Shooting in conditions of limited visibility

At the moment the target is illuminated, the gunner quickly aims the grenade launcher and fires a shot. In this case, the gunner should not look directly at the light source so that the light does not blind him. In the absence of lighting, guidance should be carried out by the shine (flash) of the enemy's shot; by the flame escaping from the exhaust pipe; by the noise of the engine or the silhouette of the target, having previously turned on the toggle switch for illuminating the sight reticle. When shooting in fog or smoke, depending on the density of the curtain, shooting is carried out at close distances along the silhouettes or in the direction of the noise of the engine and the rattle of the tracks.

Figure 3.13.4 – SPG-9 “Kopyo” (left) and SPG-9AM “Lanceya” (right) with the bolt open and shots prepared

Figure 3.13.5 – Left: LNG-9 in the “author's” camouflage of the Armed Forces of Ukraine; Right: Fighters of the National Guard of Ukraine with LNG-9

Shooting a fragmentation grenade at long distances

If the exact distance to the enemy is known, up to 4.5 km, then he can be fired at with a fragmentation grenade using the "Side Level", where the handwheel is set to the desired barrel elevation angle (Table 3.10).

Table 3.10. Shooting the OG-9V using a “side level”

Distance, m	Aiming angle, degrees, minutes	Grenade flight time, seconds	Mean deviations, by range, m	Median deviations, lateral, m
100	0° 13	0,3	16	0,1
200	0° 30	0,6	16	0,1
300	0° 48	1,0	16	0,2
400	1° 07	1,3	16	0,3
500	1° 26	1,7	16	0,5
600	1° 46	2,0	16	0,6
700	2° 06	2,4	16	0,8
800	2° 27	2,8	17	1,0
900	2° 48	3,2	17	1,2
1000	3° 10	3,6	17	1,3
1100	3° 33	3,9	17	1,5
1200	3° 56	4,3	17	1,6
1300	4° 20	4,7	17	1,8
1400	4° 44	5,1	17	2,0
1500	5° 09	5,5	17	2,2
1600	5° 35	6,0	18	2,4
1700	6° 01	6,4	18	2,6
1800	6° 28	6,8	18	2,8
1900	6° 55	7,3	18	3,0
2000	7° 23	7,8	18	3,2
2100	7° 52	8,3	19	3,4
2200	8° 22	8,7	19	3,6
2300	8° 52	9,2	19	3,9
2400	9° 23	9,7	19	4,1
2500	9° 55	10	19	4,4
2600	10°28	11	20	4,6
2700	11° 01	11	20	4,8
2800	11° 35	12	20	5,1
2900	12° 10	12	21	5,3
3000	12° 46	13	21	5,5
3100	13° 23	13	21	5,8
3200	14° 02	14	22	6,0
3300	14° 42	14	22	6,3
3400	15° 23	15	22	6,5
3500	16° 05	16	23	6,8
3600	16° 49	16	23	7,0
3700	17° 34	17	24	7,2
3800	18° 21	18	24	7,4
3900	19° 10	18	25	7,7
4000	20° 00	19	26	7,9
4100	20° 52	20	27	8,1
4200	21° 47	21	28	8,3
4300	22° 44	21	29	8,5
4400	23° 44	22	30	8,7
4500	24° 47	23	31	8,8
4520	25° 00	23	31	8,8



Chapter 14. Carl-Gustaf Granatgevär m/48 (Grg m/48) recoilless rifle M2/M3

Grg Carl Gustaf – Swedish anti-tank grenade launcher, manufactured by Saab Bofors Dynamics. According to the official Swedish classification, it is “Granatgevär”, or abbreviated as “Grg”, which means “grenade rifle”.

The Grg is designed to combat armored vehicles, destroy enemy manpower located in light shelters, at firing positions, as well as to create smoke screens and illuminate the area. Against the backdrop of the Russian invasion, allied Canada transferred a batch of these Grgs of two modifications M2 and M3 to Ukraine (Fig. 3.14.1).

Figure 3.14.1 – Grg Carl Gustaf M3 (left) and M2 (right)

The Carl Gustaf has a rifled barrel, which, coupled with the high velocity of the grenades, provides good accuracy, which is approximately on par with the LNG-9.

Both modifications have a common structure, a single loading and aiming principle. Only the M2 weighs 14.2 kg, and the M3 - 8.5 kg; the M2 is also 8 cm longer.

Ammunition for Grg Carl Gustaf

Characteristics of grenades used in Grg Carl Gustaf M2/M3 are given in Table 3.11.

Table 3.11. Applicable ammunition for Grg Carl Gustaf.

Name grenades	Grenade type	Sighting distance, m	Armor penetration, mm	Notes
ADM 401	Cartridge  *Figure 3.14.2 – ADM 401*	100	Doesn't have	Anti-personnel projectile close combat. Shoots 1100 feathered steel arrows with a range of up to 12 m, creating a high effectiveness of defeating the enemy.
HE 441D Fragmentation 	 *Figure 3.14.3 – HE 441D and its installation at the required distance*	1300	Doesn't have	Anti-personnel projectile that detonates at a given point in its trajectory or on impact. Fires 800 steel balls.

SMOKE 469C	Smoke	1300	Doesn't have	1. Blinding enemy, when shooting directly at the target; 2. Camouflage, when establishing a smoke screen between the enemy's position and your own; 3. Target designation for artillery and aviation.
HEDP 502	Armor-piercing -high explosive	40-1000 against infantry; 40-500 against stationary APCs; 40-300 against mobile APCs	150	Has a powerful armor-piercing effect. Effective against lightly armored armored personnel carriers, bunkers, and field shelters; Tanks break through feed hull and turret
ASM 509 Anti-Construction		300	Doesn't have	A projectile for destroying dugouts, buildings, and other types of structures. The fuse has two modes: impact or delayed.
TODAY 545	Illuminating-lin	300-2300	Doesn't have	Suspended on a parachute, burns for 30 seconds, providing an illumination area with a diameter of 400 to 500 m. For full effectiveness, you need to shoot at a very high angle, from a standing position, so as not to create a hazard, as the return blast can burn the shooter.

Figure 3.14.4 – SMOKE 469ÿ

Figure 3.14.5 – HEDP 502 and its fire damage to the BMP-1

Figure 3.14.6 – ASM 509 and its fire damage

Figure 3.14.7 – ILLUM 545 and its performance at night

HEAT 551	Against-tank cumulative single-action	20-700 – against immovables; 20-400 – against mobile armored personnel carriers	400	T-62M penetrates anywhere; T-72, T-80, T-90 penetrate only places without DZ; Penetrates the gun mask of all tanks; It was with this grenade that on May 4, 2022, soldiers of the 227th Battalion, 127th Brigade, knocked out a T-90M in stern of the hull
HEAT 551CRS	Against-tank cumulative with protective probe	20-1000 – against immovables; 20-600 – against mobile armored personnel carriers	400 for the "Contact-1" DZ	Like HEAT 551; The grenade is set off at a distance of 15 m from grenade launcher barrel and does not respond to branches trees, camouflage nets; Also penetrates all T-72, T-80, T-90 through the DZ
HEAT 655CS	Cumulatively -high explosive single-action	20-300	500	Like HEAT 551CRS; Has a powerful repelling effect therefore very effective against lightly armored BTT
HEAT 751	Against-tank cumulative tandem action	20-500	500+ for DZ	The hull of the T-62M, T-72, T-80, T-90 is penetrated from all directions. The turret of the T-62M, T-80BV, T-80BVM is penetrated to any point. The turret of the T-72, T-90 and T-80U modifications is penetrated only into the gun mask, weakened areas, sides and stern.

Figure 3.14.8 – HEAT 551

Figure 3.14.9 – HEAT 551CRS

Figure 3.14.10 – HEAT 655CS and its firepower on the BMP-1

Figure 3.14.11 – HEAT 751

MT 756	Tandem against-bunker	30-500	20	Provides effective destruction of the enemy in buildings or fortifications. When the grenade hits a wall, it makes a hole in it, through which the
				the main charge of the grenade penetrates the room and explodes inside it. It is successfully able to
				destroy enemy manpower behind 30 cm of brickwork or 20 cm of reinforced concrete wall. Very effective against infantry fighting
				vehicles, armored personnel carriers, etc.

Figure 3.14.12 – MT 756 and its fire action

Bringing Grg Carl-Gustaf into combat position and firing from it

The structure of the Grg Carl-Gustaf is very simple (Figure 3.14.13), therefore, in handling There are no difficulties with it. **The safety measures** are the same as for LNG (Fig. 3.14.14).

