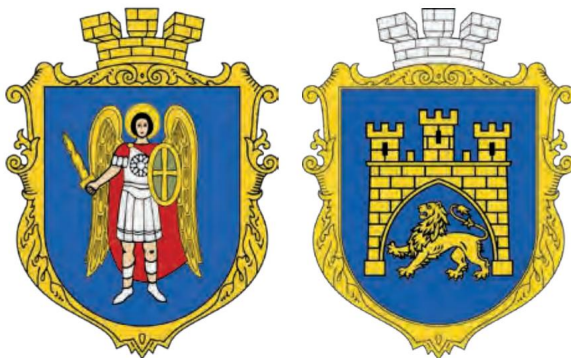


# DESTRUCTION OF RUSSIAN TANKS

MANUAL FOR THE SOLDIER OF THE DEFENSE FORCES OF  
UKRAINE *4th edition (abridged)*



Kyiv-Lviv

2023



# ЗНИЩЕННЯ РОСІЙСЬКИХ ТАНКІВ

4-те видання (скорочене)

## ПОСІБНИК СОЛДАТУ СИЛ ОБОРОНИ УКРАЇНИ

**Щиро вдячні Громадській організації  
«Об'єднання Наш Рух» за підтримку та  
активність в просуванні нашого проекту,  
збору коштів, позитивні відгуки та  
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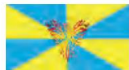
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## Symbols:

Grg – recoilless rifle (cannon)

AVG – anti-material large-caliber rifles

AZ – automatic loading machine

ATO – anti-terrorist operation in eastern Ukraine, 12.04.2014-30.04.2018 BC – combat kit

BCS – armor-piercing cumulative projectile BM

– armored vehicle

BMD – airborne combat vehicle

BMP – infantry fighting vehicle

UAV – unmanned aerial vehicle

BPS – armor-piercing subcaliber projectile BRM

– combat reconnaissance vehicle

BTR – armored personnel carrier

BTT – armored vehicles, the general name for all armored vehicles (tank, infantry fighting vehicle, armored personnel carrier, SG, etc.)

BP – explosive substance

GOS – homing head

DZ – dynamic protection

ZGRK – anti-aircraft gun-missile complex

Spare parts – spare tools and accessories

ZKU – anti-aircraft machine gun

installation SAM – anti-aircraft missile system

Armed Forces – Armed Forces

AFU – Armed Forces of Ukraine

IR – infrared

KAZ – active protection complex

KKO – guided weapons complex

KOEP – optical-electronic countermeasure complex

LD – laser rangefinder

m/v – driver-mechanic

MTV - motor and transmission department of

the Joint Forces Operation - Joint Forces Operation, ATO reformatting from 04/30/2018

OFS – high-explosive fragmentation projectile

PVKV – built-in verification control device

ATGM – anti-tank guided missile that is fired from an ATGM

ATGM – anti-tank missile system

RPG – hand-held anti-tank grenade launcher; rocket-propelled anti-tank grenade

RF – Russian Federation

SG – self-propelled howitzer; self-propelled gun

SPZ – curtain deployment system SUV

– fire control system

K. d. – Rangefinder dots – average stabilization accuracy value

TKR – tank guided missile, fired from a tank gun

TPV – thermal

imager TTX – tactical and technical characteristics

UVZ – Uralvagonzavod

UYA – shock core

HZTM – Kharkiv Transport Engineering Plant (tank plant) ChTZ – Chelyabinsk Tractor

Plant CRI – Chechen Republic of Ichkeria

Introduction

*"Russian tanks burn like matches,  
burst like firecrackers."*

*General of the Israel Defense Forces*

*– Israel Tal*

The defense of the Fatherland, independence, and territorial integrity is the sacred duty of every citizen – the Constitution of Ukraine.

This book: "Destruction of Russian Tanks" shows the practical use of RPGs, LNGs, ATGMs, AVGs, which are in service with the Armed Forces of Ukraine. used by infantry units against tanks, BMP, BMD, BTR, BRM, BM, SG, ZSU, SAMs that are in service with the Russian Federation.

The tactics of using anti-tank weapons, their main characteristics, recommendations for their practical use based on combat experience gained in local conflicts in Afghanistan, Vietnam, Tajikistan, Chechnya, Yugoslavia, Syria, Israel and Ukraine are given. The vulnerabilities of Russian armored vehicles are clearly shown, their characteristics and shortcomings are briefly given. A brief overview of Russian tanks is given so that a fighter, having discovered an enemy tank, can quickly classify it and, using available anti-tank weapons, quickly destroy it. The firing tables have been completely revised and recalculated, taking into account the dimensions of Russian tanks T-72, T-90, and others. All names and literature are presented in the original language.

The book includes 24 tables, 400 photographs and diagrams, some of which Published for the first time. Most of the characteristics are given for the first time.

The book is intended for conscripts, military servicemen under contract, who are fulfilling their military duty to cleanse Independent Ukraine from Russian invaders. The author team expresses gratitude to everyone, primarily to the

participants of the ATO who expressed their wishes and comments during the preparation of the book for publication. And also: **Pavlo Stanislavovich Telynyuk and Igor Vasilyovich Stetsenko - LLC "Admiral's Guard", Kyiv; Svetlana Ivanovna Vasylina - Director of VPU-20, Lviv; Bohdan Dmytrovych Dudyn - Deputy Director of VPU-20, Lviv; Viktor Degtyarev "Sensei" - Commander of the "Kupol" unit.**

On the 2nd page of the cover is a compilation of Constantine's murals Kachanovsky "The Beauty Will Not Stand" from the PSRL-1 RPG.

On the 4th page of the cover is a nice Ukrainian girl from the Ukrainian-made Snipex T-REX and Snipex ALLIGATOR AVGs of the Kharkiv concern "XADO".

*Author's team.*



**Bold robot**

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## Part 1. Identification of Russian tanks and their vulnerabilities

The basis of the tank fleet of the Russian Federation is the T-72, T-80, T-90 tanks and their modifications. Figure 1.1 shows the placement of fuel and ammunition in these tanks. The artillery reserve is located at the bottom of the fighting compartment and is protected by a very thin lower side plate.

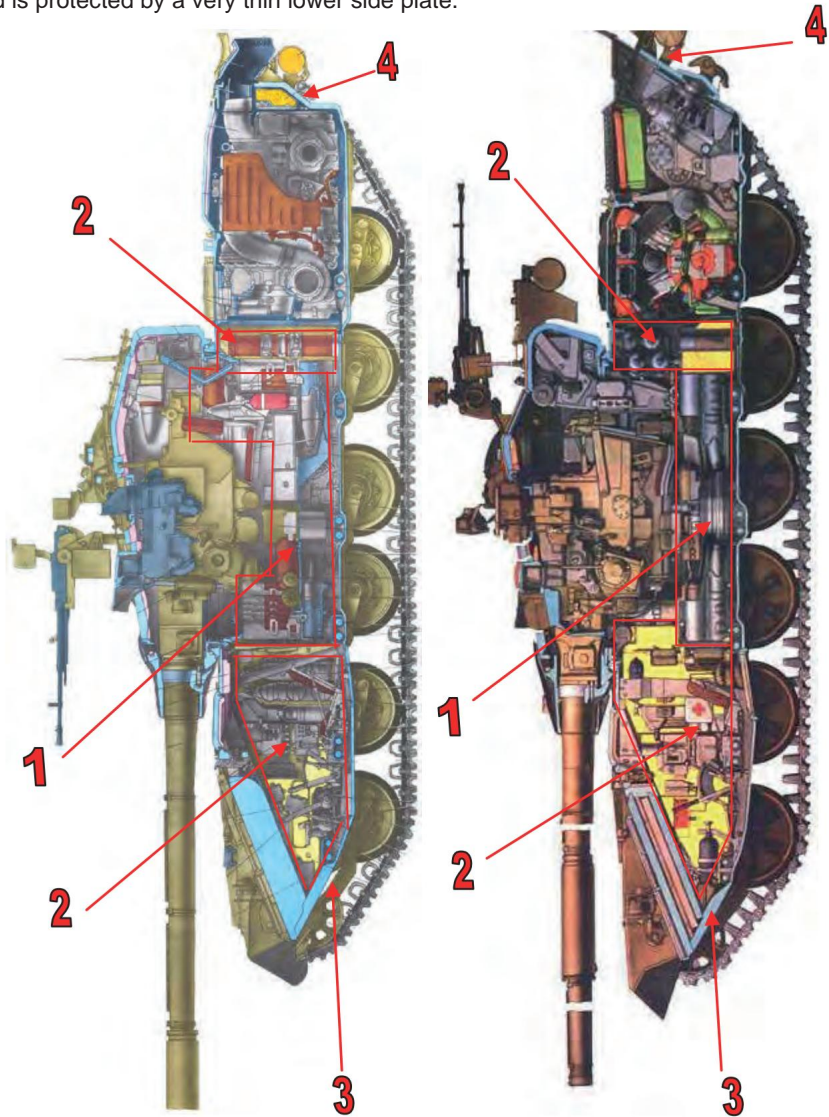




Figure 1.1 – Left: T-80 tank; Right: T-72/T-90 tank; 1 – AZ; 2 – fuel and shell tank rack; 3 – lower frontal hull plate – does not protect against RPGs; 4 – hull stern – does not protect against RPGs

## Chapter 1. T-72BV and T-80BV tanks

These tank types are easily recognizable by the large number of small Kontakt-1 DZ blocks covering a large area of the hull and turret. This makes the tank invulnerable from the front to cumulative grenades and single (not tandem) rockets.

