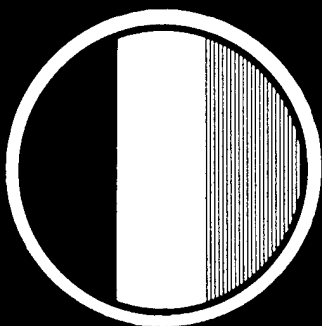


UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND

TRADOC BULLETIN 10



- *WEAPONS*
- *TACTICS*
- *TRAINING*

**THE SOVIET
MAIN BATTLE TANK:
CAPABILITIES
AND LIMITATIONS**

FEBRUARY 1979

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UNITED STATES ARMY
TRAINING AND DOCTRINE COMMAND

BULLETIN NO 10
9 FEBRUARY 1979

**THE SOVIET
MAIN BATTLE TANK:
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This TRADOC BULLETIN is intended to provide timely, technical information on weapons, tactics, and training to commanders and others concerned with military training. It is not intended to supplant doctrinal publications, but to supplement "how-to-fight" material with data derived from tests, recent intelligence, and other sources.

TRAINERS' NOTE: This bulletin is designed to help trainers identify and extract needed information. Charts, illustrations, and other key data may be extracted for individual use.

Comments and recommendations are welcome and should be directed to the:

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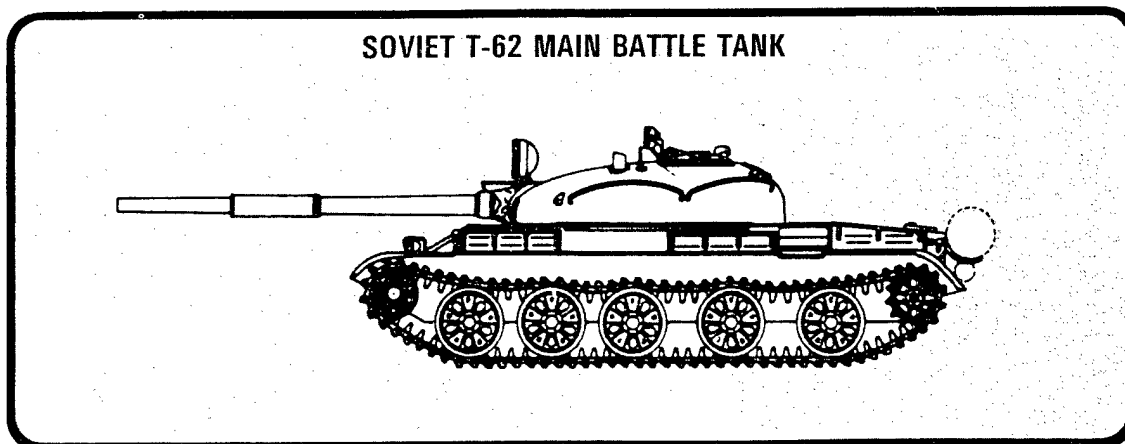
I INTRODUCTION

The Soviet Union and its Warsaw Pact allies have built their armies around mechanized combined arms teams. The tanks in these forces consist of T-54, T-55, T-62, T-64, and T-72 models. A new tank, called the T-80, is reportedly under development, however, little is known about its characteristics.

The T-62 is the principal battle tank found in Soviet tank and motorized rifle divisions. It is an accurate, highly-lethal, weapon system generally comparable to the US M60 series tank.

The purpose of this bulletin is to describe the Soviet main battle tank, and to explain:

- WHAT IT CAN DO
- WHAT IT CANNOT DO
- HOW IT IS USED
- HOW IT IS DEFEATED



The material in this bulletin is based primarily on the T-62 model since it is the current "workhorse" of Soviet tank units. Because other Soviet medium tanks (T-54, T-55) are similar to the T-62, they are not discussed in this bulletin. Some information on the T-64 and T-72 tanks can be found in appendix A.

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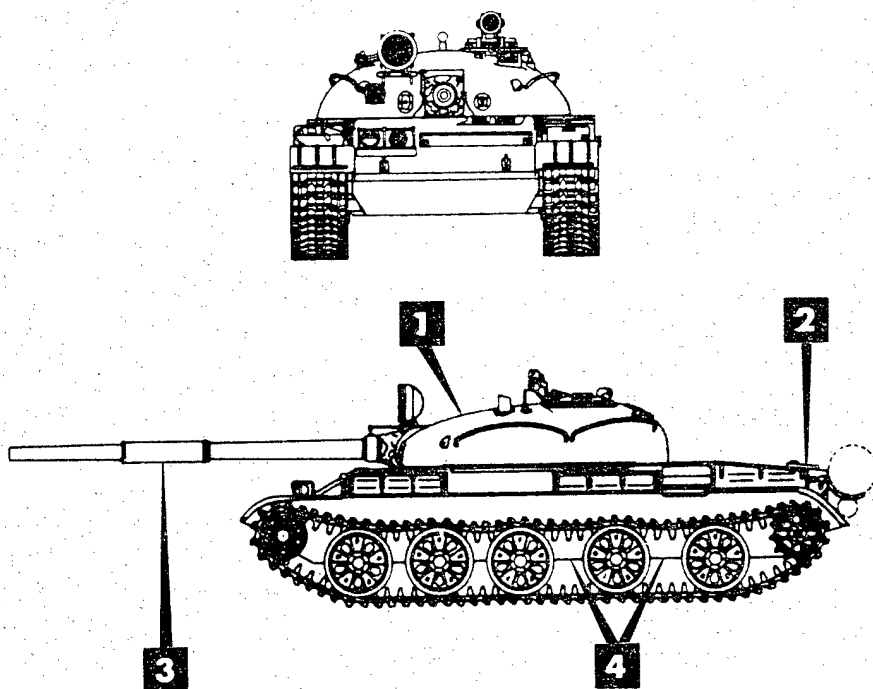
II WHAT IT IS

The T-62 series tank was first shown publicly in 1965 and has since then become the "firstline" battle tank of the Soviet Union. Its mounted weapons can deliver massed suppressive or accurate point fires. The vehicle can be made watertight for fording water obstacles. It has a filtering system which eliminates dust from the turret allowing the crew to operate in a nuclear environment for limited periods.

A T-62A version, manufactured after 1970, features a 12.7-mm antiaircraft machinegun, an improved transmission, an improved engine compartment, and a stabilized main gun. The stabilized main gun enables the gunner to track and fire on the move with significantly improved accuracy. The Soviet T-62 tank is easily recognized by the following features:

- 1** Rounded, sloping turret.
- 2** High dust "rooster tails" rising from the rear deck.
- 3** Bore evacuator located about one-third of the way back on the gun tube.
- 4** Large gaps separating the third, fourth, and fifth roadwheels.