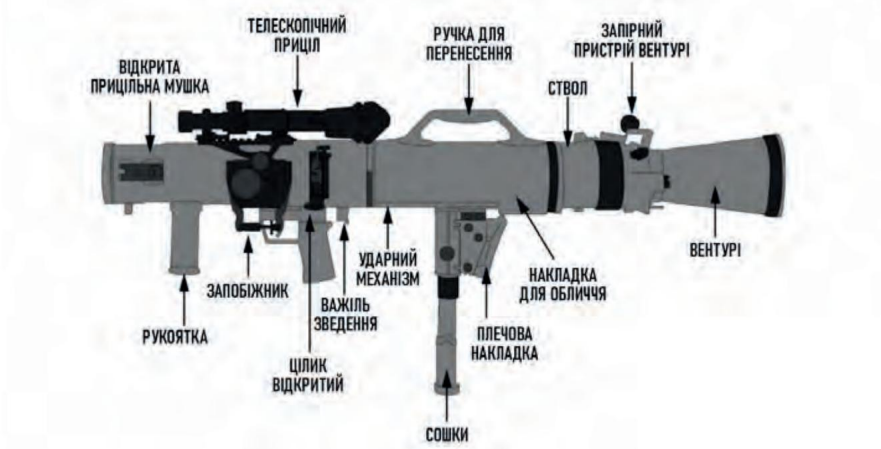

Figure 3.14.13 – Structure of Grg Carl-Gustaf

1. Install the bipod, if necessary for shooting while prone or from an APC (Fig. 3.14.14).

Figure 3.14.14 – Bipod Installation; Right – Shooting Safety

2. Push the cocking lever, located on the right side of the barrel behind the pistol grip, forward and release (Fig. 3.14.15)

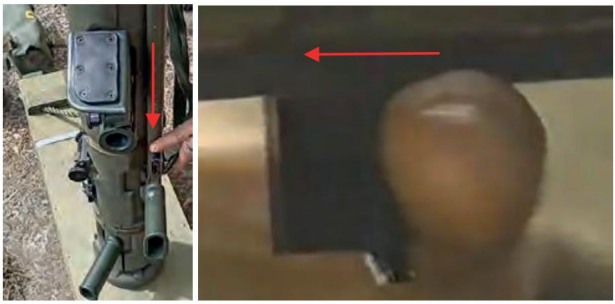

Figure 3.14.15 – Construction; Arrow – direction of movement

3. Press the venturi shut-off device down with your right hand and, holding it, Use your left hand to open the venturi opening handle to open the shutter (Fig. 3.14.16).

Figure 3.14.16 – Unscrewing the locking device (left) and opening the shutter (center); arrows – direction of movement

4. On the pistol grip on the left, set the safety flag down – to **"S"** (Fig. 3.14.17); Insert the shell into the breech and close the bolt in the opposite direction (Fig. 3.14.17).

*Figure 3.14.17 – Safety on **"S"** – locked; Right – loading the projectile*

5. Move the fuse flag up to **“F”** (Fig. 3.14.18).

*Figure 3.14.18 – Fuse on **“F”** – opening fire*

6. If a mechanical sight is used, determine the distance
Sight and set the required distance on the sight (Fig. 3.14.19), aim at the target and fire by pulling the trigger. The sight has markings 0, 2, 4, 6, which correspond to distances of 0, 200, 400, 600 meters respectively and are used for direct aiming shooting.

Figure 3.14.19 – Mechanical sight with front sight; on the right – aiming in Grg

7. If an optical sight is used, the distance is determined
by pressing the LD button on the sight body and setting the required distance, air temperature and corrections (Fig. 3.14.20).

Figure 3.14.20 – Optical sight

8. After firing – Push the cocking lever forward and release; Open
bolt; Set the safety to "S"; Insert a new grenade; Close the bolt; Set the safety to "F"; Aim at the target and shoot.

9. The bias when shooting should be taken according to the same rules as in the RPG-7, because Their ballistics are similar.

Part 4. Combating Russian Armor with Anti-Material Large-Caliber Rifles (AVG)

The following AVGs are in service with the Armed Forces of Ukraine: Snipex T-REX; Snipex ALLIGATOR; Barrett M82, Barrett M107ÿ1; PGW LRT-3.

Chapter 1. Snipex T-REX and Snipex ALLIGATOR large-caliber anti-material rifles

These are the latest rifles of domestic production (Fig. 4.1.1) Kharkiv concern "XADO" (XADO Chemical Group). The main purpose of these rifles is to combat unarmored or lightly armored equipment, damage enemy radar antennas, detonate ammunition and mines from a safe distance, communication and air defense equipment, aircraft in parking lots, fortified long-term defense points, dugouts, and not to shoot at individual people. That is why they are called "Anti-material". Both rifles have a similar structure, except for the trigger mechanism (USM) and power supply: T-REX - single-shot with a trigger USM; ALLIGATOR - 5-shot magazine with a striker USM. The rifles have a single cartridge and similar characteristics (Table 4.1). The standard sight is a domestic optical sight of variable magnification Snipex JOVE 50 with an aiming distance of up to 3000 m. Also included is a mechanical sight with a conventional 2000 m sliding sight and a front sight. The presence of a Picatinny rail allows you to install other sights according to NATO standards.

The rifles are equipped with an effective muzzle brake, which makes the recoil acceptable. An elastic multi-layer shoulder rest is installed, a height-adjustable cheek rest, which can be repositioned for shooting from the right or left side. For ease of aiming, the rifle has a bipod and an adjustable rear support, which provides the possibility of precise adjustment for the shooter, a push-button safety and a silencer (Fig. 4.1.2). The floating barrel is in free roll at the moment of the bullet's departure, which ensures greater accuracy of the bullet's hit.

Figure 4.1.1 – T-REX (top) and ALLIGATOR rifles with muzzle brake

Figure 4.1.2 – Numbers indicate: 1 – Cheek rest; 2 – T-REX shutter; 3 – Safety catch (red circle); 4 – Folding bipod and easily removable barrel mount (red arrows – movement in the direction of assembly-disassembly); 5 – Adjustable rear support; 6 – Snipex JOVE 50 optical sight

Table 4.1. Performance characteristics of AVG Snipex T-REX and Snipex ALLIGATOR

	T-REX	ALLIGATOR
Caliber, mm	14,5	
	14.5x114 mm	
Cartridge	22,5	25
Weight, kg Length of assembled rifle, mm	1800	2000
Barrel length, mm Rifles/	1200	
Twist Safety	8/16.5"	
Picatinny rail	Safety button and safety release	
Initial bullet velocity,	Mil standard top with 50 MOA slope	
m/s Effective firing distance, m Max.	980-1034 depending on the bullet	
bullet range, m	2000	
	7000	

The main disadvantage of the T-REX and ALLIGATOR is **the large unmasking flame when fired with a muzzle brake, which requires a quick and frequent change of position for firing.** When using a silencer instead of a muzzle brake, the flame is absent, and the strength of the sound of the shot is significantly reduced, which allows the shooter to remain in one position for a long time and secretly (Fig. 4.1.3).

Unlike the single-shot T-REX, the ALLIGATOR is a 5-shot rifle, which allows for a higher density of blocking fire when used. Both rifles are easily assembled and disassembled and are supplied to the Armed Forces of Ukraine in a convenient compact case (Fig. 4.1.4).

Figure 4.1.3 – Flame with muzzle brake (left), and with silencer

Figure 4.1.4 – ALLIGATOR in a carrying case

Shooting bias

The chrome-plated and floating barrel is in free rollback at the moment of bullet departure, which ensures high accuracy of shooting. The dispersion at a distance of 1000 m is 0.29 m, and at 1500 m – 0.44 m (Fig. 4.1.5).

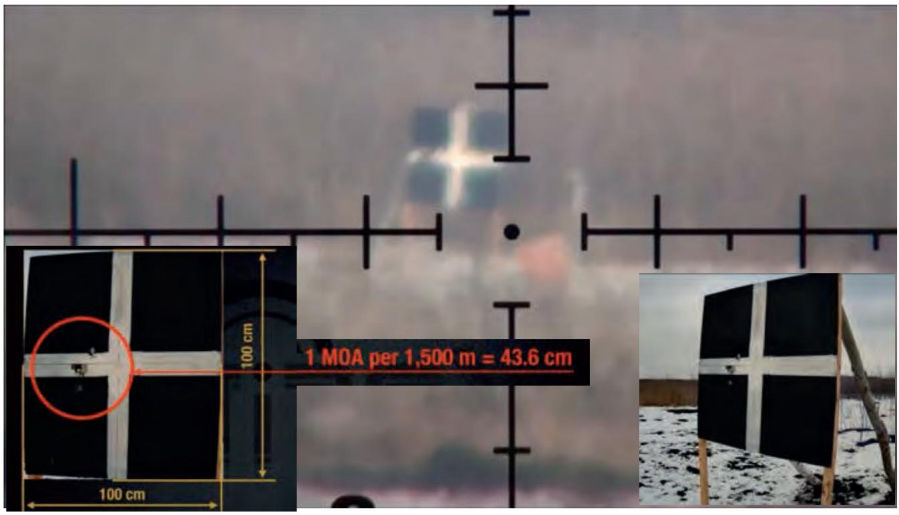

Figure 4.1.5 – Bias taken through the Snipex JOVE 50 sight at a target measuring 1.0x1.0 m, from a distance of 1500 meters; Insets show the results of hits

When the armored personnel carrier is approaching quickly, lower the aiming point, and when it is moving away, raise it. When

the armored personnel carrier is moving on the flank at a speed of 20-30 km/h, shoot at approximately the following biases:

– at a distance of 500 m, move the aiming point 3/4 of the figure in the direction of movement BTT;

– at a distance of 400 m, move the aiming point 1/2 of the figure in the direction of movement BTT;

– at shorter distances and lower speeds, as well as when the BTT moves at an angle to the front, aiming approximately at the central part of the armored personnel carrier.

