Article 1PN51

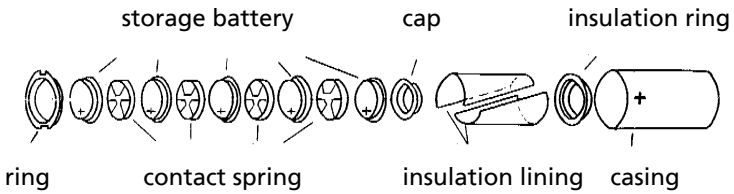
Technical description
and service manual
AL3.812.076 TO

ATTENTION!

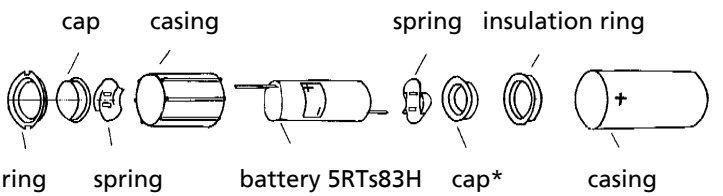
Avoid the short-circuit between the casing and cap* to prevent the breakdown of power supply during the storage and operation.

Assembling to be carried out according to the assembling diagram:

The power supply with storage batteries D-0.55S



The power supply with battery 5RTs83H



The design of device is the subject of continuous improvement. The manufacturer reserves the right to make any changes and improvements in the device described in present manual at any time and without notice.

1 Introduction

1.1 The Technical Description and Service Manual are intended for studying the design and operation of the 1PN51 night sight.

The technical description comprises the application, specifications, design and operation principles of sight, needed for proper using of the sight.

The service manual contains the information about using of sight, possible troubles and troubleshooting with the single repair kit.

1.2 When studying the sight one should use the following complementary documents also:

- the Firing Manual to kind of weapon used;
- the Technical Description And Operating Instructions to the storage battery D-0.55S FU3.585.452 TO;
- booklet to the charging device G43.20.020 DEP.

Technical Description

2 Application

2.1 The NSPU-3 unified night sight (symbolic designation 1PN51) is designed for AKMN-1 (AKMSN-1), AK74N (AKS74N), AK74UN, AS assault rifles, RPKN-1 (RPKSN-1), RPK74N (RPKS74N), PKMN-1 (PKMSN-1) machine guns, SVDN-1, VSS sniper rifles, RPG-7N1 (RPG-7DN1) light anti-tank grenade launcher. Sight ensures the sighting and battlefield surveillance under the natural night illumination conditions.

2.2. Sight operates at the ambient temperature from -50 to +50°C and relative humidity up to 98% at the temperature 40 °C.

3 Specifications

3.1 The general properties of sight conform to requirements of table 1.

Table 1

Specifications	Value	Note
Magnification, x	3.46	
Field of view	9°35′	
Eye relief, mm	50	
Line of sight adjustments		
in elevation	± 0-08	
in direction	± 0-08	
Supply voltage, V	6.25	
Max consumption current, mA	40	
Continuous operation time, h		
For storage battery AL5.529.011 without change		
at t = 20°C	10	
at t = -50°C	0.5	
For battery 5RTs83H without change		
at t = 20 … 50°C	20…25	
at t = -50°C	0.5	
Weight of sight with batteries, kg	2.1	
Weight in stowed position, kg	6.45	
Overall dimensions, mm		
length	276	
height	210	
width	140	
Overall dimensions of carrying case, mm		
length	336	
height	189	
width	300	

3.2 Sight ensures the target detection and aimed fire at range of direct fire for all kinds of weapons listed in section 2 of present descriptions, under natural starlight illumination and clear atmosphere conditions.

The recognition range of sight depends on the natural illumination level, atmosphere transparency and target/background contrast.

It increases at:

- enhanced illumination (moonlight or artificial illumination);
- light background (snow and sand).

The range decreases at:

- low illumination;
- cloudiness;
- low atmosphere transparency;
- dark background (tillage, tree trunk, etc.).

3.3 Following kinds of storage batteries are used:

- battery of five storage cells D-0.55S GOST 11258-79
- battery 5RTs83H.

4 Composition of sight

The composition of sight meets the table 2.

Table 2

Designation	Name	Qty	Note
AL3.812.076	Night sight 1PN51	1	
	Spare parts		
AL5.529.011	Storage battery	2	
AL5.883.030	Desiccator in cartridge	1	
	Removable parts		
AL6.548.035	Eyeshield	1	
AL6.086.005	Container with battery	1	
AL7.025.185	Scale*	1	SVD
AL7.025.185-1	Scale*	1	AK74
AL7.025.185-2	Scale*	1	PK
AL7.025.185-03	Scale*	1	RPG-7
AL7.025.185-04	Scale*	1	AKM
AL7.025.185-05	Scale*	1	RPK-74, AKS74UN
AL7.025.185-07	Scale*	1	RPK
AL7.025.185-10	Scale*	1	VSS – AS
	Tools		
AL8.896.009	Wrench	1	
	Accessories		
AL5.962.110	Diaphragm	1	
AL6.548.070	Headrest	1	For RPG-7N
AL8.890.001-01	Napkin	2	
G43.20.020	Charging device	1	
	Case set		
AL6.875.097	Case	1	
AL6.875.091	Case	1	
	Documents		
AL3.812.076 TO	Technical Description and Service Manual	1	
AL3.812.076 FO	Logbook	1	

* One of the scales is mounted on the sight and others are placed in the case AL6.875.091

Continue of table 2

Designation	Name	Qty	Note
FU3.585.452 TO	Storage battery D-0.55S. Technical Description and Service Manual	1	
G42.20.020 ET	Charging device. Tag	1	
G42.20.020 DEP	Charging device. Booklet	1	

5 Design and operation of the sight

5.1 Design

5.1.1 The sight consists of lens 1 (Fig.2), image intensifier U1, eyepiece 5 and mechanisms for alignment in elevation and direction.

5.1.2 The sight is provided with the following controls:

- the RETICULE BRIGHTNESS OFF handwheel 8 (Fig.8) for switching the sight and manual adjustment of reticule brightness;
- the DOWN/ STOP/ UP handwheel 1 (Fig.9) for sight alignment in elevation;
- the LEFT/ STOP/ RIGHT handwheel 6 (Fig.8) for sight alignment in direction;
- the ring 9 for focusing the image intensifier.

5.1.3 On the sight body 4 there are the desiccator 17, the nipple covered by the cover 3 (Fig. 9), the cover 20 of storage battery and the clamp.

5.1.4 The desiccator 17 is intended for permanent desiccation of air inside the sight. Unsaturated silica gel in desiccator is bluish. Silica gel saturated with moisture gets the pinkish-white or dirty-white colour which indicates the unavailability of silica gel for further using.

5.1.5 Nipple serves for blowing the inner space of sight with dried nitrogen or air. Nitrogen or air goes out through the hole provided with the tap 21 (Fig. 9).

5.1.6 Sight is mounted on the weapon by the clump which consists of holder 12 (Fig. 8), fastening screw 13, latch 14, handle 15, lock lever 16.

5.1.7 The eyeshield 11 provides the proper position of eye in the exit pupil of sight and protect the eye against an injury.

5.1.8 The focusing ring 9 of image intensifier serves as the focus adjustment at different ranges, thermo-defocusing of the image intensifier under temperature alterations from –50 to +50°C and aligning with the aid of straightening target.

5.1.9 The storage battery 11 (Fig. 1) consisting of five storage cells D-0.55 GOST 11258-79 serves as the main power supply.

The non-chargeable battery 5RTs83H in container 9 serves as the reserved power supply.

