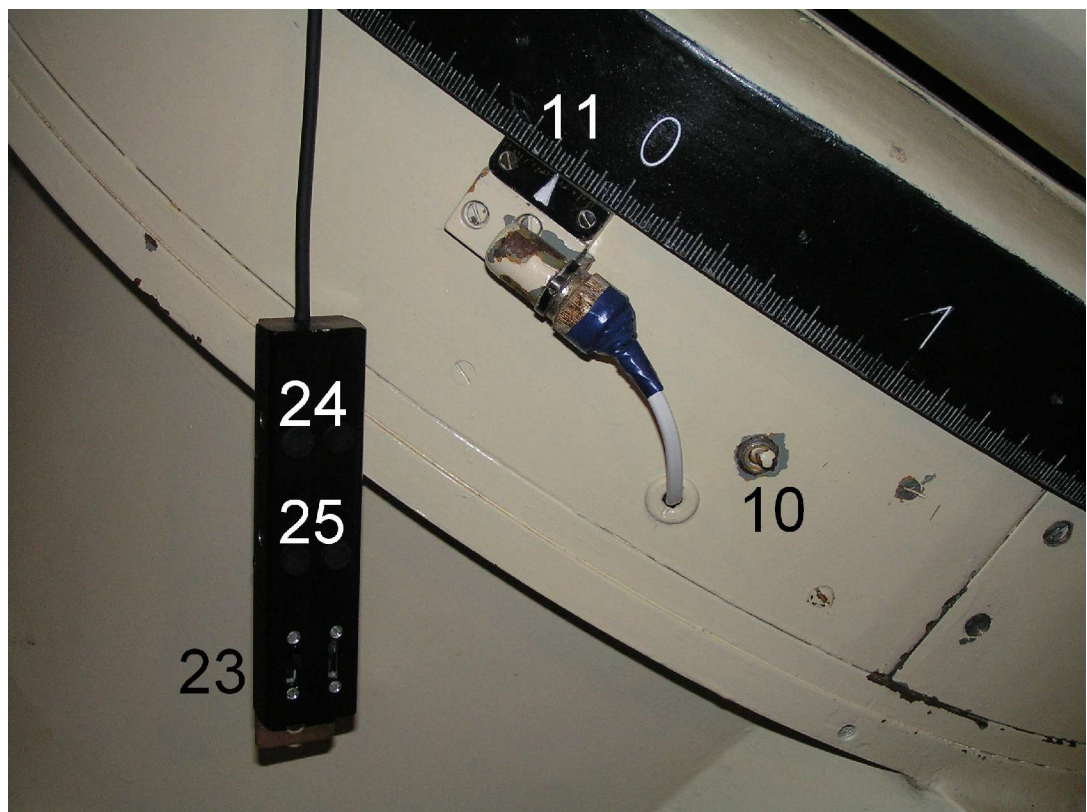


Fig.5. Limb of hour angle 11 (smallest partition – 1 m = 15 arcmin) and guiding handpaddle:

10 – thumblers switch of the illumination of hour limb; 11 – hour angle limb (also 8 in the Fig. 3); 23 – thumblers for guiding speed adjustment; 24 – declination guiding buttons; 25 – right ascension guiding buttons

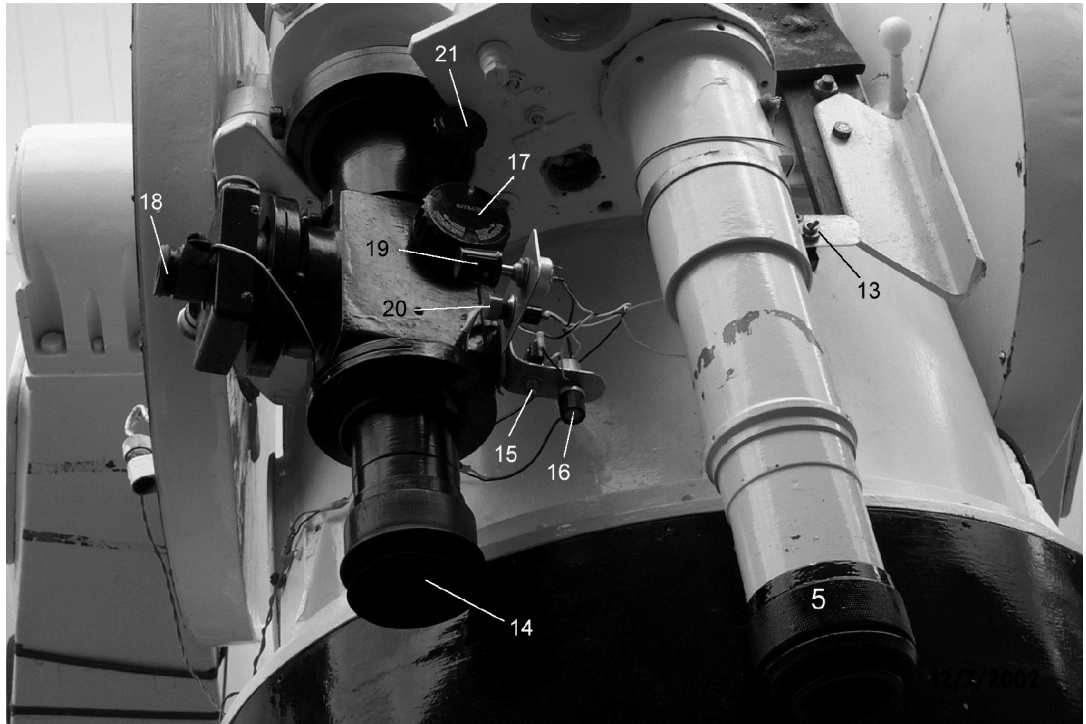


Fig. 6. Both oculars of the guide and the viewfinder (5).

13 – tumbler switch of the viewfinder field illumination; 14 – straight-view ocular of the guide (1.6 deg field) and its cross-hairs illumination switch 15 and intensity rheostat 16; 17 – round handle to position the mirror for directing the star beam to the small field (~18 arcmin) ocular 18; 19 – regulation of the small field ocular's cross-hairs illumination; 20 – button which switches-off the small field ocular illumination temporarily while the observer holds it pressed; 21 – guide telescope focusing handle.

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