ARTICLE 1PN91-2

Service manual

AL3.803.105 RE

CONTENTS

MAINTENANCE

REPAIR IN SERVICE

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The Service Manual is intended for studying of the design and operating rules of the article 1PN91-2.

The Service Manual contains information about the purpose, performance features, information about design and operation of the article 1PN91-2 which are necessary for correct running of the article and full usage of its technical capacities. It also comprises the list of the most probable consequences of failures and damages, as well as the methods of their elimination. Storage rules, requirements to transportation and information about operation of the article 1PN91-2 are also given in the Service Manual.

While studying the article 1PN91-2, it is necessary to use the following documentation:

AL3.803.105 FO "Article 1PN91-2. Logbook";

AL4.799.001 RE "Charge unit set. Service manual"

List of abbreviations:

NNI – natural night illumination

DM – daily maintenance

STA – spare parts, tools and accessories

CI – control inspection

OCC – ordinary climatic conditions

M.-1 – maintenance procedure N1

M.-1h – storage maintenance procedure N1

M.-2 – maintenance procedure N2

M.-2h – long storage maintenance procedure N2

IIT – image intensifier tube

ERD – radiodevices

DESCRIPTION OF DESIGN AND OPERATION

1 DESCRIPTION AND OPERATION OF THE ARTICLE

1.1 Purpose

1.1.1 The night distant observation device (index 1PN91-2), the article 1PN91-2 (hereinafter referred to as the article) is designed for battlefield observation, target recognition and adjustment of shooting at night.

It is possible to carry out the following operations with the help of the article: measuring of horizontal and vertical angles, defining azimuth and target angle of elevation, measuring distance to the target if its dimensions (height or direction) are known.

1.1.2 The article operates in ambient air range from -50 to +50 °C and relative humidity at 100% at temperature +25 °C.

1.2 Performance features

1.2.1 The main performance features must correspond to the table 1.

Table 1

Name	Value
Magnification, x	6.5
Angular field of view in the objects area	5.5°
Exit pupil diameter, mm	4.75
Eye relief, mm	50
Ocular setting range, diopter	from – 4 to + 4
Angle-of-adjustment range:	
for target position, etc.	from – 3-00 to 3-00
for horizontal, etc.	from 0 to 60-00
Limb scale factor:	
rough reading, etc.	1-00
fine reading, etc.	0-01
Focusing range, m	from 50 to ∞
Maximum voltage, mA:	
for sighting device consumption	40
for illuminator consumption	40
Power batteries voltage, V:	
two accumulators NLTs-0.9-1	2.4
two batteries R6 (AA)	3.0
element THL-316	3.6

Continuation of the table 1

Name	Value
Minimum continuous operation time of the viewfinder, the switch handle being in the position 11, without changing power supplies, h	
at temperature:	
from 0 to +50 °C	10
from 0 to -40 °C	3
-50 °C	0.5
Maximum time needed to get the article ready for the battle operation after power is switched on, sec	4
The sighting device maximum weight, kg	3
Maximum weight of the set in action position, kg	8
Maximum weight of the set in stowed position, kg	13
Overall dimensions of the sighting device, mm:	
height	164
length	351
width	130
Overall dimensions of the case, mm:	
height	200
length	707
width	400

1.2.2 The following types of batteries are used for power supply of the article:

- two accumulators NLTs-0,9-1;
- one element THL-316;
- two batteries R6 (AA).

1.3 Composition of the article

1.3.1 The delivery set must correspond to the table 2.

Table 2

Code	Item	Qty	Note
AL5.811.035	Sighting device	1	Without NLTs-0.9-1
AL5.189.109	Angle measuring device	1	
G42.14.067	Tripod	1	

Continuation of the table 2

Code	Item	Qty	Note
	Spare parts		
	Accumulator NLTs-0.9-1	8	Are delivered discharged
AL6.215.014	Bushing	2	*
AL6.548.035	Eyeshield	1	
AL8.634.062	Cap	1	
	Element THL-316	2	*
	Battery R6 (AA)	4	*1
	Tool		
AL8.896.023	Spanner	1	
	Accessories		
AL4.799.001	Charge unit	1	
AL5.100.062	Battery tester YK-316	1	
AL5.142.667	Illuminator	1	Without NLTs-0.9-1
AL6.274.184	Diaphragm	1	On AL5.811.035
AL6.354.592	Handle	1	
AL6.832.051	Soft cover	1	For AL5.811.035
AL8.890.001-01	Napkin	2	
AL8.918.272	Screw	1	
	Package		
AL4.162.001	Case	1	
AL6.830.084	Carrying bag	1	For AL4.799.001
AL6.832.186	Soft cover	1	For G42.14.067
1Ya27M.01.000	Suspension system	1	For AL4.162.001
	Documentation		
AL3.803.105 RE	Service manual	1	
AL3.803.105 FO	Logbook	1	
AL4.799.001 RE	Charge unit set. Service manual	1	

* Is delivered if mentioned in the supply contract.
*1 The definite element of standard size R6 (AA) is delivered according to the agreement with the customer.

1.4 Design and operation

1.4.1 The main components of the article are the sighting device 3 (Figure A.2), the illuminator 2, the handle 1 for fastening the illuminator on the sighting device for carrying the sighting device, the tripod 5 on which angle measuring device 4 with the sighting device are fastened.

1.4.2 The operation principle of the sighting device is based on the electro-optical intensification of the image brightness of the objects (targets) at night to such degree which is sufficient for eye observation.

1.4.3 The sighting device operation at night is provided by the IIT A2 (Figure A.1) of heightened sensibility with micro channel intensification and automatic adjustment of the screen brightness. The image of objects with little brightness is projected to the photocathode of the IIT A2 by the objective 1, the IIT is located in the focal plane of the objective 1.

The object image with intensified brightness on the screen of the IIT A2 is transferred to the plane of the reticle 3 by the erector 2 and is viewed together with the reticle 3 through the ocular 4.

1.4.4 The figure A.6 shows the field of view of the sighting device (each angle dimension between the lines presents one-thousandths part of the real distance).

1.4.5 When the switch SA1 (Figure A.1) is switched on, 2.0 – 3.6 V voltage is given to the IIT from the power supply G1 and G2.

1.5 Design and operation of the components of the article

1.5.1 The sighting device3 (Figure A.2) consists of the following parts:

– the objective 1 (Figure A.3) which is intended for projecting image of the observed aim of little brightness to the photocathode of the IIT A2 (Figure A.1);

– the ocular 8 (Figure A.3) which is intended for observation of the object.

1.5.2 The sighting device has the following controls:

– the handle 2 which is intended for switching on the sighting device and for switching on the reticle illumination;

– the diopter ocular setting ring 5 which allows to adjust the ocular according to the diopters of the observer;

– the handwheel 12 which is intended for obtaining sharp image of the observed object at the corresponding distance and for the compensation of defocusing when the temperature changes from +50 to –50 °C.

1.5.3 The tripod 5 (Figure A.2) is intended for fixing the sighting device 3 with the angle measuring device 4 on the ground while working with the sighting device in lying or sitting position.

Adjusting of the tripod height is carried out with the help of the telescopic supports 1 (Figure A.4), whose position is fixed with the help of the nuts 2.

The strap 3 is intended for tightening of the legs 4 during transportation.

When stored and transported in the case, the tripod is put into the soft cover 17 (Figure A.9).

1.5.4 The angle measuring device 4 (Figure A.2) is intended for the following:

– setting of the sighting device 3 on the tripod and its horizontal and vertical aiming at the object of observation;

– orientation of the sighting device with the help of the aiming circle corresponding to the direction of the magnetic meridian (North-South);

– measuring of the horizontal, vertical and direction angles.

1.5.5 The angle measuring device has the following parts and controls:

– the handwheel 8 (Figure A.4) for the sighting device aiming in the horizontal plane. The value of the horizontal angles is read on the scale 7 while observing through the lens 15;

– the handwheel 13 for the sighting device aiming in the vertical plane. The value of the vertical angles is read on the scale 11 through the lens 12.

The measure limit for the vertical angles is ± 3-00. The black figures of the scales correspond to the positive angles, the red scales – to the negative ones;

– the round level 16 controls setting of the angle measuring device in regard to the horizon;

– the aiming circle 14 defines the magnetic meridian (North-South) position;

– the handle 6 releases the scale 7 from fixation and sets any reading on it;

– the handle 9 fixes the location of the sighting device on the seat 10 of the angle measuring device;

– the screws 18 and 19 fix the aiming circle position during adjusting;

– the handwheel 17 fixes the needle of the aiming circle 14.