RECOGNITION OF T-62 TANK

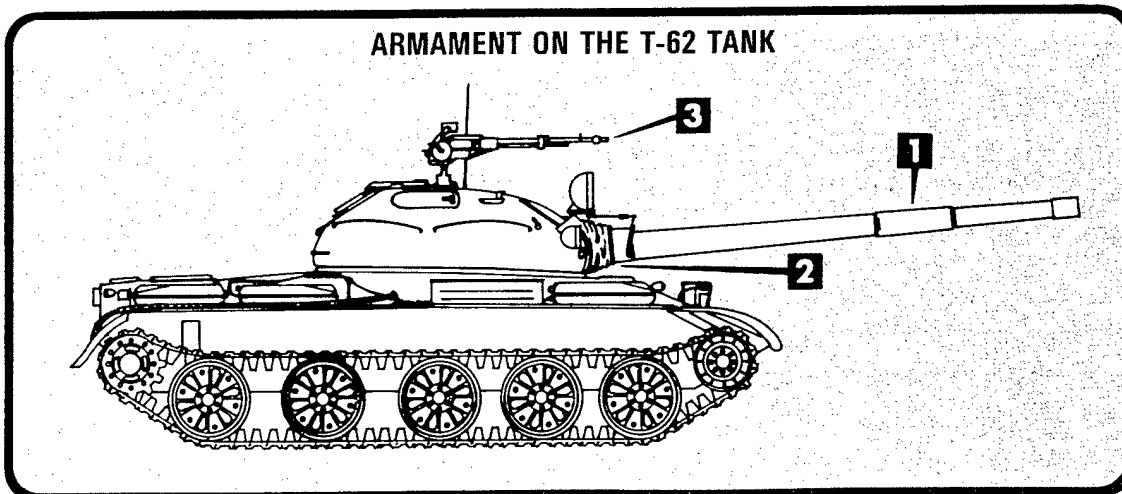


Characteristics of the T-62 Tank

Crew	4
Weight	37.1 metric tons
Height	2.4 m
Length (gun forward)	9.33 m
Width	3.29 m
Ground clearance	.43 m
Engine	580-hp Diesel V-12
Cruising range paved road	450 km
cross country	320 km
Cruising range with auxiliary fuel tanks paved road	650 km
cross country	450 km
Suspension system	Christie System, five road wheels
Maximum speed	50 kmph
Main armament	115-mm smoothbore gun
Main gun basic load	40 rounds
HVAPFSDS	12 rounds
HEAT	6 rounds
HE	22 rounds
Muzzle velocity	Greater than 1615 meters per second
Practical rate of fire	3 to 4 rounds per minute
Primary fire control sight	Articulated telescope
Secondary fire control sight	None
Range finding device	Stadiametric rangefinders in telescope and periscope
Effective range (50% P _H)	1500 m
Traverse	360° power and manual
Elevation main gun	-4° to +17°
Gun stabilization	Vertical and horizontal
Coaxial machinegun	7.62 mm
Antiaircraft machinegun	12.7 mm
Maximum gradient	30°
Ditch crossing width	2.85 m
Wall scaling height	0.8 m
Water fording depth	1.4 m
Water obstacle depth (using snorkel)	5.5 m
Water obstacle width (using snorkel)	1000 m

ARMAMENT

The firepower of the T-62 tank is designed around a turret that contains the equipment necessary to operate and fire the three organic weapons. These weapons are the 115-mm smoothbore cannon, PKT 7.62-mm coaxial machinegun, DShK 12.7-mm antiaircraft machinegun (only on T-62A models).



1 115-mm Smoothbore Cannon

The main gun of the T-62 is an extremely accurate weapon and fires projectiles with the highest muzzle velocity of any tank gun in the world. The gun is controlled and ranged by the tank commander, and aimed and fired by the gunner. It is capable of defeating any type of armor currently in the field. The gun fires three types of rounds as described on page 4.

2 PKT 7.62-mm Coaxial Machinegun

The 7.62-mm coaxial machinegun is mounted to the right of the main gun, and it is fired either electrically by the gunner or manually by the loader. The machinegun has an effective range of 1500 meters and is primarily used against area targets such as troops in the open. It has a basic load of 2500 to 3500 rounds. This weapon is extremely reliable and rarely jams or malfunctions.

3 DShK 12.7-mm Antiaircraft Machinegun

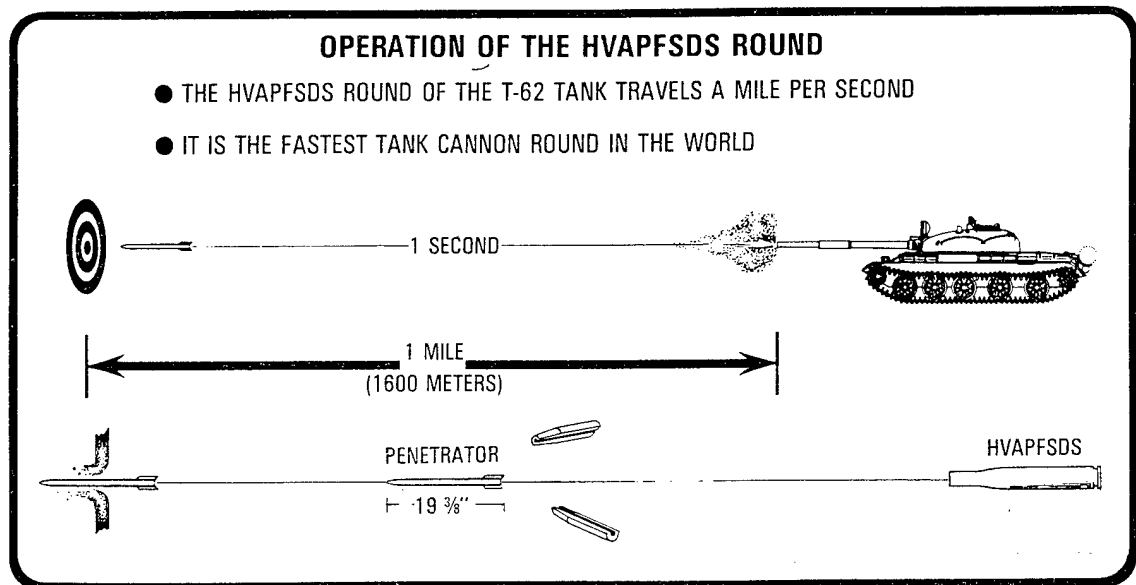
The 12.7-mm antiaircraft machinegun is mounted outside the tank above the loader's hatch. To fire the weapon, the loader must be partially exposed, making him vulnerable to suppressive fires. This also leaves the main gun loading duties unattended. The machinegun is used against area targets out to 2000 meters and against aircraft at a slant range of 1000 meters. It has a basic load of 200 to 600 rounds, fed from 50-round metallic, link belts.

MAIN GUN AMMUNITION

The T-62 carries a mix of 40 hypervelocity, armor-piercing, fin-stabilized, discarding sabot; high explosive antitank; and high explosive rounds. The specific number of each type round varies with the anticipated tactical situation.