Below, their vulnerable areas are shown in colored ink (Fig. 1.1.1-1.1.3). The most vulnerable areas are shown in red. The lower frontal sheet of the hull, the side below the DZ and above the middle of the track rollers, the stern side of the hull where the engine, the hatch with the triplex m/v, the leading and guiding rollers are guaranteed to be hit by any RPG and ATGM. When fired from the rear, the tank is unprotected.

 Partial damage to the tank, injury or death of the crew, exit from - malfunction of units, fire.

 Ignition of fuel, powder charges, explosion and guaranteed destruction of the tank. In the red sector there is a conveyor of the automatic loading (ALO) and a fuel tank-rack with ammunition.


 Failure of the leading and guiding rollers, which will lead to the tank stopping and depriving it of mobility.



Figure 1.1.1 – Vulnerable zones of T-72BV and T-80BV with single-action grenades when fired at the side



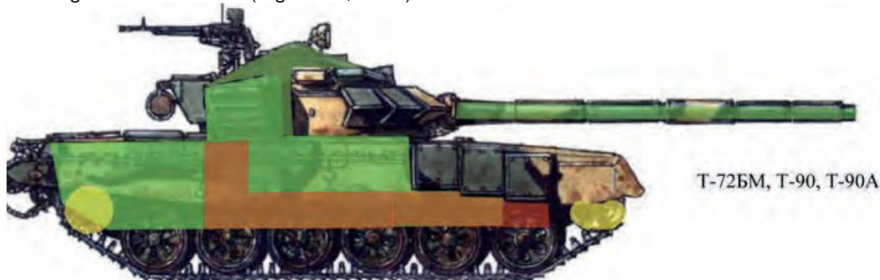
Figure 1.1.2 – Vulnerable zones of T-72BV, T-80BV during frontal fire



*Figure 1.1.3 – Vulnerable zones of T-72BV, T-80BV tanks from single-action grenades when fired from behind*

## Chapter 2. Tanks T-72BM, T-72B3, T-80U

These tanks, instead of many small blocks of the Kontakt-1 DZ, have rather large blocks of the Kontakt-5 DZ. Due to the installation of this DZ, the tanks have many weakened areas on the hull and turret, which allows them to be guaranteed to be destroyed by grenades and single-action missiles (Fig. 1.2.1, 1.2.2).



*Figure 1.2.1 – Vulnerable zones of T-72BM, T-72B3, T80U, T-90 when fired at the side*



*Figure 1.2.2 – Tanks of the T-72, T-90, T-80U type with the Kontakt-5 DZ, the affected areas*

### Chapter 3. T-72B3M and T-80BVM tanks.

These tanks are very similar in appearance, have bulwarks with DZ blocks on a large platform, DZ blocks on the sides of the turret stern, anti-cumulative grilles on the bulwarks, at the stern of the hull and at the stern of the turret (Fig. 1.3.1).



*Figure 1.3.1 – T-72B3M and T-80BVM damaged by grenades non-tandem action, side and rear*

### Chapter 4. Tank T-90, T-90A, T-80UA

These tanks have the following main difference: two large rectangular containers are installed to the right and left of the gun. This is the Shtora-1 optoelectronic countermeasures (KOEP). It is designed to intercept ATGMs of the Fagot, Konkurs, Metis, Milan, and Cobra types (TKR of the T-64BV tank). When the Shtora is turned on, it is clearly visible with IR lights, especially at night (Figures 1.4.1 and 1.4.2).



*Figure 1.4.1 – T-90A. The Shtora complex is turned on and because of it the tank unmasks itself very well even during the day.*



*Figure 1.4.2 – T-80UA. Damage from non-tandem grenades, front. To the right and left of the gun are two “box-shaped” blocks of the “Shtora-1” complex. The complex is turned off*

## Chapter 5. T-90M "Breakthrough" tanks

Externally, the tank is easily distinguished by the presence of anti-cumulative nets. front and sides of the turret and grilles at the stern of the hull, installation of a log for self-extraction not at the rear, but on the right bulwark and a new ZKU, with a 12.7 mm Kord machine gun. Also, the turret lacks large KOEP Shtora illuminators (Fig. 1.5.1, 1.5.2).



*Figure 1.5.1 – T-90M “Breakthrough”, side view and its area of impact with non-tandem grenades*



*Figure 1.5.2 – T-90M “Breakthrough”, front view and its areas of damage by non-tandem grenades*

## **Part 2. Basics of Combating Enemy Tanks**

### **Chapter 1. General provisions**

The organization of the fight against tanks should be based on a thorough study of the terrain. Anti-tank weapons should be concentrated in tank-dangerous directions. If the terrain conditions do not contribute to the maneuverability of tanks, then it is enough to take elementary protective measures.

Information about the presence of tanks is provided by ground and air surveillance (UAVs and aerial photography), detected engine noise, intelligence data and testimonies of prisoners. The appearance of tanks is always a sure sign of an imminent attack. All units take an active part in the fight against tanks, operating with

maximum coordination and mutual support. Units

organize a defense system mainly based on the use of terrain.

The fight between artillery and tanks requires careful advance organization and highly trained personnel, because tank operations are based on stealth, surprise, and speed of attack.

It should be taken into account, however, that the dense location of soldiers increases losses, because even extremely inaccurate tank fire has a detrimental effect on crowds of people, while when soldiers are distributed as individual shooters, tanks do not meet profitable targets. On established sections of the front, field fortifications and fire defense play a leading role. In modern armed conflicts, natural obstacles are used primarily. The latter can either completely eliminate any possibility of overcoming them by tanks or only slow down the advance of the latter. Obstacles of the first

The category includes steep slopes, escarpments (vertical walls), significant water obstacles, marshy soil in which a person's foot sinks, and dense thick-trunk forest.

The following serve as delaying obstacles: positions destroyed by shells, terrain dotted with large craters, ditches, hills, etc. The diameter of the craters from shells can be artificially increased by explosives.

To the means of combating tanks that can be created during defensive combat training includes:

a) Wide ditches with steep walls, lined with stone or covered with turf to avoid collapse. b) Barricades of large dimensions so

that tanks cannot drive around or overturn them. Barriers made of railway rails about 1 m high above the ground, placed in several rows, in a checkerboard pattern, with an inclination towards the enemy. To strengthen the rails, it is recommended to place them on a concrete base.

c) Tank traps – wolf pits, about 4x6 m in size and at least 3 m deep, covered on top with branches and a thin layer of earth. Traps are usually arranged in a checkerboard pattern on narrow passages. d) Minefields,

which are arranged on important sections of the front from special anti-tank mines or with the help of improvised means (shells, land mines, etc.). Mines are installed in several rows in a checkerboard pattern. A tank that has fallen into a minefield can be completely or partially destroyed by an explosion. An anti-tank land mine must weigh at least 5 kg. Laying such a mine in average soil will take about 5 minutes with the work of one miner. To create a real minefield, at least one mine per linear meter of the front is required. If the mine explosion is not able to completely destroy a tank, but has disabled it, then the task of artillery and anti-tank infantry units is to destroy a stationary tank with their fire.

e) Natural and prepared during the preparation of defensive combat obstacles in interaction with fire weapons against tanks that are stopped or stuck. For active combat against

tanks, mechanized units are armed with machine guns, machine guns, mortars, hand grenades, RPGs and ATGMs. Machine gun and machine gun fire with ordinary bullets is ineffective against tank armor. Only accurate sniper fire from rifles with optical sights and

Concentrated machine gun fire on sights and triplexes can produce good results at close ranges.

Armor-piercing bullets from 7.62 mm rifles and machine guns pierce 10-12 mm thick armor at a right angle at distances up to 150 m, so they are very useful to use at these short distances (preferably from ambushes) when firing at the sides of BMP-1, BMP-2, BMD-1, BMD-2, BTR-60, BTR-70, BTR-80, BTR-82, BRDM, MTLB, 2S1 "Gvozdika", 2S9 "Nona-S", 2S21 "Nona-SVK", 2S25 "Sprut-SD", BTR-D; when hit at sharp angles, the bullets ricochet.

Throwing single F-1, RGO and RGN hand grenades is not very effective against armored targets, but it knocks out the enemy infantry accompanying the armored vehicle. Since tank crews go into battle in most cases with open hatches, fearing a cumulative explosion, there are a number of cases when infantry throws a grenade into an open hatch and disables the tank or crew.

Mortars are a real means of combating tanks. Of course, mortars are significantly inferior to artillery in terms of range, but still, within their reach, they can bring significant benefits. As experience has shown, an 82-mm mortar when firing a fragmentation mine, with a favorable angle of incidence (from 60° to 90°) pierces armor 10 mm thick, i.e. the roof of all types of BMP, BTR, SG.

A stream of fragments flies inside the hull and, after that, they usually fail. Hitting the tracks deprives tanks of mobility. Direct hits of 120 mm mines in the roof of an armored personnel carrier cause its complete destruction; even if they explode near an infantry fighting vehicle, armored personnel carrier, or armored personnel carrier, such a mine can sometimes disable it.

Quite effective against lightly armored vehicles are infantry heavy machine guns of the 12.7 mm caliber "DShK" and "NSV" type, which penetrate from 500 m. 16 mm armor, and from 300 m - 20 mm armor. They are especially effective when aiming and guidance devices are disabled. Their fire at distances close to 300 m is detrimental to all types of BMP, APC, SG and at distances up to 100 m - BMP-3.