1.6 Measuring tools, tools and accessories

1.6.1 The spanner 7 (Figure A.9) is intended for screwing out the ring 2 (Figure A.5) which fixes the cap 1 of the illuminator 6 switch (Figure A.9), for screwing out the screws 10 (Figure A.3) and 3 mechanisms for direction and height adjustment and for screwing out the screws 17, 18 (Figure A.4) during adjusting the aiming circle.

1.6.2 The charge unit 1 (Figure A.9) is intended for charging of the accumulators NLTs-0.9-1. When transported, is it put into the bag 18 (Figure A.9).

1.6.3 The illuminator 6 is intended for mutual orientation of two observers, as well as for illumination of the scales 7 and 11 (Figure A.4) and of the needle of the aiming circle 14.

1.6.4 The bushing 11 (Figure A.9) is intended for setting into the sighting device 3 (Figure A.2) and into the illuminator 6 (Figure A.9) together with the element THL-316 12.

1.6.5 The napkin 10 is intended for cleaning external surface of the optical elements.

1.6.6 The soft cover 15 is intended for protection of the sighting device mounted on the tripod from dust, precipitation and during breaks in operation.

1.6.7 The diaphragm 4 is intended for protection of the sighting device 3 objective (Figure A.2) from damage during transportation.

1.6.8 The handle 3 (Figure A.9) is intended for fastening the illuminator 2 (Figure A.2) on the sighting device 3 and for carrying the sighting device.

1.6.9 The screw 9 (Figure A.9) is intended for fastening the handle 1 (Figure A.2) on the sighting device 3.

1.6.10 The battery tester YK-316 5 (Figure A.9) is intended for measuring of the accumulators NLTs-0,9-1 14 charge level.

1.6.11 The soft cover 17 is intended for putting the tripod during its transportation in the case.

1.6.12 The suspension system 19 serves for transportation of the case 1 (Figure A.10) behind one's back.

1.6.13 The Landolt ring (its size is shown in the Figure A.7) serves for defining illumination at the location at night. The Landolt ring is drawn on the shield of thick cardboard (or thin plywood). The colour of the shield is white, the colour of the ring is black.

The methods of illumination measuring includes the following:

– the illumination readings are taken every 5 minutes;

– the measures are carried out by two people – one is an operator, the other is an observer. The observer's position is at the place of testing. The operator with the Landolt ring goes away from the observer in the direction of the target for 15 – 20 m, then the operator turns in the direction of the observer. The operator rotates the shield around the ring axis and stops it;

– the observer must define the direction of the open space in the ring. If the observer defined it correctly, the operator goes further away from the observer. If the observer made a mistake, the operator comes closer. The testing is carried out again;

– the longest distance, at which the observer defined the direction of the open space in the ring correctly, is defined. Then the illumination corresponding the given distance is defined according to the chart in the Figure A.8.

1.7 Designation and seals

1.7.1 The following marking is done on the strip 13 (Figure A.3) of the sighting device:

– index of the article 1PN91-2;

– article works number;

– trademark.

1.7.2 The following marking is done on the front side of the case 1 (Figure A.10) and on the cap:

– index of the article 1PN91-2;

– article works number.

1.7.3 The case 1 is sealed.

1.8 Package

1.8.1 The case 1 (Figure A.10) serves for storage and transportation of the sighting device, single STA kit and maintenance documentation.

1.8.2 Before putting the components of the article into the case, it is necessary to do the following:

– put the diaphragm 4 (Figure A.9) on the objective 1 of the sighting device (Figure A.3);

– put the tripod 5 (Figure 2) into the soft cover 17 (Figure A.9);

– put the charge unit 1 into the bag 18.

1.8.3 It is possible to carry the case in two ways:

– in hands;

– behind one's back.

For carrying the case behind one's back it is necessary to do the following:

– take the suspension system 19 out of the case;

– fasten the safety hooks of the suspension system on the staples of the case.

1.8.4 Seal the case together with the components of the article which were put inside according to the nomenclature list as mentioned in the point 1.7.3 of the given Manual.

1.8.5 Damage of the paint coat on the elements of the case locks is possible.

OPERATION

2 EQUIPMENT LIMITATIONS

2.1 Each time before work with the sighting device, check if the sighting device is fastened to the tripod well enough and if the tripod is set on the ground firmly.

2.2 Study the location at daytime for easier observation at night.

2.3 Protect the sighting device from shocks especially the parts having optical elements.

2.4 Do not touch the optical elements with hands. Dust and dirt from the optical elements is cleaned with the help of a clean napkin 10 (Figure A.9) from the single STA kit.

2.5 Do not apply excessive power while working with the handwheels of the sighting device and of the angle measuring device.

2.6 WHILE OPERATING THE ARTICLE, DO NOT:

– DISASSEMBLE THE ARTICLE;

– SWITCH THE SIGHTING DEVICE AT DAYTIME WITHOUT PUTTING DIAPHRAGM 4 (Figure A.9) ON THE OBJECTIVE;

– AIM THE SIGHTING DEVICE WHICH IS SWITCHED ON AT BRIGHT SOURCES OF LIGHT (LIGHTS, GLOWING HEADLIGHTS, ETC) EVEN IF THE DIAPHRAGM IS PUT ON THE OBJECTIVE.

WARNING! DAYLIGHT SPOILS THE SIGHTING DEVICE!

2.7 During breaks in work and in bad weather, it is necessary to put the soft cover 15 on the sighting device.

2.8 If some bright glowing objects come into the field of view, it is necessary to switch the sighting device off by turning the handle 2 (Figure A.3) to the position marked by the red point.

2.9 Switch the sighting device off after finishing work.

2.10 Be sure if the sighting device 4 (Figure A.10), the angle measuring device 2, the tripod 3 and the STA kit are put and fastened in the case 1 correctly.

2.11 Do not connect the sighting device to other power supplies except the accumulators 14 (Figure A.9), elements 12 or 13.

2.12 Do not place the sighting device near the sources of magnetic fields.

2.13 It is recommended to remove the accumulators from the sighting device and from the illuminator and keep them in the pocket of the uniform before and after working with the device. It is done in order to prevent accidental switching on the power supply. When the temperatures are below zero, it also allows to extend the time of the accumulators operation.

3 PREOPERATION INSTRUCTIONS

3.1 General instructions

3.1.1 While working with the sighting device under the conditions which require the high degree of camouflage, fix the Eye shield 2 (Figure A.9) on it, for that do the following:

– take the clamp 6 (Figure A.3) off the eye shield 7;

– dismount the eye shield 7;

– take the eye shield 2 (Figure A.9) from the single STA kit;

– put the eye shield 2 on the ocular ring, for that slightly spread the Eye shield;

– put the clamp 6 on the Eye shield 2 (Figure A.3).

3.1.2 If there are no charged accumulators 14 (Figure A.9) available, use the element 13 or the element 12 with the bushing 11 as a power supply. Replace them in the following way:

– switch the sighting device off;

– screw out the cap 11 (Figure A.3) with the accumulators NLTs-0.9-1;

– take the accumulators NLTs-0.9-1 out of the cup of the cap 11;

– put the elements 13 (Figure A.9) or the element 12 with the bushing 11 inside the sighting device; mind the polarity indicated on the elements and on the cup of the cap 11 (Figure A.3);

– screw the cap 11 up;

– switch on the sighting device, check the brightness of the IIT screen and switch the sighting device off.

Replace the power supply of the illuminator shown in the figure A.5 in the same way.

3.1.3 It is recommended to take the tripod 5 (Figure A.2) from the soft cover 17 (Figure A.9) and put the tripod and the soft cover into the case separately. This is done for reducing the time of setting the article in action position.

