PN23
NIGHT SIGHT
Service Manual

CONTENTS

INTRODUCTION

This Service Manual is intended for studying the operating rules of night sight model PN23 (hereinafter referred to as the "sight").

The Service Manual contains purpose, technical data, information on design and operating principles of the sight required for correct operation and full use of its technical capabilities as well as a troubleshooting guide.

CAUTION! DO NOT switch on the sight in the day time without the light filter cap being put on the objective lens.

DO NOT point the sight at bright subjects such as the sun, welding etc, and never observe such shining objects as the direct light of headlights, fire, flares, etc., at night–even with the light filter cap being attached.

1 DESCRIPTION AND OPERATION

1.1 Purpose

1.1.1 The sight is designed for terrain observation, detection and recognition of targets, and for aimed firing with smallarms, caliber 5.45 to 9.3 mm, during natural night illumination from $(3–5)\cdot10^{-3}$ lux to 1.5 lux.

1.1.2 For this a 3rd -generation image-intensifier tube (hereinafter referred to as the "IIT") is used.

1.1.3 A built-in infrared (IR) illuminator allows observation and aimed fire under low-light and completes darkness.

1.1.4 The sight operates within the ambient temperature range of plus 40 °C to minus 40 °C and relative humidity up to 98 percent at a temperature of 25 °C.

1.2 Specifications

1.2.1 Sight specifications shall correspond to those specified in Table 1.

Table 1

Specifications	Value	Note
Recognition range, meters		
- s IIT 2+ Gen	300	
- s IIT 3 Gen	400	
Magnification rower, x	3	
Field of view, degrees	12	
Aperture ratio	1:1.6	
Eye relief, millimeters	35	
Aiming line adjustment range:		
by height	±0-10	
by direction	±0-10	
Supply voltage, volts	1.1–1.5	
Hours of continuous operation without battery replacement; within temperature range of 0° C to plus 40° C:		
without IR illumination	15	
with IR illumination	6	

1.2.2 Variable technical specifications for different kinds of sights, depending on mounted bracket, are shown in Table 2.

Table 2

Sight modification	Overall dimensions (mm), maximum tolerance	Weight (kg), maximum tolerance	Figure	Note
PN23	210×91×79	0.74	A.1	Bracket type is selected by customer
PN23-01	235×91×95	0.9	A.3	For Picatinny rail (Weaver rail)
PN23-02	210×91×167	1	A.4	"Tigr", "Tigr-9-1", "Sayga-5.6C", S"ayga-20K", "Sayga-M3", "Sayga-308-2", "Vepr"

1.2.3 The sight provides detection and recognition of targets as well as direct aimed firing at distances of under natural night illumination conditions, in the complete darkness, and in the day time.

Reliable recognition range depends on ambient natural illumination, air transparency and contrast between the target and the background. Recognition range increases at higher illumination levels (moonlit nights), upon availability of external lighting, and if a target is located against light background (sand, snow). Under low illumination levels such as low cloud cover, decreased air transparency, or the target being located against a dark background (soil, forest, etc.) recognition range decreases.

1.2.4 The sight is powered by one AA 1.5 V battery.

1.3 Included Parts

1.3.1 The complete set's specifications are in Table 3.

Table 3

Name	Q-ty	Note
Sight PN23	1	Without power supply
Screw M3×14*	2	
Screw M6×12*	4	
Combination Wrench-screwdriver	1	
Allen Wrench (4 mm)*	1	
Allen Wrench (2 mm)	1	
Eyeshade*	1	
Guide*	1	
Cloth	1	
Bag*	1	
Case*	1	
Service Manual	1	

* Supply is determined by the terms of the contract

1.4 Design and Operation

1.4.1 The sight operating principle is based on intensification of a dim image created by the objective lens on the photocathode of the image intensifier tube (IIT), creating an image with sufficient brightness so that it can be viewed through the eyepiece.

1.4.2 Structurally the sight consists of the objective lens, 2 (Figure A.1), and the body, 3, in which the IIT, reticle, adjustment mechanism, eyepiece, IR illumination and the others details are housed. Optical parts of the objective lens, 2, are arranged in their own frame connected with the body by a threaded fixture.

