

AST-B PERISCOPIC BINOCULAR

Original page 1

Use of the instrument

The AST-B periscopic binocular is used for artillery reconnaissance by observation, for determining the position of targets (objects), for correcting artillery fire and for the topographic linking of command-observation posts and observation posts.

Original page 2

Basic parameters of the AST-B periscopic binocular

Parameter	Without attachment	With attachment
Magnification	10x	20x
Field of view	0-84 / 5° /	0-42 / 2° 30' /
Resolving power	7"	5"
Exit pupil diameter	4.5 mm	3.0 mm
Distance of the exit pupil from the last eyepiece lens	19 mm	19 mm
Eyepiece focusing range	+/- 4 diopters	+/- 4 diopters

Construction data

Parameter	Value
Periscopic offset	325 mm
Horizontal angle measuring range	360° / 60-00 /
Vertical angle measuring range	+/- 18° / +/- 3-00 /

Original page 3

Additional parameters

Parameter	Value
Value of one division of the focal-plate reticle	0.05
Value of one reticle division with the attachment	0.025
Elevation-screw micrometer	0-01
Horizontal-scale micrometer	0-01
Length of binocular	600 mm
Length of tripod with legs extended	1545 mm

Weight data

Parameter	Weight
Weight of the AST-B periscopic binocular	6.6 kg
Weight of the complete illuminator	2.8 kg
Weight of the magnifying attachment	0.72 kg
Weight of tripod	6.2 kg
Weight of the set-up periscopic binocular	10.32 kg
Weight of the binocular case with additional accessories	4 kg
Weight of the auxiliary mount	0.9 kg
Weight of the tripod case	1.4 kg
Total weight of the periscopic binocular	22.62 kg

Contents of the set

The periscopic binocular set includes:

Component	Qty.	Component	Qty.
AST-B periscopic binocular	1 pc	Objective cap	2 pcs
Binocular case	1 pc	Bulb 2.5 V - 0.2 A	8 pcs
Magnifying attachment	1 pc	Bulb case	1 pc
Plumb bob	1 pc	Binocular tripod	1 pc
Binocular illuminator	1 pc	Tripod case	1 pc
Battery 2NK13-GOST9240-79 in case	1 pc	Optical cloth	1 pc
Battery bag	1 pc	Optical brush	1 pc
Green filter	2 pcs	Auxiliary instrument mount	1 pc
Sunshade	2 pcs	Desiccant insert	1 pc

Original page 5

Description of the periscopic binocular

The AST-B periscopic binocular consists of the following main parts:

1. Basic instrument (Fig. 1)
2. Tripod (Fig. 2)
3. Instrument case (Fig. 3)
4. Illuminator (Fig. 4)

Basic instrument (Fig. 1)

- It consists of two binocular tubes, item 1. The following optical elements are installed in the binocular tubes.
- Protective glass of the entrance aperture with anti-laser effect, item 20.
- Mirror 21 is inclined at 45° to the optical axis of the binocular. It changes the direction of the light-ray bundle by 90°, is secured in mirror holder 31 and is located in binocular head 27.
- Erecting prisms 23 erect the image inverted by the objective and change the direction of the rays coming from the objective by 90°.

Original page 6

- The vertical-angle measuring device 2 is located on a special sleeve that is rotatably mounted on the right side of the eyepiece tube. It is rigidly connected to the sleeve containing focal plate 24. The focal plate is a plane-parallel glass plate on which divisions are marked. In both the horizontal and vertical directions, three large divisions are marked from the centre (up-down, right-left). Each large division is divided into two small divisions. The value of a large division is 0-10 and that of a small division is 0-05. The shorter mark has a value of 0-025 and the longer mark has a value of 0-05. When the attachment is used, the values of the marks are halved. Vertical angles are read using elevation scale 7 and elevation-screw micrometer 8.
- Eyepiece lenses 25 consist of two pairs of lenses and are used to observe the image formed by the objective over a large field angle.
- Desiccant insert 28 is located in the upper part of each binocular tube and is used to dry the air inside the tube. It thus protects optical and metal components against the effects of moisture. A desiccant insert is also supplied in the accessories as a spare part.