Even more effective than a large-caliber machine gun against infantry fighting vehicles, armored personnel carriers, and all types of armored personnel carriers is the ZU-23-2 anti-aircraft artillery mount, which penetrates 15 mm of armor from 1,000 m and 25 mm from 500 m. With such armor penetration multiplied by a high barrage of fire from two barrels, the specified weapon is a fairly effective means of combating enemy light armored vehicles.

When encountering "tank destroyers" located in shelters, the tank experiences great difficulties. For a tank, the effective detection range of an ATGM or RPG crew dug in is only 500-600 m during the day, and up to 100 m at night, and the tank has dead zones of its weapons up to 20 m in front of it and on the sides (Fig. 2.1.1, 2.1.3), back – 37 m (Fig. 2.1.2). The maximum elevation angle of the gun and twin machine gun of the tanks is also small – 130 32', so in limited urban conditions it is difficult to fire from it on the upper floors of buildings (Fig. 2.1.4). Below, in Fig. 2.1.4, the "invulnerable space" of Russian tanks is shown, that is, the area that its gun and machine gun cannot fire due to the small angle of inclination.



Figure 2.1.1 – Dead zone for weapons of T-72, T-80, T-90 tanks in front – 20 m



Figure 2.1.2 – Dead zone for the rear weapons of the T-72, T-80, T-90 tank – 37 m

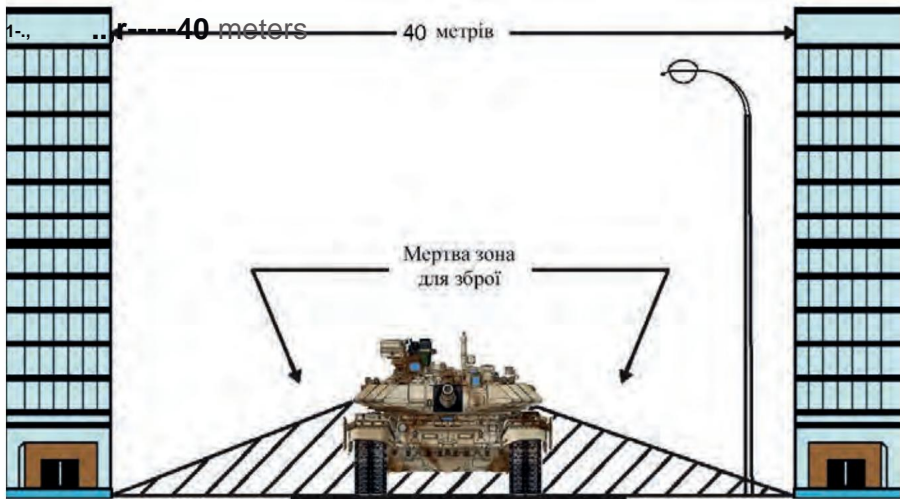


Figure 2.1.3 – Dead zone for Russian tank weapons on the sides – 20 meters each

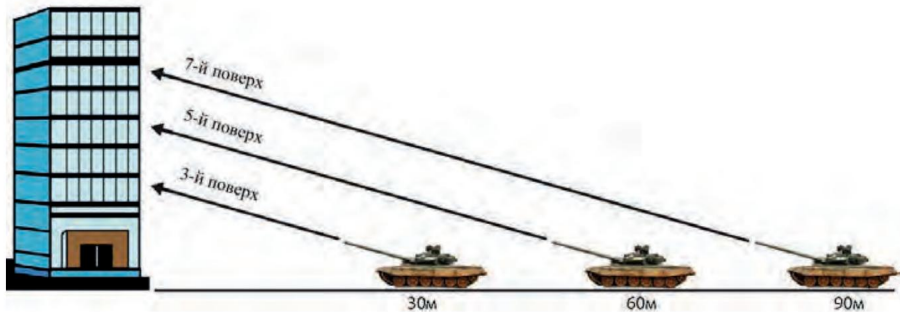


Figure 2.1.4 – The figure shows the possibilities of firing at residential buildings at the maximum gun elevation angle. The numbers under the image of the tank indicate its distance from the house.

In the presence of several targets, the tank is able to fight only sequentially with each target in turn. The attacking tank, due to the "blindness" of Russian SUVs, can fire a corresponding aimed shot at such small camouflaged targets only after self-detection of the target, and before that it itself is a rather large target. In the forest, dense bushes and among buildings or ruins, visibility from the tank is very low, it cannot use the distance of its fire and effective maneuvering and is very sensitive to dagger fire from anti-tank weapons.

Tank machine gun fire is not effective against targets located on the reverse slopes, where anti-tank weapons may be located.

The tank's armored hull and turret fully protect it from bullets, direct hits from high-explosive and high-explosive shells, but a direct hit from a single 152 mm high-explosive shell, or two 122 mm high-explosive shells at the same time, can knock the turret off the hull. Frontal armor protection of the tank

the most durable and almost invulnerable to many infantry anti-tank weapons, except for weakened areas: gun mask, turret epaulettes, triplex area driver, commander's turret. The tank's side armor protects only against small-caliber automatic guns. The hull and turret sterns are very weak, engine roof, bottom of the hull. BMP, BMD, BTR, SG are very poorly protected and can actually withstand only ordinary 7.62 mm bullets.

On tanks, any hatch is opened and closed from the outside using a turret key (Fig. 2.1.5).

The key is stored in the first drawer on the left over-track shelf (Fig. 2.1.6 marked with a red arrow), it is suitable for all hatches without exception.



Figure 2.1.5 – "Tank key" or as it is also called – turret key



Figure 2.1.6 – T-72B3 tank; location of the spare parts box with the tank key (red arrow)

A tank losing speed or stopping on the battlefield under fire is tantamount to death. As a rule, when a tank's track was damaged during battle, it was destroyed. That is, the tracks were and are the weak point of tanks.

When transporting tanks along the bottom of a small river, with a depth of more than 1.2 m, they It is necessary to prepare, which takes 15-60 minutes. During this time, the tank is stationary.

BMP, BTR, BMD, SG "Gvozdika", SG "Nona", "Sprut-SD" overcome water obstacles by swimming, which reduces their speed to 5-10 km/h. The water surface and a slowly floating tank are very favorable conditions for its defeat. BMP, BMD, BTR, SG - are confidently fired at from RPGs and ATGMs in any place; from AVG - see "Part 5".

Also, the performance of tanks directly depends on logistical support. It is enough to cut off the supply of fuel and ammunition for a tank unit to become incapable of combat.

The stability of combat formations is achieved in modern conditions not only by streamlining defense, but above all by adding high-level anti-tank independence and immediate readiness to fight tanks.

Initially, the anti-tank group does not fire at the tanks themselves, but at the infantry accompanying them; the tanks are then fired at by ATGMs and mortars. Anti-tank group opens fire on tanks with RPGs and AVGs only at close range and, to avoid his own death, at their vulnerable points: the side of the hull and turret, the stern hull and turret, hull and turret roof; if impossible – in the gun mask, the junction of the hull with the turret (sash, shoulder strap), the area of the crew's observation devices.

### **WARNING DANGEROUS!**

**1. The very high pressure from a tank gun shot can kill soldier or inflict severe burns on him in sector 900 at a distance of up to 200 meters from the muzzle of the barrel (Fig. 2.1.7, orange circle).**

**2. The risk of being hit by tank shell fragments remains at a distance of up to 1000 meters and up to 400 meters along the front from the epicenter of the explosion (see Fig. 2.1.7).**

**3. It must be remembered that the tank turret rotates 3600 around itself (see Fig. 2.1.7), so rules 1 and 2 always hold, depending on which way the tower is facing.**

**4. If a soldier finds himself in a danger zone, he must lie down or Sit down, cover your head with your hands, close your eyes and open your mouth to equalize the pressure on your eardrums.**

Fig. 2.1.8, 2.1.9 shows an image of a T-90 tank firing a gun. The photo clearly shows the danger zone of his infantry. A soldier must take into account the possibility of a shot without warning from the crew. It must be taken into account that when attacking and maneuvering during battle, the turret moves in different directions. In this regard, it is necessary to choose a position as far as possible from the danger zone. In the Joint Forces Operation zone, there were frequent cases when Russian soldiers fell into the danger zone of their tanks and received severe contusions and injuries during the shot.