Hypervelocity, Armor-Piercing, Fin-Stabilized, Discarding Sabot (HVAPFSDS)

This is a kinetic energy round that destroys tanks by penetrating their armor. When the round hits, shrapnel kills the crew and ignites fuel and ammunition. The round is fired at an extremely high muzzle velocity. The muzzle velocity is achieved by a collar (sabot) that breaks away from the penetrator after the round leaves the gun tube. The penetrator flies in a very flat trajectory and is, therefore, extremely accurate out to a range of 1500 meters. The HVAPFSDS is the T-62's principal armor defeating round.



High Explosive Antitank (HEAT)

This is a chemical energy round that kills armored vehicles by producing a high velocity jet of gas that penetrates the target's armor and directs the force of the explosion inside the vehicle. The penetration capability of the HEAT round is not affected by range.

High Explosive (HE)

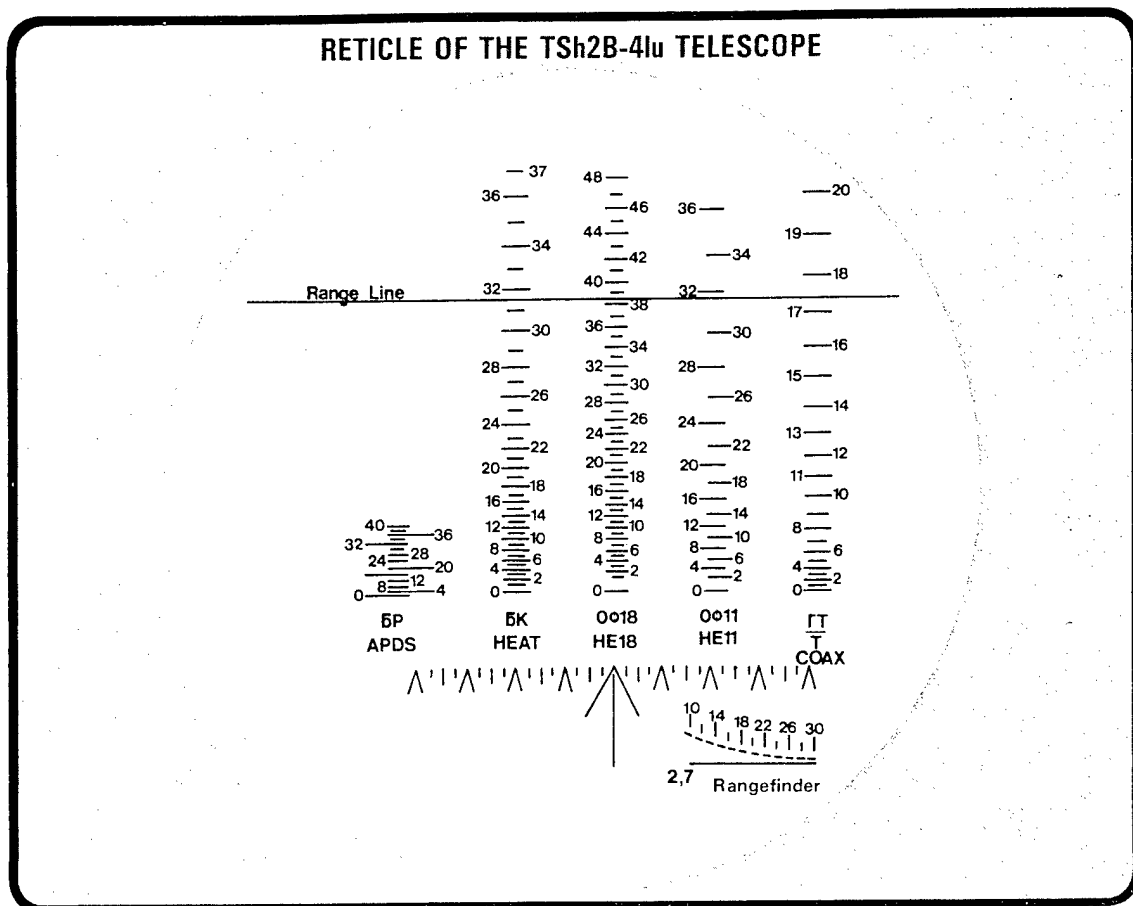
This is a conventional fragmentation round. It has an instantaneous, point-detonating fuze that cannot be adjusted. The round is used primarily against unarmored targets such as troops, light-skinned vehicles, and buildings.

FIRE CONTROL INSTRUMENTS

The T-62 has three fire control instruments which enable the crew to sight, range, and fire the 115-mm smoothbore cannon.

TSh2B-4lu Telescope

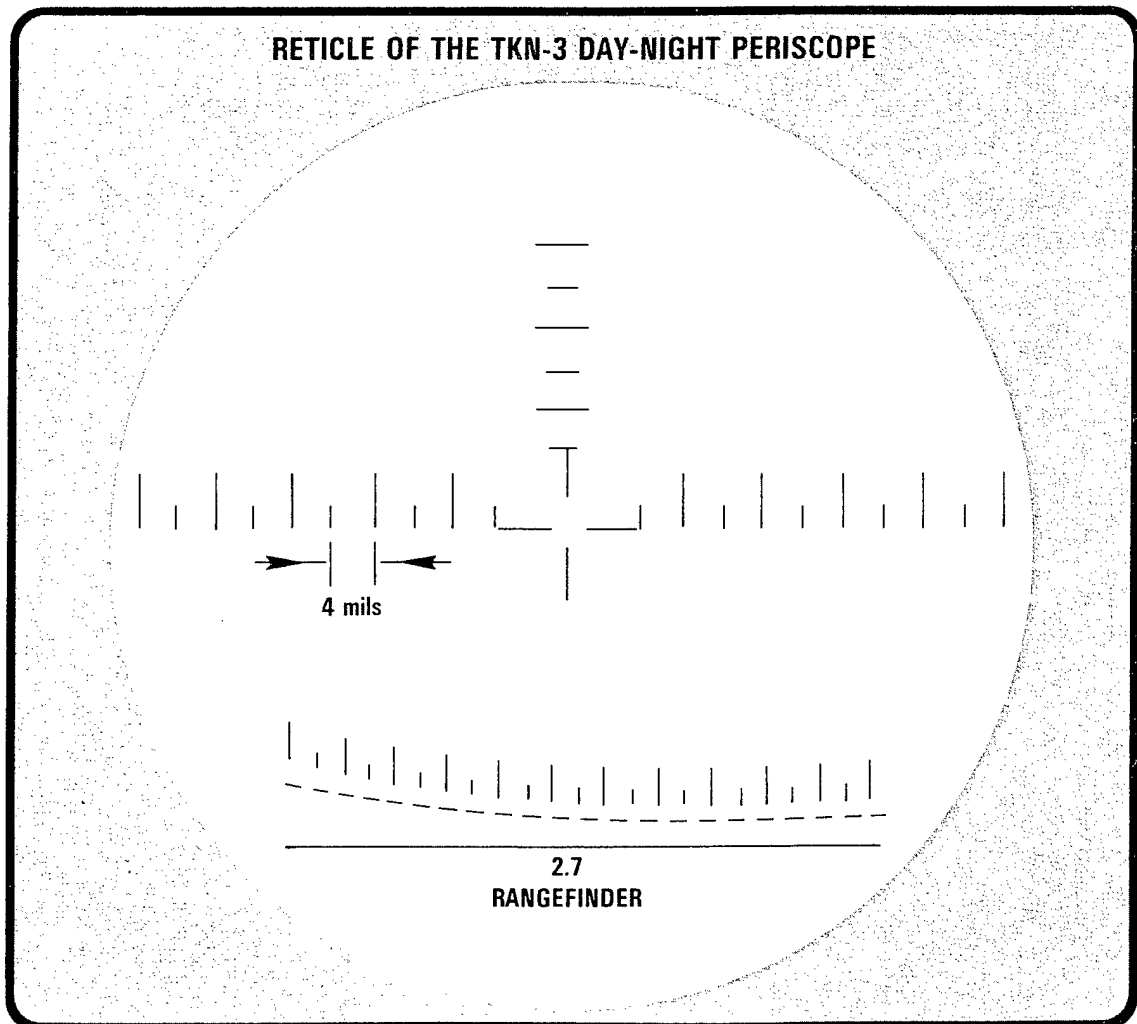
The TSh2B-4lu telescope is the gunner's primary means of target engagement and the only sight for daylight use. The gunner can select 3.5x- and 7x- power magnification. A range knob on the bottom of the sight introduces the superelevation required for the ammunition specified by the tank commander. The gunner's stadiametric rangefinder is at the bottom right of the reticle. Shown below is the reticle as it appears to the gunner through his telescope.