3.2 Setting of the article in action position

3.2.1 For setting the article in action position at night it is necessary to do the following:

– take the tripod 3 out of the case 1 (Figure A.10);

– take the soft cover 17 (Figure A.9) off the tripod 3;

– set the tripod on the ground;

– take the angle measuring device 2 from the case 1 (Figure A.10), set it into the ball bearing of the tripod (Figure A.4), having slightly turned the thumbscrew 20 tight;

– level the angle measuring device in the ball bearing of the tripod till the bubble of the round level 16 is placed in the center of the level vial. Finally, screw the thumbscrew 20 tight;

– take the sighting device 4 (Figure A.10) from the case and mount it on the seat 10 (Figure A.4) of the angle measuring device. Turn the handle 9 up to the stop;

– screw the cap 11 (Figure A.3) out of the sighting device, the lid 3 (Figure A.5) out of the illuminator. Take four accumulators NLTs-0.9-1 14 (Figure A.9) from the case and set two accumulators in the cap 11 (Figure A.3) and two accumulators in the cap 3 (Figure A.5). Screw the lids into the sighting device and into the illuminator;

– if it is necessary to carry out mutual orientation of two observers, take the handle 3 (Figure A.9) and the screw 9 from the case. Fasten the handle with the help of the screw through the hole A (Figure A.3) on the sighting device body. Fix the illuminator 6 (Figure A.9) into the handle hole;

– switch on the sighting device by turning the handle 2 (Figure A.3) to the position marked with the white point;

– set the diopter value necessary for the eye on the ocular scale by turning the ring 5 of the ocular;

– take the diaphragm 4 (Figure A.9) off the sighting device objective;

– make the image of the object, which is observed, by turning the handwheel 12 (Figure A.3);

– release the aiming circle by turning the handwheel 17 (Figure A.4).

3.2.2 Setting the article in action position in the daytime and at dusk must be carried out in the same way as at night. The only difference is that the diaphragm 4 (Figure A.9) is not taken off the sighting device objective.

3.3 Checking and adjusting of the aiming circle

3.3.1 Checking of the aiming circle includes checking coordination of the aiming circle needle with the observing line of the device (checking aiming circle according to the direction); checking deviation of the upper surface of

the needle from the plane with index (checking aiming circle according to the height); checking of the deviation of the needle from the zero position (checking of the standstill angle); checking of the decay time and number of oscillations of the needle.

First, checking the aiming circle according to the direction and height is done; then, the standstill angle, the standstill time and number of oscillations of the needle are checked.

3.3.2 Before checking and adjusting of the aiming circle, it is necessary to do the following:

– level the angle measuring device 4 (Figure 2) according to the round level 16 (Figure A.4) carefully;

– aim the observing line of the sighting device at the checkpoint the direction of which (magnetic azimuth) is known beforehand;

– loosen the scale 7 by turning the handle 6 and set the reading on it corresponding to the magnetic azimuth. Fix the scale 7 by turning the handle 6;

– set the reading 0-00 on the scale 7 by turning the handwheel 8. The observing line of the sighting device is directed to the North.

3.3.3 If the aiming circle 14 needle does not coincide with the index, superpose the needle with the index by turning the handwheel 8.

If the reading on the scale 7 is less than ±0-10, the aiming circle need not be adjusted according to the direction.

If the reading on the scale 7 is more than ±0-10, it is necessary to do the following:

– loosen the screws 18 (Figure A.4) and 19 with the help of the spanner 7 (Figure A.9) and turn the aiming circle 14 till the needle coincides with the index. Fix the screws 18 and 19.

Check the coordination of the aiming circle according to the direction using the methods given in the point 3.3.2.

3.3.4 If the needle of the aiming circle 14 does not coincide with the index more than on 0.5 mm when the checking procedure from the point 3.3.3 is carried out, it is necessary to do the following:

– loosen the screws 21 (Figure A.4) with the help of the spanner 7 (Figure A.9). Superpose the needle with the index according to the height up to the value of not less than 0.5 mm by turning the aiming circle in the vertical plane. Block up the screws 21.

3.3.5 The standstill angle, the rest time and the number of oscillations of the aiming circle needle are checked after the works described in the points 3.3.3 and 3.3.4. For this do the following:

– draw a small steel object to the aiming circle 14 case. The aiming circle needle must deviate till touching the case side;

– draw the steel object away. The needle must oscillate at least 6 times and stop oscillations maximum within 50 sec. After the oscillations, the aiming circle needle must return to its original position (reading 0-00 on the scale 7);

– if the aiming circle needle does not return to the original position after oscillations, superpose it with the index by turning the handwheel 8; take the reading on the scale 7. The reading is the standstill angle of the aiming circle;

– if the obtained reading on the scale 7 differs more than on ±0-03, the aiming circle must be sent to the maintenance organization.

4 OPERATION OF THE ARTICLE

4.1 General instructions

4.1.1 It is necessary to study the reconnoitered locality in the daytime for efficient observation at night (if it is possible), as the image contrast and locality and target colouring observed with the help of the article considerably differ from the real ones.

4.1.2 Before operation, the article must be prepared according to the chapter 3 of the given Service Manual.

4.2 Defining of the direction angles of oriented directions

4.2.1 For defining of the direction angle of oriented direction it is necessary to define the magnetic azimuth of the direction on the locality with the help of the aiming circle. It is also necessary to calculate its direction angle taking into account the aiming circle allowance. For this use the formula 1:

$$\alpha = Am - \Delta Am, \quad (1)$$

α – direction angle of oriented direction;

Am – mean value of the magnetic azimuth;

ΔAm – the aiming circle allowance with its sign.

4.2.2 For defining the magnetic azimuth do the following:

– aim the observing line of the sighting device at the North with the help of the aiming circle 14 by turning the handwheel 8 (Figure A.4) of the angle measuring device;

– loosen the scale 7 by turning the handle 6. Set the reading 0-00 on the scale 7. Fix the scale 7 with the help of the handle 6;

– superpose the cross of the sighting device reticle with the target by turning the handwheel 8;

– take the reading on the scale 7.

4.2.3 For defining the allowance do the following:

– set the sighting device to the point (check point) from which two or three objects with known direction angles are seen well;

– define the magnetic azimuth according to the point 4.2.2 of the given Service Manual for each object not less then three times, put down the results;

– calculate arithmetic average value of the magnetic azimuth for each oriented object;

– subtract corresponding value of the direction angles from the calculated values. Evaluate the aiming circle allowance by taking the arithmetic average from the obtained differences.

For example: We know the direction angles of the directions: for the object N.1 they are 8-69, for the object N.2 they are 14-37, for the object 3 they are 20 -21.

During checking by these objects, the magnetic azimuths shown in the table 3 were defined.

Table 3

Readings	Numbers of objects		
	1	2	3
1	8-36	14-05	19-88
2	8-34	14-01	19-85
3	8-40	14-07	19-88
Arithmetic average	8-37	14-04	19-86

Define the difference between the average values of the magnetic azimuths and corresponding direction angles:

Object N.1: 8-37 – 8-69 = – 0-32

Object N.2: 14-04 – 14-37 = – 0-33

Object N.3: 19-86 – 20-21 = – 0-35

Define the aiming circle allowance:

$$\Delta\beta = -\frac{(32+33+35)}{3} = -0-33.$$

The allowance which has been found is valid for the locality free of any magnetic anomalies, within 20 km from the checking point to the East and West; within 100 km to the South or North.

4.3 Defining of the angles reading from the reference direction assigned with regard to the North-South direction

4.3.1 Aim the observing line of the sighting device at the North with the help of the aiming circle 14 by turning the handwheel 8 (Figure A.4). Set the reading 0-00 on the scale 7.

Set the value of the magnetic azimuth angle of the reference direction on the scale 7 by turning the handwheel 8.

Loosen the scale 7 by turning the handle 6. Set the reading 30-00 on the scale 7. Fix the scale 7 with the help of the handle 6.

4.4 Measuring of the horizontal angles between two objects with the help of the reticle

4.4.1 Rotate the sighting device by turning the handwheel 8 (Figure A.4) for superposing the vertical line of the cross of the sighting device reticle (the maximum angle is 0-30) or any vertical line of the sighting device reticle (the angle being from 0-30 to 0-60) with one of the objects between which the angle is being measured.

Count number of points of the reticle to the second object and approximately define the point part.

Multiply the obtained number of the points together with the parts by the value of one point 0-05.

The obtained result is the horizontal angle between the two objects.

4.5 Measuring of the vertical angles between two objects with the help of the reticle

4.5.1 Aim the horizontal line of the sighting device reticle or any line of the vertical row at one of the objects by turning the handwheel 13 (Figure A.4) of the target angle of elevation.

Count number of points of the reticle to the second object and approximately define the point part.

Multiply the received number of the points together with the parts by the value of one point 0-05.