5.1.10 The field of view of the sight is shown on the Fig.4 (angular values correspond to mils). The reticule is provided with the aiming marks. The upper row is intended for aiming the grenade launcher RPG-7N (RPG-7DN) at ranges up to 300 m and other kinds of weapons

listed in section 2 of the present description at all ranges according to the elevation scale. The dashes designated by figure 4 is intended for grenade launcher fire at range 400 m and the lower dash is intended for range 500 m.

5.2 Operation

5.2.1 The night operation of the sight is ensured by image intensifier U1 (Fig. 2). The image of low brightness is projected on the photocathode of image intensifier U1 by means of lens 1. The reticule 4 is illuminated by light-emitting diode D1. The image of the reticule 4 is projected on the photocathode of image intensifier U1 via the projection optics consisting of lens 2, prism 3 and mirror 6. The intensified images of target and reticule 4 on the screen of image intensifier is viewed via the eyepiece 5.

5.2.2 With the micro-switch V1 switched on, the power supply B1-B5 feeds the circuit with the voltage 6.25 V. The converter U2 with the automatic screen brightness control circuit (ABC circuit) provides the feed to image intensifier U1 and holds the screen brightness of image intensifier at the constant level under an illumination changing.

The ABC and protection circuit U3 keep the optimal contrast between the reticule 4 and screen under an illumination changing.

6 Removable and spare parts

6.1 The storage battery 11 (Fig. 1) is intended for replacement the disabled one in the sight.

6.2 The desiccator in the cartridge 7 is intended for replacement the desiccator 17 (Fig. 8) saturated with the moisture.

6.3 Eyeshield 4 (Fig. 1) is designed for covert operation and prevents the lighted spot on the face when the eye is removed from the exit pupil.

6.4 Container 9 with the battery 2 (Fig. 7) is intended for supply of sight.

6.5 The scales 6 (Fig. 1) are the elevation scales. They are mounted on the elevation adjustment mechanism. Scale's designation should correspond to kind of weapon which the sight is mounted on according to the table 3.

7 Tools and accessories

7.1 The wrench 8 (Fig. 1) is intended for unscrewing the screws 2 (Fig. 9) and 5 (Fig. 8), desiccator 17, ring 3 (Fig. 7), cover 3 (Fig. 9) and tap 21.

7.2 The diaphragm 2 (Fig. 1) is designed for sight alignment in day or twilight conditions and for twilight operation with sight.

The diaphragm 2 is mounted on the blind 19 (Fig. 8) and fastened by two screws on the sight's body 4.

7.3 The headrest 5 (Fig. 1) is designed for comfort and safety when shooting with the grenade launcher RPG-7N (RPG-7DN). It is fastened by the screws 23 (Fig. 9) and washers 22.

7.4 The napkin 10 (Fig. 1) is intended for cleaning the optics.

7.5 The charging unit 1 is designed for storage battery recharge.

8 Mounting

8.1 Sight can be mounted on all kinds of weapons listed in the section 2 of present description. The elevation scale 7 (Fig. 8) should correspond to the kind of weapon which the sight mounted on (table 3).

Table 3

Kind of weapon	Scale designation
Sniper rifle	SVD
Sniper rifle VSS	VSS
Assault rifle AK74N (AKS74N)	AK74
Machine gun PKMN-1 (PKMSN-1)	PKM
Assault rifle AKMN-1 (AKMSN-1)	AKM
Assault rifle AKS74UN	AKS74UN
Assault rifle AS	AS
Machine gun RPK74N (RPKS74N)	RPK74
Machine gun RPKN-1 (RPKSN-1)	RPK
Grenade launcher RPG-7N1 (RPG-7LN1)	RPG-7

8.2 For mounting the sight the weapon is provided with the dove tale fit.

Mount the sight on a weapon in the following order:

- direct the sight into dove tale of a weapon holder and push the sight forward to stop;
- push the handle 15 (Fig. 8) up to its catching for fastening the sight;
- check up the reliability of sight fastening.

The sight must be rigidly kept in the weapon's holder.

For reliable fastening of the sight, one should adjust the sight's clamp to the weapon in the following order:

- unlock the latch 14;
- shift the handle 15 by teeth number providing the reliable fastening;
- lock the latch 13.

9 Marking and sealing

9.1 The cover 18 (Fig. 8) is engraved with the following information: designation of manufacturer (logo), designation of sight 1PN51, serial number of sight.

9.2 The cover 2 of carrying case (Fig. 3) is engraved with the designation 1PN51 and the serial number of sight.

9.3 The carrying case with sight and single maintenance kit is sealed with the seals.

10 Packing

10.1 The case 3 (Fig. 1) is designed for storage the scales 6.

10.2 The carrying case 2 (Fig. 3) is designed for transportation and storage the sight with the single maintenance kit and documents.

10.3 The sight is fixed in special site into the carrying case with diaphragm put on.

The documents are put in the polyethylene bag according the inventory into the carrying case.

10.4 The carrying case is provided with the shoulder belt for carrying.

Service manual

11 General directions

11.1 Study the sight design, arrangement and mounting the sight on the weapon and in the carrying case.

11.2 Familiarise yourself with the operation terrain by day before night operation.

11.3 In the case if the sight is after long storage, one should reactivate it and perform the daily maintenance procedure.

Remove the lubricant from outer surfaces by rags. Wipe the outer optical surfaces with the napkin 10 (Fig. 1).

11.4 Don't touch the optics by hand. A dust or dirt on the optics should be removed by napkin 10.

11.5 The scale 7 (Fig. 8) should correspond to the kind of weapon.

11.6 Avoid to waste the batteries 2 (Fig. 7) used or defective in a dustbin for general use. They must be collected and sent for mercury regeneration.

11.7 For undisturbed operation of sight the following is prohibited:

- to disassemble the sight;
- to switch on the sight with opened diaphragm 2 (Fig. 1) by day; REMEMBER THAT DAYLIGHT DAMAGES THE SIGHT!
- to aim the sight on bright light sources (campfire, headlights, etc) even with closed diaphragm;
- to apply the excessive effort to handwheel 8 (Fig. 8).

11.8 Ensure the proper packing and fastening the sight in the carrying case.

11.9 Protect the sight against impacts during operation and transportation.

11.10 Switch off the sight by counter-clockwise turning the handwheel 8 up to the stop if the bright luminous objects appears in the field of view.

11.11 Switch off the sight after operation.

11.12 Do not use another power supply but D-0.55S storage battery 11 (Fig. 1) or 5RTs83H battery in container 9.

11.13 Charge one of the battery 11 not earlier than one month prior to use at the command of commander and keep it in charged state. Other storage batteries are charged at the appropriate command of commander.

11.14 To increase the operating time of storage battery 11 under negative temperature conditions it is recommended to remove the battery from the sight and keep it in a pocket before and after operation.

11.15 The short circuit between container 9 and battery 5RTs83H is prohibited.

11.16 If the charged storage battery 11 was not used within 28 days it should be discharged according to FU3.585.452 TO.

11.17 Avoid the excessive brightness of aiming marks when shooting.

11.18 Switch off the reticule in the observation mode by counter-clockwise turning the handwheel 8 (Fig. 8) in order to avoid the imprinting of aiming marks in the sight's field of view.

11.19 After switching on the sight, the field of view should begin to shine within 1-4 seconds with yellow-green colour.

11.20 When putting on the diaphragm, the handle should be at the gunner's left side.

12 Safety precautions

12.1 Look after the reliability of sight fastening on the weapon to avoid the injures in operation.

12.2 Follow the safety precautions of FU3.585.452 TO when using the storage battery.

12.3 Avoid the exceeding pressing to the eye shield at the using the sight on the AK74N (AKS74N), AKMN-1 (AKMSN-1), AKS74UN, AS assault rifles, PKMN-1 (PKMSN-1), RPK74N (RPKS74N), RPKN-1 (RPKSN-1) machine guns, SVDN-1, VSS sniper rifles. The eye shield should be pressed until the clear appearance of margin of sight's field of view only.