When the target moves at an angle of 900, take the bias according to table 5.2. If the target moves at an angle of 300 . – take half of what is specified in bias tables if at an angle of 450 . – 2/3 of the specified bias.

Table 4.2 – Table of biases for a target moving at an angle of 900

Target movement speed		Distance to target, m									
		100	200	300	400	500	600	700	800	900	1000
km/year	m/sec	Prejudice, m									
18	5	0,5		1,5	2	2,7	3,5	4,2	5	5,7	6,9
38	10	1	1 2	3	4	5,5	7	8,5	10	11,5	13

When firing from these AVGs, due to the high initial velocity of the bullet, air temperature and longitudinal wind (headwind and tailwind) do not have a significant effect on the distance of the bullet. There is no need to take them into account. Crosswind, especially strong, has a noticeable effect, starting from a distance of 400 m. Therefore, when firing at narrow targets, it is necessary to take this into account and move the aiming point to the windward side, using the following table 4.3.

Table 4.3 – Table of biases for strong winds of 8-10 m/sec at a lateral angle of 900

Firing distance, m 100	Aiming point removal, m
	0,04
200	0,11
300	0,22
400	0,35
500	0,57
600	0,86
700	1,22
800	1,63
900	2,2
1000	2,8

When shooting at an angle of 450, 2/3 of the full bias is taken, when shooting at an angle of 300 , half of it.

When shooting in moderate winds (4 m/s), take half the bias; do not take weak winds (2 m/s) into account.

Ammunition used and their striking effect

1. Armor-piercing special cartridge BS-41, BST (Fig. 4.1.6).

Figure 4.1.6 – BS-41

The top of the BS-41 bullet is painted black, the rest of its surface up to the edge of the sleeve cap is painted red, the primer-igniter coated with black varnish

Table 4.4 – Armor penetration of BS-41, BST

Armor penetration with 800 m, mm	Armor penetration from 500 m, mm	Armor penetration from 300 m, mm	Armor penetration at 100 m, mm
31	50	60	65

The most effective cartridge for fighting tanks. When hitting an obstacle (armor), the core of these bullets pierces the armor, causing damage with fragments formed by the bullet and the pierced armor. When firing at fuel protected by armor, the core of the bullet pierces the armor; the incendiary composition ignites when the bullet hits the armor; the flame penetrates through the hole punched by the core in the armor and ignites the fuel. The bullets also provide ignition of flammable objects and fuel located in

in thick-walled containers not protected by armor (in tanks, railway tanks, gas stations, gas storage facilities, etc.) at distances up to 1500 m.

2. Armor-piercing cartridge B-32gl, B-32gs (Fig. 4.1.7).

Figure 5.1.7 – B-32

The head of the B-32 bullet is painted black with a red band.

Table 4.5 – Armor penetration of the B-32:

Armor penetration from 800 m, mm	Armor penetration from 500 m, mm	Armor penetration from 300 m, mm	Armor penetration from 100 m, mm
20	32	40	45

The 14.5 mm cartridge with the B-32 armor-piercing incendiary bullet is designed to engage lightly armored targets, live targets and firepower located behind light cover, as well as low-flying targets.

The penetration effect is at least 80% when firing at a 20 mm thick armor plate installed at an angle of 200 to the vertical at a distance of 300 m, and the incendiary effect is at least 80% at paper moistened with gasoline and covered with a 20 mm thick armor plate at a distance of 100 m.

When hitting an obstacle (armor), the core of these bullets pierces the armor, causing damage with fragments formed from the bullet and the pierced armor. When firing at fuel protected by armor, the core of the bullet pierces the armor, the incendiary composition ignites when the bullet hits the armor, the flame penetrates through the hole punched by the core in the armor and ignites the fuel. The bullets also provide ignition of flammable objects and fuel located in thick-walled containers not protected by armor (in tanks, railway tanks, gas stations, gas storage facilities, etc.) at distances up to 1500 m.

3. Armor-piercing incendiary tracer charge BZT, BZT-44, BZT-44m (Fig. 4.1.8).

Figure 4.1.8 – BZT The main part of the BZT ball is colored purple with red belt

Table 4.6 – Armor penetration of BZT:

Armor penetration from 800 m, mm	Armor penetration at 500 m, mm	Armor penetration from 300 m, mm	Armor penetration from 100 m, mm
15	27	35	40

BZT series cartridges are used for shooting together with B-32 cartridges and are designed to engage low-flying air targets, lightly armored vehicles, vehicles, and group live targets, as well as for fire correction and targeting. They can also be used

to create fires.

The penetration effect is at least 80% when firing at a 20 mm thick armor plate installed at an angle of 200 from the vertical, at a distance of 100 m, and the incendiary effect is at least 80% against gasoline (in the BZT-44 M - at least 90%) protected by a 20 mm thick armor plate, at a distance of 100 m.

4. Instantaneous incendiary charge MDZ, MDZM (Fig. 4.1.9).

Figure 4.1.9 – MDZ

The top of the MDZ bullet is painted red to the edge of the sleeve cap.

Cartridges with an MDZ bullet are designed to engage low-flying air targets (aircraft and helicopters) at distances up to 2,000 m, as well as to engage manpower behind light cover and unarmored combat and support equipment (tractors, ATGMs, anti-aircraft and missile launchers, vehicles, oil terminals, etc.).

The MDZ bullet, having a high-explosive and incendiary effect, ensures the destruction or damage of air targets with fragments or a blast wave, as well as the ignition of flammable liquids in tanks with a thickness of
walls from 8 to 2 mm at a distance of 100 to 1500 m, respectively. When an MDZ bullet hits an obstacle, the shell explodes and the fragments and blast wave that are formed damage the target and ignite the fuel.

When an MDZ/MDZM bullet hits the engine, the fuel ignites instantly, because the flame temperature is from 25,000 C to 35,000 C. The flash from the rupture of MDZ/MDZM bullets is visible at a distance of up to 2,000 m.

These cartridges can also be used to create cells
fires.

When a bullet hits an air target, a charge of explosives is initiated. The bullet fragments and explosion products pierce the skin of the aircraft or helicopter. A stream of fire and shrapnel enters the hole formed, hitting the equipment and personnel. Piercing the skin of an aircraft or helicopter at a distance of 1.5 km, the bullet forms a hole with a diameter of 20-40 cm.

5. Firing cartridge ZP (Fig. 4.1.10).

Figure 4.1.10 – FP

The top of the ZP ball is colored red.

14.5 mm cartridges with an incendiary bullet ZP are designed to hit open ground targets, ignite wooden buildings, haystacks, straw and other flammable objects, fuel in unprotected tanks and reservoirs, at distances up to 1500 m. The ZP bullet has a tracer. The trace is red, visible day and night. The tracing distance is up to 1500 m.

Appendix 1: Use of 14.5x114 cartridges in KPV and KPVT machine guns

When firing from KPV and KPVT machine guns, the greatest firing efficiency is achieved by using different cartridges alternately. When firing at air and ground lightly armored targets, it is advisable to use cartridges with B-32, BZT, BS-41 bullets or with BST, B-32 and BZT bullets alternately.

When firing at unarmored ground targets, cartridges with B-32, BZT-44M, and MDZM bullets are used interchangeably.

When shooting at air targets, it is necessary to use the following
a combination of large-caliber cartridges with B-32, BZT-44M and MDZM bullets.

From KPV and KPVT machine guns, firing long bursts of this cartridge at tanks equipped with the Kontakt-1 anti-tank missile system (T-72BV, T-72BA, T-72S, T-80BV) will be effective, but only for destroying their anti-tank systems, which explode from these bullets, which will weaken the defense and allow fighters with RPGs to more easily destroy enemy tanks.

Shooting with T-REX and ALLIGATOR at T-72, T-80, T-90 tanks

BMP, BMD, and APCs are guaranteed to penetrate from distances of 800-1000 m.

The T-72, T-80, and T-90 tanks have quite vulnerable bridges for anti-tank missiles. guns (Fig. 4.1.11).