4.6 Measuring of the horizontal angles between two objects with the help of the angle measuring device

4.6.1 Aim the cross of the sighting device reticle at one of the objects by turning the handwheel 8 (Figure A.4). Take the reading on the scale 7 using vernier counting method and write it down.

Aim the cross of the sighting device reticle at the other object by turning the handwheel 8, take the reading on the scale 7. Subtract the smaller angle value from the larger one.

4.7 Measuring of the vertical angles between two objects with the help of the angle measuring device

4.7.1 Aim the horizontal line of the cross at one of the objects by turning the handwheel 13. Take the reading on the scale 11 using vernier counting method. Take the reading to the second object by turning the handwheel 13.

If the index is against the black figures of the scale 11, the angle is positive, if it is against the red ones, it is negative.

Add absolute values of the obtained results if the measured angles have different signs. If their signs are the same, subtract the smaller result from the larger one.

4.8 Article orientation

4.8.1 Article orientation at the observation post according to the direction angle is carried out in the following way:

– aim the observing line of the sighting device at the checkpoint which has the known direction angle by turning the handwheel 8 (Figure A.4);

– set the reading on the scale 7 equal to the direction angle to the checkpoint.

4.8.2 The orienting of the article for defining targets from the point of conjugated observation is carried out by mutual aiming of the sighting devices or according to the direction angle.

During orienting by mutual aiming of the sighting devices, the illuminators 2 (Figure A.2) set on the sighting devices are aimed at each other. The sighting devices are located at different ends of the conjugated observation base. The illuminator of the left observation point (point A) is switched on and the reading 30-00 is set by turning the handwheel 8. The reading 0-00 is set on the sighting device of the right observation point (point B). After switching the illuminators off, the sighting devices are oriented by mutual aiming, the limbs have zero to the right on the base.

For orientation according to the direction angle, the sighting device is aimed at the checkpoint, whose direction angle for the direction from the observation point is known. The reading which corresponds to the direction angle from the observation point to the checkpoint is set on the scale 7. When using this method of orientation, bear in mind that reading of the angle on the target corresponds to the direction angle of the direction from the observation point to the given target.

4.9 Measuring of the distance to the target

4.9.1 Aim the sighting device at the target the size of which is known by turning the handwheel 8 (Figure A.4) and the handwheel 13 of the measuring device. Define the value of the angle, above which the width and the height of the given target are seen, by the horizontal and vertical lines of the reticle.

Divide the known size of the target by the obtained angle, multiply the result by 1000.

Example: Side projection of a tank is seen at the angle of 0-10, the length of the tank is 5 m. Define the distance to the tank:

$$D = \frac{5\ \text{m}}{10} \cdot 1000 = 500\ \text{m}.$$

The angle at which the target is seen can be measured using the reticle of the sighting device or with the help of the scales 7 and 11 of the angle measuring device.

4.10 Preparation for carrying

4.10.1 For preparation for carrying the article do the following:
– take the illuminator 2 (Figure A.2) from the handle 1;
– screw out the cap 3 (Figure A.5);
– take the batteries from the cup of the cap 3 and put them into the case;
– screw up the cap 3 into the illuminator and put it into the case;
– screw out the cap 11 (Figure A.3);

– take the batteries from the cup of the cap 11 and put them into the case;
– screw up the cap 11;
– take the handle 1 (Figure A.2) off the sighting device 3, having screwed off the screw A (Figure A.3) and put it into the case;
– put the diaphragm 4 (Figure A.9) on the sighting device;
– turn the handle 9 (Figure A.4);
– take the sighting device 3 (Figure A.2) from the holder 10 (Figure A.4) of the tripod and put it into the case;
– loosen the thumbscrew 20, take the angle measuring device 4 (Figure A.2) out of the ball bearing of the tripod 5 (Figure A.2);
– slide the supports 1 (Figure A.4) inside, fasten them with the help of the nuts 2, tighten them with the strap 3;
– put the tripod 5 (Figure A.2) into the soft cover 17 (Figure A.9) and into the case.

MAINTENANCE

5 MAINTENANCE

5.1 General instructions

5.1.1 It is necessary to carry out maintenance works of the article in time for maintaining it in constant alertness, for providing reliability in operation, for increasing interrepair time as well as for timely revealing and liquidation of the reasons causing premature wear and damage of the assemblies and elements of the article.

During operation the following types of servicing are provided for the article:
– maintenance works in the period of operation;
– maintenance works during short-term storage;
– maintenance works during long-term storage.

5.1.2 When the article is delivered to the military unit, its technical state is checked according to the table 4.

5.1.3 Maintenance works in the period of operation include the following types of servicing:
– CI;
– DM;
– M.-1;
– M.-2.

5.1.3.1 CI is carried out for checking technical state of the article and for eliminating the revealed defects.

CI is carried out by the staff who are responsible for the article. CI must be carried out before combat, march, exercises or maneuvers with the help of the tools and outfit from the single STA kit.

CI includes the works described in the table 4.

5.1.3.2 DM is carried out for preparing the article to operation.

DM is carried out by the staff who are responsible for the article. DM must be carried out after combating, marching, exercising, maneuvering and transporting with the help of the tools and outfit from the single STA kit.

If the article is not used, DM is carried out once in two weeks.

DM includes the works described in the table 5.

5.1.3.3 M.-1 is carried out for maintaining the article in the state of operability till the next number maintenance works.

M.-1 is carried out by the staff and the elements responsible for maintenance works, repair and routine-tuning works when the article is delivered to the military article and after exercises. M.-1 is carried out after every 500 hours of operation, as well as before combating or sending the article for short-term storage regardless of the previous operation of the article (period of operation time). M.-1 is carried out with the help of spare parts, tools and outfit from the single and group STA kits.

M.-1 is carried out as described in the table 6.

After carrying out M.-1, it is necessary to fill in the table 4 of the logbook AL3.803.105 FO.

5.1.3.4 M.-2 is carried out for maintaining the article in the state of operability till the next number maintenance works.

M.-2 is carried out by the people responsible for maintenance works, repair and routine-tuning works attracting staff. M.-2 is carried out after 1000 hours of operation and further after every 200 hours of operation; after replacement of the image intensifier taken from the group STA kit in not less than after 1000 hours of operation and further after every 200 hours of operation; before sending the article for long-term storage regardless of the previous period of operation. M.-2 is carried out with the help of the spare parts, tools and outfit from the single and group STA kits.

M.-2 is carried out according to the table 6, the detection range on locality is additionally checked.

After carrying out M.-2, it is necessary to fill in the table 4 AL3.803.105 FO.

5.1.4 Maintenance works for short-term storage of the article comprises M.-1h.

M.-1h is carried out for maintaining the article in the state of operability before preparing it to operation or till the next maintenance works.

M.-1h is carried out by the staff responsible for maintenance works once in six months as demanded by DM using the single STA kit. Preservation is checked and is restored if necessary in the same way.

5.1.5 Maintenance works for long-term storage include the following:

– M.-1h;

– M.-2h.

5.1.5.1 SM.-1 is carried out for control of the article state and maintaining the article in the state of operability before its preparing to operation or till the next number maintenance works.

M.-1h is carried out by the people responsible for storage with the help provided by the elements responsible for maintenance works, repairing and routine-tuning works once a year as described in the DM with the help of the single STA kit. Preservation is checked and is restored if necessary in the same way.

5.1.5.2 M.-2h. is carried out for maintaining of the article in the state of operability till the next number maintenance works.

M.-2h. is carried out by the people responsible for storage with the help provided by the elements responsible for maintenance works, repairing and routine-tuning works as demanded by M.-2h (except sight adjustment) after two years of storage.

5.2 Safety measures

5.2.1 Set the tripod by pressing the supports well into the ground before setting the sighting device on it.

5.2.2 While setting the tripod, make the tips of the tripod legs be on the same distance from each other, they must form an equilateral triangle.