13 Preparation for operation

13.1 Setting the sight in operational state

13.1.1 To set the sight in operational state under the day or twilight conditions do as follows:

- choose the fire position;
- put a rifle or assault rifle on the ground with right side downwards, and a machine gun or grenade launcher on their legs so that nothing sand, light etc. has got in the barrel;
- put the carrying case with sight at the left of weapon so that cover of case can be opened to the left;
- take out the sight and mount it on the weapon according to section 8 of the present description;
- ensure that the diaphragm 2 (Fig. 1) of sight is put on and closed;
- switch on the sight by clockwise turning of handwheel 8 (Fig. 8);
- adjust the optimal brightness of reticule for aiming fire by appropriate turning the handwheel 8;
- if only observing is needed the reticule should be switched off;
- the double image of target in the field of view means that the sight has not been focused on the target. It should be focused by means of ring 9.

13.1.2. The setting the sight into operational state under night conditions is the same as by day, but diaphragm 2 (Fig. 1) should not be put on. Consequently the doubling of target image will not appear.

13.2 Zeroing the sight on the rifles, assault rifles and machine guns

13.2.1 Zero the sight in the same terms as for iron sight according to the Firing Manual for appropriate kind of weapon.

To zero the sight with an weapon under day or twilight conditions do as follows:

- check if the scale designation on the sight corresponds to the weapon according to table 3;
- if the scale do not corresponds to the weapon, set the proper scale according to the section 16 of present description;
- mount the sight on the weapon's holder according to the section 8 of present description;
- set the weapon on the aiming rest;
- set the sighting leaf of weapon to range
  "3" for AKMN-1 (AKMSN-1) assault rifle and RPKN-1 (RPKSN-1) machine gun;
  "4" for AK74N (AKS74N) assault rifle, PKMN-1 (PKMSN-1), RPK74N (RPKS74N) machine gun and SVDN-1 sniper rifle;
  "1" for VSS sniper rifle and AS assault rifle;
- lay the weapon at aiming point by means of the iron sight at the range 100 m (with the ordinary target for iron sight zeroing);
- set the scale 7 (Fig. 8) of sight to division
  "3" for AKMN-1 (AKMSN-1) assault rifle and RPKN-1 (RPKSN-1) machine gun;
  "4" for AK74N (AKS74N) assault rifle, PKMN-1 (PKMSN-1), RPK74N (RPKS74N) machine gun and SVDN-1 sniper rifle;
  "1" for VSS sniper rifle and AS assault rifle by the clockwise turning the handwheel 1 (Fig. 9) up to the stop;
- put the diaphragm 2 (Fig. 1) on the sight;
- make sure that diaphragm is closed;
- switch on the sight and adjust it to best visibility by turning the handwheel of diaphragm 2 ;
- eliminate the doubling of target image by turning the ring 9 (Fig. 8);
- adjust the optimal brightness of reticule by turning the handwheel 8;
- check the coincidence of sight's aiming mark with the aiming point determined with the iron sight.

13.2.2 Adjust the aiming mark if it mismatches with the aiming point in the following order:

- loosen the screws 2 (Fig. 9) and 5 (Fig. 8) by one or two turnover with the wrench 8 (Fig. 1);
- align the aiming mark of sight with the aiming point by turning of handwheels 1 (Fig. 9) and 6 (Fig. 8), avoiding a displacement of scale 7;
- tighten the screws 5 and 2 (Fig. 9);
- take the weapon from the aiming rest;
- do four single shot with thorough and uniform aiming the sight at the aiming point;

- determine the accuracy of shots and the mean point of impact (MPI) according to Firing Manual for weapon used.

The accuracy is recognised as acceptable if it is not worse than without the sight. If the accuracy is acceptable the commander should determine the mean point of impact relative to check point. Check point is located:

- by 16 cm above the aiming point for RPK74N (RPKS74N) machine gun;
- by 21 cm above the aiming point for AKMN-1 (AKMSN-1) assault rifle and RPKN-1 (RPKSN-1) machine gun;
- by 22 cm above the aiming point for PKMN-1 (PKMSN-1) machine gun;
- by 20 cm above the aiming point for AK74N (AKS74N) assault rifle;
- by 23 cm above the aiming point for SVDN-1 sniper rifle;
- in the same position as the aiming point for AS assault rifle and VSS sniper rifle.

Zeroing is acceptable if the mean point of impact coincides with the check point or deflection in any direction not exceeds:

- 5 cm for RPK74N (RPKS74N) and PKMN-1 (PKMSN-1) machine guns, AKMN-1 (AKMSN-1), AK74N (AKS74N) and AS assault rifles and VSS sniper rifle;
- 3 cm for SVDN sniper rifle.

- If deflection exceeds the specified value do as follows:
  - if the mean point of impact deflects up or down, loosen the screws 2 (Fig. 9) by one-two turnover and turn the handwheel 1 along DOWN STOP or UP STOP arrow respectively, simultaneously holding the scale 7 (Fig. 8) by arm to avoid its displacement. The turn ofhandwheel1 (Fig. 9) by one division corresponds to displacement of mean point of impact by 5 cm at the range 100 m;
  - if mean point of impact deflects to the right or left, loosen the screws 5 (Fig. 8) by one-two turnover and turn the handwheel 6 along LEFT STOP or RIGHT STOP arrow respectively. The turn of handwheel 6 by one division corresponds to displacement of mean point of impact by 5 cm at the range 100 m;
  - tighten the screws 5 and 2 (Fig. 9);
  - check the last adjustment by repeated shooting.

13.2.3 Zeroing the sight with an weapon under night conditions is the same as by day or twilight, but diaphragm 2 (Fig. 1) should not be put on. Consequently the doubling of target image will not appear.

If an illumination of target or fore sight is used for aiming the weapon with the iron sight, the night sight should be switched off.

13.2.4 To zeroing the sight with the AKS74UN assault rifle under day or twilight conditions do as follows:

- mount the sight on the holder of assault rifle according to the section 8 of present description;
- if the scale do not corresponds to the AKS74UN assault rifle, set the

proper scale according to the section 16 of present description;
- set the scale 7 (Fig. 8) of sight to division 5;
- make sure that diaphragm 2 (Fig. 1) is put on and closed;
- switch on the sight and adjust it to best visibility of target remoted at 100 m, by turning the handle of diaphragm 2 m (the target to be ordinary for iron sight zeroing);
- eliminate the doubling of target image by turning the ring 9 (Fig. 8);
- adjust the optimal brightness of reticule by turning the handwheel 8;
- do four single shot with thorough and uniform aiming the sight at the aiming point;
- determine the accuracy of shots and the mean point of impact according to Firing Manual;

The accuracy is recognised as acceptable if it is not worse than one for the AKS74N assault rifle without the sight. If the accuracy is acceptable the commander should determine the mean point of impact relative to check point. Check point is located by 16 cm above the aiming point for the AKS74N assault rifle.

Zeroing is acceptable if the mean point of impact coincides with the check point or deflection in any direction not exceeds 5 cm.

- if deflection exceeds the specified value, adjust the sight according to paragraph 13.2.2 for other kinds of weapons;

zeroing the sight with the AKS74N assault rifle under night conditions is the same as by day or twilight, but diaphragm 2 (Fig. 1) should not be put on. Consequently the doubling of target image will not appear.

13.3 Zeroing the sight on the grenade launcher

13.3.1 Zero the sight in day or twilight conditions using the alignment target or remoted point. Zeroing should be executed in the terms specified by Firing Manual for RPG-7N (RPG-7DN) grenade launcher.

