STATE UNITARY ENTERPRISE
PA "NOVOSIBIRSK INSTRUMENT MAKING PLANT"

OBSERVATION BINOCULAR INSTRUMENT

ПНБ-2

SERVICE MANUAL

АЛЗ.803.098 РЭ

CONTENTS

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

01.04

1 GENERAL INFORMATION

The binocular instrument ПНБ-2 is intended for observation and determination of angular coordinates of targets from stationary and temporary observation posts in the daytime and at night at searchlight.

The instrument is operable in the open air at a temperature from minus 40° to 50°C and at relative humidity up to 80%.

The following rules should be adhered to provide for proper operation of the instrument:

-protect the instrument against shocks and damages;

- do not touch the optical parts with fingers;

- remove dust, dirt and moisture from the optical partc with a clean napkin;

- replace the dryer in due time.

Attention! It is prohibited to lay the insitument on object along the vertical with knob 3 (Fig. 1) released.

Prior to begin operation with the instrument it is advisable to get known with the rules of inaintenance and the order of operation. When bying the instrument see to it that the package is in good order.

2 SPECIFICATIONS

Magnification	15
Field of vision, degree	6
Resolution power in tha centre of the field vision, s	4
Limits of angle measurement, degree:	
horizontal	360
vertical	minus 20...60
Diopter setting of eyepieces, D	minus 3...12
Overall dimensions, mm	400x318x320
Mass, kg:	
instrument	15
tripod	10

3 STANDARD EQUIPMENT

Instrument ПНБ-2	1
Tripod	1
Ball level	1
Drying agent in socket	2
Light filter (orange)	2
Light filter (neutral)	2
Eyepiece cap	2
Objective cap	2
Pipe union	1
Screwdriver	1
Wrench	1
Napkin	2
Cover	1
Case	1
Packing case for tripod	1
Service Manual	1

4 SAFETY RULES

The instrument should be reliably secured on the tripod. The tripod should be stable on the ground. Swinging ol the instrument and tripod is impermissible.

5 INSTRUMENT DESIGN

The instrument consists of two telescopes which are connected between each other in the bottom part and with post 9 (Fig. 1) by means of the mechanism of eye base with knob 2 (Fig. 2).

Each telescope is composed of the casing, objective, prism unit, eyepiece, dryer and blind. The objective is mounted in the front part of the casing, is secured with a ring and is, intended for obtaining the erect image of an object.

The prism unit is located in the middle part of the casing and serves as a reversing system.

The eyepieces serve for viewing images received from the objectives. They are attached to the rear wall of the casing. The right eyepiece is provided with the reticle. The image sharpness by the observer's eye is obtained by turning the eyepiece scales. The value of the eyepiece diopter setting is determined (in the range from minus 3 to 5 diopters) by the scales and indices on the eyepiece casings. Changeable light filters of a respective colour are used when necessary. The caps should be put on the eyepieces and objectives when the operation is over.

Headrest 4 (Fig. I) is inserted into the bracket'secured on casing 2 and is fastened by handle 3 (Fig.4). It makes convement the operation with the instrument.

The dryer filled with silica gel is attached to the casing and serves for constant drying of the inner cavity of the instrument. Silica gel condition is checked through protective glasses: dry silica gel is of blue colour, moist silica gel is of white-pink colour. Splines for the wrench are provided on the dryer's covers to screw them out in case of replacement.

Blinds 11 (Fig. 1) are put on casing 2 on the side of the objectives, protect the latter against lighting with the sun rays and serve to lessen ingress of dissipated light into the instrument.

Post 9 is intended for fixing the instrument on the tripod. The post design makes it possible to vary the direction of the instrument sighting line in the horizontal plane for 360°. Relative value of the sighting line direction in the horizontal planets determined by scale 8 with division value of 5° and the indicator secured on the post. Movable scale 8 provides for setting the zero position relative to the chosen direction. To prevent rotation the instrument is fixed in the horizontal plane by means of the knob.

Mounted on post 9 is the brake controlled by knob 3. The brake provides fixing of the instrument in the vertical position.

The direction of the sighting line in the vertical plane is determined by scale 6 (Fig. 2) with division vafue 5° and by index 1 with ball level 5 in the zero position. The ball level is fastened on post 9 (Fig. 1) and serves for levelling the instrument.

The changeable tripod is used as a support for the instrument when operating in standing position. The main parts of the tripod are head 3 (Fig. 3), pin 10 and three extensible legs 5

To protect against damage while in transport cap 4 is put on the pin. The tripod is portable by means of shoulder strap 1 with a buckle.

Handles 10 (Fig. 1) attached to casings 2 serve as the instrument controls.

The cover provides protection of the instrument against influence of rain, snow, dust in the intervals during operation.