5.2.3 IT IS PROHIBITED TO SET THE TRIPOD WITH THE SIGHTING DEVICE MOUNTED ON IT BEFOREHAND

5.3 Maintenance procedure

5.3.1 CI is described in the table 4.

Table 4

Point of the Service Manual	Object and contents of maintenance works	Note
1 / 5.3.1	Check, if the whole integration of the article corresponds to the one given in the logbook AL3.803.105 FO. The article integration must correspond to the delivery set given in the logbook or to the nomenclature list	
2 / 5.3.1	Carry out visual check of the article and of the single STA kit. There must not be any cracks, dents, traces of corrosion and any other defects on the external surfaces	
3 / 5.3.1	Check if the sighting device is fastened well enough on the seat 10 (Figure A.4) of the angle measuring device. It must be fastened tight	
4 / 5.3.1	Check by sight the condition of the optical elements external surfaces. There must not be any mechanical damage, fat stains, films on the optical elements external surfaces	
5 / 5.3.1	Check feed elements voltage: – with the help of the battery tester YK-316 5 for the elements 13 and accumulators 14; – with the help of the complex device Ts4353 for the elements THL-316	

Continuation of the table 4

Point of the Service Manual	Object and contents of maintenance works	Note
	Voltage of the feed elements must be the following: – not less than 3 V for the element THL-316 12; – not less than 1.2 V for the accumulators NLTs-0.9-1 14; – not less than 1.4 V for the standard size batteries R6 (AA) 13.	
6 5.3.1	Check the condition of contacts for batteries in the sighting device and of the batteries contacts by sight. There must not be any oxidation on the contacts of the sighting device and of the batteries	
7 5.3.1	Check the working capacity of the illuminator 6 (Figure A.9) by switching on and off the illuminator switch. The illuminator must glow	
8 5.3.1	Check the level 16 (Figure A.4) condition by sight. There must not be any cracks, clefts on the level which can prevent from watching the bubbles. The sizes of the bubbles must not exceed the limits of the middle lines	
9 5.3.1	Check if the handwheels 3 and 12 (Figure A.3), the handwheels 8, 13 and 17 (Figure A.4) rotate smoothly by testing. The handwheels must rotate smoothly	
10 5.3.1	Check the sighting device operation. For that put the diaphragm 4 (Figure A.9) on the objective and switch on the sighting device by turning the handle 2 (Figure A.3). The IIT must be seen through the ocular. The reticle brightness must change. No blinking of screen is allowed	
11 5.3.1	Check the tripod 5 (Figure A.2) condition by testing. The nuts 2 (Figure A.4) must fasten the supports 1 of the tripod firmly	
12 5.3.1	If necessary, the works demanded by DM must be carried out	

5.3.2 DM is described in the table 5.

Table 5

Point of the Service Manual	Object and contents of maintenance works	Note
1 5.3.2	Carry out the works described in the table 4	
2 5.3.2	Clean dust, dirt and moisture off the article with the help of cleaning rag (GOST 4643-75). The article and the case must be clean	
3 5.3.2	Lubricate the external surfaces of the metal elements which are not painted. For that use viscous lubrication GOI-54p (GOST 3276-89), spread it in a thin layer. The external surfaces of the metal elements must not have any traces of corrosion	
4 5.3.2	Clean the contacts of the sighting device, of the illuminator and that of the batteries with the help of absorbent cotton for optical elements wound around a wooden stick end. The absorbent cotton must be moistened in alcohol-ether mixture (15% of ethyl purified technical alcohol of the extra-class, GOST 18300-87 and 85% of ethylic medical ether). The contacts must be clean	
5 5.3.2	Clean the external surfaces of the optical elements in the following way: – wind some cotton wool around a wooden stick end; – moist the cotton wool with alcohol-ether mixture, shake off the mixture excess; – clean the optical elements with the wet cotton wool, do not touch the framing; – replace the cotton wool for the dry one and clean the surface of the optical details with the dry cotton wool by circular motions from the center to the edge, finish cleaning; – do not touch optical elements with hands. The exterior surfaces of the optical elements must be clean	
6 5.3.2	Replace the assemblies which are out of operation for the spare ones from the single STA kit. The article must be operable. The eye shield must not have any traces of mechanical damage	

5.3.3 M.-1 and M.-2 are described in the table 6.

Table 6

Point of the Operating Manual	Object and contents of maintenance works	Types of maintenance works		Note
		M.-1	M.-2	
1 / 5.3.3	Carry out the works described in the table 5	+	+	
2 / 5.3.3	Check the aiming circle 14 (Figure A.4) according 3.3 to the Service Manual	+	-	
3 / 5.3.3	Check the recognition distance on the locality according to the point 5.3.4 of the given Service Manual	+	+	
4 / 5.3.3	Paint the parts of the sighting device 4 (Figure A.10) where the lacquer coating is damaged. For that use enamel ML-165PM of the black colour (GOST 12034-77). For painting the tripod 3, angle measuring device 2 and the case 1 use enamel ML-165PM of the khaki colour (GOST 12034-77)	+	+	
5 / 5.3.3	If necessary, repair the case. Glue the bushings with nitro glue AK-20	+	-	
6 / 5.3.3	If necessary, repair the soft covers 15 (Figure A.9), 17 and the bag 18. Use glossy factory threads 20 "Prima" of the 1 Class (GOST 6309-93)	+	-	
7 / 5.3.3	Check the resolution limit, quality of image and operation resolution of the sighting device. The 17th element of the line test pattern GOI SH-K No 6 must be resolved, all four directions of the lines of which must be viewed simultaneously by the observer. The control test must be not lower than No 34 on the collimator	-	+	the Article UKNP-1M (1Yu7-1)
8 / 5.3.3	Check the integration of the single STA kit according to the log-book AL3.803.105 FO. If necessary, replace the missing parts of the single STA kit with the ones from the group STA kit	-	+	

Continuation of the table 6

Point of the Operating Manual	Object and contents of maintenance works	Types of maintenance works		Note
		M.-1	M.-2	
9 / 5.3.3	Dry the sighting device up according to the instruction on using the group STA set AL3.803.105 II	-	+	
10 / 5.3.3	Preserve the article, the single STA kit when they are sent for storage according to the point 5.4 of the given Service Manual	+	+	

5.3.4 The recognition distance on the locality is checked at night on the real target (side tank or armoured troop-carrier projection) under the following conditions: NNI is $3 \cdot 10^{-3}$ – $5 \cdot 10^{-3}$ lux, rain, fog, snowfall, etc. being absent.

The values of the recognition target distance with the regard to the background are given in the table 7.

Table 7

Background on which the target is projected	Minimal recognition distance, m
green grass	1000
open space covered with snow	1000
yellow grass (sand)	1000
deciduous forest	600
coniferous forest	300

Distance to the deciduous or coniferous forest must be not less than 25 m.

Recognition distance on the locality is started to be checked from the light of $(1\text{-}3) \cdot 10^{-2}$ lux and is observed till light reduces to $(3\text{-}5) \cdot 10^{-3}$ lux.

Light readings are taken every 5 minutes. Light on locality at night is measured with the help of the Landolt ring.

Methods of light measuring are given in the point 1.6.13 of the given Service Manual.

The sighting device is operable if distinctive features of the target (tank or armoured troop-carrier contours, direction of the barrel) are recognized within 3-10 sec, the light being $(3\text{-}5) \cdot 10^{-3}$ lux.

5.4 Preservation (depreservation, represervation)

5.4.1 Preservation of the article is carried out before sending it for storage.

Partial or full preservation of the article is carried out when M.-1h and M.-2h are conducted.

Represervation periods during storage correspond to the periods of carrying out M.-1h and M.-2h according to the point 5.1.5.1 and 5.1.5.2 correspondingly.

Depreservation is carried out when the article is put into operation after delivery from the manufacturer or when the article is taken from storage.

5.4.2 Depreservation of the article after its delivery from the manufacturer is carried out in the following way:

– check presence and condition of the marking on the case 1 (Figure A.10) according to the points 1.7.1 and 1.7.2 of the given Service Manual;

– check safety of the sealing on the case according to the point 1.7.3 of the given Service Manual;

– remove the seal from the case;

– take the article out of the case, check its integrity according to the log-book AL.3.803.105 FO;

– check if the acceptance certificate of the manufacturer is drawn up correctly;

– remove preservation lubricant from the exterior metal surfaces, which are not painted. For that clean these surfaces with cleaning rag moistened with petroleum solvent, then clean them with clean dry cleaning rag;

– clean the exterior surfaces of the optical elements of the article according to the point $\frac{5}{5.3.2}$ of the table 5.