1.4.3 The sight has the following controls:

— handwheel, 12: Switches on/off the sight and adjusts the reticle illumination brightness marked by the sign ⏻ and white-dot position indicator;

— handwheel, 5: Switches on/off the IR illuminator marked by the sign ☼ and white-dot position indicator;

— handwheel for elevation adjustment, marked with the **"U↔D"** symbol and covered with a cap'

— handwheel for windage adjustment, marked with the **"R↔L"** symbol and covered with a cap 8.

1.4.4 Handwheel 12: **"On"** is marked by the white dot, **"Off"** by red dot. Both positions have detents.

Within 1-4 seconds of the sight being switched on, the eyepiece should appear yellowish-green with black reticle markings.

Handwheel 12 also activates the illumination reticle with red luminodiode and regulates reticle brightness. The reticle brightness increases when you turn Handwheel 12 clockwise (direction is shown by ) .

1.4.5 Handwheel 5 has three fixed radiation levels, that are marked on the sight body:

The red dot indicates the IR illuminator is on;

– – IR illuminator is on the average power;

– – IR illuminator is on the maximum power.

The illuminator design allows the user to align the illuminator to the sight.

1.4.6 The reticle variations in sight field of view are shown in Figure A.5.

The point of aim and reticle lines appear light red on the yellow-green IIT screen background when illumination is switched on.

1.4.7 Every **"U↔D"** and **"R↔L"** handwheel alignment mechanism has increments, 3 (Figure A.2). Each increment line changes the alignment lock by a value of 1 centimeter per 100 meters, as marked on the back of the handwheel.

1.4.8 To protect IIT from light overloads more than 10^{-1} lux and to adjust the sight in the day time and at dusk, there is a flexible light filter cap, 1 (Figure A.1).

1.4.9 There is a battery compartment in the body, 3, closed by a cap, 14, connecting pipe for shank bore blowing of the sight, which is closed by cap, 7.

The cap, 14, is attached to the body by a tether, 13, to avoid loss.

1.4.10 The eyeshield, 9, facilitates eye orientation in the sight's exit pupil and protect against damage. It is attached to the eyepiece assembly.

Ring, 10, allows diopter shifts of eyepiece.

1.4.11 The manufacturer logotype, name PN23 and serial number of the sight as well as battery sign and positive polarity **"+"** sign are applied on the body, 3.

1.4.12 The bracket, 1 (Figure A.3 or A.4), allows for mounting on weapons with 1913 Picatinny rails or dovetail mounting types.

1.5 Tools and Accessories

1.5.1 The cloth is intended to wipe external surfaces of optical parts and to clean contacts of batteries and battery compartment.

1.5.2 If you need to increase the exit pupil (position of the observer's eye,) attach the eye relief from the set of compartment parts. The eye relief included provides an exit pupil of 50 mm.

1.5.3 The combination wrench-screwdriver is used to tighten the screws 2 (Figure A.3) when you install the sight on a weapon.

1.5.4 The hex-head wrench (4 mm) is used to tighten the fastening screws of the bracket, 1 (Figures A.3 and A.4), to the sight body.

1.5.5 The hex-head wrench (2 mm) is used to tighten the fastening screws of the adjustment handwheel, 2 (Figure A.2), and mount rail screws, 4 (Figure A.3).

1.5.6 Rail, 3, designated as the Picatinny rail, is used for installing additional external devices on sight. This rail is mounted on the sight by screws, 4, as shown in Figure A.3.

1.5.7 The bag is used for packing, transportation and storage of the sight.

2 INTENDED USE

2.1 Operating Constraints

2.1.1 To ensure reliable operation of the sight, **DO NOT**:

— switch on the sight in the day time or at dawn/dusk without the light filter cap, 1 (Figure A.1), covering the objective lens.

Caution! Day light will damage the sight!

— direct the sight at bright light sources (flames, sparks, headlights, etc.) even with the light filter cap on;

— cause mechanical damage to the sight.

2.1.2 Turn off the sight using handwheel, 12, if bright light sources suddenly appear in the field of view.

2.1.3 Turn the sight off after use.

2.1.4 Prevent contact between the battery and various metal parts.

2.1.5 The battery should be removed when not in use in order to avoid the sight from being unintentionally switched on. This will also help to extend battery life in below-zero temperatures.