TKN-3 Day-Night Periscope

The TKN-3 day-night periscope, mounted at the tank commander's (TC) station, is the primary instrument for determining target range. When fixed on the axis of the main gun, it is used by the TC to lay the gun on target in an emergency.

The 5x-power day mode or the 4.2x-power, infrared (IR) mode can be selected with a switch on the sight. When used with the tank commander's searchlight, the periscope has a range of 400 meters. However, it has a range of 800 meters when used on the same axis as the main searchlight. Shown below is the reticle as it appears to the tank commander through his periscope.



TPN 1-41-11 Infrared Periscope

The TPN 1-41-11 infrared periscope is used for night target engagements. This 5.5x-power sight has a range of 800 meters when used with the main searchlight. It has an illuminated reticle to assist the gunner, but it does not have a stadia rangefinder.

VISION DEVICES

The T-62 is equipped with vision devices that enable it to fight effectively with all hatches closed and in conditions of reduced visibility.

Vision Blocks

There are seven vision blocks on the T-62 tank. The tank commander has four unmagnified vision blocks, mounted in the cupola and hatch. Depending on the position of the cupola, the blocks give the tank commander a 180° field of view at any given time. The gunner has an unmagnified vision block mounted in the turret ceiling that is used for general viewing and main gun orientation. The driver has two vision blocks which he uses for driving when the hatch is closed. For night driving, the left vision block is replaced with a TVN-2 infrared periscope. The periscope has a range of about 60 meters but its position creates a dead space 5 meters forward of the tank which makes turning and high speed driving difficult.

MK-4S Periscope

This device has a dual vision capability—front and rear. The sight is normally oriented to the front providing a 25° field of vision. By pulling the headset down, the loader can turn the periscope to the rear providing a 16° field of vision.

Searchlights

Searchlights on the T-62 are used exclusively for infrared illumination. While it is possible to use visible light, the infrared filters are hard to remove. Unless some other source of visible light is used, the T-62 cannot effectively engage targets at ranges greater than 800 meters during darkness. There are two searchlights on the T-62; the L-2G and the OU-3GK.

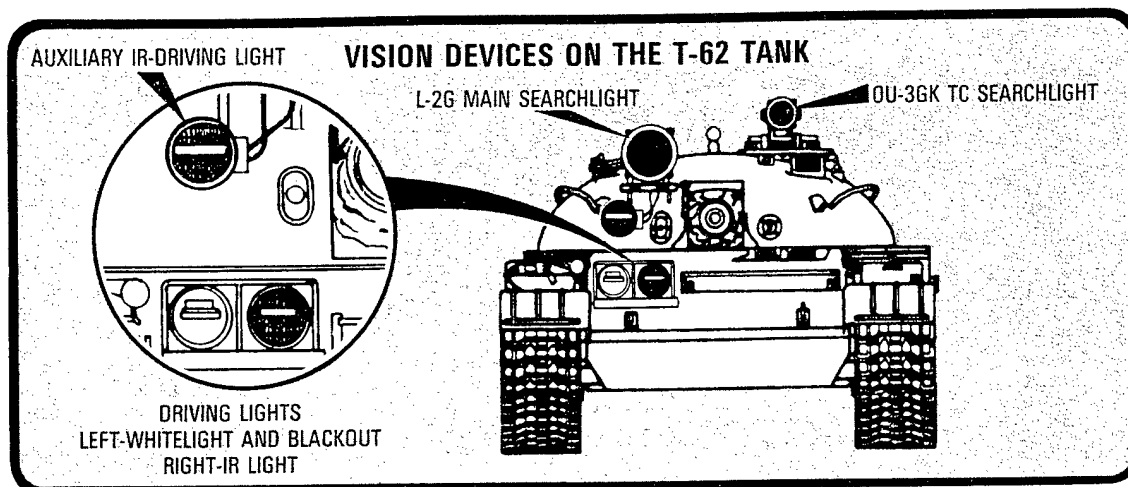
1 The *L-2G searchlight* is used primarily by the gunner in conjunction with the TPN 1-41-11 infrared periscope. In the infrared mode, the searchlight can illuminate a target at a range of 800 meters. It can also be used in the visible light mode by removing the infrared filter.

2 The *OU-3GK searchlight* is used by the tank commander in connection with the TKN-3 periscope. It can only illuminate a target at a range of 400 meters. But, like the L-2G, it can be operated in the visible light mode by removing the infrared filter.

Driving Lights

White driving lights and infrared driving lights are mounted on either side of the driver's hatch. The white driving lights can be switched to a high, low, or blackout beam. The infrared lights are used in conjunction with the

driver's infrared periscope. In addition, an auxiliary infrared light is located under the main searchlight to extend the driver's vision when the tactical situation permits.



ENGINE

The T-62 is powered by a 580-horsepower, water-cooled, diesel engine capable of speeds up to 50 kilometers per hour on paved surfaces. The tank has a cross-country cruising range of 650 kilometers when equipped with auxiliary fuel drums (450 kilometers without them). The auxiliary fuel drums are not connected to the main fuel system. The crew must manually pump the fuel out of the auxiliary drums and into the fuel cells.

NUCLEAR PROTECTION

The T-62 tank has an integral atomic defense system (PAZ) which includes a gamma ray sensor to detect nuclear radiation. When activated, the system automatically shuts off the engine and seals the combat and driver's compartments. The particulate filter and pump are activated creating a slight over pressure in the tank. The entire system can also be activated manually by the crew.