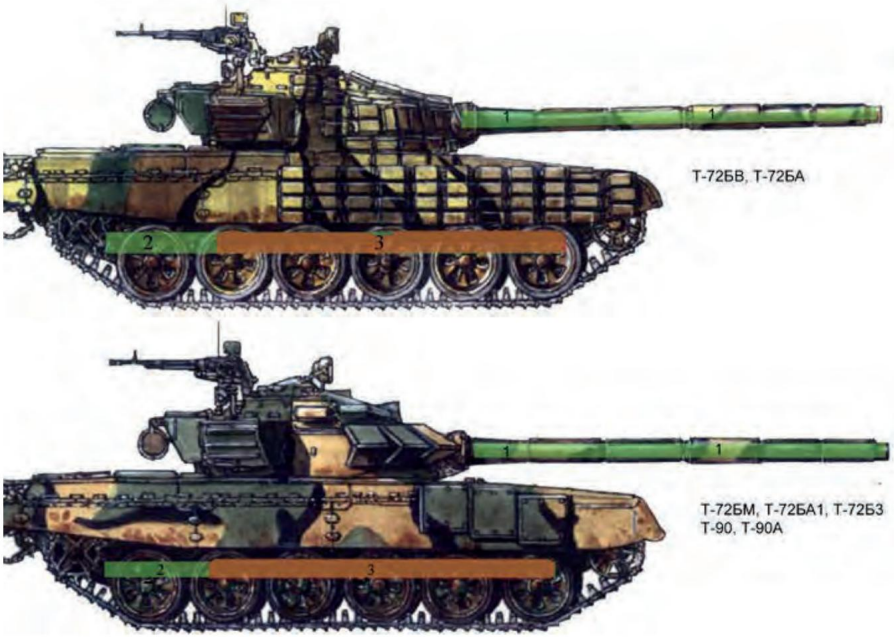

Figure 5.1.11 – Vulnerabilities of T-72, T-80, T-90 for T-REX and ALLIGATOR bullets

Positions marked in green: 1.

Firing the cannon and disabling it;

2. Damage to the engine and transmission, fire in the MTO, tank stoppage.

Items marked in red:

3. Ignition of fuel, powder charges, explosion and guaranteed destruction tank. In the red sector there is a conveyor for the automatic loader and a fuel tank-rack with ammunition (provided it is loaded).

Areas 2 and 3 are located below the track roller tires and above the track roller hubs (here the hubs). There is extremely thin armor there – 20 mm, installed with a camber of 320 with the upper edge outward. The track rollers are made of aluminum alloy. That is, this area is an ideal target for AVG (see also Fig. 4.1.12, 4.1.13, 4.1.14 and 5.7.2 on page 143).

It is also recommended to shoot at the leading and guiding rollers, which will cause them to fail and the tank to stop.

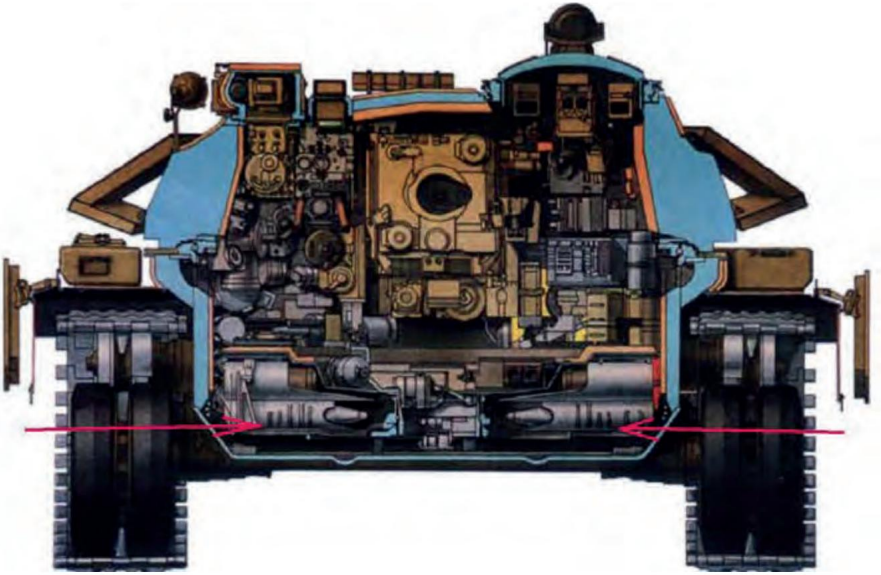

Figure 4.1.12 – Vulnerable to AVG areas of the 20 mm thick lower hull side plate of T-72 and T-90 tanks

Figure 4.1.13 – The same 20 mm section of the side of the T-72/ T-90 tanks – shown by green arrows, located below the weld of the upper side plate – marked by a blue arrow.
The T-80BV has the same 20 mm side section

Figure 4.1.14 – As can be seen in the photo, the T-80U series tanks have a similar weakened, only 35 mm section with a camber of 100 (highlighted red), vulnerable to AVG and RPG

Effective firing range with AVG T-REX and ALLIGATOR in the areas marked in Fig. 4.1.12, 4.1.13, 4.1.14, 5.7.2 when firing at an angle of 900 :

BS-41, BST: B-32: **through the skating rink up to 600m; between the skating rinks up to 750m;**
through the skating rink up to 300m; between the skating rinks up to 400m;

BZT, BZT-44, BZT-44m: through the roller up to 100m; between rollers up to 300m;

The rear hull plate of all T-62, T-72, T-80 and T-90 tanks is pierced:

BS-41, BST B-32	**up to 350m;**
	up to 50m;

The stern of the turret of all T-72 and T-90 tanks is broken through:

only BS-41, BST	**up to 100m**

The stern of the T-90A turret, the T-90A "Vladimir" breaks through:

BS-41, BST	**up to 600m**
B-32	**up to 400m;**
BZT, BZT-44, BZT-44m	**up to 200m.**

The stern of the T-80BV and T-62M turret is broken through:

only BS-41, BST	**up to 300m**

Also, shooting with the T-REX and ALLIGATOR AVGs will be very effective.
through sights, observation devices (Fig. 4.1.15, 4.1.16), tracks, exhaust from the left side on the over-track shelf (T-80 - exhaust from the rear of the hull), and from the heights - through the turret hatches, the engine hatch, and the engine roof.

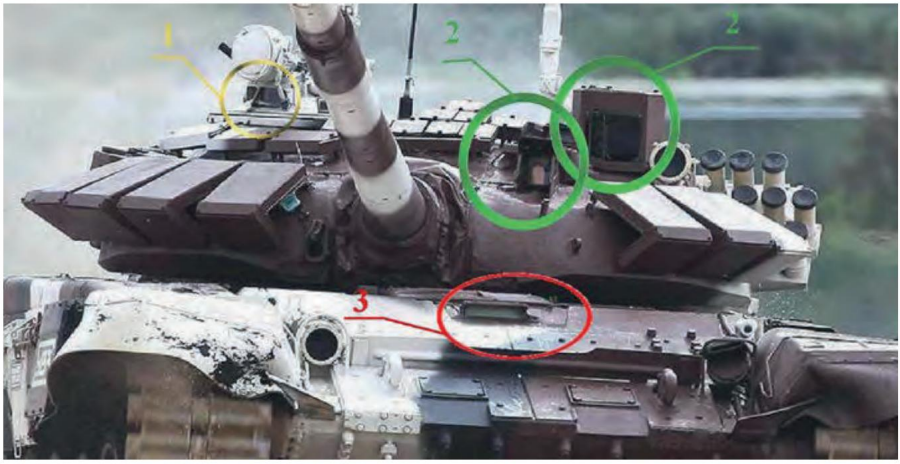

Figure 4.1.15 – Locations of T-72 observation and aiming devices vulnerable to AVG, the failure of which blinds the tank crew. The numbers indicate: 1 – commander's sight; 2 – gunner's sights; 3 – driver's triplex

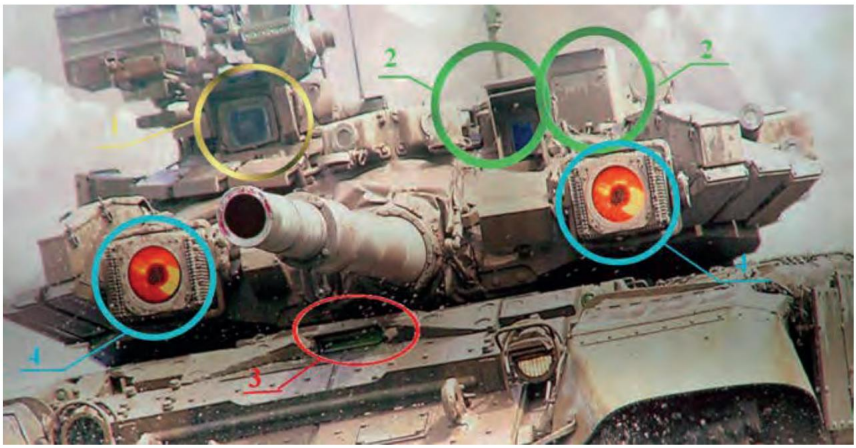

Figure 4.1.16 – Locations of T-90 observation and aiming devices vulnerable to AVG, the failure of which blinds the tank crew. The numbers indicate: 1 – commander's sight; 2 – gunner's sights; 3 – driver's triplex; 4 – Shtora COEP illuminators

The best results are obtained when shooting up to 300 m, because at this distance a rather heavy bullet retains great stability and the shooting is direct, so the corrections are very small. The closer the tank is, the easier it is to hit and destroy it, choosing an aiming point at its vulnerable part (engine, fuel tanks, ammunition, sights, weapons, track belts).