2.2 Preparation of the Sight and Operation Procedure

2.2.1 To bring the sight into operating position during day time and at dawn/dusk, perform as follows:

— attach the light filter cap, 1 (Figure A.1), to the sight's objective lens;

— remove the cap, 14, and insert the battery insuring proper polarity;

— fsten the cap, 14, firmly;

— mount the sight on a weapon.

The sight should be firmly mounted, ensuring against wobble or slip.

2.2.2 If the sight is attached with a side bracket and is wobbling or the handle, 2, of the bracket, 1 (Figure A.4), cannot be turned up to the stop when the sight is fastened secure, then adjust the sight's bracket clamp, 1:

— remove the sight;

— adjust latch, 3, with the combination wrench-screwdriver, having released it from under the screw head, 4, and then remove;

— shift the handle, 2, by the number of teeth necessary to secure the sight to the weapon;

— position the latch, 3;

— check the sight mounting on the weapon and repeat adjustment if necessary. The sight is mounted on the Picatinny rail by tightening the nuts, 2, of the rail, 1 (Figure A.3).

2.2.3 To bring the sight into operating position:

— switch on the sight using handwheel, 12 (Figure A.1); the field of view should glow yellow-green in 1 to 4 seconds;

— if necessary, switch on the reticle illumination (red) by turning the handwheel, 12, clockwise and keep turning it to set optimal brightness of the aiming mark;

— turn the diopter ring, 10, until the optimal quality of the reticle's aiming mark is reached.

Aiming is performed by the top of the central aiming mark

2.2.4 A weapon with the sight must be zeroed in. Zeroing in is performed in the day time with the light filter cap attached:

— place a meter-square target at a distance of 100 meters;

— fire three or four single shots carefully at the same point;

— determine a mean point of impact (MPI) by holes in the target.

If MPI is more than 5 centimeters from point-of-aim, remove protective caps, 6, and, 8 (Figur A.1), and adjust the sight as follows:

— turn the screw **"U↔D"** in the direction of the arrow, towards the **"D"** sign if MPI is above the aiming point, and **"U"** if it is below the aiming point. Turning the screw **"U↔D"** by one click corresponds to MPI shift by 1 centimeter at 100 meters;

— turn the screw **"R↔L"** in the direction of the arrow towards the **"R"** sign if MPI is on the left of the point-of-aim, and in the direction of the arrow towards the **"L"** sign if the MPI is to the right. Turning the screw **"R↔L"** by one click moves the point of impact 1 centimeter at 100 meters;

— check if the sight adjustment is corrected by repeated shooting;

— switch off the sight using handwheel, 12;

— loosen the three screws, 1 (Figure A.2), using wrench S=2 mm;

— align the zero-line scale with index, 4;

— tghten the screws, 1;

— screw on the caps, 6 (Figure A.1), and, 8, firmly.

After adjustment, fire again to confirm zero.

2.2.5 The IR illuminator, 4, must be adjusted at night with the light filter, 1, cap put on the objective lens as follows:

— loosen the nut, 15;

— switch on the sight using handwheel, 12;

— switch on the IR illuminator using handwheel, 5;

— align the illuminator spot with sight's center, observing the sight and inclining the right-left IR illuminator frame, 16;

— tighten up the nut, 15, holding IR illuminator frame, 16;

— switch off the IR illuminator and the sight.

Caution! DO NOT turn around the axis IR illuminator frame, 16.

— switch off the IR illuminator and the sight.

3 MAINTENANCE

3.1 General Instructions

3.1.1 Keep the sight clean and protect it from dust and dirt. External surfaces of optical parts must be always clean.

To ensure reliability of the sight during operation, **DO NOT**:

— disassemble the sight;

— switch on the sight during day time or at dawn/dusk without the light filter cap;

— use other types of electrical power;

— store the device with batteries inserted.

During sight maintenance, perform the following actions:

— wipe the sight to remove dust, dirt and moisture;

— check battery contacts for corrosion;

— use a clean cloth to remove greasy contaminations from the glass; in case of severe contamination clean it using alcohol.