13.3.2 To zeroing the sight with a grenade launcher under day or twilight conditions with the aid of alignment target do as follows:
- draw the circle of 80 mm across diameter with the cross-hairs on a target sheet;

cross-hairs is intended as the aiming point for sight; the location of aiming point of sight relative to aiming point of grenade launcher is shown on the Fig. 6;

- set up the target vertically with the aid of plummet, in the front of grenade launcher at the range 20 m from the sight leaf;
- check whether the designation of temperature correction scale on the sight corresponds to grenade launcher (the designation should be RPG-7);
- set the grenade launcher on the zeroing bench;
- mount the sight on the grenade launcher's holder according to the section 8 of present description;
- set the scale 7 (Fig. 8) of sight to temperature correction "+";
- put the diaphragm 2 (Fig. 1) on the sight;
- make sure that diaphragm is closed;
- switch on the sight and adjust it to best visibility by turning the handwheel of diaphragm 2;

- adjust the optimal brightness of reticule by turning the handwheel 8 (Fig. 8);
- eliminate the doubling of target image by turning the ring 9 (Fig. 8);
- coincide the bore axis of grenade launcher with the aiming point for the grenade launcher on the target;
- check the coincidence of sight's aiming mark with the aiming point of sight;
- if aiming mark mismatches with the aiming point of sight do as following:
  - loosen the screws 2 (Fig. 9) and 5 (Fig. 8) by one or two turnover with the wrench 8 (Fig. 1);
  - align the aiming mark with the aiming point of sight by turning of handwheels 1 (Fig. 9) and 6 (Fig. 8), preventing a displacement of scale 7 by hand;
  - tighten the screws 5 and 2 (Fig. 9);
  - check up the alignment;
  - switch off the sight.

An illumination of the target can used for aiming the grenade launcher in twilight conditions. If the image of target degrades at entirely opened diaphragm 2 (Fig. 1), the illumination of target should be increased and the diaphragm be reduced.

Zeroing the sight under night conditions is the same as by day or twilight, but diaphragm 2 (Fig. 1) should not be put on. The target can be illuminated if it is necessary.

13.3.3 To zeroing the sight with a grenade launcher under day or twilight conditions with the aid of remoted point do as follows:

- set the grenade launcher on the zeroing bench;
- mount an zeroed optical sight on the grenade launcher's holder and choose a remoted point (post top, corner of building etc) at the range 300-500 m from grenade launcher ; The optical sight should be previously zeroed according to Firing Manual for antitank grenade launcher RPG-7N1 (RPG-7DN1);
- set the temperature corrections handwheel of optical sight to sign "+";
- lay the grenade launcher so that the mark on central axis of range scale, corresponding to range of remote point chosen, coincides with the edge of remote point;
- remove the optical sight, avoiding a disturbance of grenade launcher laying;
- mount the night sight on the grenade launcher and set the scale 7 (Fig. 8) in position "+";
- switch on the sight;
- check if the sight's aiming mark corresponding to the range, coincides with the remote point in elevation and direction;
- if aiming mark mismatches with the remote point, align them in accordance to paragraph 13.3.2;
- switch off the sight after zeroing.

In zeroing with the aid of remote point the probable misalignment is 0-00.5 … 0-01, consequently the zeroing by remote point should be used only in the case when zeroing by alignment target is impossible.

13.4 Range finding with the sight

13.4.1 The range to target can be determined:

- over a reference point or terrain objects if the range to them is known;
- over angular size of target or terrain objects.

In order to determine the range, one should measure the angular size of target or object in mils, by means of reticule marks in the field of view and calculate the range by formula:

$$R = H * 1000 / y$$

where: R – the range, m;
H – height of target or object, m;
y – angular size of target or object, mil.

Angular sizes of reticule marks in the field of view are given on the Fig.4.

For range determination with the aid of reticule marks one can be guided by examples shown on the Fig.5

14 Order of operation

14.1 General directions

14.1.1 Initial position of controls:

- marker of handwheel 8 (Fig. 8) is set at inscription OFF;
- marker of handwheel 7 is set at index:
  - "+" for RPG-7N1 (RPG-7DN1);
  - "3" for AKMN-1 (AKMSN-1), RPKN (RPKSN-1);
  - "4" for SVDN, AK74N (AKS74N), AKS74UN, PKMN-1 (PKMSN-1), RPK74N (RPKS74N);
  - "1" for VSS and AS.

The scale of handwheel 7 is numbered in hectometres. The success in night observing and firing depends on the experience, since the image contrast and appearance of terrain and target significantly differ from the ones in daylight conditions.

Before operation:

- switch on the sight by clockwise turning the handwheel 8;
- adjust the optimal brightness of reticule for firing mode by appropriate turning the handwheel 8; in observing mode the reticule should not be visible;
- lay the weapon at target, using the aiming mark or division of reticule as shown on Fig. 5.

The scale 7 should be set in accordance with the range to target. The range is rounded to integer hundreds of meters. The centre of target is used as aiming point usually.

For aiming of RPG-7N1 (RPG-7DN1) grenade launcher one should coincide the aiming mark corresponding to range, with the aiming point. The scale 7 should be set to sign "+" if the air temperature is positive

(above 0°C) and to sight "-" if otherwise.

When firing against inbound or outbound targets the scale 7 should be set to following division:

- "3" for AKMN-1 (AKMSN-1) assault rifle and RPKN-1 (RPKSN-1) machine gun at the range up to 300 m;
- "5" for AKS74UN assault rifle at the range up to 300 m;
- "7" for AKS74UN assault rifle at the range 350-500 m;
- "4" for AK74N (AKS74N) assault rifle, SVDN-1 sniper rifle, PKMN-1 (PKMSN-1), RPK74N (RPKS74N) machine gun at the range up to 400 m;

If range exceeds 300-400 m, the scale should be set to range predicted on the moment of fire initiation.

Fire against crossing targets is applied both with tracking or waiting methods. The predicted interval for tracking method of fire against target moving at speed 3 m/s and range 300 m is 0-04 and for range exceeding 300 m one is 0-06 (this values is applied to assault rifles and machine guns only). The aiming point can be shifted by shift of aiming mark.

In waiting method of fire, the vertical dashes is used for determination of fire initiation moment. For repeated shot or burst, one shifts the weapon in direction of target movement and shoots when the target reaches the predicted interval to aiming mark.

The prediction interval is proportional to angular velocity of target.

Switch off the sight in the case of long exposure by bright light sources.

To sighting with a gas mask put on, the eye shield 11 (Fig. 8) with the ring 10 should be removed.

14.2 Transferring the sight from operational state to carrying position

14.2.1 Transfer the sight from operational state to carrying position in the following order:

- switch off the sight by counter-clockwise turning the handwheel 8 (Fig. 8) up to the stop;
- put on the diaphragm 2 (Fig. 1);
- remove the sight from weapon, pack it into carrying case 12 (Fig. 3) and fasten it.

15 Serviceability inspection

15.1 The trouble-free operation and operational readiness of the sight depend on periodic inspection and maintenance.

The sight in service should be inspected in proper time. The serviceability inspection is carried out in all kinds of maintenance for determination of technical condition of the sight and timely troubleshooting. The technical condition of the sights is estimated by its serviceability, completeness and operational readiness.