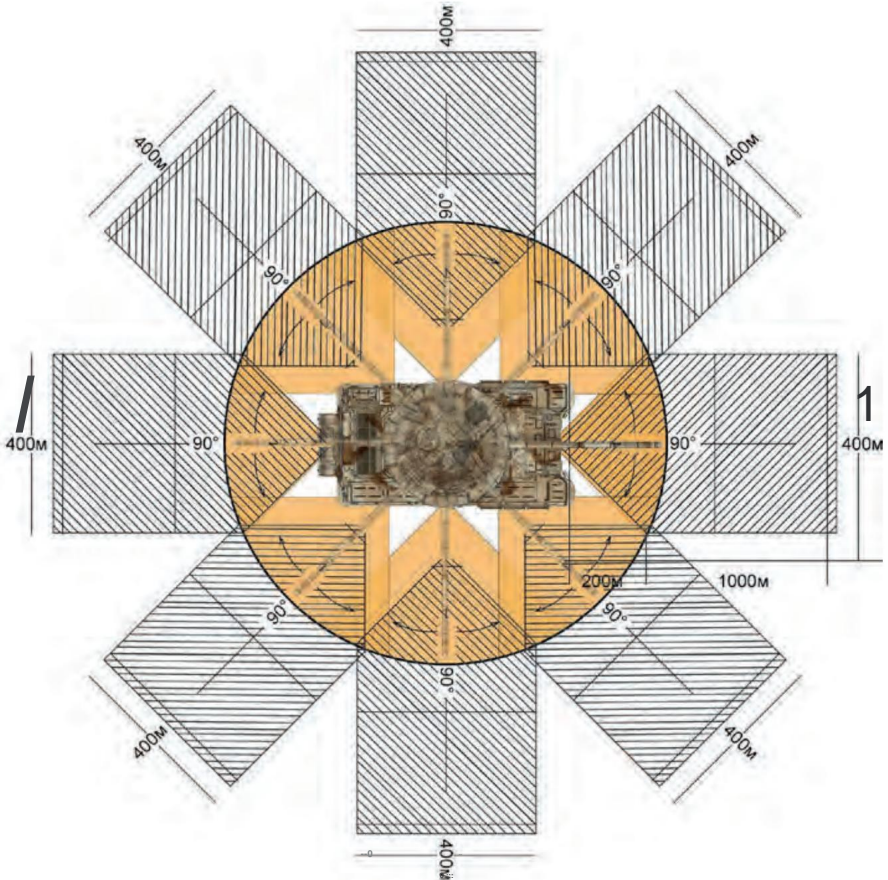


Figure 2.1.7 – Danger zone when fired from a tank gun



Figure 2.1.8 – Initial stage of a cannon shot



*Figure 2.1.9 – Fireball from a shot gradually dissipates, maintaining a traumatic threat to infantry*

## **Chapter 2. Peculiarities of urban combat**

The tank is one of the most destructive means in the commander's arsenal. The tank most effectively provides accurate direct fire from close range (up to 2000 m). In close combat in the city, a tank without infantry support is very vulnerable. For support, special assault groups are created that act together with the tank as a single unit and have high combat effectiveness.

Assault groups move from cover to cover. From the point of view of a soldier trying to fight and survive, cover can be excellent (indoors) or completely absent (on an open street). Therefore, fighters fight mainly from the middle of the premises, and move between them with the greatest possible speed, thus minimizing the time spent in the open. Having come into contact, fighters need to accumulate enough strength to conduct suppressive fire on the enemy building, after which the assault takes place. They need to prevent the enemy from conducting effective fire from the building being stormed and from the buildings surrounding it. Having taken a bridgehead inside the building, soldiers clear room by room, destroying enemy resistance. Infantry in 95% of cases detects its targets at a distance of 100 meters or closer. By taking the best possible cover and being spread out, the infantry is able to withstand heavy enemy fire and therefore must lead the attack. The soldiers of a well-trained unit hardly leave their homes. The unit seems to dissolve into the urban landscape, not exposing itself to observation and fire.

On the other hand, it is difficult for a tank to find cover. At short distances, typical of urban combat, a tank remains an open target while being seen and heard by a well-camouflaged enemy. A tank can be destroyed by anyone who notices it, but it is extremely rare for an infantry unit to be able to quickly detect it. The main threat remains infantry anti-tank weapons, which are difficult to detect. If the infantry is concerned about finding cover and needs fire and smoke to attack, then the tank crew needs

worry about covering the flanks, rear, roof, but at the same time it has more than enough firepower to suppress any oncoming enemy. Although some commanders use tanks as a shield for infantry, tanks do not really need to attack directly at the object. It does not matter how close the tank comes to the object of attack, but the available sector of fire is crucial.

**Tankers, advancing on enemy targets and buildings, advance forward of the firing sector their guns, not their vehicles.**

If the tank crew can observe an enemy position, it most likely means that it is within effective range fire.

Let's give an analogy: a car is driving on a night road, its driver illuminates the path with the help of headlights. In threatening areas, he drives more slowly. And he will not drive with the headlights off, relying on the light of the car driving behind. Similarly, without light, tanks cannot find targets, navigate in space and decide what to do with the obstacle that has arisen. In urban combat, the role of light, which reveals enemy positions, is played by infantry. Therefore, in an uncertain situation, the infantry moves forward. The tank provides freedom of maneuver, destroying the detected enemy on the spot. If we bring our car ahead of the light, we will not achieve the set goal. In this case, a collision with the enemy will turn into a dangerous sharp turn, to which the tank crew will not have time to react on its own terms, will lose the initiative and, as a result, the battle scenario written by the enemy will be imposed on it.

The most aggressive assault commanders often try to lead an attack into a city with tanks in front. While this maneuver provides short-term success, it very often leads to heavy casualties, reduced combat effectiveness, loss of momentum, tanks, and soldier lives.

When infantry and tanks move together, tactics change. Infantry units in the attack become less dependent on their covering fire. Tanks provide suppressive fire, while infantry cover the front, flanks, and rear, protecting the tanks' most vulnerable areas from enemy anti-tank groups. Cover and movement, along with tank covering fire, propels the attack forward. The assault group moves inside every building. The group makes contact, identifies the

enemy position, pins it down with fire, and takes cover. The tanks remain behind, ready to open fire. A separate guard group protects the tanks from grenade launcher fire from the flanks and rear. The cover group should not be near the tank, behind it, or in the nearest entrance that opens onto the street where the tank is located. The cover group should occupy the nearest buildings and observe advantageous positions from which the tank can be fired upon. Timely identified threats allow the assault group to launch an attack on the RPG service in time, or allow the tank to retreat, move or attack.

As much as possible, the tank should fight from the middle of a moving perimeter, which ensures its safety.

**Chapter 3. Vulnerability of Russian armored personnel carriers in urban combat, experience of Chechen fighters**

During the first war in Chechnya, the tactics of the attack of the fighters of the Chechen Republic of Ichkeria (CRI) were built around the RPG-7: a fighter with an RPG-7 fired at Russian military equipment. He was covered by one or two machine gunners. The machine gunner cut off the enemy infantry and prevented them from evacuating the damaged military equipment. And the sniper with an SVD fired aimed fire at the tank's observation and communication equipment. In order to increase the effectiveness of the destruction of the shaped charge, which was not quite adapted for fighting manpower, Chechen fighters attached TNT bombs to RPG grenades.

The combat anti-tank unit of the CRI fighters consists of 15-20 people, divided into fire groups of 3-4 people. Each group includes a grenade launcher (with RPG-7 or RPG-18), a machine gunner and a sniper. The rest of the unit's fighters are engaged in ammunition (helping the grenade launchers and machine gunners). Combat anti-tank units transfer

deploy their groups into "tank hunter" teams. Sniper and The machine gunner cuts off the infantry, and the grenade launcher hits the armored targets. The teams are placed on the first, second, third floors of buildings and in basements (see Fig. 2.3.1). Usually 5-6 teams attack one tank at the same time. Shooting is carried out on the roof, sides or rear

cars. Bottles of gasoline or napalm are thrown onto the roof of the car. Chechen "tank hunters" tried to trap columns on city streets by blowing up the front and rear of the car, and then methodically

They destroyed the entire column.

The vertical firing angles of Russian tank guns do not allow them to fight "tank hunters" when they are located in basements or on the third or fourth floors, and the simultaneous attack of 5-6 teams makes the use of anti-aircraft machine guns a dangerous occupation.

The first losses of Russian equipment are explained by inappropriate tactics, underestimation of the enemy and insufficient combat readiness. The Russians entered the city of Grozny without surrounding it or cutting it off from reinforcements. They planned to capture the city on the move, without even dismounting. Due to the lack of personnel, the columns were of a mixed nature and most of the APCs moved with minimal or no foot cover. These first columns were completely destroyed.

After the regrouping, the number of infantry was increased and the systematic liberation of the city began house by house, block by block. Losses in the armored personnel carriers were significantly reduced due to the change in tactics. The Russian infantry moved in line with the tanks to support and cover them. Some of the vehicles were equipped with a wire mesh, which was mounted 25-30 cm from the hull for premature cocking of cumulative anti-tank grenades, Molotov cocktails and explosives. In order to destroy the "tank hunters", ambushes were arranged on their approaches.

Chechen fighters have managed to develop effective techniques for destroying Russian armored personnel carriers on the streets of a large city. Many of these techniques can

be used by the Ukrainian armed forces to combat Russian-made armored personnel carriers in urban battles.