Of the multiple targets that appear at the same time, choose the more dangerous, threatening arrow or other fighters. When several equally dangerous targets appear, choose the one that is closer and easier to hit.

The most favorable moment to open fire is when the armored personnel carrier (BMT) will expose vulnerable areas for firing (turns to the side, stern), stops or slows down. In these cases, the aiming point should be selected in the vulnerable part of the target. When shooting at vulnerable areas of a tank (BMP, BTR, etc.), remember that the engine in the T-72, T-80, T-90, BMP-3, BMD, BTR, SG "Nona", "Msta", ZSU "Shilka", ZGRK "Tunguska" is located at the rear; in the BMP-1, BMP-2, SG "Akacia", "Tulip", "Hyacinth", "Pion" - in the front; MTLB, SG "Gvozdika" - in the middle part of the hull near the left side.

Remember, it's very important!

In summer, in hot weather, firing heated cartridges leads to an increase in gas pressure in the barrel bore, as a result of which the extraction of spent cartridges deteriorates sharply. To avoid tight extraction, it is necessary to:

a) cover the cartridges from sunlight;

b) before firing, lightly lubricate the cartridges, chamber and moving system parts with gun grease;

c) every 15-20 shots, it is advisable to clean the chamber and slightly lubricate it with gun grease.

Chapter 2. Barrett M82, Barrett M107A1 and PGW LRT-3 large-caliber anti-materiel rifles

American Barrett self-loading large-caliber rifles (Fig. 4.2.1) are manufactured by Barrett Firearms (USA) and are in service with a number of countries, including Ukraine. PGW LRT-3 is a rifle manufactured in Canada, which is also in service with the Armed Forces of Ukraine (Fig. 4.2.1).

Figure 4.2.1 – From top to bottom: Barrett M82, Barrett M107A1, PGW LRT-3 rifles

The main purpose of these rifles is to combat unarmored or lightly armored vehicles, damage enemy radar antennas, and detonate ammunition and mines from a safe distance, rather than shooting at individual people.

All three rifles are similar in structure and have a single cartridge and similar characteristics (Table 4.7). The standard sight is a 1800 m Leupold Mark 4 M 1 optical sight with a variable magnification of 1000 m with a special ballistic computer BORS (Barrett Optical Ranging System), which contains a ballistic program that calculates and displays the optimal aiming parameters (sight corrections) on the screen, taking into account such factors as the distance to the target, air temperature, atmospheric pressure, direction and wind speed. It can be connected to any mobile device running Windows no lower than XP, as well as Mac OS, via a USB cable. The rifles are equipped with an effective muzzle brake, which reduces recoil. The Barrett M107A1 rifle comes complete with a silencer (Fig. 4.2.1).

Ammunition used

Table 4.7 – Nomenclature of .50BMG (12.7x99mm) cartridges

Name, Color	Weight bullets, g	Type	Purpose, Image
50, Armor-Piercing, M2 *The top of the ball is painted. black*	46.53	Armor-piercing	Lightly armored targets. Armor-piercing effect behind 20 mm armor plate at a distance of 100 m - not less than 90%; Incendiary effect on gasoline located behind 15 mm armor plate at a distance of 70 m - not less than 75%.  *Figure 4.2.2 – M2*
50, Armor-Piercing-Incendiary, M8 *The top of the ball is painted silver.*	42,06	Armor-piercing incendiary	Armored combustible targets. Armor-piercing effect behind a 15 mm thick armor plate at a distance of 100 m - not less than 90%; Incendiary effect on gasoline located behind a 15 mm armor plate at a distance of 70 m - not less than 75%.  *Figure 4.2.3 – M8*
50, Armor-Piercing-Incendiary-Tracer (API-T), Mk 300 Mod 0 Bullet Top yellow	51,8	Armor-piercing incendiary tracer	Armored and unarmored targets, range up to 1500 m. From 1500 m it penetrates 13 mm armor, from 1000 m it penetrates 15 mm armor.  *Figure 4.2.4 – Mk 300*
50, High-Explosive Armor-Piercing-Incendiary (HEIAP), Mk 211 Against 0 "Raufoss" *The top of the ball is green with white strip*	51,8	High-explosive fragmentation (bursting), armor-piercing incendiary	Lightly armored and unarmored targets. From a distance of 400 m, it pierces armor with a thickness of 16 mm, from 1000 m - 13 mm. Explosion of the VR (particles of burning zirconium - 20 pieces, at a distance of 30-40 cm behind the armor (obstacle), can set fire to flammable materials at a distance of up to 15 m. The level of destruction is comparable to a 20-mm shell.  *Figure 4.2.5 – Mk 211*
50, Incendiary, M1 *The top of the ball is blue.*	41,02	Inflammatory	Ignition of unarmored combustible targets.  *Figure 4.2.6 – M1 incendiary*

50, Tracer, M1 *Top of the ball red*	41,67	Tracer	Target designation, aiming, signal, range up to 1800 m, unarmored targets.  *Figure 4.2.7 – M1 tracer*
50, Tracer, M17 *The top of the ball is burgundy or brown*	41,67	Tracer	Target designation, aiming, signal, track up to 2290 m, unarmored targets.  *Figure 4.2.8 – M17*
50, Ball, M33 *The ball is not colored.*	42,9	Bullet in a solid metal shell (FMJ)	Unarmored targets.  *Figure 4.2.9 – M33*
50, Ball, XM1022 *The bullet is not painted.*	51,8	High-precision match class (sniper)	Unarmored targets at long distances. Maintains supersonic flight speed at distances up to 1600 meters.  *Figure 4.2.10 – ÿÿ1022*
50, M1022LRS Long Range Sniper *Solid olive green color of the ball*	51,8	High-precision sniper	Unarmored targets at long distances. Maintains supersonic flight speed at distances up to 1600 meters.  *Figure 4.2.11 – M1022LRS*

Shooting with AVG Barrett M82, Barrett M107A1, PGW LRT-3 at lightly armored targets

These AVGs give good results in the fight against armored personnel carriers. They are very effective against lightly armored vehicles. 03.05.2022 A soldier of the Armed Forces of Ukraine with an M107A1 from a distance of 754 m destroyed an enemy BMP-1. They can also be effectively used in the "Tank Hunter Team" as snipers, together with RPGs.

Mk 300, Mk 211 cartridges (Fig. 4.2.4, 4.2.5) are the main cartridges, firing with which is intended **only** for armor targets and **is prohibited** for use against manpower.

Shooting with AVG Barrett M82, Barrett M107A1, PGW LRT-3 at tanks

Shooting at T-72/T-90 and T-80 tanks is carried out with the Barrett M82, Barrett M107A1, PGW LRT-3 anti-tank guided missiles at the same vulnerable points as for the T-REX anti-tank guided missiles. and ALLIGATOR. Effective firing range with AVG Barrett M82, Barrett M107A1, PGW LRT-3 in the areas marked in Fig. 4.1.12, 4.1.13, 4.1.14 (on page 103), 6.7.2 (on page 143), when hitting at an angle of 900 :

Mk 300 – via roller	**up to 100m;**
Mk 300 – between the rollers	**up to 500 m;**
M2 – between the rollers	**up to 300m;**

The rear hull plate of all T-62, T-72, T-80 and T-90 tanks is broken through:

Mk 300	**up to 50m;**

Rear of the T-90A, T-90A "Vladimir":

Mk 300	**up to 100m**

Also, firing with the Barrett M82, Barrett M107A1, PGW LRT-3 AVG at sights, observation devices (Fig. 4.1.15, 4.1.16 on pages 104-105), at the exhaust from the left side on the over-track shelf (T-62, T-72/ T-90), at the exhaust from the stern (T-80), and from heights, with the Mk 300 cartridge – at the over-engine roof, will be quite effective.

Muzzle exhaust when firing a .50 caliber weapon is the main unmasking factor and the main reason for the need for eye protection. And the loudness of the shot clearly requires serious hearing protection.

Figure 4.2.12 – The result of the .50 BMG cartridge on 12 mm thick armor plate at a distance of 400 m from a PGW LRT-3 rifle

Part 5. Fighting Russian armored vehicles with anti-tank missile systems (ATMS)

Anti-tank missile systems have high accuracy in hitting targets at long distances. However, the accuracy of hitting depends on the launch conditions, the design properties of the ATGM and ATGM, the operator's skills, and his moral and psychological state.