15.2 Carry out the check-ups listed in the table 4, at the serviceability inspection.

Table 4

Verified parameters and method of checking	Technical requirement
Match the completeness of sight with the list in logbook	The completeness of sight should conform to the set listed in logbook or enclosure inventory
Inspect visually the sight and the single maintenance kit	The outer surfaces should be free of cracks, dents, corrosion and other defects
Check the reliability of sight fastening on the weapon by means of swinging the sight switched off	No swinging is admissible
Inspect visually the condition of optics and diaphragm 2 (Fig. 1)	The inner and outer surfaces should be free of damages, grease spots and other depositions
Inspect visually the condition of the silica gel in desiccator 17 (Fig.8) and desiccator in the cartridge 7 (Fig. 1) through the cover glass of desiccator	Silica gel should be bluish
Check the voltage of storage battery 11 by voltmeter of accuracy grade 2.5 or higher	The voltage of storage battery 11 should be 6 V or higher
Inspect visually the condition of contacts of sight and power supply	The contacts of sight and power supply should be free of corrosions and depositions
Check the operability of sight by switching on with the handwheel 8 (Fig. 8) at closed diaphragm 2 (Fig. 1)	The distinctive sound of acting sight should be heard. The field of view should slightly luminescent
Inspect visually the brightness of reticule and the purity of field of view with the turning of handwheel 8 (Fig. 8) and diaphragm's 2 handle (Fig. 1)	The reticule brightness should be controlled by handwheel 8. The contrast of aiming marks should be sufficient for exact recognition. The field of view should be free of spots and other defects
Check the operability of diaphragm 2 by turning the handle from position OPEN to position CLOSE and inversely. Inspect visually whether the diaphragm shutter closes the aperture	The position of diaphragm 2 should be distinct located. The diaphragm shutter should close the aperture entirely

16 Typical defects and troubleshooting

16.1 Typical defects and troubleshooting

16.1.1 In the case of an defect appearance one should check at first:

- the sight fastening on the weapon;
- whether the diaphragm aperture is opened;
- absence of dust, dirt, grease, hoarfrost or water on the lens and eyepiece;
- charge of power supply;
- whether the handwheel 8 (Fig. 8) is in position OFF.

Especially look after the condition of battery contacts.

16.1.2 The list of possible defects is given in the table 5.

16.2 Application of single maintenance kit

16.2.1 Replace the assembling units with operable if they are provided in the single maintenance kit only. In other cases send the sight to repair facility. A repair of carrying case 12 (Fig. 1) can be carried out also.

Before a replacing, prepare the workplace and determine the trouble.

16.2.2 Replace the storage battery in following order:

- switch off the sight;
- remove the storage battery from the sight;
- mount the charged operable battery from single maintenance kit into the sight;
- switch on the sight, check its operability and switch it off.

16.2.3 The replacing of desiccator 17 (Fig. 8) to be carried out in an indoor dry conditions. Do not expose to air the operable desiccator without cartridge more than 1-2 min, in order to avoid its saturation with moisture.

To replace the desiccator 17 do as follows:

- prepare the desiccator in the cartridge 7 (Fig. 1) from single maintenance kit by light loosening it with the wrench 8.
- unscrew the expired desiccator 17 (Fig. 7) from the sight and quickly screw in the operable one with an effort to slight deformation of gasket.

16.2.4 Replacing of eyeshield to be carried out in the following order:

- spread the ring 10;
- remove the eyeshield 11 with the ring 10;
- take the eyeshield 4 (Fig. 1) from the single maintenance kit and put it on the eyepiece mount with slight stretching; orient the shutters conjunction line horizontally;
- put the ring 10 (Fig. 8) on and lock it.

16.2.5 Replacing of the scale 7 to be carried out in the following order:

- set the initial scale position opposite to marker on the flange of sight's body;
- unscrew the screws 2 (Fig. 9) by wrench 8 (Fig. 1) without a rotation of the handwheel 1;
- remove the handwheel 1;
- remove the scale 7 (Fig. 8);
- mount the scale 6 (Fig. 1) corresponding to the kind of weapo

Table 5

Defect's signstures	Possible cause	Method of elimination
The distinctive sound of acting sight is heard weakly	Discharge of battery	Replace the battery with operable from the single maintenance kit
The image brightness rises to maximum and falls down fast or fluctuates disturbing the sight operation	Light overload	Put the diaphragm 2 on the lens (Fig. 1)
	Break-down of the voltage transformer	Send the sight to repair facility
Image is degraded and blurred	Sweating or dirtying the outer optical surfaces	Wipe the outer optical surfaces of lens and eyepiece with napkin 10 (Fig. 1)
Image is degraded and blurred, the flasching and blinking are observed in the field of view	Sweating the inner surfaces of lens, eyepiece and image intensifier	Replace the desiccator 17 (Fig. 8). If the trouble do not eliminated, send the sight to repair facility for blowing with dry nitrogen or air and sealing
The image is present but the reticule is absent	The light emitting diode D1 (Fig. 2) is defective	Send the sight to repair facility
The screen of image intensifier does not shine but the distinctive sound of acting sight is heard	The image intensifier U1 is defective	Send the sight to repair facility
The screen of image intensifier does not shine and the distinctive sound of acting sight is not heard	The converter U2 is defective	Send the sight to repair facility

Continue of table 5

Defect's signstures	Possible cause	Method of elimination
Dark spots appear in the field of view, disturbing the sight operation	The image intensifier is damaged by point light sources. The photocathode or screen flaking appears	Send the sight to repair facility
A falcate darkening at the margin of view-field appears and the image is shited relative ti the center of screen and degraded or image is collapsed	The image intensifier is damaged by powerful light sources	Switch off the sight. After one minute illuminate the lens with any light souce (flashlight for example) for one minute. Switch on the sight. If the trouble is not eliminated, check it within two days by switching on for 5-7 min twice per day. If the trouble is not eliminated in specified time, send the sight to repair facility

used in accordance with the table 3 and align the initial division of scale with the marker on the flange of sight's body;

- mount the handwheel 1 (Fig. 9) and screw in the screws 2 without a rotation of the handwheel 1.

16.2.6 When mounting the battery 5RTs83H 2 (Fig. 7) into the container one must conform to polarity of battery contacts. The polarity is marked by sign "+" on the casing 1 and by "+" and "-" on the battery 2.

Mounting of the battery 2 into casing 1 to be carried out in the following order:

- unscrew the ring 3;
- remove the casing 7 from the casing 1;
- remove the springs 6 and caps 4;
- mount the battery 5RTs83H into casing 7;
- put the springs 6 on both sides of battery 5RTs83H as shown on the figure in following order:
  - insert the contact 5 in one of the grooves of spring 6;
  - place the springs 6 at interval 1-2 mm from the battery 2;
  - insert the contact 5 into another groove of spring 6;
  - press the spring 6 to battery 2;
  - press the contact 5 to spring 6;

- put the caps 4 on the battery 5RTs83H with springs 6;
- mount the battery 5RTs83H with caps 4 into the casing 1 in compliance with the polarity and screw in the ring 3 (Fig. 7) up to the stop by wrench 8 (Fig. 1).

16.2.7 If the sight is used on the RPG-7N1 grenade launcher, it should be provided with the headrest 5 (Fig. 1).

Mount the headrest in following order:

- unscrew the screws 23 (Fig. 9) by means of wrench 8 and remove the washers 22;
- mount the headrest 5 on the body of sight 4 (Fig. 8) and fasten it with the washers 22 (Fig. 9) and screws 23.

To dismount the headrest 5 (Fig. 1) do as follows:

- unscrew the screws 23 (Fig. 9) by means of wrench 8 and remove the washers 22;
- remove the headrest 5 into case 2 (Fig. 3);
- screw in the screw 23 (Fig. 9) with washers 22 in the sight's body up to the stop.

17 Maintenance

17.1 General directions

17.1.1 The sight in service should be prevented against dust and dirt. Prevent the sight against impacts in service, storage and transportation. Outer optical surfaces should be clean always. In the order to avoid the scratches of optics, wipe a dust or dirty by clean napkin 10 (Fig. 1) only. Do not touch the optics by hand to avoid grease spots.