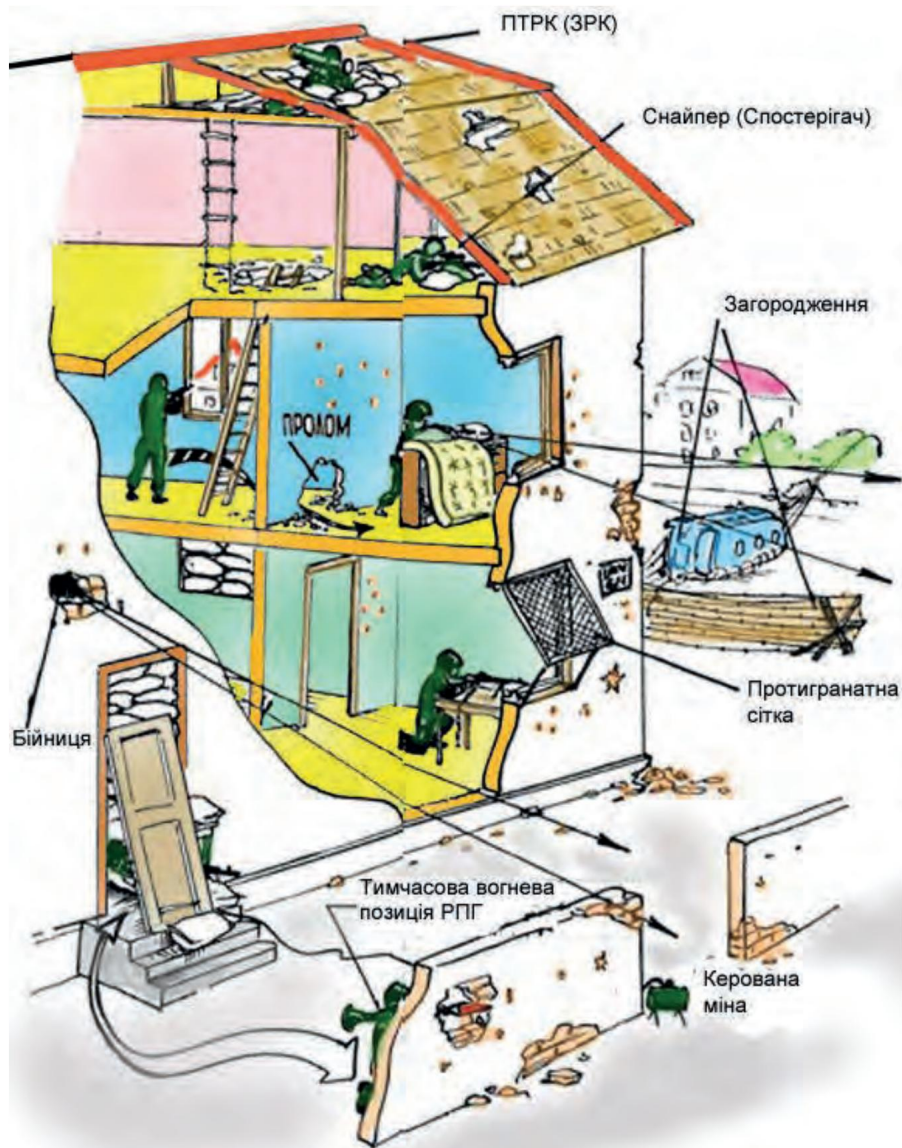


Figure 2.3.1 – Approximate placement of a combat group in a building. Capital buildings simplify combat operations. Even elderly soldiers can be used in them with full combat effectiveness.

Let's list these methods:

1. The created teams of "tank hunters" must have in their composition a machine gunner and a sniper to protect the grenade launcher from infantry.
2. Areas for anti-tank ambushes should be selected in areas of the city or terrain that restricts the movement of armored vehicles to narrow "channels" (to reduce their mobility and maneuverability).
3. The location of the ambush should ensure that escape routes are cut off and locking machines at the destruction site.
4. It is necessary to use several teams, placing them at different levels – in basements, on the first-third floors of buildings, on camouflaged heights. Difficulties with the use of RPG-7 and RPG-18 were caused by their unmasking jet stream and flashes. To reliably hit an armored object, 5-6 launches of different commands were made simultaneously.
5. It is necessary to fire on armored objects from above, from the flanks and from the rear. Shots at frontal armor are ineffective (except for hits directly into the gun mask, where the armor is homogeneous, 315-320 mm thick, under the gun and under the turret shoulder strap, which requires sniper accuracy of fire) and are only capable of unmasking the grenade launcher.
6. The added anti-aircraft artillery installations should be destroyed first. Shilka type, because they like to use them against grenade launchers.

#### Chapter 4. Vulnerability of the Russian armored personnel carrier, the Afghan experience of the Mujahideen

The specificity of the terrain and combat use, as well as the tactics of the Mujahideen, quickly revealed the main drawback of Soviet tanks in the battles of 1979-89: weak protection against mines and cluster munitions.

Here the tanks (T-55 and T-62) had no other opponent than a single Mujahideen with a grenade launcher and mines that littered the roads. There was practically no freedom of maneuver: either moving along the roads or firing from a position at checkpoints. Even where the terrain allowed leaving the road, this was in most cases impossible - the sides were densely mined by the enemy. Finally, the attack itself was carried out by the Mujahideen where the crew's visibility was minimized - in mountain defiles, in green areas or among the remote villages.

All this led to the fact that the crew on the combat exit could at any moment expect a cumulative grenade to hit the side or an explosion of a landmine under the track. In such a situation, one had to rely only on armor protection, and it just failed. The thin armor of the sides, roof and stern was easily penetrated by a grenade from the RPG-7. **Having an armor penetration of 300-500 mm (depending on the type of grenade),**

**The RPG-7 grenade launcher hit T-55 and T-62 tanks, even in the front of the hull and turret.** A cumulative grenade, when hit in the turret, usually killed one or more crew members, could disable weapons, and blow up ammunition. Hitting the engine compartment made the vehicle a stationary target, and if the cumulative jet encountered oil and fuel lines or tanks, it would ignite. It should also be taken into account that the enemy usually did not limit himself to one hit, but continued to fire until the vehicle was completely disabled. In 11 months of 1980, 16% of tank losses came from RPG fire.

Fire from an RPG at openly positioned manpower using cumulative ammunition gives a satisfactory result - the impact of fragments of the grenade body and the blast wave of personnel within a radius of up to 4 meters, which has an additional demoralizing effect.

The widespread use of PG-7V cumulative grenades by Afghan mujahideen on infantry inevitably led to increased losses in Soviet troops from grenade launcher fire, including when operating on foot. For example, on March 13, 1987, in the village of Alishang, Laghman province, a single RPG-7 shot wounded 7 people during the evacuation of a mortally wounded group commander from under fire. On September 4, 1987, in the province of Kunar, as a result of two PG-7V cumulative grenades hitting the flat roof of a house (firing was carried out from above), 11 people inside the house received shrapnel wounds and contusions. Another non-standard method of firing from an RPG-7 is fire along a hinged trajectory using both

fragmentation and cumulative grenades. Except for the use of fragmentation grenades, it is not as effective as direct fire and was used by the Mujahideen mainly for "disturbing fire" on flat targets. The "inconvenience" of this type of fire, as with mortar fire, is the difficulty of determining the firing position of the grenade launcher, especially in closed terrain.

The method of carrying grenades on a belt is unsuitable in wet weather, because the paper insulation of the powder charge is easily damaged, which leads to a deterioration in the accuracy of shooting due to the dampness of the powder, and most often to the complete unusability of the powder charge. Portable bags for shots were not popular with the Mujahideen. It was observed among the Afghan Mujahideen that only in rare cases did one grenade launcher use more than 2 or 3 grenades in battle, preferring to carry one in the barrel and the second on the shoulder using a rope belt device.

The Mujahideen also used RPG-7s against Soviet helicopters. Of course, such use of the RPG-7 against a helicopter requires skill, but attacks against Soviet helicopters in Afghanistan confirm its effectiveness. In general, only experienced shooters can

effectively fire against moving targets, so to stop a convoy of vehicles, barriers, staged accidents, crowds of people are used, so tactically stopping a moving convoy is not always a good idea, especially in the absence of infantry support.

#### **Chapter 5. Vulnerability of the Russian Federation's BTT, experience of other countries**

When fighting in closed terrain (forests, mountains, settlements), the opposing sides are usually separated by only a few dozen meters. In such conditions, when artillery and aviation fire pose a threat to their own troops, the RPG becomes an indispensable means of fire, and the presence of an optical sight in the RPG-7 makes firing from it especially accurate and safe for their units.

Russian troops always use them during combat in a populated area. tanks and other armored personnel carriers. On the narrow streets of the city, this armored vehicle has a limited firing sector and low maneuverability and is an easy target in close combat. It is better to place anti-tank barriers in populated areas not directly on the highway, but behind road bends. Then it is more difficult for the enemy to detect them and fire at them from a safe distance. Such barriers, when properly positioned, become "anti-tank traps."

### **Vietnam**

The tactic of tying up the enemy in close combat was called "belt grabbing" by the Vietnamese military, and the Afghan mujahideen used it everywhere, especially effectively and frequently in the "green zone" and in the highlands. Thanks to such tactics, in both cases the enemy lost his main advantage - artillery and aviation fire.

### **Tajikistan**

A feature of the tactics of the Tajik "Namangan" group, consisting of 25-30 people armed with up to 12 RPG-7, RPG-18 and RPG-26, was the destruction of the BTT of the Popular Front of Tajikistan by the sequential concentration of fire of two or three RPGs on one tank from a distance of 20-50 meters. Moreover, when faced with T-72 tanks equipped with DZ elements, the first grenade launcher shot down the DZ, and the second hit the tank in the unprotected part of the armor. The nature of the damage to the tanks indicated that in addition to cumulative grenades, the shooting was also carried out with fragmentation grenades, in the frontal part, to disable the aiming and observation devices to blind the crew.

Firing from a very close range, the grenade launcher, with reliable fire cover from enemy infantry fire, is able to make an accurate aimed shot at the most vulnerable point of the tank. This explains the destruction of T-72 tanks in Tajikistan in the rear of the turret after knocking down the spare parts box with the first shot, as well as damage to the barrel by a cumulative jet of the gun and direct hits of fragmentation grenades in the triplex of the driver-mechanic with subsequent damage to the devices located on the turret by fragments.