5.4.3 For depreservation of the article during M.-1h and M.-2h do the following:

– take the article and the single STA kit from the case 1;

– take the component parts from the package;

– remove preservation lubricant from the exterior metal surfaces, which are not painted. For that clean these surfaces with cleaning rag moistened with petroleum solvent, then clean them with clean dry cleaning rag;

– clean the exterior surfaces of the optical elements of the article according to the point $\frac{5}{5.3.2}$ of the table 5.

5.4.4 For preservation of the article during sending it for storage do the following:

– take batteries from the sighting device and from the illuminator;

– clean the article and its parts from dust, dirt and corrosion with the help of cleaning rag moistened with petroleum solvent C2 80/120;

– clean the exterior surfaces of the optical elements of the article according to the point $\frac{5}{5.3.2}$ of the table 5;

– WARNING! THE SURFACES OF OPTICAL ELEMENTS AND PAINT COAT MUST BE PREVENTED FROM LUBRICANTS!

– put absorbent cotton for optical use into the eye-shade 7 (Figure A.3);

– lubricate the spanner 7 (Figure A.9), the screw 9 and the bushing 11 with a thin layer of viscous lubrication GOI-54p (GOST 3276-89) and wrap them separately in parchment P-45 (GOST 1760-86);

– put the accumulators NLTs-0.9-1 14, the batteries of standard size R6 (AA) 13, the elements THL -316 12 from the single STA kit separately into pockets made of polyethylene film (T sleeve of the 1st class, GOST 10354-82), solder the pockets up;

– wrap the napkins 10 separately with the parchment П-45 (GOST 1760-86);

– put maintenance documentation into pocket made of polyethylene film (T sleeve of the 1st class, GOST10354-82), solder the pocket up.

5.4.5 Put the article, single STA kit, maintenance documentation into the case 1 (Figure A.10).

REPAIR IN SERVICE

6 REPAIR ARTICLE IN SERVICE

6.1 General instructions

6.1.1 For detection of failures in the article operation check the following:

– if the sighting device is fastened well on the tripod;

– if there is no dust, dirt, grease, hoar-frost or water on the objective and ocular;

– if the battery is not discharged;

– if power supply of the article is on.

Special attention must be paid to the cleanness of the power supply contacts.

6.1.2 While working with the article, the safety measures must be taken according to the chapter 2.

6.2 Troubleshooting

6.2.1 Possible consequences of failures and damage, instructions on their elimination are described in the table 8.

Table 8

Problem	Possible reasons	Instruction on identifying and elimination of the assembly (detail) failure and damage consequence
Image of the location is seen vague and blurred	1 Dew or dirt on the external surfaces of the ocular or objective	1 Clean the ocular and objective of the sighting device with a napkin 10 (Figure A.9) from the single STA kit
	2 The sighting device is defocused	2 Focus the sighting device by turning the handwheel 12 (Figure A.3)
No illumination of the image intensifier IIT tube A2 (Figure A.1)	1 Battery has run down	1 Replace the battery for the good one from the single STA kit according to the point 6.2.4 of the given Service Manual

Continuation of the table 8

Problem	Possible reasons	Instruction on identifying and elimination of the assembly (detail) failure and damage consequence
	2 The IIT A2 has broken down 3 The contacts have oxidized or become dirty	2 Send the sighting device to the repair shop 3 Clean the contact and wipe it with a napkin, flannel or cotton wool moistened with petroleum solvent C2 80/120 of the first class. Clean and wipe the threading in the lid of the sighting device case and in the cap 11 (Figure A.3)
Dark stains have appeared in the field of view of the sighting device which prevent its good operation	The IIT A2 (Figure A.1) is spoiled because of a flash exposure to point light sources; peeling-off on the photocathode or the image intensifier screen has occurred	The sighting device must be sent to the repair shop
When the sighting device is switched on, the image is blurred; the IIT flickers or the image is not stable and fades	The IIT A2 is spoiled because of a flash exposure to some strong light source	Switch the sighting device off and keep it in a dark place under OCC for two days, the diaphragm 4 (Figure A.9) being put onto the objective. If the sighting device does not function well after this time, send it to the repair shop

6.2.2 Replace the cap 1 (Figure A.5) in the following way:

– screw out the ring 2 with the help of the spanner 7 (Figure A.9) from the single STA kit;

– take the cap 1 off (Figure A.5) together with the bush which is under the ring 2;

– replace the cap with the good cap 8 (Figure A.9) from the single STA kit;

– put the bush on its place and screw up the ring 2 (Figure A.5) with the help of the spanner 7 (Figure A.9).

6.2.3 Replace the accumulators G1 and G2 (Figure A.1) in the sighting device in the following way:

– switch off the sighting device by turning the handle 2 (Figure A.3) to the position marked with the red point;

– screw out the cap 11 (Figure A.3) with the cup;

– remove the accumulators which are out of order and put the good ones into the cup of the cap 11, having taken them from the single STA kit. Mind the polarity marked on the accumulators and on the cap 11 cup;

– screw up the cap 11 (Figure A.3) with the cup;

– switch on the sighting device by turning the handle 2 to the position marked with the white point, check its operation and switch it off.

6.2.4 Replace the accumulators in the illuminator 6 (Figure A.9) in the following way:

– switch the illuminator off;

– screw out the cap 3 (Figure A.5) with the cup;

– take off the accumulators which are out of order and put the good ones into the cup of the cap 3, having taken them form the single STA kit. Mind the polarity marked on the accumulators and on the cup of the cap 3;

– screw the cap 3 with the cup into the illuminator;

– switch on the illuminator, check its operation and switch it off.

STORAGE

7 STORAGE OF THE ARTICLE

7.1 For sending the article for storage and taking it from storage do the following:

– store the article in the case together with the single STA kit and with the maintenance documentation;

– send for storage only examined operable clean articles;

– when sending the article for the short-term storage, carry out M.-1; when sending the article for the long-term storage, carry out M.-2; preserve the article according to the point 5.4 of the given Service Manual;

– when the article is taken from storage, depreservation must be carried out according to the point 5.4 of the given Service Manual.

7.2 It is recommended to store the article in the heated storehouses. Temperature of the air must be from + 5 to + 35 °C, maximum relative air humidity must be maximum 85% for the whole year. Temperature diurnal oscillation must be not more than 5 °C.

7.3 The case must be placed on shelving, shelves or in cupboards. It is prohibited to store the article on the floor, near sources of heat, windows and under direct solar rays.

7.4 The time of long-term storage is 10 years. The accumulators NLTs-0.9-1 must be replaced when their service life has expired (5 years from the day of acceptance of the accumulators by the inspector of work).

TRANSPORTATION

8 TRANSPORTATION OF THE ARTICLE

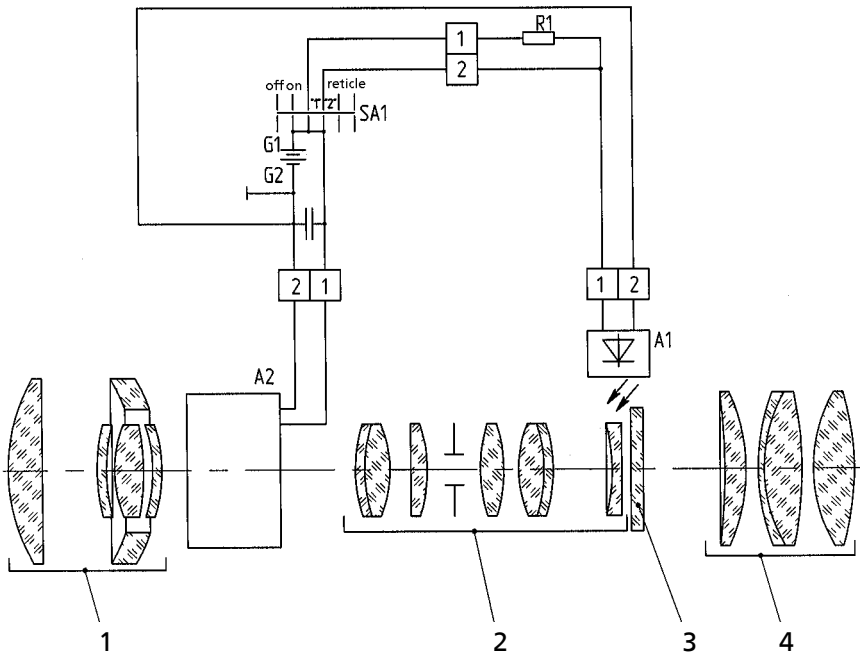
8.1 The article together with the single STA kit and maintenance documentation in the case can be transported by all traffic means on any distance.