The following materials can be used for cleaning the outer optical surfaces:

- the white flannel N1 mark 1639 GOST 7259-77,
- the cotton wool for optical industry GOST 10477-75,
- the rectified ethyl alcohol of extra grade, GOST 18300-77,
- the industrial ether EP or its mixture with the mentioned ethyl alcohol (10% of alcohol and 90% of ether).

The grease spots on the glass is removed by napkin or cotton wool. In the case of strong dirt the cleaning to be carried out with the solvent in the following order:

- wind some cotton wool on the end of wood stick;
- wet the cotton wool with the solvent and remove the excess by slight joggle;
- wipe the glass with the wetted cotton wool more than once, avoiding to touch the lens mounting;
- change the cotton wool and finish the cleaning by circular movements from center to periphery;

In cleaning, avoid to getting of the solvent to lens mounting as it dissolves the sealant.

In order to prevent the corrosion, the outer unpainted parts of sight and single maintenance kit should be covered by thin layer of lubricant GOI-54p GOST 3276-89.

17.1.2 In order to provide the operational readiness, trouble-free operation, sufficient interrepair time and revealing the damaged or worn units the serviceability inspection and maintenance should be carried out in the specified terms.

The maintenance system for sight in service involves the following actions:

- serviceability inspection (SI);
- daily maintenance (DM);
- maintenance No.1 (M-1);
- maintenance No.2 (M-2);
- seasonal maintenance (SM).

The maintenance system for sight in storage involves the following actions:

For short-term storage:

- maintenance No.1 for storage (M-1x);

For long-term storage:

- maintenance No.1 for storage (M-1x);
- maintenance No.2 for storage (M-2x).

The material consumption rates per one maintenance procedure are listed in the Supplement 1.

17.2 Serviceability inspection (SI)

The SI of the sight in service is carried out by the gunner which the sight allotted to, under commander's control.

The SI is performed before a battle, march, training and in halts during a march.

The SI consists of actions listed in the table 6.

17.3 Daily maintenance (DM)

17.3.1 The DM of the sight in service is carried out by the crew which the sight allotted to, under commander's control.

The DM is performed in maintenance hours specified by the daily routine, maintenance days, before each shootings, after march if the sight was in operational state, but at least once per two weeks.

17.3.2 In DM they carry out all check-ups listed for serviceability inspection and in the case of need the maintenance procedures listed in the table 6.

17.4 Maintenance No.1 (M-1)

17.4.1 The M-1 in service is carried out by crew which the sight allotted to, under control of commander and technician from the repair facility in case of need.

The M-1 is performed once at the coming in the sight and yearly further for sight in service.

In short-term storage the M-1 is performed before storage.

Table 6

Procedure and methods	Technical requirements	Instruments, tools, accessories, materials
Wipe the sight and carrying case from dust, dirt and moisture	The sight should be clean	Rags
Clean the outer unpainted surfaces of metal parts from dirt and moisture. Then smear them with the thin layer of lubricant	Unpainted outer surfaces of metal parts must be free of corrosion	Solid lubricant GOI-54p GOST 3276-89
Clean the contacts of sight and power supply	The contacts must be clean	Napkin 10 (Fig. 1)
Clean the outer surfaces of optics	The outer surfaces of optics must be clean	Napkin 10
Replace the disabled units with the operable from the single maintenance kit in accordance with the subsection 16.2	The sight should conform to technical requirements listed in the table 5	Tools in accordance with the subsection 16.2
Charge the storage battery 11 (Fig. 1) in accordance with the Service Manual On Charging Unit G43.20.020 DEP or Technical Description and Service Manual On Storage Battery D-0.55S FU3.585.452 TO	The voltage of storage battery 11 should be 6 V or higher	The charging unit 1 or charging unit AL4.069.000 from group maintenance kit

17.4.2. The M-1 comprise all actions stipulated for DM an in case of need the follows:

- if the sight was not used more than year, check the recognition for sight in night condition at target (vehicle);
- repair the carrying case 12 and paint it with enamel ML-165 of khaki color GOST 12034-77;
- restore the silica gel saturated with moisture as follows:
  - unscrew the cover of desiccator,
  - pour the silica gel into another clean metal container,
  - place the container with silica gel on the heat source (electric

range, carbons of fire, etc). The contact with the open flame is prohibited. The reduction temperature for silica gel is from 150 to 170°C. The time needed for reduction is 3-4 hours.

In the case of short-term storage, smear the outer unpainted surfaces of sight and parts of single maintenance kit with the thin layer of lubricant GOI-54p GOST 3276-89.

In the case the defects are not eliminated with the single maintenance kit, the sight should be sent to repair facility.

17.5 Maintenance No.2 (M-2)

17.5.1 The M-2 is carried out in the special repair facilities by means of group maintenance kit and their repair equipment and tools.

The M-2 is performed once per two year for sight in service and once at long-term storage.

17.5.2 The M-2 comprises all acts stipulated by M-1 and also the followings:

- check the limiting resolution of the sight and image quality;
- check the recognition range of sight in the field;
- check the eyepiece setting relative to image intensifier.

In the case of need:

- replenish the single maintenance kit and replace the disable units and parts with the operable from the group maintenance kit;
- blow-up the sight with the dry nitrogen or air;
- perform the alignment of the sight by alignment equipment;
- refill the lubricant and sealant in the points of repair.

DO NOT UNSEAL THE SIGHT FOR REPLACING THE LUBRICANT AND SEALANT ONLY!

Perform the mentioned procedures in accordance with the Guide To Group Maintenance Kit AL3.812.076 TO1, Supplement 3.

Besides the mentioned procedures, for long-term storage perform the followings:

- cover the unpainted surfaces of sight and parts of single maintenance kit with the thin layer of solid lubricant GOI-54p GOST 3276-89;
- wrap the smeared parts with the sub-parchment P-3 GOST 1760-81;
- close up the eyepiece by sub-parchment P-3.

17.6 Seasonal maintenance (SM)

17.6.1 The SM for sight in service is carried out twice per year at the transition from warm time of year (spring-summer period) to cold (autumn-winter period) and vice versa.

SM is performed by screw which the sight allotted to, under control of commander and technician from the repair facility in case of need.

The procedures of SM are the same as for M-1.

18 Storage

Only inspected, repaired and clean sight are the subject of storage. Sight are stored in the carrying cases with the single maintenance kit.

18.2 Sights are stored in the heated storage facilities. Air temperature must be within the limits from 5 to 35^{O}C. Relative humidity must not exceed 85%. Daily temperature variations in the warehouse must not exceed 5 ^{O}C.

18.3 The sights should be placed on the shelves. A storage the sights on the floor, near stoves or windows or under the sun is prohibited.

18.4 When the personnel is situated in barracks, the sights should be placed near the personnel in special assigned shelves.

When the personnel is in camp the sights should be stored in special assigned storage facilities.

18.5 The storage batteries are stored with the sight according to Technical Description and Service Manual on storage battery D-0.55S.

18.6 The storage time for battery 5RTs83H is 9 month.

18.7 The maintenance M-1x should be performed:

- each 6 month for short-term storage;
- each year for long-term storage.

The maintenance M-2x should be performed each two years for long-term storage.

The maintenance M-1x and M2x in storage is carried out by storage facility team and the technician of the repair facility can be got in case of need.

The M-1x consists of the same procedures as the Daily Maintenance. The M-2x consists of the same procedures as the maintenance M-1.

19 Transportation

19.1 The sight with the single maintenance kit can be transported in the carrying case by any transport at any distance.

19.2 Before transportation, it is necessary to ensure the reliable fastening of sight and single maintenance kit in the carrying case. All locks of case should be operable.