When a tank, infantry fighting vehicle, etc. is hit by a cumulative grenade, the factors affecting the crew are excess pressure, armor fragments, and cumulative jet. However, with open hatches, excess pressure no longer works, causing only minor contusions to the crew, so the factors affecting the crew remain armor fragments and cumulative jet. The destructive force of the cumulative jet inside the armored vehicle affects a person at a distance of up to 2.5 m, and the fragments affect the entire depth of the internal space.

In most cases, an accurate shot from an RPG is facilitated by intensive fire from automatic small arms by the grenade launcher's assistant and other shooters. This is done in order to force the enemy infantry to stop observing the battlefield and conducting aimed fire, as well as to destroy the optical sights of enemy combat vehicles. This allows the grenade launcher to take an advantageous firing position, determine the aiming point, and after the shot, quickly and imperceptibly change the firing position without unnecessary fuss and with a lower probability of being hit.

When firing at one target from two or three RPGs, the firing is carried out without the obligatory change (after each shot) of the firing position, especially when the target is hit by the first shots. Very often in such situations, grenade launchers get into an unhealthy excitement and, forgetting about safety measures, pay dearly for it. For example, the "Namangan" group during October-December 1992 was completely destroyed at the cost of two burnt BTR-70s, as well as three damaged T-72s and one BTR-80.

When setting up ambushes, in order to reduce dust formation and unmask the firing position at the time of firing from RPGs and other rocket-propelled grenades, it is very important to choose an advantageous firing position. If there is time and conditions, it is usually specially prepared - the soil is watered with water (in summer conditions and when dusty) in front of and behind the firing position, in order to reduce dust formation during firing. Thickets of tall bushes, reeds, corn crops and other herbaceous plants more than two meters high mask the RPG firing position quite well. It must be remembered that there should be no vegetation in the direction of firing that would impede the flight of the grenade. In order to prevent the grenade from detonating when touching branches and grass, the safety cap from the detonator is not removed.

## USA

US doctrine (FM 3-23) establishes three types of damage that can be inflicted by anti-tank fire: 1) deprivation of mobility when the engine or suspension is damaged; the vehicle cannot move, but retains the ability to fire its gun (if the turret remains mobile); 2) deprivation of firepower: the weapons systems are disabled, depriving tank of its combat potential, but it retains the ability to drive off the battlefield under its own power; 3) catastrophic defeat, when the vehicle's ammunition or its fuel tanks explode, resulting in complete combustion of both the vehicle and its crew. **Germany**<sup>1</sup>

All firepower intended for fighting tanks should be installed in the most responsible or threatening points and, if possible, formed into deep echeloned, staggered defensive groups. If possible, they should be used exclusively to fight tanks in order to avoid their premature detection by the enemy. If tanks are hit by ATGM fire from the maximum distance, then other anti-tank weapons should take the most advantageous hidden positions and open fire only when the tanks approach the limit of their most effective impact. According to the command of the German army, in these conditions, a literally continuous ring of one or two rows of soldiers armed with RPGs is created around the tank unit.

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<sup>1</sup> Germans, Germany is a Russism that arose in connection with the illiteracy of Russians. It arose from the Russian "γγγ, γγγγγ" - that is, unable to speak in an understandable language. Also in Russia the word meant all foreigners who spoke "unclear". Correct – Deutschland – Deutschland, Deutschlanders or Germania – Germany, Germani.

### Part 3. Fighting Russian armored vehicles with the help of hand-held anti-tank grenade launchers (RPGs)

The following RPGs are in service with the Armed Forces of Ukraine: RPG-7; RPG-7B; RPG-7D; RPG-M7; PSRL-1; RPG-18; RPG-22; RPG-26; AT4; M141; Panzerfaust 3; RPG-76; RPG-75; C90-CR; RGW90 HH Matador – MP; M72 EC Mk.I LAW; M72 y6 LAW; Carl-Gustaf Granatgevär m/48 (Grg m/48) M2; Carl-Gustaf Granatgevär m/48 (Grg m/48) M3; SPG-9 "Spear".

#### Chapter 1. RPG-7/RPG-7V/RPG-7D/RPG-M7/PSRL-1

##### Structure and modifications of the RPG-7

RPG-7 (Fig. 3.1.1, 3.1.2, 3.1.3) and its modifications – **the main anti-tank grenade launcher of the Armed Forces of Ukraine**, so we give a little more information about it than about other anti-tank weapons. In addition to destroying tanks, it can be used to destroy enemy manpower located in light fortifications, as well as in urban structures. RPG-7 is a universal weapon; in addition to the above purposes, the grenade launcher is effectively used in military conflicts against air and sea targets. The weight with an optical sight is 6.35-6.9 kg, depending on the modification; the effective firing range is 300 m against moving targets and 500 m against stationary ones.



Figure 3.1.1. From top to bottom: RPG-7 with PG-7VM grenade; RPG-7V with grenade PG-7VS, with "optics" and bipod; RPG-7D in folded form

**The use of an RPG-7, regardless of its camouflage, leaves a noticeable gray-blue smoke and flash that unmarks the shooter. To avoid detection, the shooter must immediately change position after firing.**

This grenade launcher was designed for short-range shooting and especially dangerous with coordinated fire from two or three shooters.



*Figure 3.1.2 – RPG-M7 of modern production by the Kyiv plant "Mayak". It is clearly visible that the Ukrainian version is more advanced than the Soviet prototype RPG-7, below is the PG-7VR grenade*



*Figure 3.1.3 – The RPG-7, manufactured in the USA and supplied to Ukraine, has modern improvements in the form of Picatinny rails for mounting optics, and the name "PSRL-1"*

Grenade launchers of all these modifications consist of the following main parts and mechanisms (Fig. 3.1.4):

1. Barrel with mechanical sight;
2. Trigger mechanism (USM) with a safety catch;
3. Striker mechanism;
4. Optical sight.

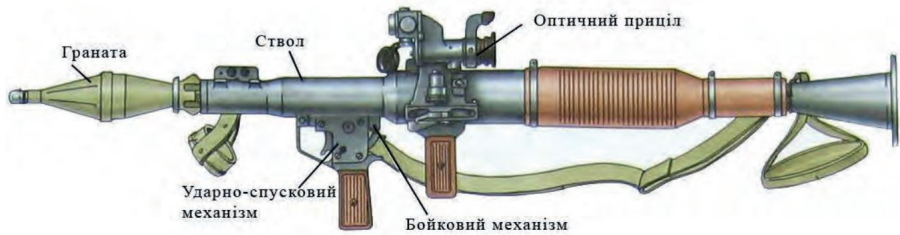


Figure 3.1.4 – Structure of the RPG-7

### Shots to RPG-7

The RPG-7 is supplied with the following types of ammunition: PG-7V; PG-7VM; PG-7VS; PG-7VL; PG-7VR (the most modern); TBG-7V (anti-personnel), PUS-7 (training inert without VR). The performance characteristics of the grenades are given in Table 3.1.

**Table 3.1 – Performance characteristics of grenades for RPG-7:**

Grenade	Sighting distance flax, m	Direct shot, m	Armor- piercing, mm	Damage:
PG-7V	500	330	260	<ol style="list-style-type: none"> <li>1. The hull side of all T-72, T-80, T-90 not protected by DZ (middle part and stern; T-62M – in the side and stern);</li> <li>2. Side of the turret, stern of the turret and hull all T-72, T-80, T-90, except T-72B3M;</li> <li>3. Over-engine roof;</li> <li>4. M/V hatch, hatches on the roof of the tower;</li> <li>5. Stern roof of the garden; T-72B3M – the front part of the tower roof.</li> <li>6. APC, BMD, BMP, SG all modifications are making their way into anything place.</li> </ol>



Figure 3.1.5 – PG-7V grenade

PG-7VM	500	310	300	Same as PG-7V
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Figure 3.1.6 – PG-7VM grenade



7B - TBG grenade - 0 3.1.1 k yno Mal

<p>10 m -</p> <p>The radius of destruction of manpower is high-explosive, fragmentation and incendiary effect.</p> <p>I want it, - Protipi</p> <p>at a distance of up to 2 m from a trench or trenches, bunkers when a grenade explodes. It hits enemy manpower.</p> <p>The shot is intended to suppress</p>	<p>200</p> <p>200</p> <p>7V - TBG</p> <p>7VR - grenade PG - 9 3.1. yunok Mal</p>
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<p>62M - and T 80BV/BVM - 2. T tanks</p> <p>1.5 m.</p> <p>3. Reinforced concrete block thickness break through to any place.</p> <p>vulnerable cheekbones. Tower cheekbones are invulnerable, but easy to hit in the forehead, man</p> <p>90: - T 80U, - 72, T - 1. T tanks</p>	<p>for DZ up to 200 650</p> <p>200</p> <p>7VR - PG</p> <p>7VL - grenade PG - 8 3.1. young Mal</p>
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<p>72; - Pierces the gun mask of all T 2.</p> <p>7B; - 1. Same as in PG</p> <p>slabs 1.1 m thick.</p> <p>1.5 m thick, reinforced concrete</p> <p>Provides penetration of brick wall to any place; - 62M - 3. T</p>	<p>300</p> <p>250</p> <p>300</p> <p>7VL - PG</p> <p>C 7B - grenade PG - 7 3.1. young man Mal</p>
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<p>72. - 2. Breaks through the mask of all T's guns</p> <p>7B; - 1. Same as in PG</p>	<p>400</p> <p>310</p> <p>500 7yy - PG</p>
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## Inspection of the grenade launcher before firing

1. When inspecting the barrel, pay special attention to the condition of the barrel; For To check the condition of the barrel, you need to raise it to a light source so that the rays of light do not fall directly into the eye, but on the walls of the barrel; then, turning the barrel, carefully inspect the barrel bore from the muzzle and breech; when inspecting the expanded part of the bore - moving it away from the eye. **The barrel bore should not have any fragments of chrome, rust, cracks, shells, or contamination. After a shot - any powder charge (paper) residues.**

A network of surface cracks due to wear and individual areas with chromium chips are allowed on the nozzle surface.