6 OPERATION ORDER

6.1 Putting into working position

To put the instrument into working position proceed such as follows:

- take the tripod out of the packing case and remove wrap- ping paper;
- unbuckle strap 8 (Fig. 3) bracing the tripod legs 5;
- unscrew clamping nuts 9, set legs 7 at a required height and secure them with nuts 9;
- release legs 5 by turning pedals 2 upwards, turn them at an angle providing stable position of the tripod, secure them with pedals 2;
- install the tripod stable on the ground by pressing in stops 6 in the ground by foot;
- take off protective cap 4 from the tripod pin;
- wipe out the pin;
- take the instrument out of the packing case and wipe the
- install the instrument on the tripod pin and secure it with
- level the instrument by means of ball level 5 (Fig.2) with the aid of the tripod legs;
- unscrew nuts 9 (Fig.3);
- level the bubble of ball level 5 (Fig.2) by pulling legs 7 (Fig. 3) in or out;
- tighten nuts 9. The eyepieces in the installed instrument should be at the level of the observer's eyes.

If the instrument is levelled properly the level-bubble should not be disturbed by more than one division when the instrument is turned for 180° in azimuth.

6.2 Preparing for Operation

The instrument should be prepared for operation in ths tollowing sequence:

- remove protective caps from the objectives and eyepieces and wipe exlternalop'tical parts if necessary;
- set the eyepieces for sharp image. With this aim in view release the levelling brake. Then turning the instrument by handies 10 (Fig 1) with knob 3 pressed lay the instrument on some sharply outlined object located in the observation zone. Release knob 3. Obtain sharp image of the object observed in the eyepieces of both the tubes of the instrument alternately for each eye. (Here you may open the eyes or darken the input windows of the, instrument);
- set the eyepieces by the observer's eye base. In this case obtain proper visibility of the reticle viewfield (see Fig. 4) by turning knob 2 (Fig. 2) at binocular observation in the instrument. The viewfield of the instrument should be in the form of the solid circle;
- check for proper installation of the headrest. The pupils of the observer's eyes should be aligned with the exit pupils of the instrument. In this case the viewfield of the instrument should be observed without darkening or edge cutting. The headrest may be moved with handle 3 (Fig. 2) serewed out;
- orient the instrument in the terrainonknown landmarks as well as in-the direction north-south in the following way:

a) release the brake of horizontal laying;

b) bring in line the central csoss of the reticle with a chosen landmark or orient the instrument in the direction north-south by means of a compass turning the instrument by the handles with knob 3 pressed (Fig. 1);

c) set scale 8 of azimuth angles in the zero position, having released it by turning screws counter clockwise;

d) fix the scale in the zero position by screw 6;

e) then measure angles on the scale relative to lthe indicator index.

6.3 Operation with the instrument

The operation should be carried out in the following order:

- insert one of the light filters into the instrument, if necessary. (Slightly bend the filter mount in the places of its cut for reliable fastening on the eyepieces);

- pull out the blinds;

- release the brake of horizontal laying by turning the knob clockwise and carry out observation;

- lay the instrument on an object operating by handles 10 (Fig. 1) with knob 3 pressed, then release the knob, secure the brake of horizontal laying by turning the knob clockwise and carry out observation.

If you observe objects located at various distances from the observer the image sharpness is obtained by turning eyepieces 4 (Fig.2).

Attention! It is prohibited to lay the instrument on object along the vertical with knob 3 (Fig. 1) released.

The range measuring scale (Fig. 4) serves for measuring distance up to targets of 1.7 m high (man's growth). It is made in the form of two lines: horizontal and inclined ones. The marks with division value of 2 hectometers and, figures in each 2 marks are engraved over the inclined line. The scale limits are from 4 to 30 hectometers.

The target range is determined on the scale such as follows:

- lay the instrument on the target (1.7 m hieh) so that the lower point of the target lies on the horizontal straight line of the range measuring scale and the upper one - on the upper indined line with divisions;

- take the range reading in hectometers up to the target in the point of contact of the upper point of the target with the upper inclined line.

7 MAINTENANCE

The following procedures should be carried out:

- remove dust, dirt and moisture from the instmument;

- clean the external surfaces of metal parts. Wipe painted surfaces first with a rag wetted in benzine, then wipe them dry; coat unpainted parts with a thin layer of grease upon cleaning;

- clean the external optical parts with a clean napkin.

If the external opltical-parts are very contaltlinated clean them such as follows:

- wind a piece of cotton wool round a wooden stick and wet it in alcohol, ether ЭН or their mixture (10% alcohol, 90% ether), then by slight shaking remove excessive liquid;

- wipe the surfaces of optical parts with wetted cotton wool not touching the mount;

- replace the cotton wool and making round wiping from the centre to the edge end cleaning; avoid ingress of the solvent under lthe mount to protect safety of the packing putty.