Original page 7

- Erecting-prism housing 29 is part of the binocular tube. By means of eye-shaped lugs, it is connected together with the binocular tube to binocular holder 3. The binocular holder connects the two binocular tubes to each other and connects to the lower part of the binocular. The holder has knob 9 for setting the binocular in the vertical plane and securing screw 10 for locking the binocular tubes in any position.
- The lower parts of the tubes contain eyepieces with rubber eyecups 25a. The distance between the optical axes of the eyepieces is read on interpupillary-distance scale 6. The interpupillary distance is adjusted to the observer's eyes. Eyepiece focusing is possible within a range of ± 4 D.
- The lower part of the AST-B periscopic binocular (limbus), item 4 (Fig. 1), forms the base on which all moving elements are located. Worm gearing makes it possible to rotate the entire instrument about the vertical axis using the micrometer knobs as well as the levers for partial and general movement. A circular bubble level is used to set the instrument horizontal. For further work, the instrument must be oriented to magnetic north.

Original page 8

Orientation to magnetic north is provided by a built-in magnetic compass. The letters IO-C are engraved on its cover (explained in the source text as "south, north"). A device for locking the compass is located on its side. The black and red scales make it possible to set the instrument to the main direction, measure horizontal angles between the main direction and a target, etc. The scales have a division value of 1-00. Both scales are divided into 60 divisions (60-00). The scales are numbered with even numerals. Numbering on the black scale increases clockwise, while numbering on the red scale increases counter-clockwise. A pointer mounted above the scales allows accurate reading of both scales. The red scale is marked Y with a red index mark, and the black scale is marked B with a black index mark. The lower part of the periscopic binocular terminates in a ball stud. The ball stud is inserted into the ball socket on instrument tripod 5. A screw secures the instrument in a stable position on the tripod.

Note on Cyrillic markings: IO-C denotes south-north (Russian IO = юз, south; C = север, north). The symbols Y and B are period designations for the red angular scale and the black compass scale; they are retained in their original form in the text for easy comparison with the instrument.

Original page 9

Tripod (Fig. 2)

The tripod is used to place the periscopic binocular in the working position. For this purpose, under certain conditions, the auxiliary binocular mount may also be used (it is included with the equipment in the instrument case). The tripod has head 89 and three extendable legs 98, with tripod-leg rails 90. These are attached to the head by hinge screw 91 and nut 92. The required tripod height is obtained by extending or retracting extendable legs 98 and securing them with leg clamp 94. Ball lock 95 is used to secure the periscopic binocular in the working position. The metal spike of the tripod is used for firmly pressing the tripod with the instrument into the ground and setting it up in terrain. The tripod of the periscopic binocular is stored and carried in the tripod case.

Periscopic binocular case (Fig. 3)

The periscopic binocular case is used to store the binocular and its accessories. It consists of case 106 and hinged lid 107, on which latch 108 is mounted. Straps 109 are used to carry the case. In addition to the standard accessories, the periscopic binocular case also carries the magnifying attachment, sunshades, green filters and the auxiliary instrument mount. The accessories are arranged in the case so that the periscopic binocular cannot be damaged.

Original page 10

Illuminator (Fig. 4)

The illuminator is used when working with the periscopic binocular at night. It consists of battery 98 with a canvas bag, plug cap 103, cable 99, socket 100, focal-plate illuminator 101 and hand illuminator 102. The battery voltage is 2.5 V. Focal-plate illuminator 101 with a 2.5 V - 0.2 A bulb is fitted to the dovetail of the sleeve on the right binocular tube and illuminates the focal plate of the periscopic binocular. The hand illuminator is portable and is used to illuminate the scales when working with the instrument at night.