The particulate filtering system prevents contaminated dust particles from entering the turret. Crew members are thus protected from radioactive dust, but must wear individual protective masks and clothing to guard against chemical and biological agents. Because the T-62 is not airtight, the crew must pass through contaminated areas rapidly and then decontaminate the tank before it is fully operational.

III WHAT IT CAN DO

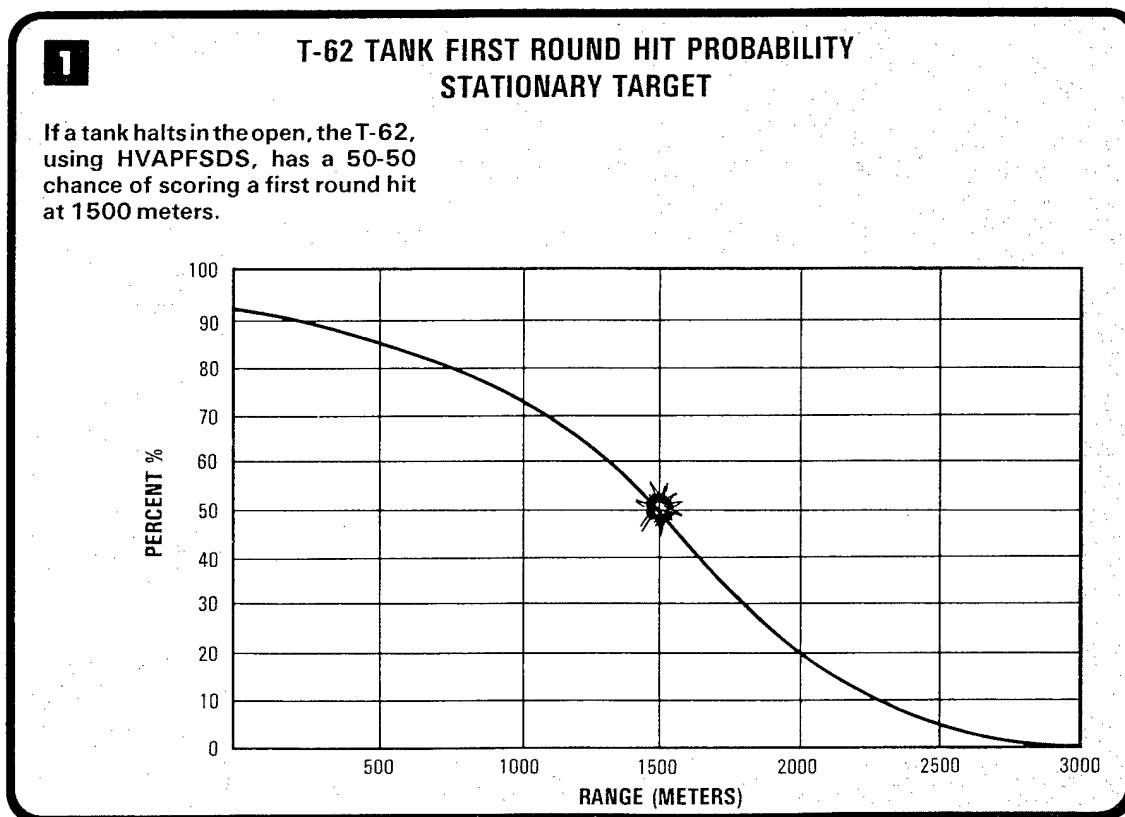
The T-62 medium tank is a mobile, effective, and dangerous weapon system. It will be present in large numbers in Soviet tank units for at least the next decade. It is a rugged but sophisticated system around which Soviet ground forces have built their tactical doctrine. In addition, the T-62 is comparable to the M60A1 in firepower, armor thickness, and mobility.

EFFECTIVENESS OF MAIN GUN AMMUNITION

The ammunition fired by the main gun of the T-62 is effective against a variety of targets to include armored vehicles, light-skinned vehicles, buildings, and personnel. The powder used to propel the round is technically excellent. Also, each type of round has its own powder mixture.

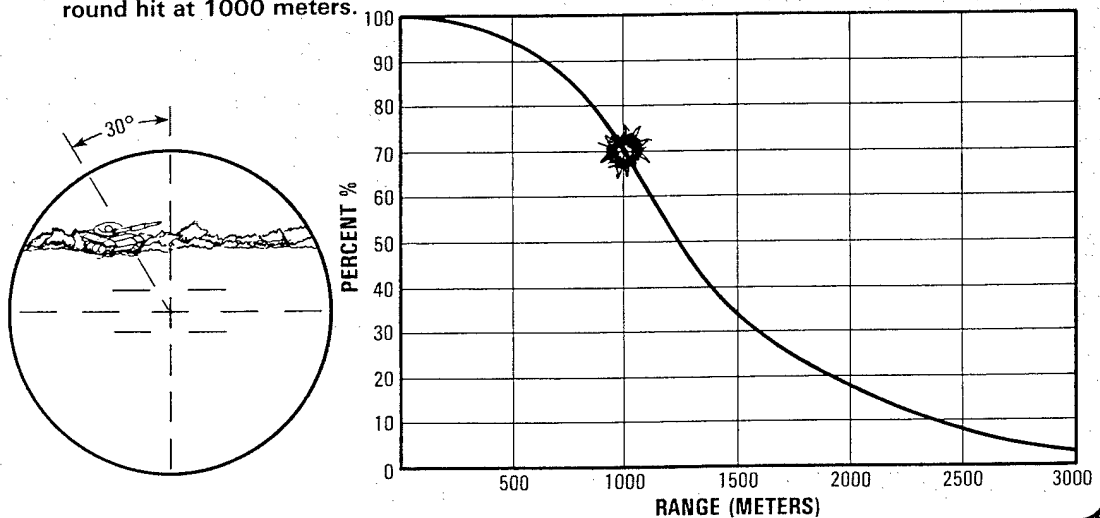
Hypervelocity, Armor-Piercing, Fin-Stabilized, Discarding Sabot

The probability of a first round hit for a tank is a function of projectile speed, target range, and fire control equipment. These factors combine to give the HVAPFSDS a lethal first round hit probability as shown in the following two tables.



- 2** If a tank is making a 30° approach at 12 mph, the T-62, using HVAPFSDS, has a better than 70 percent chance of scoring a first round hit at 1000 meters.