8.2 Before transportation (transporting by vehicles or carrying), it is necessary to make sure that the sighting device, the single STA kit and maintenance documentation are fixed well in the case. All locks in the case must be operable.

8.3 While transporting, put the case with its lid upwards. It is prohibited to throw and turn over the case with the article.

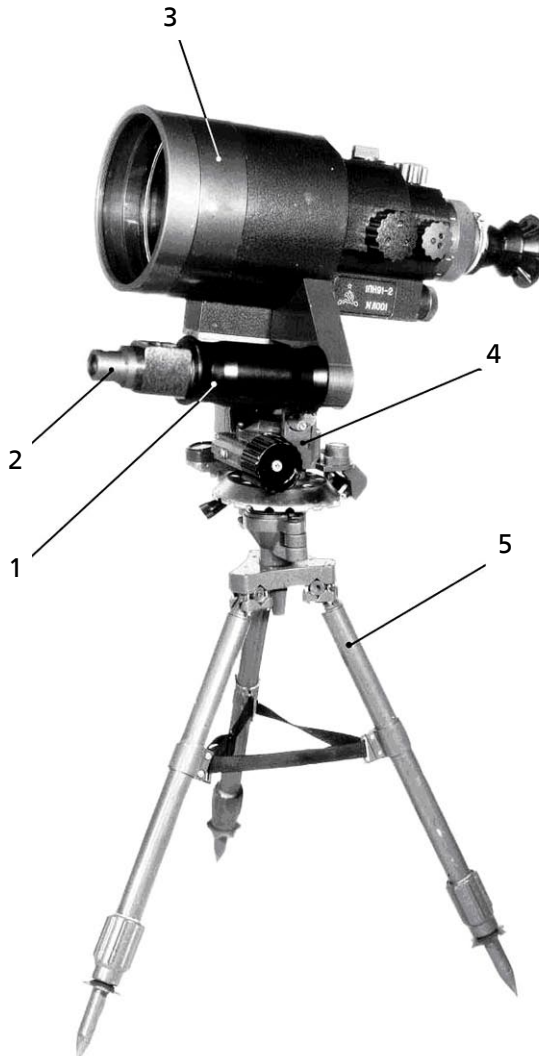
Appendix A

List of figures



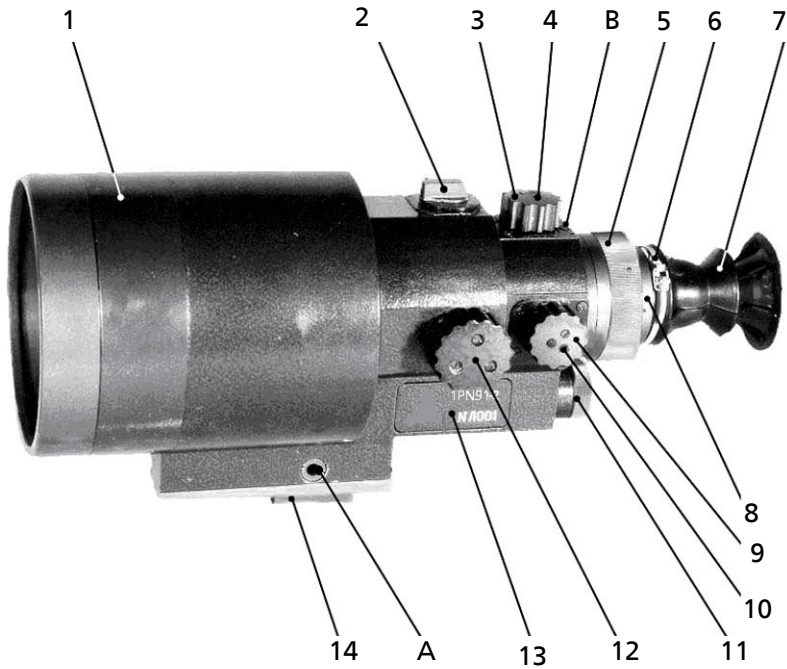
1 – objective; 2 – erector; 3 – reticle; 4 – ocular;
A1 – reticle illumination luminodiode; A2 – IIT tube;
SA1 – switch; G1, G2 – batteries

Figure A.1 – **Electronic optical scheme of the sighting device**



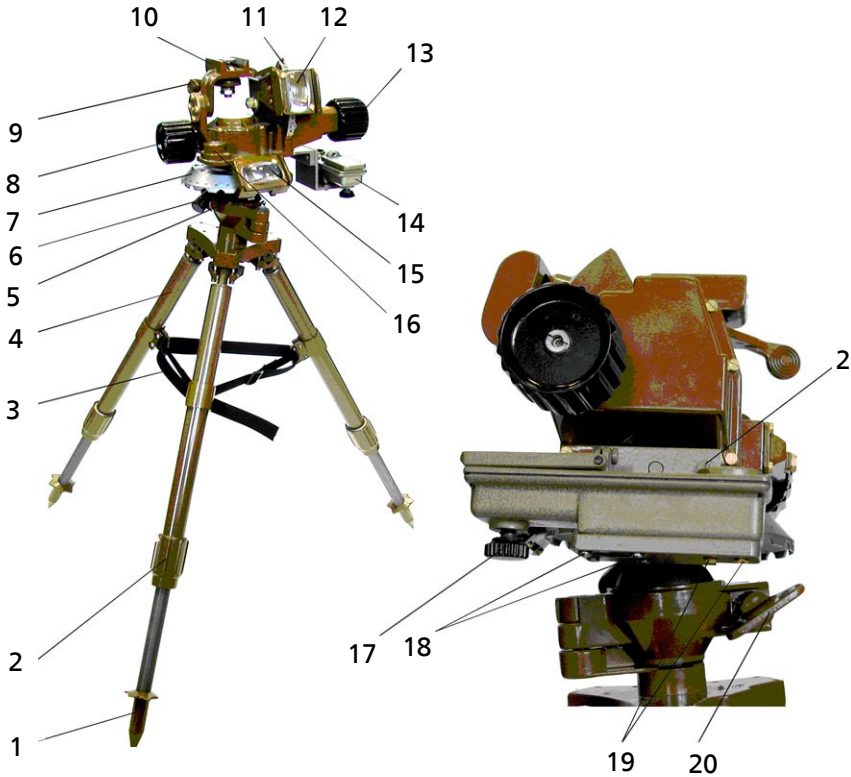
1 – handle; 2 – illuminator; 3 – sighting device;
4 – angle measuring device; 5 – tripod

Figure A.2 – **The Article 1PN91-2**



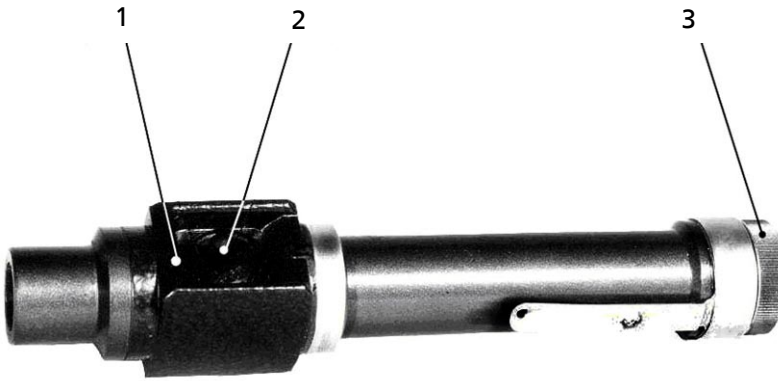
1 – objective; 2 – handle; 3 – handwheel; 4 – screw; 5 – ring; 6 – clamp;
7 – eye shield; 8 – ocular; 9 – handwheel; 10 – screw; 11 – cap;
12 – handwheel; 13 – strip; 14 – holder

Figure A.3 – **The sighting device**



1 – support; 2 – screw-nut; 3 – strap; 4 – leg; 5 – angle measuring device;
6 – handle; 7 – scale; 8 – handwheel; 9 – handle; 10 – seat; 11 – scale;
12 – lens; 13 – handwheel; 14 – aiming circle; 15 – lens; 16 – round level;
17 – handwheel; 18 – screw; 19 – screw; 20 – thumbscrew; 21 – screw