Fig. 1 - Basic instrument

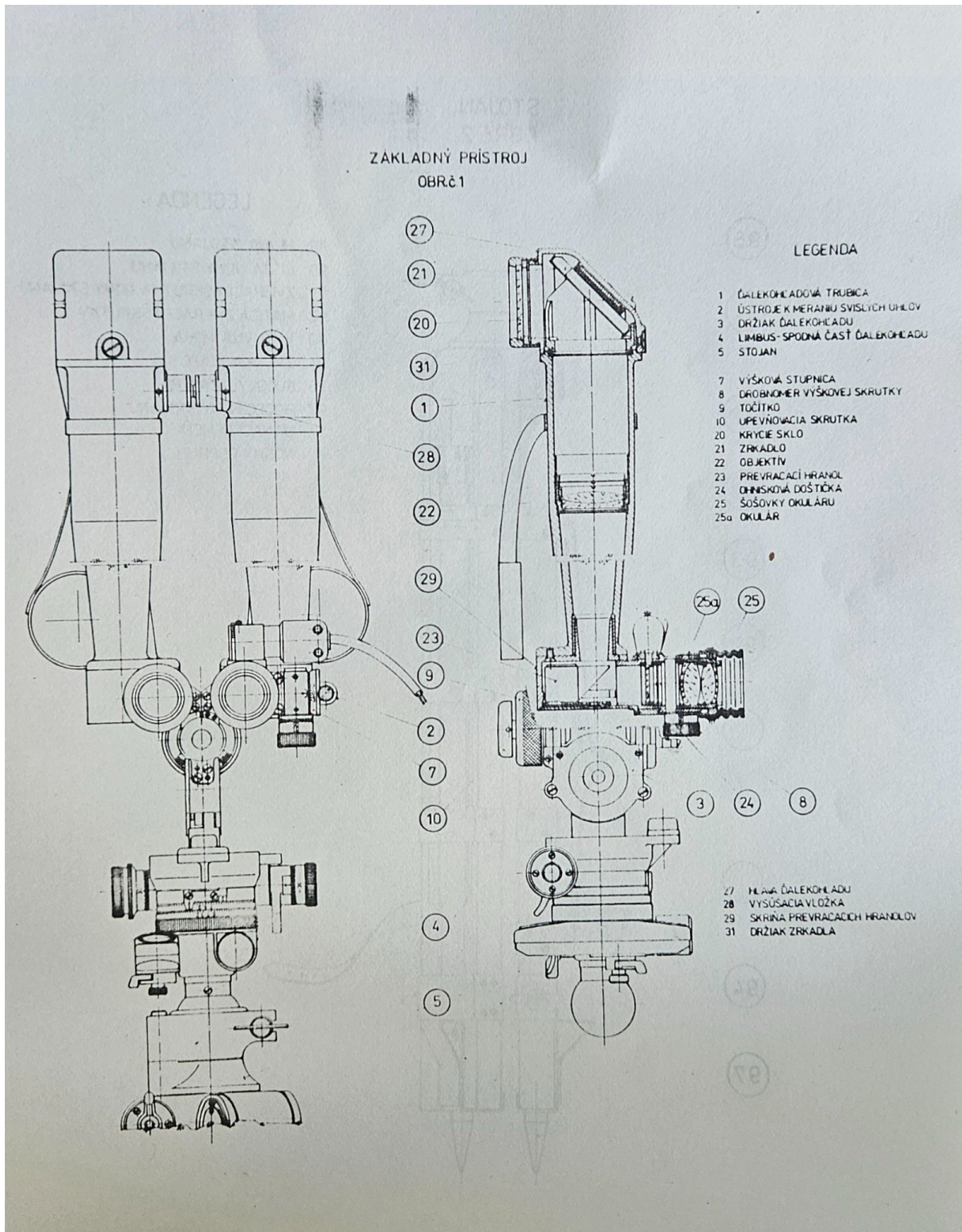


Fig. 2 - Tripod

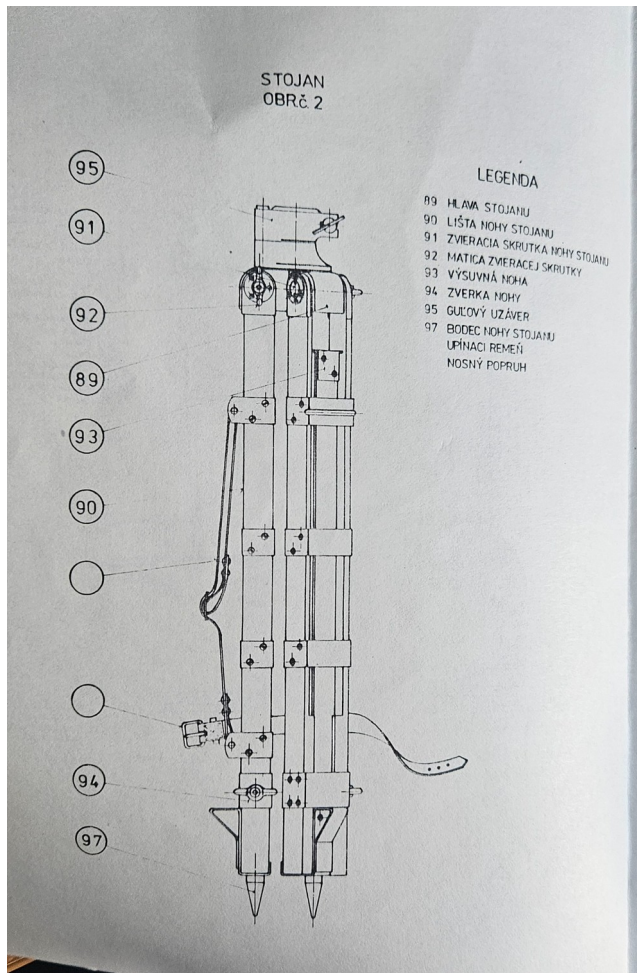


Fig. 3 - Binocular case

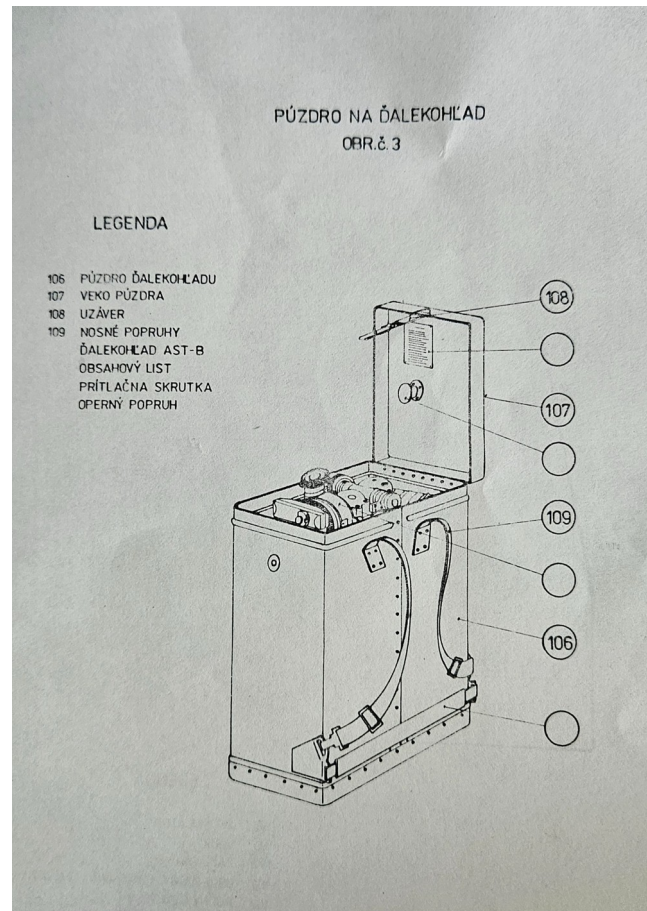
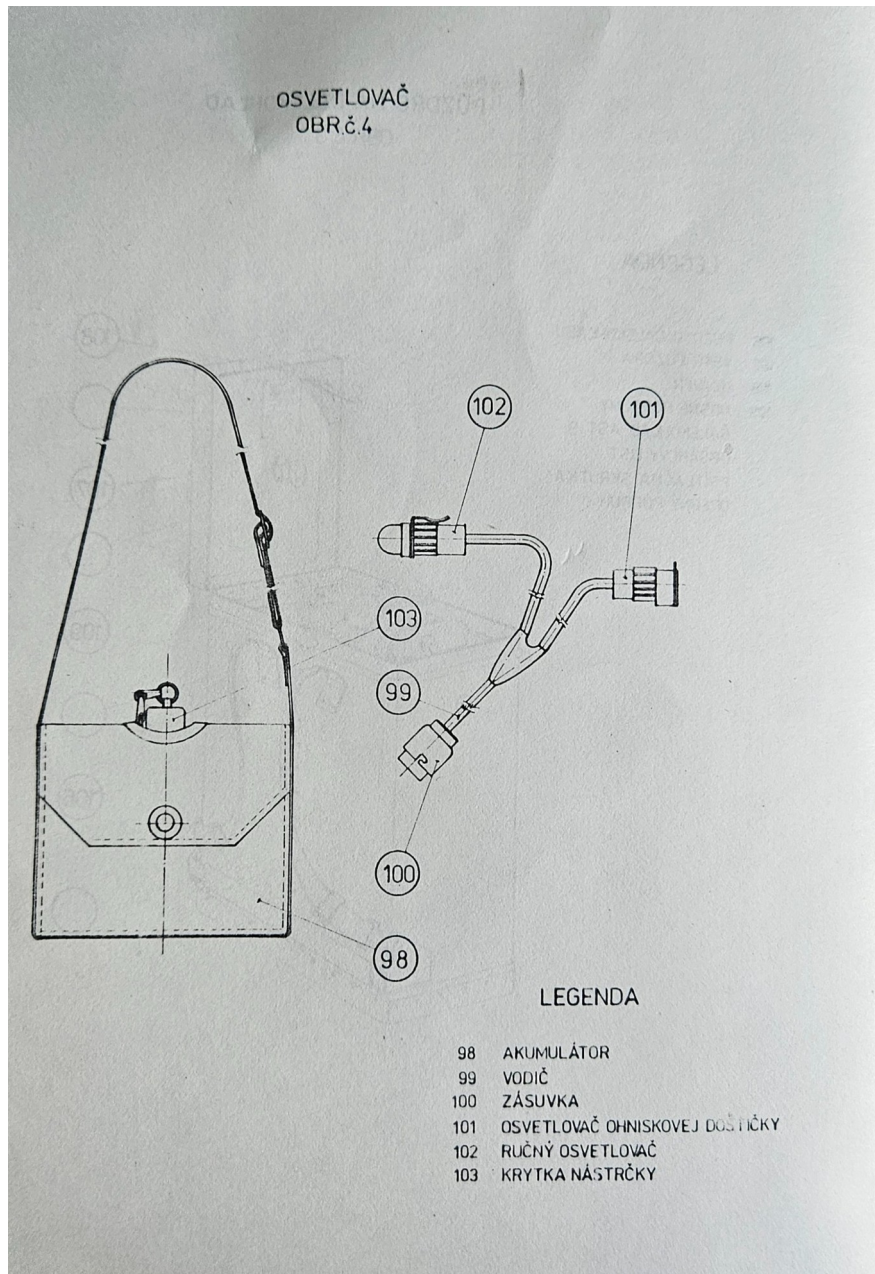


Fig. 4 - Illuminator



Placing the AST-B periscopic binocular into the instrument case

After work with the periscopic binocular has been completed, the binocular is to be placed in the instrument case as follows:

Screw the eyepieces into their end position.

Original page 11

Securely lock the magnetic compass and fit the protective objective caps. Switch off the switch on the horizontal scale and set the horizontal-scale micrometer to 44-00. Rotate the vertical-angle measuring device from right to left as far as it will go. Turn the securing screw and fold the binocular tube as far as it will go toward the base of the holder. Fold the left binocular tube onto the rubber stops toward the right binocular tube. Loosen the screw of the tripod ball socket and release the periscopic binocular from the socket. Place the binocular carefully and without force into the case so that it seats in the locating supports. The rubber eyecups point toward the strap side. After the lid is closed, the pressure screw in the case lid must firmly press against the folded binocular holder. The screw prevents any movement of the binocular in the case.