The small size of the complexes makes it easy to place them in a firing position and easily camouflaged from ground and air reconnaissance.

However, ATGMs have dead zones of fire: 40-100 m, depending on the complex, which the operator must take into account. The accuracy of

the launch is most affected by the surrounding combat environment, which negatively affects the operator's psyche while controlling the missile's flight. The operator must observe the target and the missile simultaneously for a relatively long time (5-25 seconds), until the moment it hits the target. Even a strong operator in moral and psychological terms can be thrown off balance by sudden changes in circumstances (a nearby shell burst, enemy machine-gun fire, etc.). In this regard, he may twitch and the missile will go off course. And while

the first missile did not reach the target, the next one cannot be launched. Therefore, The rate of fire of ATGMs is low. ATGMs

are difficult to use in conditions of limited visibility (except for modern high-performance complexes): rain, snowfall, fog, smoke, and at night, because IR devices are illuminated by the bright trail of the main engine and tracer of the ATGM during its flight. But this is not the case in modern ATGM devices.

After launch, the ATGM gives off unmasking signs – the launch flash and smoke formation in the form of a spherical cloud, which, depending on the wind speed, can last in the air for several seconds. The firing position at the moment of launch unmasks itself with the flame of the starting engine, usually yellowish-orange in color. In addition, the rocket leaves a trail in flight, which, together with the rocket, is well observed with the naked eye and allows us to determine not only the direction of launch, but also the place from which the launch was carried out.

Therefore, it is advisable to have a main and backup ATGM position and shelter. servants from enemy fire.

The Armed Forces of Ukraine are armed with the following anti-tank missiles: complex:

ATGM with tracer and coordinator: ATGM
9K111 "Fagot";
ATGM 9K113 "Konkurs";
ATGM 9K115 "Metis";
ATGM "MILAN 2".

ATGM with IR and LD guidance:
ATGM RK-3 "Corsair";
ATGM "Stugna-P";
ATGM FGM-148 "Javelin";
ATGM "NLAW".

Chapter 1. ATGM 9K111 "Fagot" and ATGM 9K113 (9K111-1) "Konkurs"

The Fagot and Konkurs complexes (Fig. 5.1.1) are designed to destroy tanks and armored vehicles, as well as other small-sized targets: lightly armored and unarmored equipment, various types of fortifications, manpower, and elements of the enemy's infrastructure. The differences between these ATGMs are insignificant, because Konkurs is actually a slightly modernized version of the Fagot ATGM. The principle of their operation and combat characteristics are the same.

Figure 5.1.1 – ATGMs "Fagot" and "Konkurs"

The following missiles are used for these complexes: 9M111, 9M111M (M1, M2), 9M113, 9M113M (Fig. 5.1.2), the performance characteristics of which are indicated in Table 5.1.

Table 5.1 – Used missiles: TTX

Rocket Index	9M111	9M111M «Factory» 75 -	9M113	9M113M
Firing distance, m 70 - 2000 Rate of fire,		2500	75-3000	75-4000
rounds/min.	1-3, depending on distance to target and experience operator			
Maximum flight speed, m/s Flight time to	240	240	250	250
maximum distance, s Armor penetration, mm	11	13,2	16,5	20
	400	460-500	500	700 for DZ

ATGMs are generally high-precision weapons that allow a small target to be hit with high probability and at a long distance. Using the advantages of the terrain when conducting combat operations, which also includes taking positions that provide maximum sectors and viewing distances, is one of the main conditions for successful combat. The low weight and dimensions determine its high mobility on the terrain, even in the body of a pickup truck, which makes this weapon universal and deadly in experienced hands.

The range and accuracy of fire, as well as the power of the warhead, allow these ATGMs to be used not only as anti-tank weapons, but also as a high-precision means of destroying fortifications, replacing traditional artillery.

Of course, it is difficult to get into the mask of a tank gun moving at high speed at a distance of 2000 meters, but the ability to fire from extremely short distances of 75 meters allows the use of ATGMs from ambushes in pre-prepared and well-camouflaged positions. When firing at armored targets that cross water obstacles (BMP, BMD,

BTR, SG "Gvozdika", MTLB), it is necessary to create a firing position at a certain height from the water surface depending on the firing distance according to table 5.2. In particular, in March 2022, a pair of Russian Raptor boats attempted to land troops from the sea in Mariupol. However, the regiment's fighters

The Azovs were able to hit one of the boats with a second shot from the Fagot ATGM. The hit boat was towed away by the second boat in an unknown direction.

Table 5.2 – Shooting from the Fagot / Konkurs ATGM at floating targets

Distance, m	Firing height above water, m
Up to	Not less than 1.5
500	At least 5.5
500-1000 1000-2000	At least 12
2000-3000	At least 16
3000-4000	At least 20

The disadvantage of the complexes is the possibility of hitting the target only if it is visually visible and the missile must be brought to the target "manually".
Missiles (9M111, 9M111M (M1, M2), 9M113; Fig. 5.1.2) have a conventional (non-tandem) cumulative warhead and cannot hit armored vehicles, in places that are closed by dynamic protection. Missile guidance is radio command with a tracer and coordinator. BTR, BMD, BMP, SG of all modifications break through from all directions. T-72, T-80, T-90 tanks break through only in the side, stern, and others places are not protected by the DZ. The gun mask is also penetrated. But, as practice has shown, when a missile hits a tank without penetrating the armor, the crew is concussed and the SUV is disabled. The T-62M penetrates in the forehead. The 9M113M missile (Fig. 5.1.2) is tandem and penetrates the armor of Russian tanks at any point through the DZ.

Figure 5.1.2 – ATGMs 9M111 and 9M111M, below – 9M113 and 9M113M

Preparation of the "Fagot" / "Konkurs" ATGM for firing

1. Open the legs of the launcher base, locking them with the handle on each leg opposite the red mark (Fig. 5.1.3).

Figure 5.1.3 – Opening the legs of the bed; Fixation by the red mark

2. Pull the arcuate handle on the launcher body towards you and raise the sight to the combat position (Fig. 5.1.4).

Figure 5.1.4 – Raising the sight to the combat position

3. On the left side of the sight cover, select one of the three shooting modes, written in Russian: “ÿÿÿÿ; ÿÿÿÿÿÿÿÿ; ÿÿÿÿ”, which means “ÿÿÿÿ; ÿÿÿÿÿÿÿÿ; ÿÿÿÿ”; If the sun is bright, turn on the light filter (Fig. 5.1.5).

Figure 5.1.5 – Three shooting modes (left) and enabling the light filter

4. Remove the protective red caps on the launcher and on the disposable rocket container (Fig. 5.1.6).

Figure 5.1.6 – Safety caps

5. Install the rocket on the launcher by inserting the rocket container fastener into the slide grooves (at the end of the slide – with a sharp movement) until it clicks (Fig. 5.1.7).

Figure 5.1.7 – Installing the rocket on the launcher. Red arrows – rocket container fasteners; Yellow arrow – direction of rocket movement along the runners

6. Transfer the complex from the stowed position to the combat position, for which lift the transfer handle up; Cock the trigger mechanism by lifting the trigger handle sharply up and releasing it (Fig. 5.1.8).

Figure 5.1.8 – From left to right: Safety catch in the stowed position; Safety catch in the firing position; Cocking the trigger mechanism, arrow – direction of movement

Shooting with the "Fagot" ATGM / "Competition"

1. When shooting with the Fagot / Konkurs ATGM, you must remember **the technique Safety:** There should be no obstacles directly in front of the position, because these ATGMs use wires for control that can break through bushes, tall grass and other obstacles; Behind the ATGM at a distance of at least 10 meters in sector 300 there should be no wall or other obstacles due to the possibility of burns, because the rocket's starting motor is triggered at an elbow distance. Therefore, the shooter should fire, taking a position at an angle of 900 from the launcher, and only wearing headphones and a helmet, or a helmet-mounted radio (Fig. 5.1.9-5.1.10).

Figure 5.1.9 – Correct operator position before firing. With the legs of the frame raised high, firing is done from the knee, but also at an angle of 900 . The missile control wire is also clearly visible.

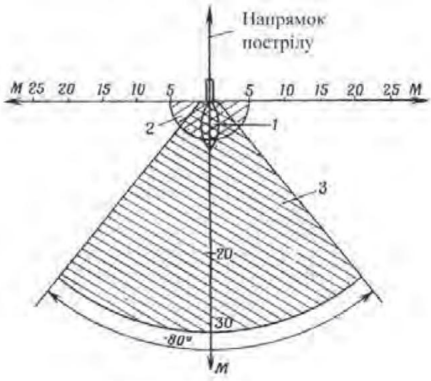

Figure 5.1.10 – Dangerous zones that arise during the launch of a missile from the Fagot / Konkurs ATGM: 1 – zone of dangerous temperatures, 2 – zone of sound pressure over 155 dB, 3 – zone of particle and back cover ejection. The photo on the right clearly shows the dangerous flame during the shot, which is also unmasking

2. The ATGM operator adjusts the sharpness of the sight's eyepiece to his eye. **It is important to remember** that the sun can enter the sight - then there is a possibility of disruption of missile control.