T-62 TANK FIRST ROUND HIT PROBABILITY-MOVING TARGET

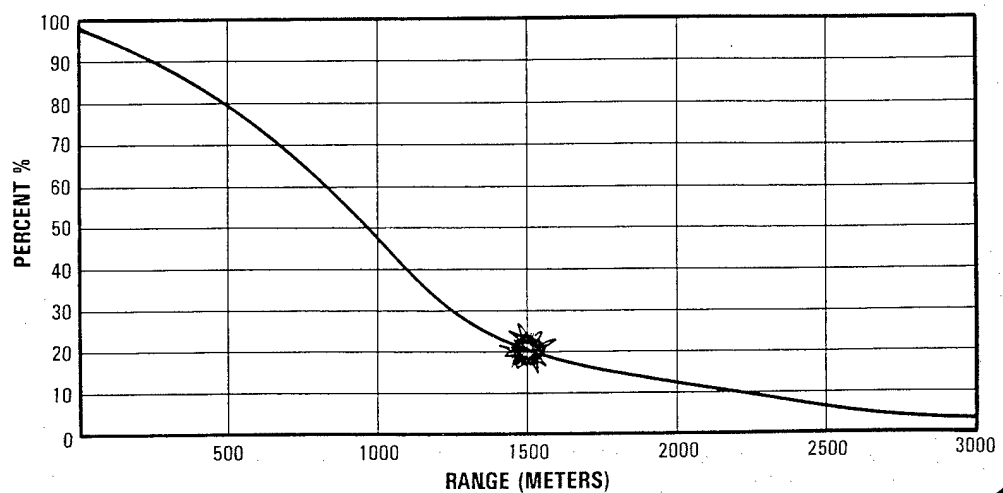


High Explosive Antitank

Because of a slower muzzle velocity, the T-62 HEAT round has a significantly lower hit probability than the HVAPFSDS as shown in the following two tables.

- 1** If a tank halts in the open, the T-62, using HEAT, has only a 20 percent chance of scoring a first round hit at 1500 meters.

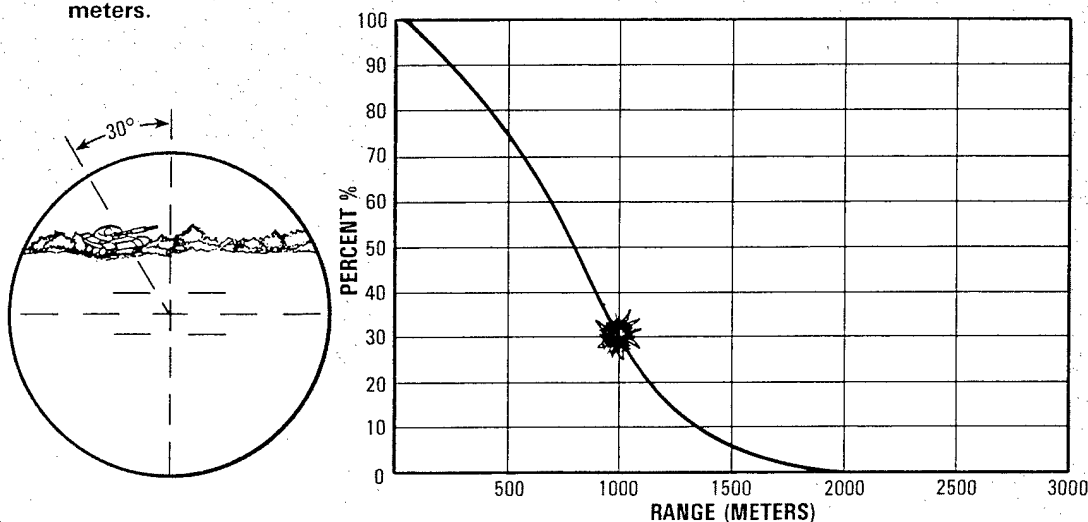
T-62 TANK FIRST ROUND HIT PROBABILITY-STATIONARY TARGET



2

If a tank is making a 30° approach at 12 mph, the T-62, using HEAT, has less than a 30 percent chance of scoring a first round hit at 1000 meters.

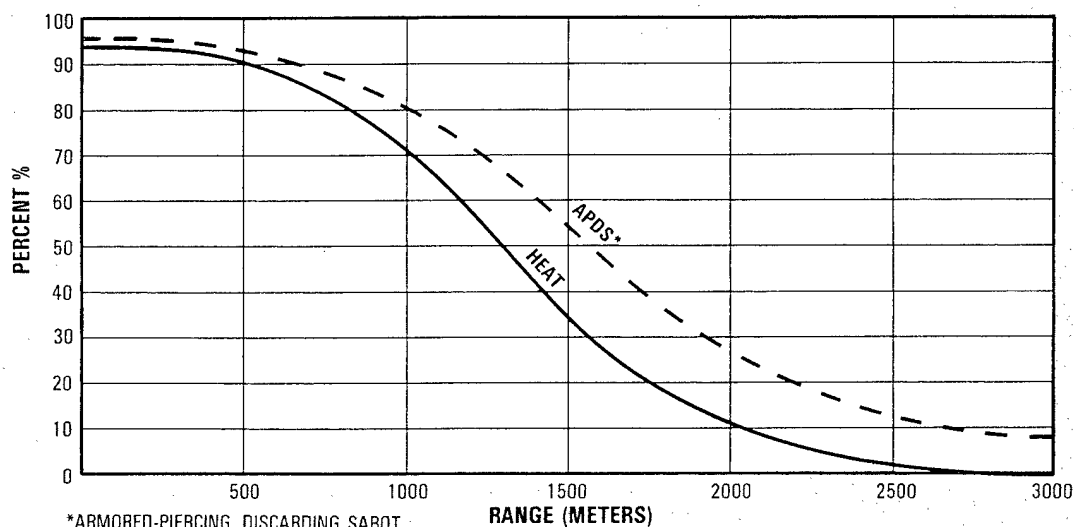
T-62 TANK FIRST ROUND HIT PROBABILITY-MOVING TARGET



US MAIN TANK GUNS VERSUS T-62 TANK GUN

The M60A1 main gun is slightly less accurate than that of the T-62 within 1500 meters, but is more accurate at greater ranges. The table below shows the first round hit probability of the M60A1.

FIRST ROUND HIT PROBABILITY-M60A1 TANK



*ARMORED-PIERCING, DISCARDING SABOT

For long range tank battles, the M60A2 provides a decided accuracy advantage. It can fire the Shillelagh missile, which can hit a tank 9 times out of 10 at 3000 meters.

Tank rounds are lethal, given a hit. To appreciate this, it is necessary to examine the armor protection of both the T-62 and M60A1 tanks.

ARMOR THICKNESS (EQUIVALENT TO CENTIMETERS OF ROLLED HOMOGENEOUS ARMOR AT 0° OBLIQUITY)							
T-62	HULL			TURRET			
		FRONT	SIDE	FRONT	SIDE	TOP	REAR
	MAXIMUM	20.3	8.1	20.3	11.9	3.0	6.1
	MINIMUM	20.3	2.0	—	—	—	—

M60A1	HULL			TURRET			
		FRONT	SIDE	FRONT	SIDE	TOP	REAR
	MAXIMUM	22.9	5.3	25.4	14.0	2.3	5.8
	MINIMUM	22.9	4.8	—	—	—	—

It is then necessary to examine main gun ammunition penetration capabilities. The chart below shows the comparative penetrating power and the lethality of the T-62 and M60A1 tanks at the expected engagement range in Europe.