3.2 Safety Measures

3.2.1 Ensure secure fastening of the sight on a weapon to avoid injuries during operation.

3.2.2 Prevent excessive pressing of the eyeshield when using the sight. To avoid eye injury, the eyeshield can be pressed only until a well-defined boundary of the sight's field of view appears (for not more than 5 mm).

3.2.3 To avoid pollution of the environment it is recommended to dispose used batteries in the special places, assigned for this purpose.

4 TROUBLESHOOTING

4.1 If the sight does not work, check:

— the sight's secure mounting;

— if the light filter cap, 1, is put on the objective lens. 2;

— that there is no dust, dirt, oil, frost or water on the objective lens and the eyepiece;

— that the battery has power;

— that the sight is turned on;

— that the battery in inserted correctly.

Draw special attention to the cleanness of battery contacts.

4.2 Both potential consequences of failures and damages and instructions on their elimination are given in Table 4.

Table 4

Failure	Probable cause	Method of elimination
IIT screen shining is low or absent	1 The battery is low	1 Replace the battery with a serviceable one
	2 The battery is installed incorrectly	2 Insert the battery correctly according to polarity
	3 IIT is damaged	3 Send the sight to repair shop
Brightness of image rises to the maximum and then falls to the extremely low level; or the image has oscillating brightness that obstructs sight operation	Light overload	Put the light filter cap on the sight's objective lens

Table 4 (continued)

Failure	Probable cause	Corrective action
Scene image is poor and smeared	Formation of dew or dirt on the external surfaces of the objective lens or the eyepiece	Wipe external surfaces of the eyepiece and the objective lens with a cloth
Image is poor and smeared. There are flashes and blinks in the field of view of the sight	Formation of dew on the external surfaces of the objective, the eyepiece and photocathode of IIT	Send the sight to the repair shop to dry and seal
There are dark spots in the field of view that obstruct sight operation	IIT is damaged by exposure to point-light sources. Flaking of the photocathode or the screen of IIT	Send the sight to repair shop
Low illumination of the reticle or full absence of illumination when IIT is illuminated	1 The reticle illumination device is disabled 2 The battery is low	1 Send the sight to repair shop 2 Replace the battery

5 STORAGE

5.1 Store the sight in a heated room with ambient temperature ranging from 5 °C to 35 °C all year and with relative humidity not exceeding 85 percent.

5.2 Store the sight in the case without battery.

6 ACCEPTANCE CERTIFICATE

PN23 ____ night vision sight, serial №_____, are manufactured and accepted in accordance with the mandatory requirements of state standards, effective technical documentation and are found fit for operation.

Date of issue _____

Signatures _____

_____

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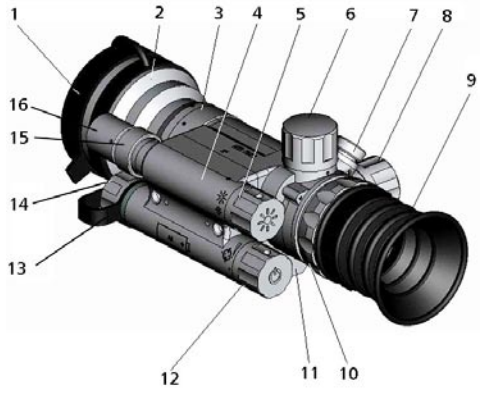
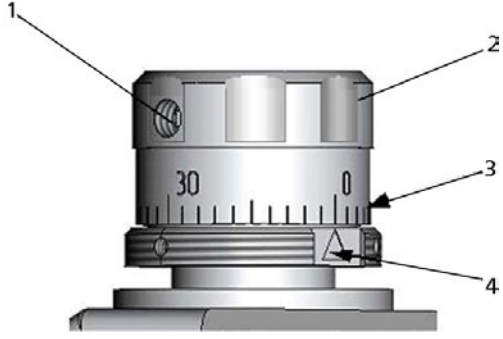
APPENDIX A