Figure A.4 – **The tripod with the angle measuring device**



1 – cap; 2 – ring; 3 – cap

Figure A.5 – **The illuminator**

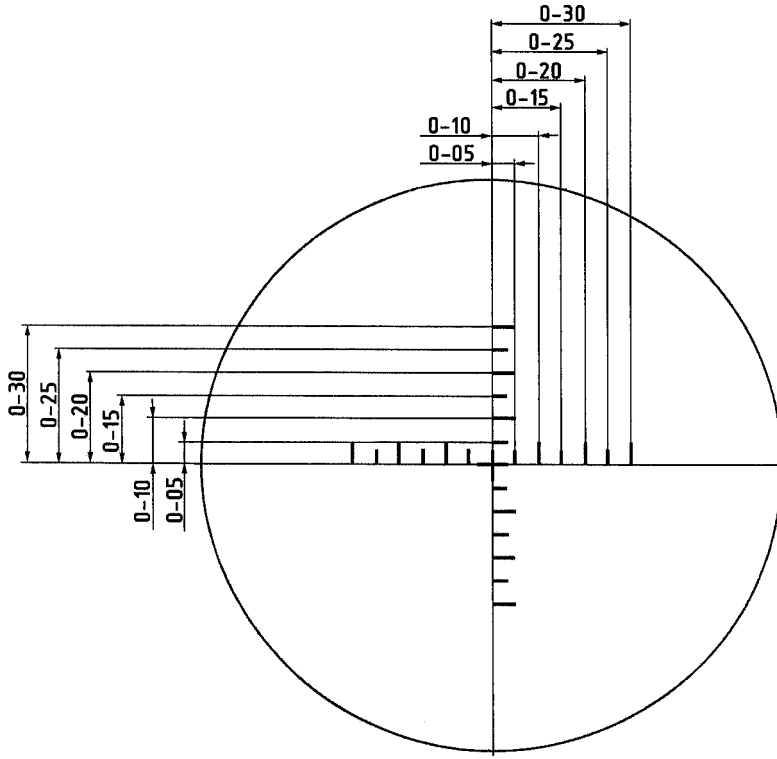


Figure A.6 – **The field of view of the sighting device**

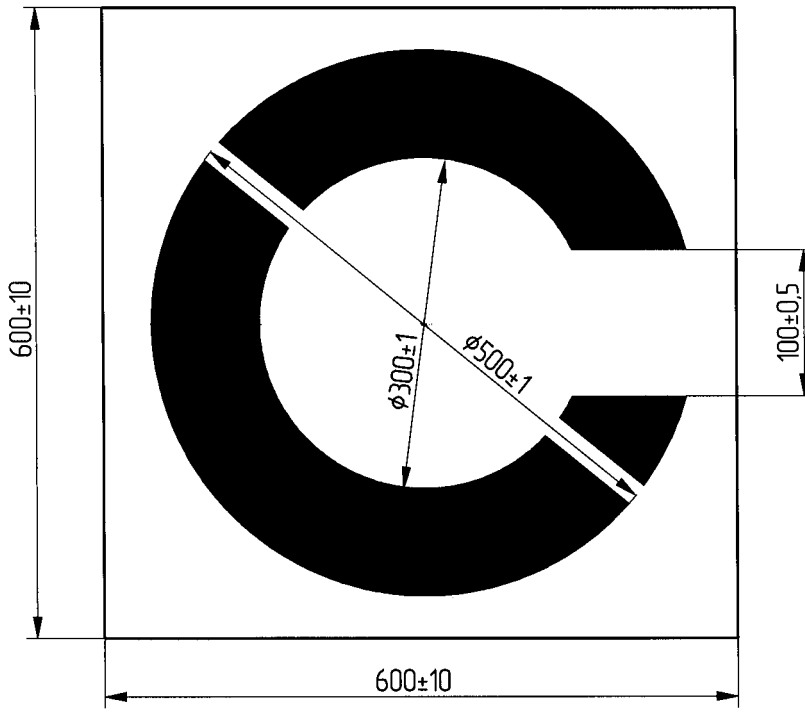


Figure A.7 – **The Landolt ring for checking illumination**

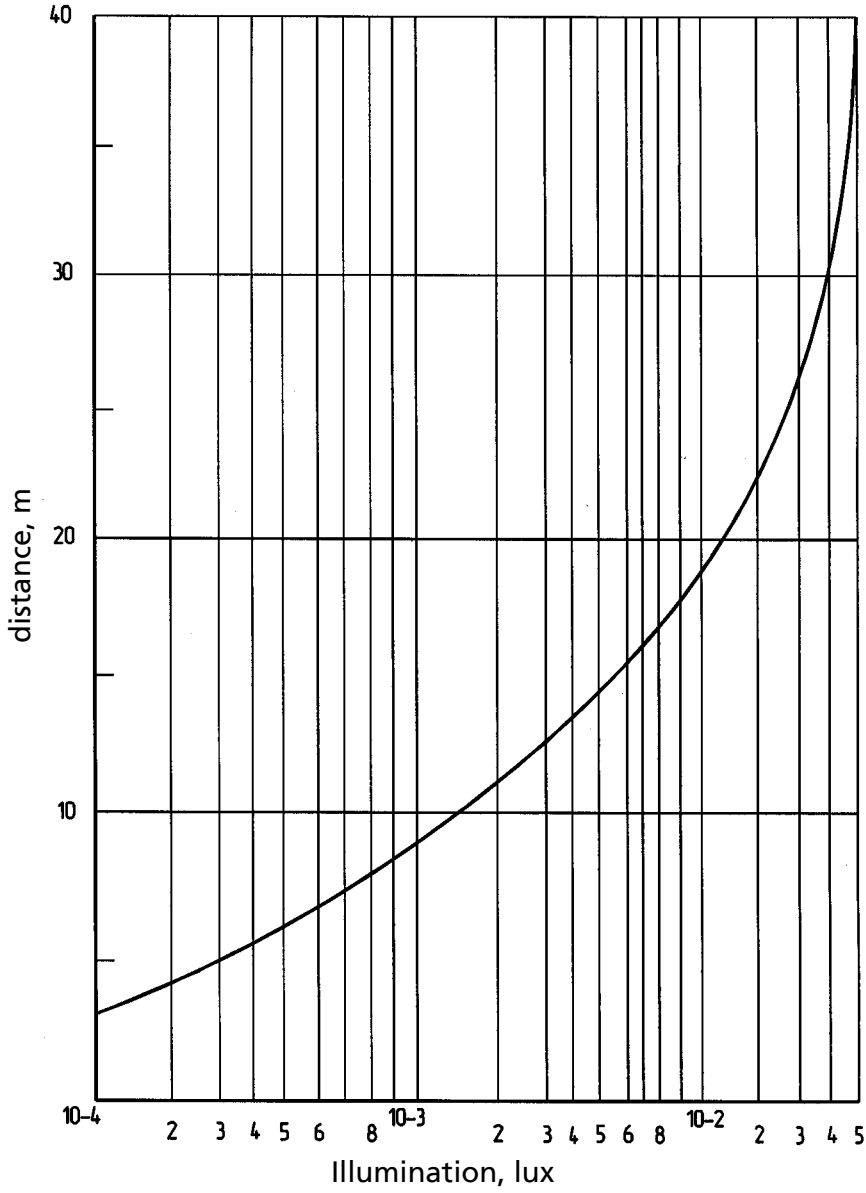


Figure A.8 – **The chart for illumination defining**

1 – charge unit AL4.799.001; 2 – eye shield AL6.548.035; 3 – handle AL6.354.592;
4 – diaphragm AL6.274.184; 5 – battery tester YK-316 AL5.100.062;
6 – illuminator AL5.142.667; 7 – spanner AL8.896.023; 8 – cap AL8.634.062;
9 – screw AL9.918.272; 10 – napkin AL8.890.001-01; 11 – bushings AL6.215.014;
12 – elements THL-316; 13 – batteries R6 (AA); 14 – accumulators NLTs-0.9-1;
15 – soft cover AL6.832.051; 16 – maintenance documentation;
17 – soft cover AL6.832.186; 18 – bag AL6.830.084;
19 – suspension system 1Ya27M-01-000

Figure A.9 – **The single STA kit**

1 – case; 2 – angle measuring device;
3 – tripod; 4 – sighting device

Figure A.10 – **The Article 1PN91-2 in the case**