The maintenance procedures require to check for reliable fastening of the instrument in the seat, for reliable fastening of the light filter mounts on the eyepieces, mobility of the blinds and their reliable fixing in the end positions;

remove common troubles (dents and blind bends, rubbed figures and lines on the scales);

regenerate the absorbing agent (silica get) of the dryers;

clean and dry the canvas cover.

The method of regenerating the absorbing agent is given in the Supplement.

8 TROUBLE SHOOTING GUIDE

Trouble, external display and additional features	Probable cause	Remedy
The terrain image in the instrument is poorly seen	Dust and dirt on the external surfaces of optical parts Optical parts are sweated	Wipe the externalopnical part Blow with dry nitrogen, check for sealing conditions Replace the dryers
Silica gel in the dryers is of pink colour	Silica gel is saturated with moisture	Replace the dryers
No level bubble is seen or the bubble gets enlarged and goes out beyond the limits of the ampule middle lines	The level goes out of order	Replace the dryers

9 STORAGE RULES

The following storage rules should be adhered to:

1. Put on the caps and cover on the instrument upon operating under stationary conditions.

2. Under field conditions proceed such as follows.

- put on the caps on the objectives and eyepieces;
- bring the eyepieces to maximum interpupillary distance by means of knob 2 (Fig. 2);
- incline the instrument down scat it touches post 9 (Fig. 1) by handles 10 with knob 3 pressed;
- put the instrument in the case;
- put on cap 4 (Fig. 3) on the tripod pin, assemble the tripod with pedals 2 and nuts 9 released, fasten them, tighten sliding legs 5 with strap 8, carry the tripod using shoulder strap 1.

Thoroughly inspected, clean and faultless instrument may be put into long storage.

The instrument with the sat of spare parts should be stored in the case.

It is forbidden to store the instrument on the floor, near ovens and by the windows. The store room should be dry and heated.

The air temperature in the room should be not lower 5°C, relative humidity (at 25 ± 10 °C) not over 70%.

The tripod is stored together with the instrument set.

10 ACCEPTANCE CERTIFICATE

The observation binocular instrument ПНБ-2, serial No _____ complies with requirements АЛ3.803.098 ТУ and is found fit for service.

Date of release _____

Signatures _____

REGENERATION OF SILICA GEL ABSORBTION ABILITY

To regenerate absorbtion ability of silica get, screw out the dryer cover, pour out silica get into a clean vessel and put it on a heat source (electric oven, ftre coals, etc.).

Direct contact of silica gel with fire is impermissible.

Regeneration is carried out at a temperature of 120°C during 16-20 hours, i. e. as long as silica gel colour will be intensively blue.

The regenerated silica gel should be cooled in closed vessel and then poured into the dryer cartridge. Then screw in the cover and insert the dryer into the socket.

It is forbidden to calcinate the dryer. The spare cartridge of the dryer without protective socket and regenerated silica gel should not be left in the open air for more then 2 minutes to avoid saturation of silica gel with moisture from the surrounding air.

Silica gel may be regenerated many times not disturbing its moisture absorbtion ability.

Though service lifeof silica gel gets reduced at its contamination. Therefore when assembling or dismantling the dryer and regenerating silica gel be careful, do not touch silica gel by hands, do not calcinate in a dusty room.

FIGURES

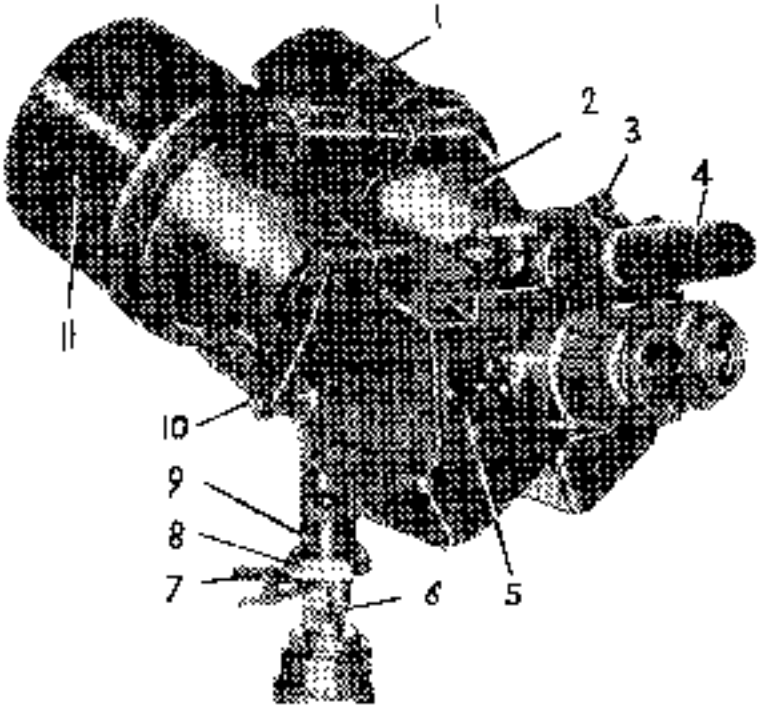

Fig. 1 **Article ПНБ-2. General view:**

1 - blind; 2 - casing; 3-knob; 4-headrest; 5 - label; 6 - screw;
7 - screw; 8 - scale; 9 - post; 10 - handle; 11 - blind