List of Figures



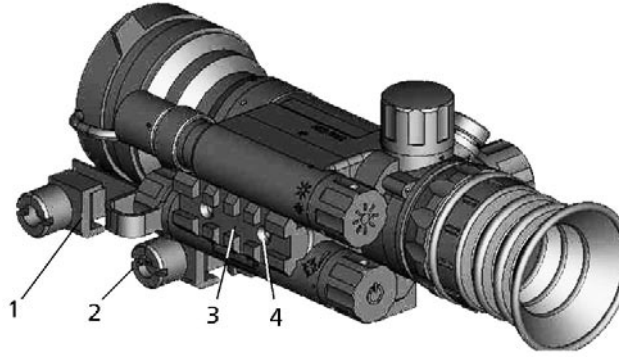
1 – light filter cap; 2 – objective lens; 3 – body; 4 – illuminator; 5 – handwheel;
6 –elevation adjusting mechanism cap;7 – connecting pipe cap;
8 – windage adjusting mechanism cap; 9 – eyeshade; 10 – diopter ring;
11 – transitional rail; 12 – handwheel; 13 – belt; 14 – cap; 15 – nut; 16 – mounting

Figure A.1 – **PN23 sight (without guiding)**



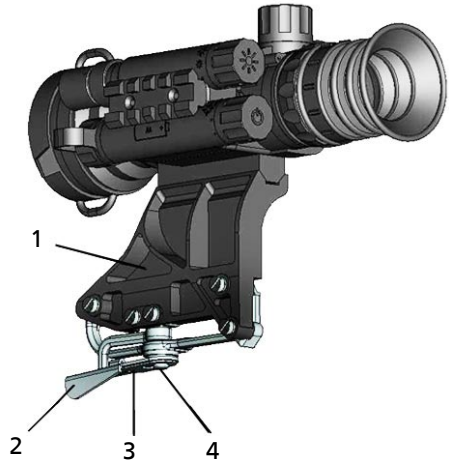
1 – screw; 2 – handwheel; 3 – scale; 4 – index

Figure A.2 – **PN23 sight adjustment**



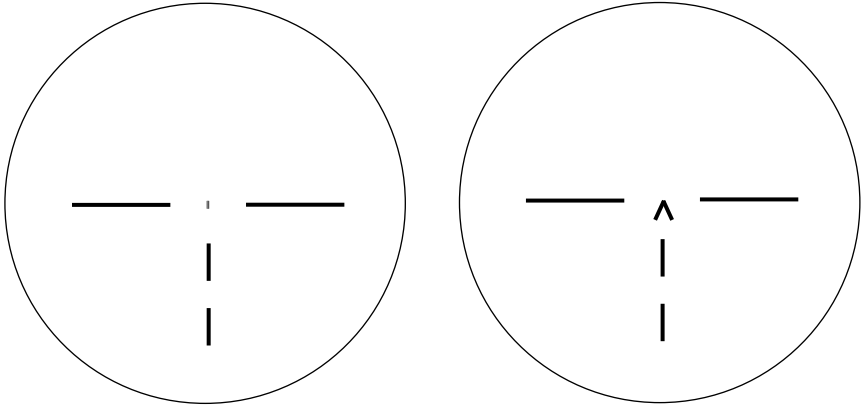
1 – bracket; 2 – screw; 3 – guiding; 4 - screw

Figure A.3 – **PN23-01 sight (with guide)**



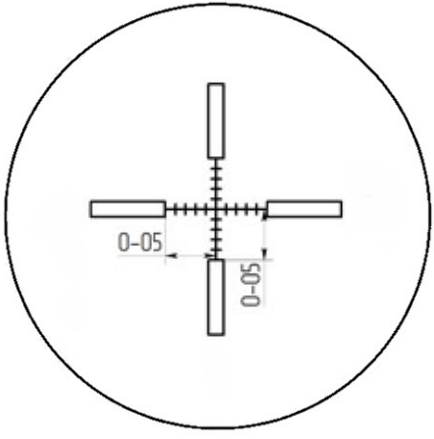
1 – bracket; 2 – hand; 3 – latch; 4 - screw

Figure A.4 – **PN23-02 sight (with guide)**



Variant 1 Variant 2

Figure A.5 – **Field of view**



Variant 3