2. The grenade launcher must not have a barrel bulge visible in the form of a transverse dark (shadowy) solid ring (semi-ring) detected by the bulge of metal on the outer surface of the barrel. **A grenade launcher with a swollen barrel or dents is not suitable for firing.**

3. **When inspecting the barrel** from the outside, check for any dents in the cutout for grenade lock and on the bar for mounting an optical sight.

4. **When inspecting the trigger mechanism**, check the condition of the external the surfaces of the body, cover, cheeks, trigger, trigger, safety and sear, as well as the condition of the threads and slots on the heads of the screws securing the sear, cover and cheeks;

5. **When inspecting the firing mechanism**, check for wear and broken striker, striker spring, nipple and support bushing, is there any in the socket and the firing pin hole is free of rust, powder deposits, nicks and dents.

6. **When inspecting shots**, follow these rules:

A) check for external damage to the fuse, main part of the grenade, the nozzle block, the jet engine tube and the powder chamber charge;

B) Prevent grenades, powder charges and grenades from falling from attached powder charges to prevent their damage;

C) Transport grenades and powder charges in designated containers. bags or closures.

D) Protect grenades and powder charges from moisture and sunlight;

D) Open the case and remove the powder charge from it only before firing; if the prepared grenade will not be used, screw it Put the powder charge from the grenade in a pencil case; screw the fuse onto the bottom of the jet engine;

E) Remove the safety cap from the main part of the detonator only before loading the grenade launcher. If the grenade will not be used, put the safety cap on the main part of the detonator and secure it with a check, first check whether the membrane is damaged;

G) **It is prohibited to use shots that have external damage for shooting.**

## Preparing the grenade launcher for firing

1. Inspect the grenade, the grenade should be free of mechanical damage.
2. Unscrew the fuse from the bottom of the jet engine and place the grenade.
3. Take the powder charge case, screw the lid on and pull it out.

powder fuse. 4.

Attach the powder charge to the grenade.

5. Shots are prepared in the required quantity.

6. Remove the covers (if any) from the grenade launcher, first from the breech, then from muzzle part.

7. Install an optical sight (if available) or put it in vertical position of the front sight and the sighting bar.

8. To load, you must check whether the trigger is cocked, put Set the grenade launcher on the safety, take the shot from below by the jet engine, insert the powder charge and jet engine into the muzzle of the barrel and fire the shot so that the grenade retainer enters the cutout on the muzzle of the barrel all the way (Fig. 3.1.11).



Figure 3.1.11 – Loading the RPG-7

**Attention: remove the safety cap from the main part of the fuse, having previously pulled the check by the ribbon. When shooting in a downpour, heavy snowfall or when shooting from a prone position, the safety cap from the main part of the fuse is not removed. When shooting prone, the cap protects the fuse from triggering on grass and branches of bushes.**

## Firing a shot

When fired from a grenade launcher, a fight occurs when the fuse is hit. The powder charge of the grenade is ignited. The gases formed from the ignition of the powder charge give the grenade rotational motion (using a turbine) and throw it out of the barrel bore at a speed when firing shots: PG-7V and PG-7VL - 120 m/s, PG-7VM and PG-7VS - 140 m/s; PG-7VR - 112 m/s; TBG-7V - 66 m/s.

**Safety precautions.** One should never forget about the effects of powder charges from the RPG nozzle, which create a dangerous zone behind the shooter (Fig. 3.1.12). Therefore, the position must be chosen so that there is no one and nothing behind: people - 15-20 meters; walls, fences – at least 2 meters; shrubs – at least 0.5-1 meter (Fig. 3.1.13).

1. After loading, the grenade launcher's assistant, if any, leaves. to the right or left, without passing behind the nozzle, so as not to be hit by the jet of powder gases.



Figure 3.1.12 – The action of powder charges from the RPG nozzle

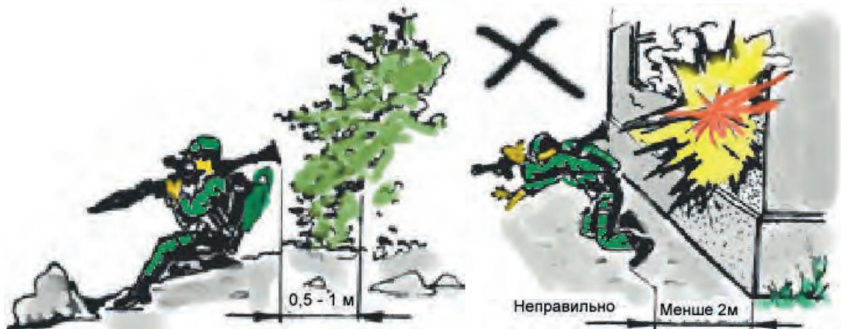


Figure 3.1.13 – Choosing a position when firing an RPG

2. Only after loading and the assistant leaves, the shooter takes the most comfortable position for shooting by placing the RPG on your right shoulder.

3. The shooter holds the RPG by the additional handle with his left hand, and by the trigger handle, and removes it from the safety. The safety is a button on the handle, when pressed on the right - the grenade launcher is removed from the safety, on the left - it is set, and it will not be possible to fire (Fig. 3.1.14, 3.1.15).

4. Use the thumb of your right hand to cock the trigger (Fig. 3.1.14, 3.1.15). **When cocking the trigger, be careful not to pinch the sleeve fabric – the shot will not be fired! If this happens, carefully move the trigger to the front position and pull out the sleeve, then cock the trigger again to fire.**

5. The shooter aims the grenade launcher at the target and fires by pressing index finger on the trigger (Fig. 3.1.14, 3.1.15).

6. **Always warn others about a gunshot with a loud shout of "Shot!" firing a shot.**

7. To continue shooting, simply insert the next shot.

After the grenade leaves the barrel, the stabilizer wings open, the fuse is cocked, and, at a distance that ensures the safety of the shooter, the powder charge of the jet engine is ignited. Due to the turbine with a tracer, the grenade rotates around itself in flight.



Figure 3.1.14 – Location of the safety, hammer and trigger in the RPG-7 of all modifications, including the RPG-M7 produced in Ukraine



Figure 3.1.15 – Location of the safety, hammer and trigger in the PSRL-1

When a grenade explodes, a cumulative (concentrated, directional) jet is formed, 2.5 meters long, with a temperature of 10,000 C, and a pressure of about 2 million atmospheres, which pierces armor, obstacles, hits manpower, destroys weapons and equipment, and also ignites fuel. **Fragments from armor and the grenade body fly up to 200 meters, so the shooter must take cover in case of a close shot so as not to be hit by his own weapon.**

The RPG-7 is a very powerful weapon and, when used properly, can disable or completely destroy any armored vehicle. When fired, the grenade launcher has no recoil, and the action of the powder gases causes some forward movement of the grenade launcher (pumping), which is barely noticeable to the shooter.

After 4-6 seconds, if the grenade does not hit the main part in obstacle (flying past, ricocheting), or if the fuse fails, the grenade self-destructs by explosion.

### Shooting with a PGO-7V optical sight Selecting reticle divisions and aiming point

A distinctive feature of RPG shooting is the significant steepness of the grenade's flight path beyond the direct shot distance. Therefore, when determining distances, it is necessary to learn to memorize by eye a segment of terrain equal to the distance of a direct shot at a tank, and also to be able to use the rangefinder scale of the RPG optical sight to determine the distance (Fig. 3.1.16).

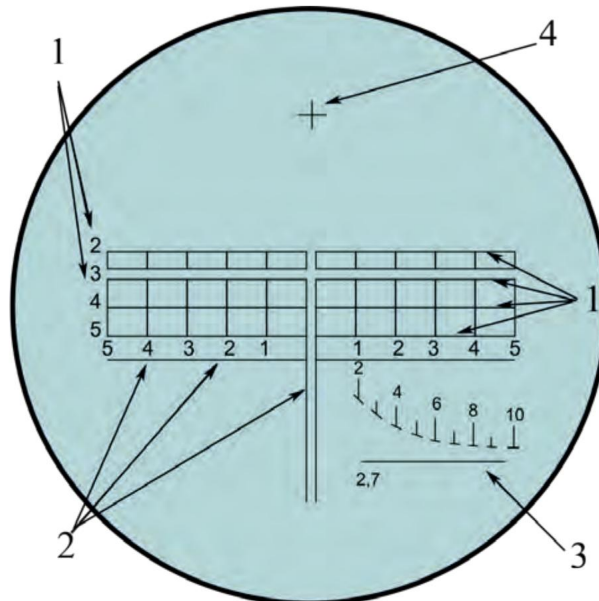


Figure 3.1.16 – Reticle of the PGO-7V optical sight. The numbers indicate: 1 – Aiming angle scale; 2 – Lateral correction scale; 3 – Rangefinder scale; 4 – Verification mark

From Figure 3.1.16:

1. Aiming angle scale (horizontal lines) – to the left of which is the top Down there are digital designations 2, 3, 4, 5 which indicate the firing distances in meters (200, 300, 400, 500 respectively) with PG-7V, PG-7VM, PG-7VS shots.