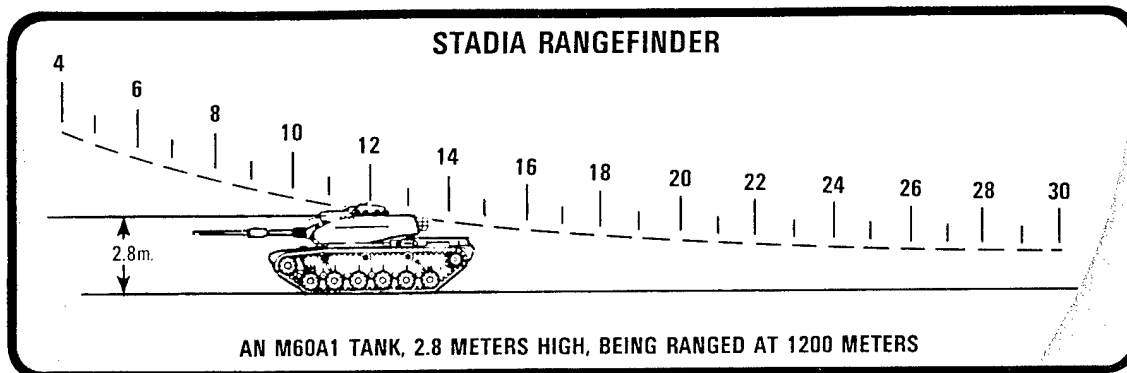
COMPARATIVE KILL PROBABILITY—T-62 VERSUS M60A1			
TANK	ROUND	ARMOR PENETRATION (CM)	PROBABILITY OF KILL IF HIT
T-62	HVAPFSDS	33cm	71%
	HEAT	43.2cm	75%
M60A1	APDS	25.4cm	54%
	HEAT	43.2cm	75%

From this comparison, it is evident that both tank guns are extremely lethal and essentially equal in effectiveness.

Therefore, if a US tank is hit, there is a good chance it will be destroyed.

RANGE ESTIMATION

Ranging is the tank commander's responsibility on the T-62. If the target is about 2.7 meters high, the tank commander uses the stadia rangefinder in his periscope as shown below.



The Soviet commander can use the stadia rangefinder to kill an M60A1, since it is 2.8 meters high from the ground to the top of the turret. To do this, however, the M60A1 must be completely exposed. This is an important reason for US tank commanders to use defilade positions.

The gunner can also determine ranges if the tank commander is unable to do so. He has a stadia rangefinder in the lower right corner of his telescope. By employing the mil relation (WORM) formula, the gunner can also use the lateral lead lines in the telescope to determine range. However, the mil relation formula is difficult to use under combat conditions.

ADDITIONAL CAPABILITIES

Aside from the capabilities discussed above which are similar to those of the M60A1 tank, the T-62 has the following three advantages:

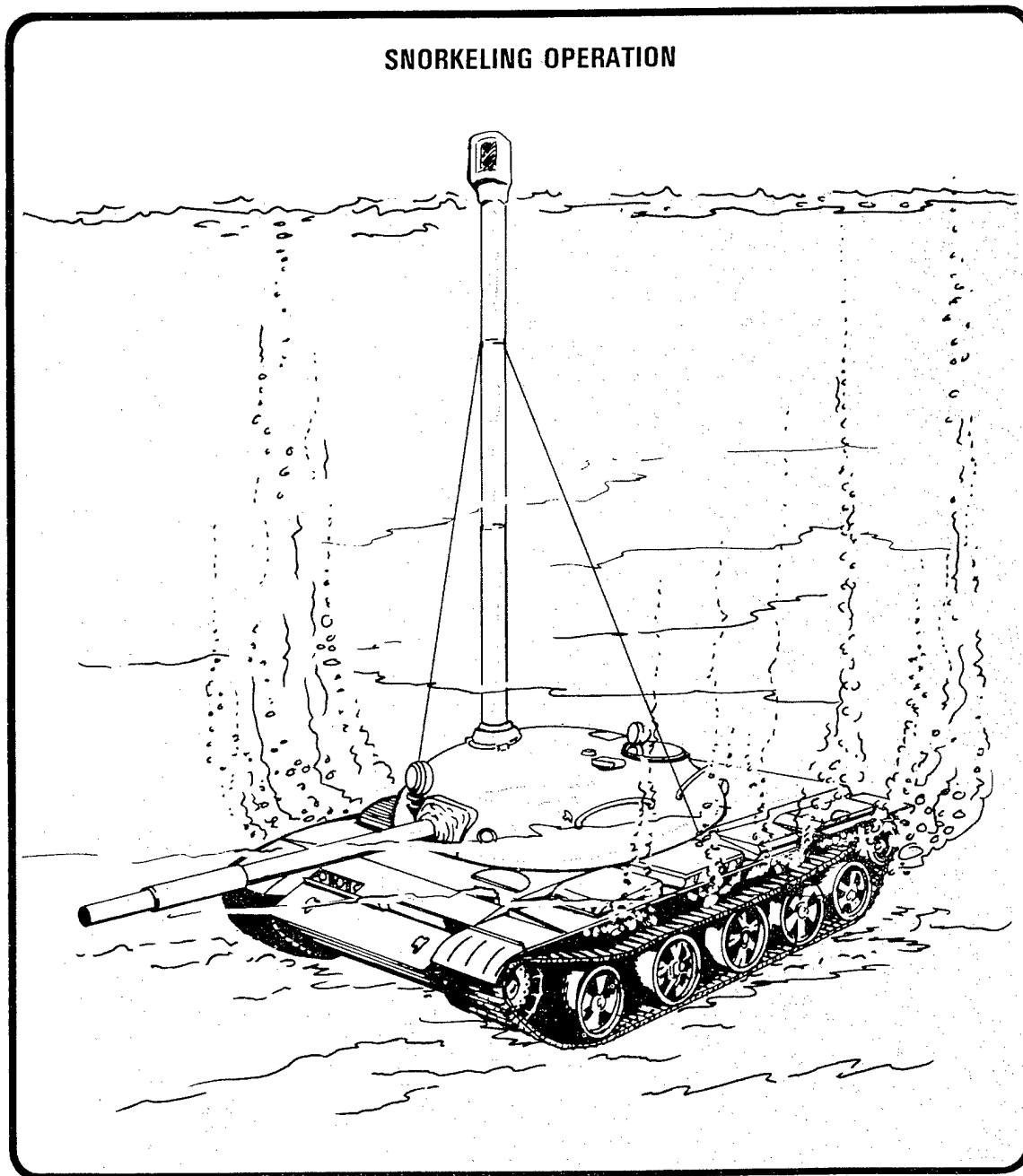
- 1** fording with snorkel
- 2** smoke generating
- 3** mine clearing

1 Fording With Snorkel

Soviet tanks, equipped with snorkels, can cross water obstacles up to 5.5 meters in depth. However, entrance and exit points may require preparation. The time needed to prepare a medium tank unit for a snorkeling operation varies greatly with the tank model and the amount of preinstalled

equipment on the vehicle. Normally, a unit selected for this mission can prepare within 1½ hours. Tanks are steered into the water on a prearranged azimuth using a gyroscope compass. Necessary corrections are then given by radio from the shore. But due to the hazards of snorkeling operations and the time required for preparation, Soviet tank units prefer to ferry or bridge water obstacles.