3. Use the sight's distance mark to measure the distance to the target (Fig. 5.1.11). The mark has marks 5, 10, 15, 20, 30, 40, which corresponds to distances of 500, 1000, 1500, 2000, 3000, 4000 meters respectively. The distance should be measured according to the principle of the RPG-7 sight - on the roof of the tower.

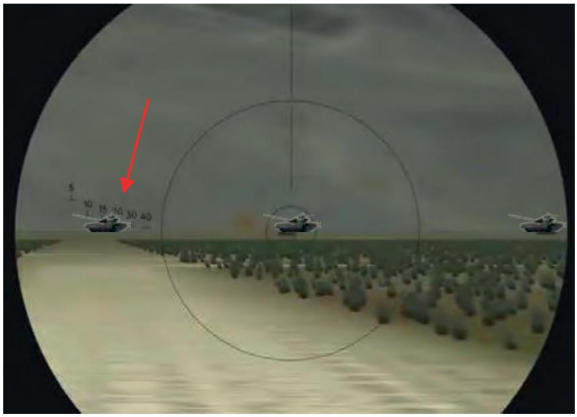

Figure 5.1.11 – Reticle of the ATGM "Fagot" / "Konkurs". The red arrow is a distance mark. According to the figure, the T-72B3M tank is 1500 m away.

4. Due to the fact that immediately after launch the rocket sinks under the influence of the Earth's gravity and can hit the ground before the shooter, before the rocket launches with the vertical handwheel, raise the aiming mark above the target (from overshoot) and pull the trigger with your index finger (Fig. 5.1.12).

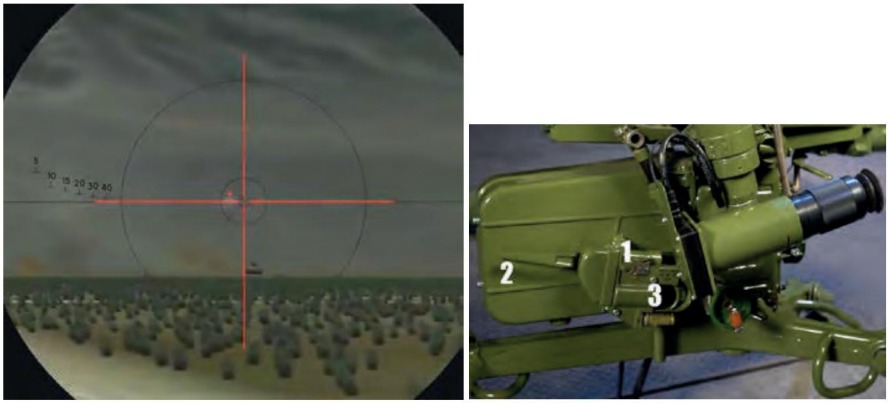

Figure 5.1.12 – Left: rocket launch with overshoot, red dot near crosshairs – visible missile tracer in optics; Right: 1-fuse, 2-cocking handle, 3-trigger

5. The start is not carried out immediately after pressing the trigger, because the rocket goes into launch mode for a few seconds. Immediately after launch, the sight is lost, which must then be manually brought to the target using the vertical and horizontal handwheels (Fig. 5.1.13). In the case of shooting with an overshoot: the closer the target is , the more difficult it is. At a distance of 1.5 km, the rocket flies for about 8 seconds. It is also necessary to take into account that while the rocket is flying, a target of the BTT type, such as
The rule moves, so you need to guide the rocket quickly, but very carefully, so as not to miss (Fig. 5.1.14). In twilight, fog, etc., aiming is more difficult due to poorer visibility, which leads to additional stress on the shooter's visual analyzer, associated with the need to focus the image of the horizontal lines of the sight grid on the retina and, as a result, to greater stress on the eye muscle, which changes the curvature of the lens of the eye, which leads to additional emotional stress for the shooter, so the shooter of these ATGMs must have the necessary training.

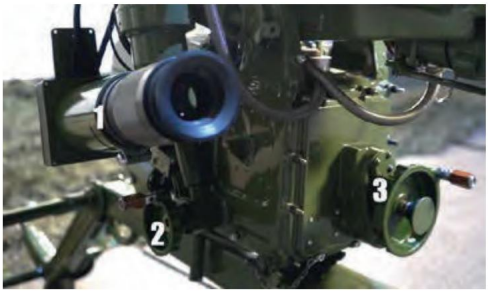

Figure 5.1.13 – 1-eyepiece of the sight; 2-handwheel for vertical guidance; 3-handwheel for horizontal guidance

Figure 5.1.14 – Bringing the missile to the target, the red dot near the intersection is the missile tracer visible in the optics

6. Immediately after shooting, the fired disposable cartridge must be removed and thrown away. missile container, take the launcher, additional missiles and change position.

Chapter 2. ATGM 9K115 "Metis"

The 9K115 “Metis” complex (Fig. 5.2.1) with a radio command control system with a tracer and coordinator is designed to destroy armored personnel carriers at a distance of 40 to 1000 m. Currently, these complexes have been transferred to the Ukrainian Defense Ministry.

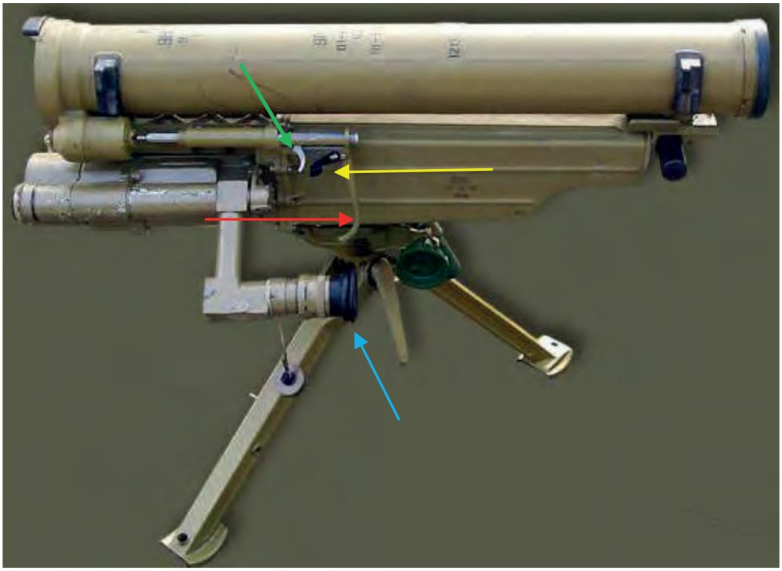

Figure 5.2.1 – ATGM “Metis”. Red arrow – cocking handle and direction of movement for cocking; Green arrow – trigger; Blue arrow – sight eyepiece;

Yellow arrow – COMBAT/ CAMPAIGN safety switch

Shooting can be done lying down, from the knee, and standing from the shoulder. When shooting **You need 6 meters** of free space behind you, for your own safety and the safety of others.

The missile's flight time to the maximum distance is 5.6 seconds. The cumulative single warhead has an armor penetration of 550 mm. APCs, BMDs, BMPs, SGs of all modifications are penetrated from all directions. Tanks T-72, T-80, T-90
Only cities that are not protected by air defense systems and cannons can penetrate. The T-62M can penetrate anywhere.

Preparing the Metis ATGM for firing

The deployment of the complex into a combat position is similar to the Fagot / Konkurs ATGM, but there are some differences:

1. Squeeze the rear legs of the bed and, throwing them back with your right hand, spread to the sides until it stops. Unlock the front leg of the bed by turning the fixing handle down counterclockwise. When shooting from the shoulder, the legs of the bed do not unfold.

2. Install the tube with the rocket on the frame and fix it by rotating it the fixing handle clockwise until it stops.

3. Move the handle of the rotary mechanism flywheel to the working position. position by turning it 900. 4.

Remove the cover from the front of the aiming device and the cover from eyepiece and adjust the eyepiece to your eye.

Shooting from the Metis ATGM

The principle of aiming and firing is similar to the ATGM "Fagot" / "Konkurs" but there are some differences: The sight

reticle has a distance mark, similar to that of the RPG-7 and the ATGM "Fagot" / "Konkurs". The mark has the marks 5, 10, 12, which corresponds to distances of 500, 1000, 1200 meters, respectively (Fig. 5.2.2).