2. Lateral correction scale (vertical lines) – marked with lower numbers (1, 2, 3, 4, 5) to the left and right of the center line. The value of one division (the distance between two vertical lines) is 0-10 thousandths.

3. Rangefinder scale (solid horizontal and curved dotted lines) – for measuring the distance to a target at a height of 2.7 meters. The numbers (2, 4, 6, 8, 10) correspond to distances of 200, 400, 600, 800, 1000 meters. The distance between Two divisions of the curved line correspond to 100 meters. Divisions without numbers correspond to distances of 300, 500, 700, 900 meters from left to right.

4. The verification mark in the form of a cross is used **ONLY** for sight alignment. **IT IS PROHIBITED TO AIM WITH IT – THE GRENADE WILL FALL INTO THE GROUND 50 METERS IN FRONT OF YOU AND 100-150 METERS BEFORE THE GOAL – YOU ARE NOT COMPLETING THE TASK, YOU WILL BE UNMASKED AND DESTROYED!**

The PG-7VL, PG-7VR, TBG-7V grenades have different ballistics than the PG-7V, PG-7VM, PG-7VS grenades, for which the sight is designed. Therefore, due to the type of grenades, they have different aiming angles (Table 3.2 and Fig. 3.1.17)

**Table 3.2. Scale for aiming angles PG-7VL, PG-7VR, TBG-7V**

<b>Grenade/ Distance</b>	<b>100 meters</b>	<b>150 meters</b>	<b>200 meters</b>	<b>300 meters</b>
PG-7VL	Aim on the aiming angle scale "2"	Aim on the aiming angle scale "3"	Aim on the aiming angle scale "4"	Aim on the aiming angle scale "5"
PG-7VR, TBG-7V	Aim on the aiming angle scale "5"	Aim at the level of the rangefinder line scales with marked 2.7	Aim above the bottom edge of the aiming circle	Aim-tation impossible

To select the reticle divisions and dot of the optical sight aiming, it is necessary to determine (measure) the distance to the target and take into account external conditions that may affect the distance and direction of the grenade's flight. When firing at moving targets, it is also necessary to take into account the direction and speed of the target.

#### **Distance to target**

It is determined visually or by the rangefinder scale of an optical sight. When the distance to local objects (landmarks) is known, it makes it easier to determine the distance to targets. Therefore, if circumstances allow, the distance to landmarks and local objects should be determined by measuring the terrain in steps, or by another, more accurate method.

To determine the distance using the rangefinder scale of an optical sight, it is necessary to point the scale at the target so that the target is located between the solid horizontal and inclined dotted lines (Fig. 3.1.18). The scale line, which is placed above the target, shows the distance to the target, which is 2.7 m high.



Figure 3.1.17 – Real and conditional aiming scales for different types of grenades












Figure 3.1.18 – Determining the distance using the rangefinder scale of the grenade launcher optical sight (distance to the target is 500 m, if the target is 2.7 m high)

**Attention: all Russian tanks: T-72, T-90, T-80, have approximately the same the height of the tower roof, which is 2.2 m.**

Therefore, in this guide we will provide Table 3.3 of ready-made calculations for the main Russian tanks mentioned above.

**Table 3.3. Determining the distance on the rangefinder scale of the RPG-7 optical sight to Russian tanks T-72, T-90, T-80**

Scope scale value	2		4		6		8		10
									
Distance on the sight scale, m	200 300	400 500	600 700	800				900 1000	
Real distance, m	160 240	320 400	480 560				640	720	800

The distance to the target on the rangefinder scale can only be determined when the target is fully visible in height. If the target is not fully visible in height, then determining the distance on this scale can lead to gross errors (distances at the same time, they will usually be exaggerated).

In tense moments of battle, when the conditions of the situation do not allow changing the sight setting depending on the distance to the target, it is necessary to fire at tanks, self-propelled howitzers and other armored targets at distances not exceeding the distance of a direct shot. At long distances, due to a sharp increase in the steepness of the trajectory

Fire will be effective only if the distance to the target is accurately determined.

### Air temperature

When firing an RPG with an optical sight, at air temperatures above 0°C, it is necessary to set the temperature correction handwheel to the "+" sign, and at air temperatures below 0°C, set it to the "-" sign.

### Crosswind

A crosswind **deflects a rocket-propelled grenade in the direction from which the wind is blowing, i.e. into the wind** (Figure 3.1.19).

In a moderate side wind, the correction of the RPG-7 sight is 1.5 (one and a half) divisions of the scale of lateral corrections of the optical sight; in a moderate wind (8 m/s), the correction is equal to 3 (three) divisions of the scale. Point removal

Aiming is done taking into account the fact that the rocket projectile when fired deviates in the direction from which the wind is blowing. In the case of a crosswind, the grenade launcher determines the lateral correction necessary in the given firing conditions and selects on the optical sight reticle the point of intersection of the horizontal line corresponding to the distance to the target and the vertical line corresponding to the wind correction.

For example, a tank is at a distance of 400 m, the wind is strong crosswind from the left. The sight should be set to 4 (each horizontal division is marked with the number 100 m), the correction for strong crosswind should be taken: three divisions of the crosswind scale

corrections. The wind is blowing from the left, the RPG barrel (marked by the double vertical line of the sight reticle) must be moved to the right, because the grenade deflects into the wind. Aim at the center of the target with the intersection of the sight lines with the number 4 and the lateral correction line with the number 3.

With a wind blowing at an angle of 300 -450, take half of the lateral correction. The speed of movement of tanks on the battlefield is determined based on the nature of their tactical use and the terrain. For example, during a front-line attack in interaction with infantry, the speed of movement of tanks is approximately 10-12 km/h (3 m/s), and when developing success on favorable terrain - 18-20 km/h (5 m/s);

The direction of movement of the armored target relative to the firing plane is easy determined by eye by the apparent ratio of the target's width to length.

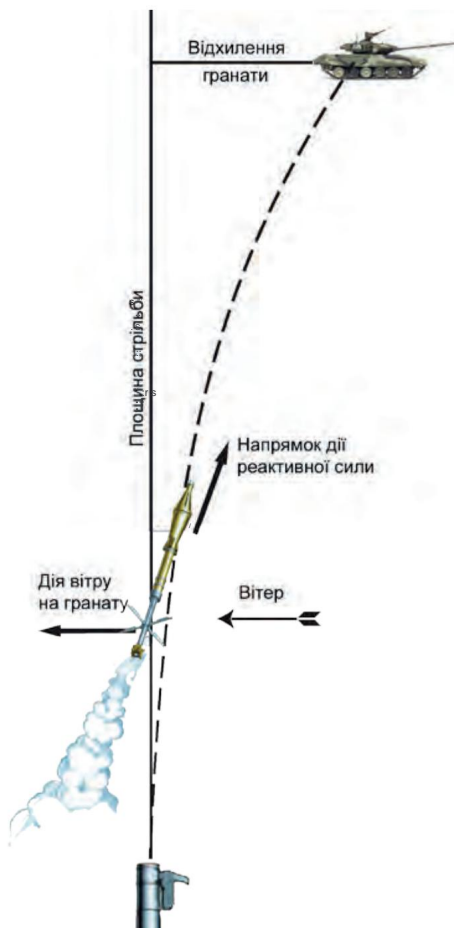


Figure 3.1.19 – Deflection of a rocket-propelled grenade under the influence of a crosswind

## Shooting with a mechanical sight

During combat, the optical sight may be knocked down, damaged, or may not be there at all. Therefore, it is always necessary to be able to shoot from a mechanical sight. The shooter may get confused in the corrections due to nervous shock and forget the optical shooting tables. At the distance of a direct shot, it is advisable to shoot from a mechanical sight (Fig. 3.1.20).

The choice of the correct sight setting and aiming point significantly affects the accuracy of shooting. When shooting at wide targets, there is no need to make corrections for crosswind. Of particular importance for quickly hitting the target is the use of sight settings within the distance of a direct shot. Under these conditions, the average trajectory over the entire shooting distance does not go beyond the target.

The sighting bar has a window and a scale with divisions 2,3,4,5. Scale numbers indicate the distance in hundreds of meters (200, 300, 400, 500 respectively).

The main front sight is used for shooting at temperatures below 00 C. An additional front sight is used at temperatures above 00 C.

To prepare a mechanical sight for shooting, it is necessary to raise the rear sight and front sight, clamp the clamp on the rear sight and set it to the desired shooting distance.



*Figure 3.1.20 – RPG-7 mechanical sight*

A mechanical sight is used to determine the distance to a target. Unlike an optical sight, which uses the height of the target to determine the distance, a mechanical sight allows you to determine the distance by the width of the target.

When a tank of the T-72, T-80, T-90 type with a width of 3.5-3.6 meters fits completely into the hole of the sighting bar, then it is 85 meters away (Fig. 3.1.21A). If when aiming at the side the first and last track rollers go beyond the dimensions of the sighting bar, then it is also 85 meters away from the tank (Fig. 3.1.21B). If when aiming at the side the tank fits completely (excluding the gun) into the hole of the sighting bar, then it is 170 meters away (Fig. 3.1.21B). When the tank is completely