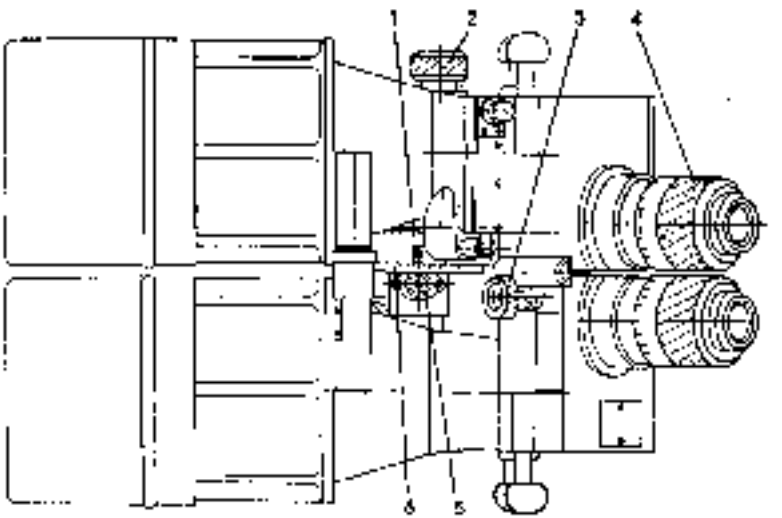

Fig. 2 **Artlcle ПНБ-2:**

1 - index; 2 - knob; 3 - handle; 4 - eyepiece; 5 - ball level;
6 - scale

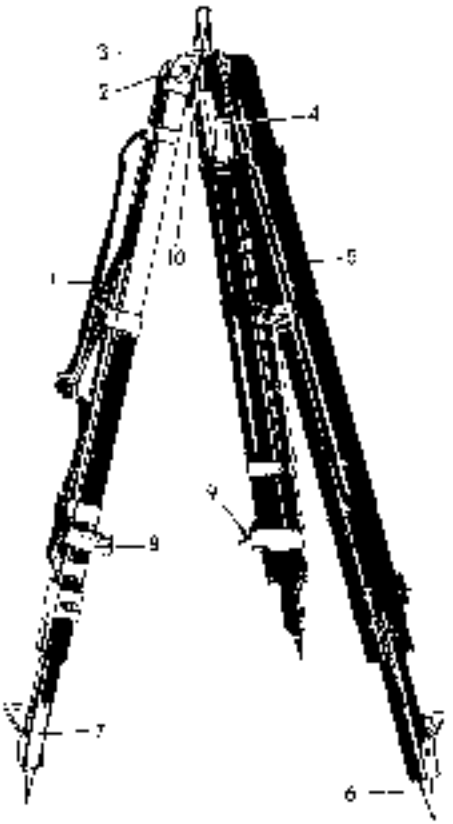

Fig. 3 **Tripod:**

1 - shoulder strap with buckle; 2 - pedal; 3 - head; 4 - cap with button; 5 - leg; 6 - leg stop; 7 - leg; 8 - strap with buckle; 9 - nut M6xl GOST 3032-66; 10 - pin

Viewfild

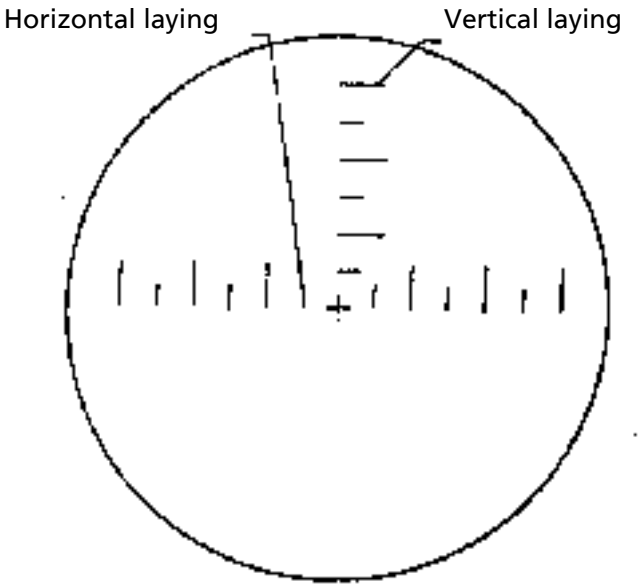

Fig. 4 **Field of vision**