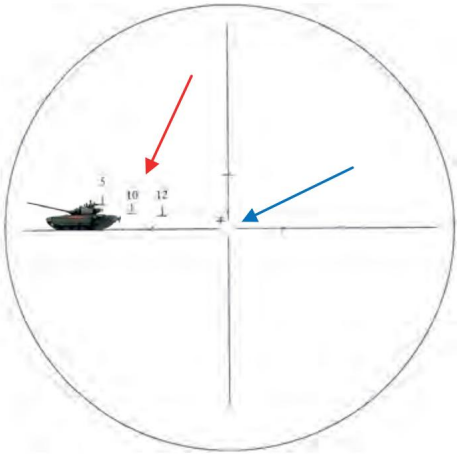

Figure 5.2.2 – Reticle of the Metis ATGM sight. Red arrow – distance mark, for the T-72B3M tank – 500 m; Blue arrow – central clearance

To fire a shot from the Metis ATGM, you must:

1. Set the safety mechanism switch to the “COMBAT” position.
2. Collapse the trigger cocking handle by pulling it back as far as it will go.
3. If the target is less than 500 meters away, aim the central beam at center of the target. If the target is more than 500 meters away, aim the center beam at the upper edge of the target and slightly downwind.
4. Pull the trigger quickly but smoothly until it clicks. Then The front cover of the container is shot off and the rocket is launched.
5. After 1-2 seconds, move the central beam to the target's weak spot or, keeping the target in the center of the sight, follow the target if it moves, using the vertical and horizontal guidance flywheels when shooting from a tripod or by turning the torso if shooting from the shoulder.
6. After firing, set the safety switch to the off position. "TRIGGER", press the rocket locking lever down and unlock it by turning the locking handle clockwise until it stops. Remove the spent rocket tube and install a new one.

Chapter 3. MILAN 2 ATGM

The MILAN 2 complex (Fig. 5.3.1) with a radio command control system with a tracer and coordinator is designed to destroy armored personnel carriers at a distance of 75 to 1975 m. These complexes were transferred by France and Italy to the Armed Forces of Ukraine.

The warhead is a single cumulative projectile that penetrates armor up to 800 mm thick. The T-72, T-80, and T-90 tanks are guaranteed to penetrate the hull side through the DZ. The T-62M and other Russian tanks (without DZ) can penetrate anywhere.

The rocket's flight time to its maximum distance is 12.4 seconds. Rockets are supplied in a polymer box containing 4 pieces (Fig. 5.3.1).

The safety equipment is similar to the Metis ATGM.

Preparation of the MILAN 2 ATGM and its firing

Deployment of the complex into combat position and the principle of guidance and shooting is similar to the "Fagot" / "Konkurs" ATGM. However, there are several differences:

1. "MILAN 2" is steered by rotating the rack with two

The left handle is for horizontal guidance, equipped with a start button; the right, horizontally located, rotates, similar to a motorcycle throttle, only here, when it rotates, the projectile is controlled in pitch - up and down (Fig. 5.3.1).

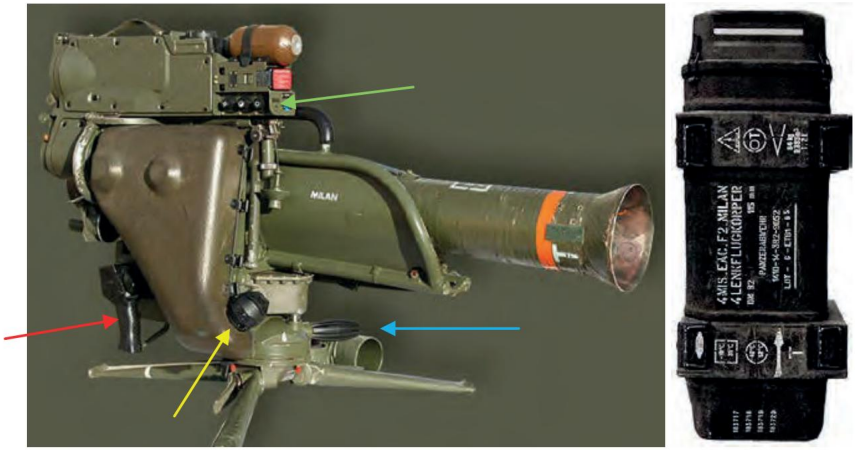

Figure 5.3.1 – ATGM "MILAN 2": Red arrow – horizontal guidance handle; Blue arrow – pitch handle (vertical guidance); Green arrow – "day, dusk, night" firing mode toggle switch and light filters; Yellow arrow – sight eyepiece; Photo on the right – box-cap for 4 rockets

2. The sound of the start is muffled, but quite loud, so you need to protect your ears. Muzzle flame is smaller than that of the Fagot / Konkurs ATGM, small flame A ball of blue smoke erupts from the side of the container's ejection engine as the container moves backward. The container falls in 3- x meters behind the installation. Visually, the start of the rocket engine can be

can be identified by the jet that escapes from the nozzle after a few meters of flight. The tracer fire is clearly visible along the entire trajectory.

3. "MILAN 2" uses the MIRA (Milan Infra- Rot Adapter) IR sight adapter , which allows the MILAN complex to be used around the clock. It detects a target at 12,000 m, recognizes at 5,000 m, and identifies at 3,000 m (Fig. 5.3.2).

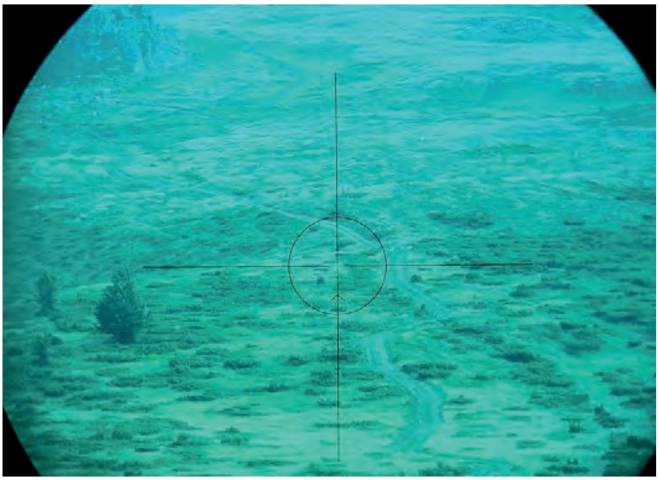

Figure 5.3.2 – Visibility in the MIRA scope

4. Before firing, the crosshair of the sight must be aimed at the target, and after the shot smoothly, by turning the handles, lower the crosshairs of the sight onto the target (Fig. 5.3.3).

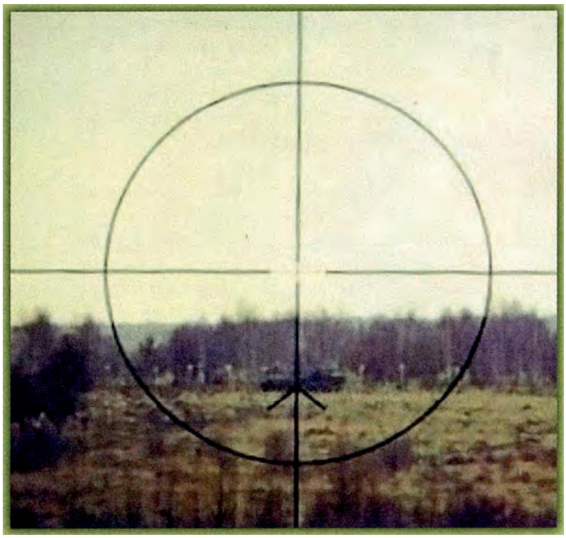

Figure 5.3.3 – Aiming the sight at the target

Chapter 4. RK-3 "Corsair" ATGM

The lightweight ATGM "Korsar" (Fig. 5.4.1) is designed to engage modern tanks and other targets with multi-layered armor, including long-range missiles, as well as small targets such as long-term firing points, lightly armored targets, and helicopters (Table 5.3).

Figure 5.4.1 – Corsair ATGM and firing the RK-3K missile from the shoulder

The Corsair ATGM has a semi-automatic laser guidance system with a fairly high level of immunity to active interference (radio interference). The ATGM also includes a TPV or IR sight. As a disadvantage: the operator must continuously monitor the target throughout the missile's flight, but shooting is allowed from the shoulder.

Table 5.3. Characteristics of the Corsair ATGM missiles

Missile type	RK-3K RK-3OF	
Firing distance, m Flight	100-2500 during the day; 100-1700 at night for solid waste	
time to maximum distance, s	10 in the afternoon 7 at night	
Armor penetration, mm	550 for DZ	50

The RK-3OF missile is equipped with a high-explosive fragmentation warhead with a nuclear warhead. and is designed to destroy lightly armored targets (BMP, etc.),
field-type structures (bunker blocks, bunkers) and manpower. During the tests, a through penetration of 50 mm thick armor plate was achieved.

Tactics of use, when firing from the machine ATGM "Fagot" / "Konkurs", when firing from the shoulder - ATGM "Metis" and RPG-7.

APCs, BMDs, BMPs, and SGs of all modifications are breaking through from all directions.

The hull of the T-62M, T-72, T-80, T-90 can be penetrated from all directions.

The turret of the T-62M, T-80BV, T-80BVM can be penetrated to any point.