When storing, maintaining and caring for the AST-B periscopic binocular, the conditions specified in regulation Del.26-2 must be observed, with the following differences:

Differences between the AST-B instrument and the AST vz. 53 instrument

The AST-B instrument differs from the AST vz. 53 instrument as follows:

Original page 12

1. The protective glass of the entrance aperture has an anti-laser effect.
2. The optical components are made of passivated glass resistant to radiation.
3. The lower part of the instrument - the limbus (horizontal setting) - differs in having a built-in magnetic compass, a red scale, a micrometer for the red scale and a mechanism allowing general movement of the instrument. This makes it possible to orient the instrument to magnetic north.
4. The instrument is attached to the tripod by means of a ball stud. For this reason, the tripod head is also modified in the form of a ball lock, as on the tripod for the PAB-2A compass.

Original page 13

Transport of the AST-B periscopic binocular

The AST-B periscopic binocular may only be transported in the instrument case. The person responsible for transport keeps the instrument on their lap and must not strike it against hard objects. The periscopic binocular may be transported loose in a vehicle only if the vehicle is fitted with special shock-absorbing pads for this purpose (Del.26-2).

Storage of the AST-B periscopic binocular

The instruments are stored in the instrument case. The storage room must be dry, clean and heated where possible. The room temperature must not be lower than 8 °C. Acids, lubricants, salts and batteries must not be stored in a room where the instruments are kept.

Original page 14

Maintenance and care of the periscopic binocular

The periscopic binocular is an optical instrument sensitive to shocks and impacts. It requires careful handling by persons who come into contact with the instrument. These persons must be thoroughly familiar with practical use of the instrument and with its cleaning and care. Repairs to the AST-B binocular may only be carried out in accordance with regulation Del.51-4. For proper maintenance and care of the instrument, the following rules must be observed:

1. Do not remove the binocular from the case by force. If the instrument cannot be removed from the case, or can only be removed with difficulty, the cause must be identified and then eliminated. The instrument may be removed from the case only by the person responsible for its condition.
2. When securing the instrument in the ball socket, which must first be cleaned of dust and, where applicable, grains of sand, use hand force only. Securing the instrument with mechanical tools is prohibited.
3. Do not leave the set-up instrument unattended.
4. Before each use, remove dust from the instrument with a hair brush and the cloth intended for this purpose. Do the same before placing the instrument into the case, after first removing dust and dirt from the case. Wipe painted components with an oiled cloth.
5. Before cleaning, make sure that the cleaning materials intended for the task are absolutely clean. Otherwise they must be washed in warm water using cleaning agents.
6. Clean the external optical components as follows: first remove dust and small grains of sand, or other dirt, with the hair brush. Only then clean the optics with the cloth; breathe lightly on the glass so that it mists slightly, then wipe it with a circular motion from the centre toward the edges.
7. The cleaning materials (brush and cloth) are protected against contamination in a plastic bag and stored in a canvas bag in the instrument case.
10. The instrument must not be transported or stored in damaged cases with defects in the internal instrument securing arrangement.
11. The desiccant insert may only be removed and regenerated by heating during repair of the binocular in an optical workshop.
12. The transport of optical instruments, their storage, maintenance and care are covered in greater detail by artillery regulations Del.51-4 and Del.26-2. Batteries 2NK13-GOST9240-79 are supplied dry, and their further use is governed by SPOJ.29-6.

Original page 17

Translator's note: Angular values in the form 60-00, 1-00, 0-10, etc. have been retained exactly as written in the original military manual. The designations of regulations and components have likewise been preserved so that the English version can be compared directly with the original.

Original page 15

8. If it is necessary to work with the instrument in rainy weather, all available means must be used to protect it from rain and water. After work, the AST-B periscopic binocular, tripod and all other accessories used must be dried and only then stored. Under special circumstances (march-movement), cleaning must be carried out at the earliest possible opportunity. Drying the instrument in direct sunlight or near heating appliances is prohibited.
9. When working in freezing conditions, the instrument must not be moved immediately into a warm room, to prevent fogging of the internal optical components. The instrument must be left for 2 hours in an area where the temperature is only slightly higher than the outside temperature.

Original page 16

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