19.3 In transportation the carrying case should be set with cover upward. Do not throw and turn over the carrying case. Handle with care.

19.4 The sight mounted on the weapon can be landed in the case of absolute necessity.

19.5 The sight in the carrying case can be landed in landing container GK-30.

SUPPLEMENT 1

Material consumption rates per one maintenance procedure

Name of material	Rate of consumption		
	DM	M-1	M-2
Sub-parchment P-3 GOST 1760-81, mm^2	-	0.5	0.5
Cotton wool GOST 10477-75, g	-	20	50
White flannel N1 mark 1639 GOST 7259-77, mm^2	-	(250x250)	2 (250x250)
Rectified ethyl alcohol of extra grade, GOST 18300-77, g	-	15	100
Industrial ether EP, g	-	90	135
Enamel ML-165 of khaki color GOST 12034-77	-	200	200
Solid lubricant GOI-54p GOST 3276-89	10	20	50

SUPPLEMENT 2

FIGURES

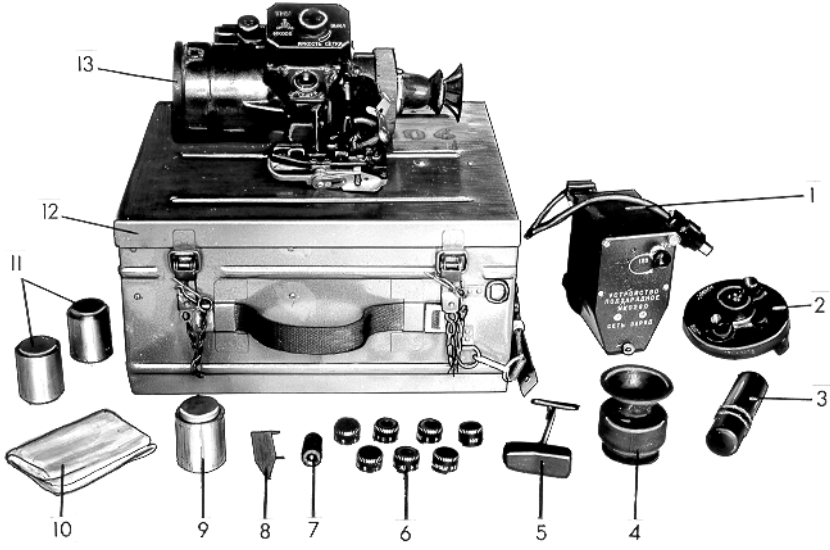


Fig. 1 **Sight package**

1 – charge unit G43.20.020; 2 – diaphragm AL5.962.110; 3 – case AL6.875.091; 4 – eyeshield AL6.548.035; 5 – headrest AL6.548.070; 6 – scale AL7.025.185; AL7.025.185-1; AL7.025.185-2; AL7.025.185-3; AL7.025.185-4; AL7.025.185-5; AL7.025.185-7; AL7.025.185-10 (one of the scales is set on the sight); 7 – desiccator in cartridge AL5.883.030; 8 – wrench AL8.896.009; 9 – container with battery AL6.086.005; 10 – napkin AL8.890.001-01; 11 – storage battery AL5.529.011; 12 – carrying case AL6.875.097; 13 – sight (article 1PN51) AL3.812.076

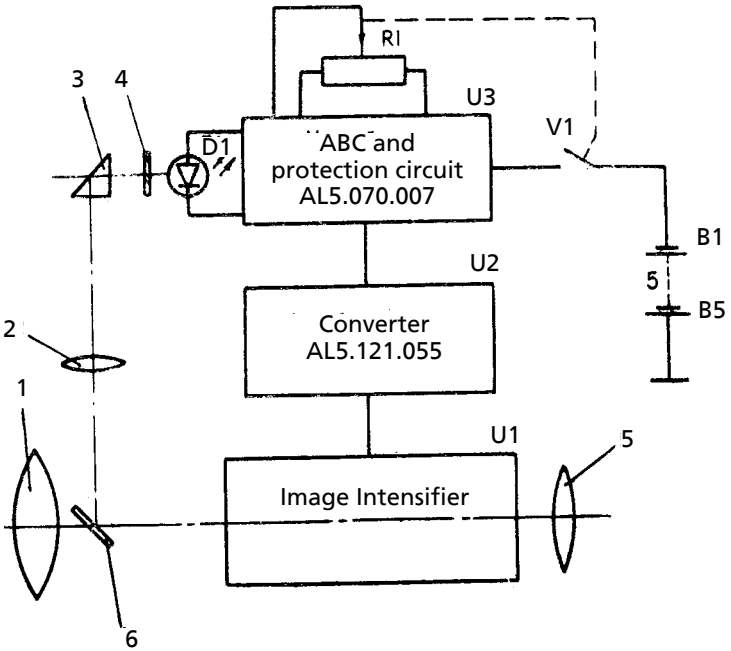


Fig. 2

Optoelectrical operating diagram

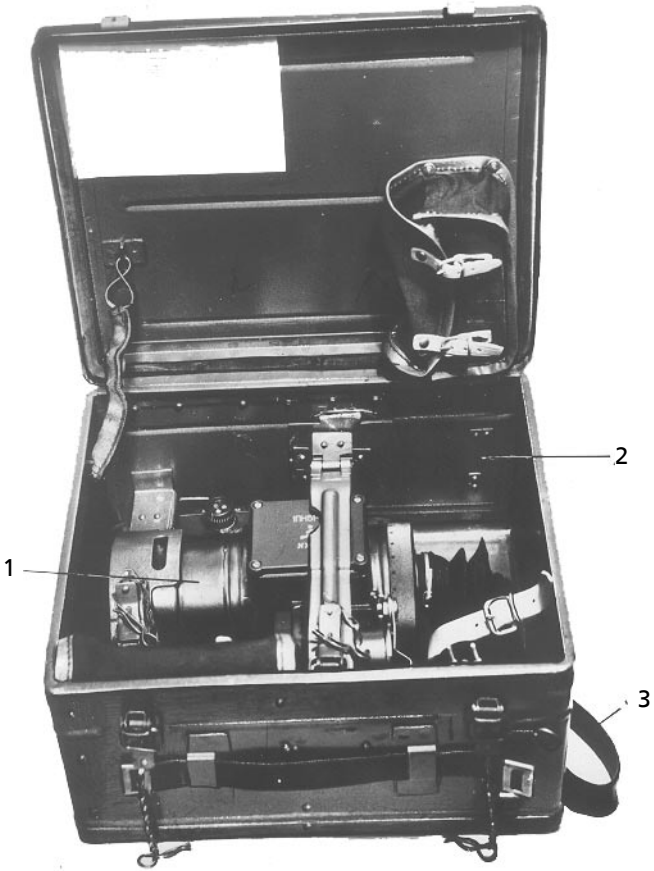


Fig.3

Sight packing

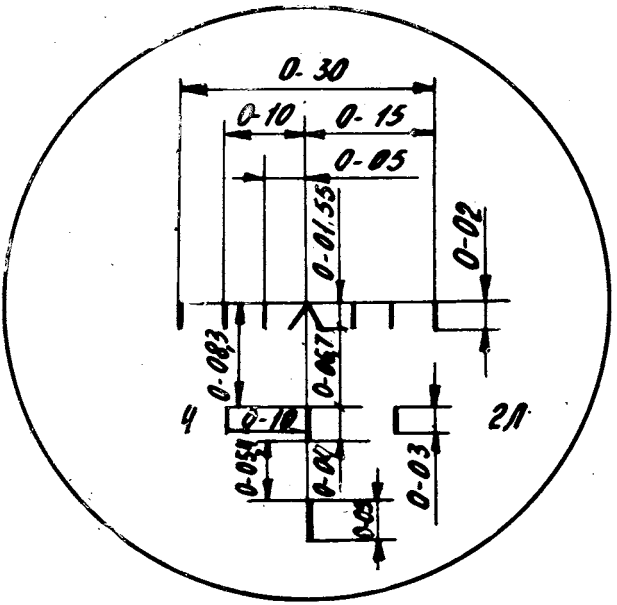


Fig.4

Field of view with angular values in mils

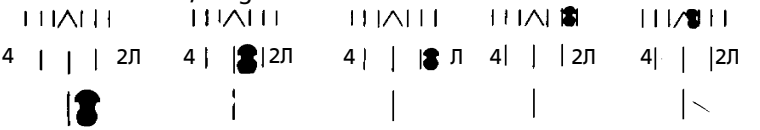
Main battle tank, height = 2.7 m

1. R=325 m 2. R=400 m 3. R=500 m

Running silhouette, height = 1.5 m

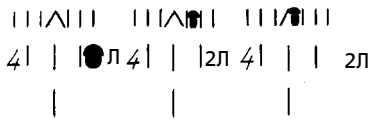
4. R = 300 m 5. R = 375 m 6. R = 500 m 7. R = 750 m 8. R = 970 m

Half- silhouette, height = 1 m



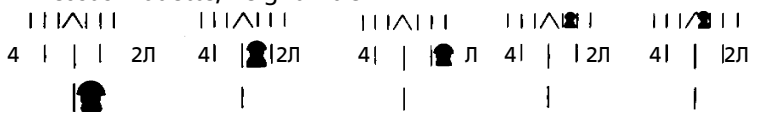
9. R = 200 m 10. R = 250 m 11. R = 333 m 12. R = 500 m 13. R =645m

Prone target (head), height = 0.3 m



14. R = 100 m 15. R = 150 m 16. R = 194 m

Breast silhouette, height = 0.5 m



17. R = 100 m 18. R = 125 m 19. R = 167 m 20. R = 250m 21. R = 325m

Fig. 5

Examples of range finding with the aid of reticule

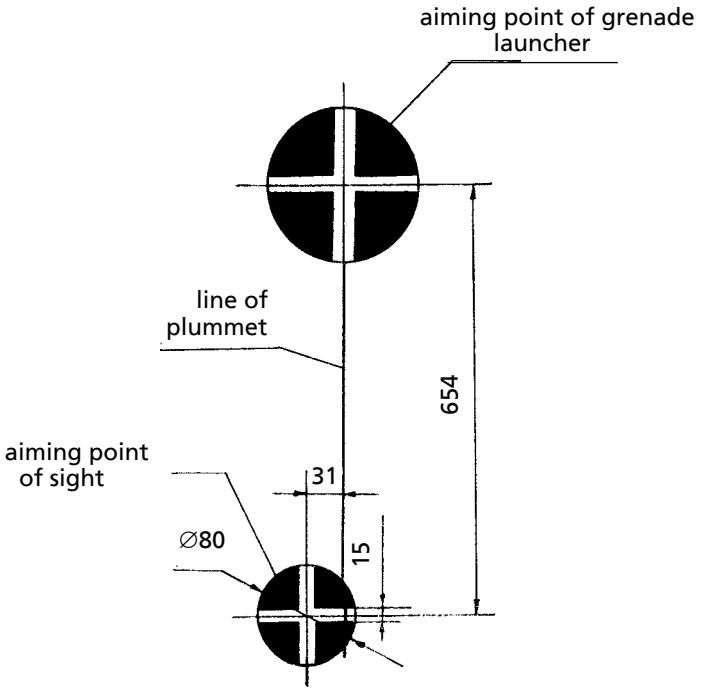


Fig. 6

Alignment target for grenade launcher

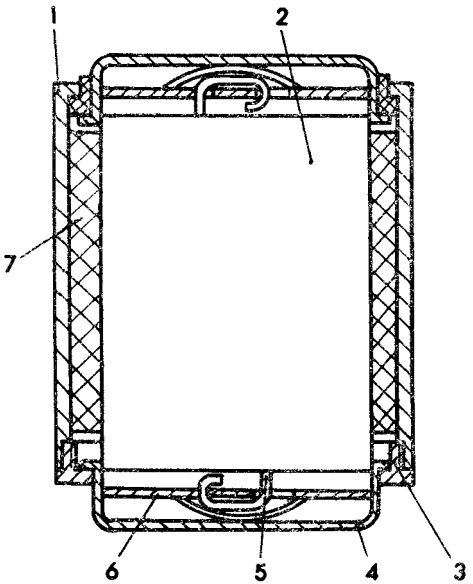


Fig. 7

Container with the battery 5RTs83H

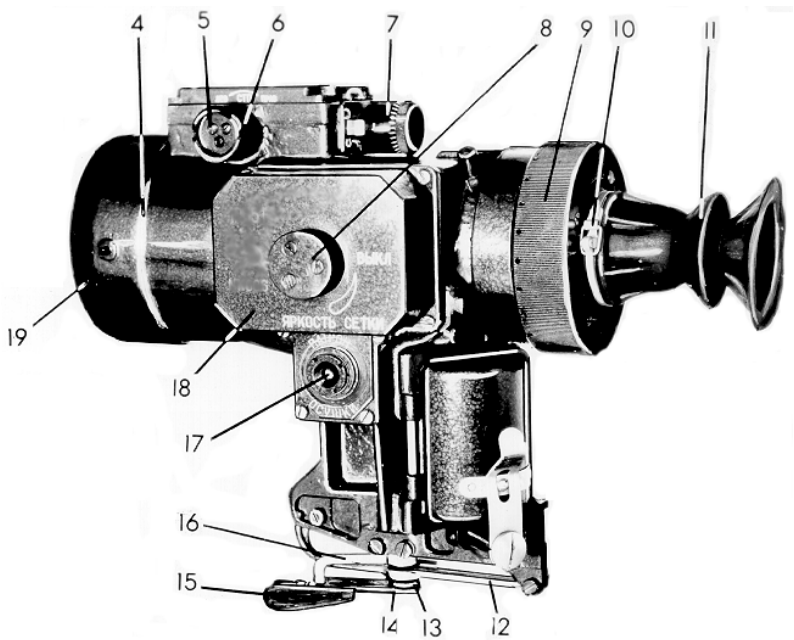


Fig.8

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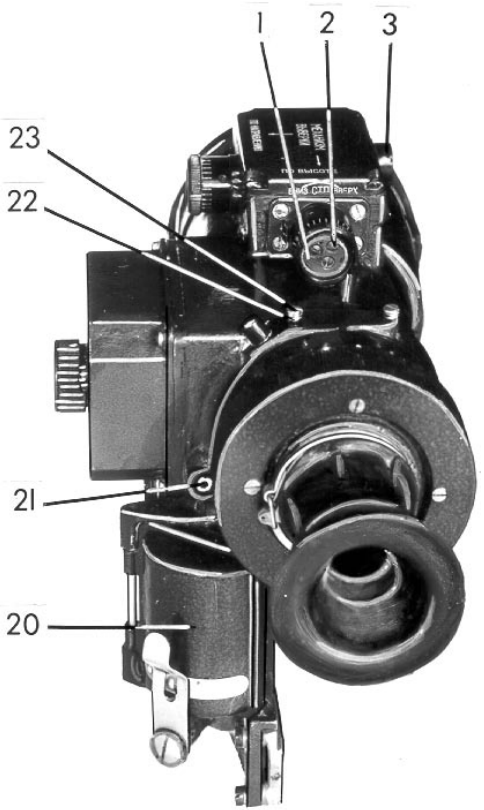

Fig.9

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