SNORKELING OPERATION

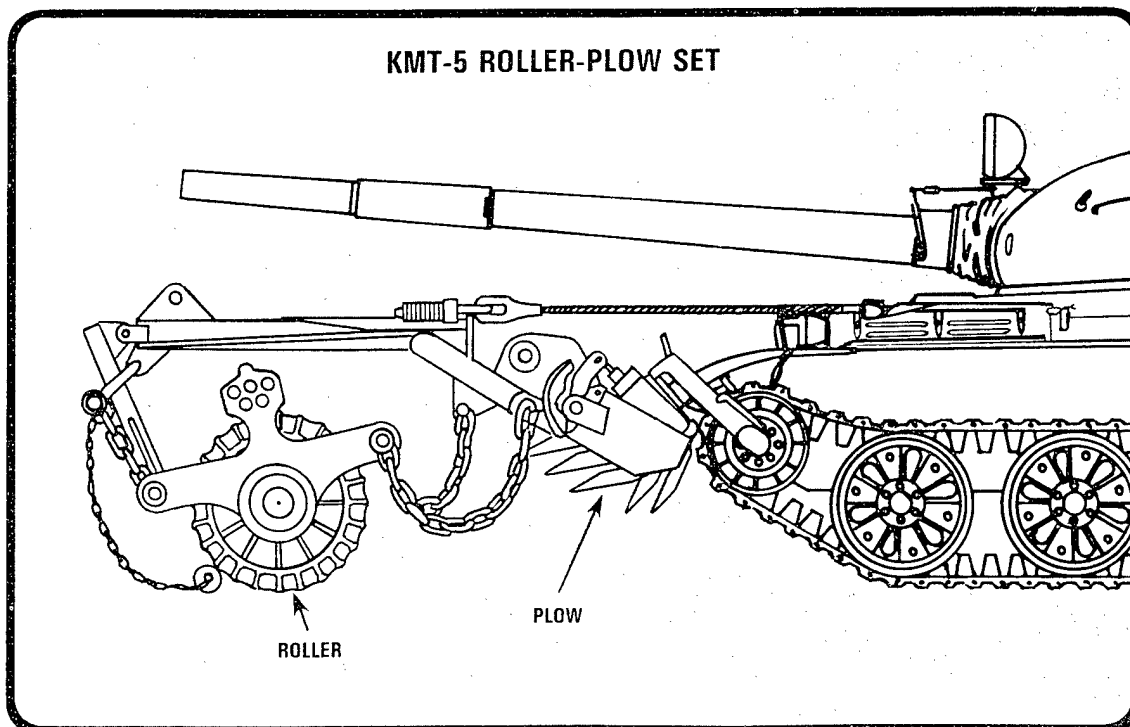


2 Smoke Generating

The Soviet medium tank can create its own smoke screen by injecting raw diesel fuel into the exhaust manifold of the engine. The heat of the manifold vaporizes the fuel, producing thick, white smoke. Thirty-five gallons of fuel will generate a smoke screen for 10 minutes.

3 Mine Clearing

Three tanks, equipped with mine clearing attachments (either rollers or plows), are found in each Soviet tank company. They clear a path just wide enough for each track. When rollers or plows are not available, engineers are used to support minefield breaching operations.



The KMT-5, a roller-pLOW set, has been recently placed in service. The set provides the Soviet commander with a choice of roller or plow. This choice depends upon the type of terrain, soil, or minefield encountered at the site of the breaching operation. The roller and plow cannot be used simultaneously. Quick disconnects allow the driver to drop both rapidly.

IV WHAT IT CANNOT DO

Although the T-62 main battle tank is an excellent tactical vehicle, it does have weaknesses and vulnerabilities. The T-62's most significant weakness is its slow rate of fire. This, coupled with a number of other limitations, gives US tanks the advantage on the modern battlefield. But to exploit this advantage, US tank crews must be thoroughly trained in the T-62's vulnerabilities. Only in this way can they gain the knowledge and confidence needed to defeat such a sophisticated and lethal weapon system.

RATE OF FIRE

While the T-62 has the fastest tank round in the world, it has a relatively slow rate of fire. Compared to the M60A1, which fires 6 to 8 rounds per minute, the T-62 fires only 3 to 4 rounds per minute. In other words, the M60A1 is twice as fast. This is due to the following factors on the T-62.

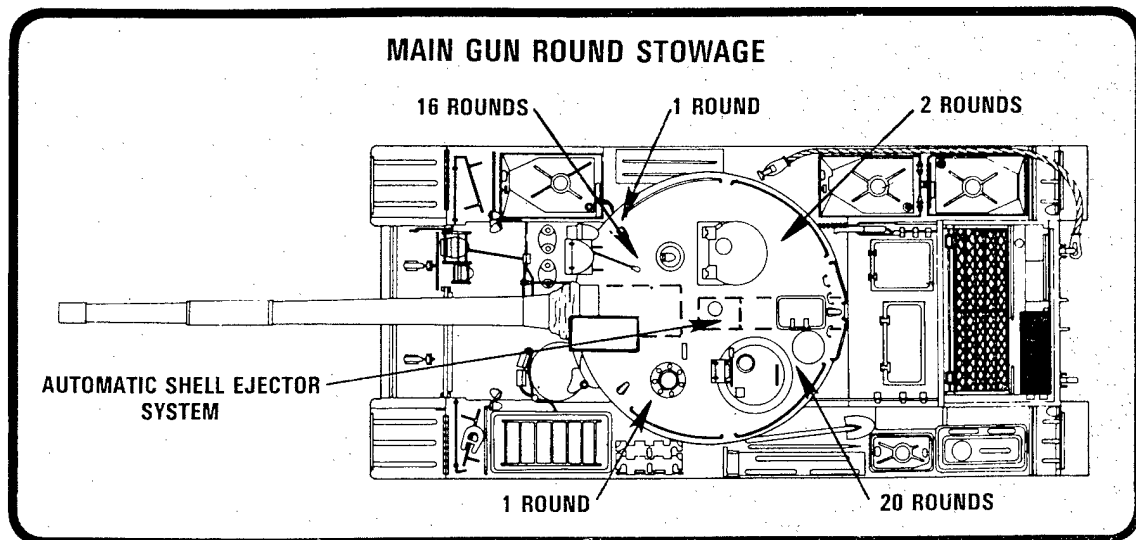
The ammunition is inconveniently stored for rapid loading.

Under certain conditions, the gun must be elevated before the loader can place a new round in the breech.

The automatic ejection system requires six seconds to complete a cycle.

MAIN GUN ROUND STOWAGE

Except for two rounds in the turret ready rack, main gun ammunition on the T-62 is not easily accessible as indicated in the diagram below.



Moreover, the T-62 carries only 40 rounds on board while the M60A1 carries 63 rounds.

GUN STABILIZATION SYSTEM

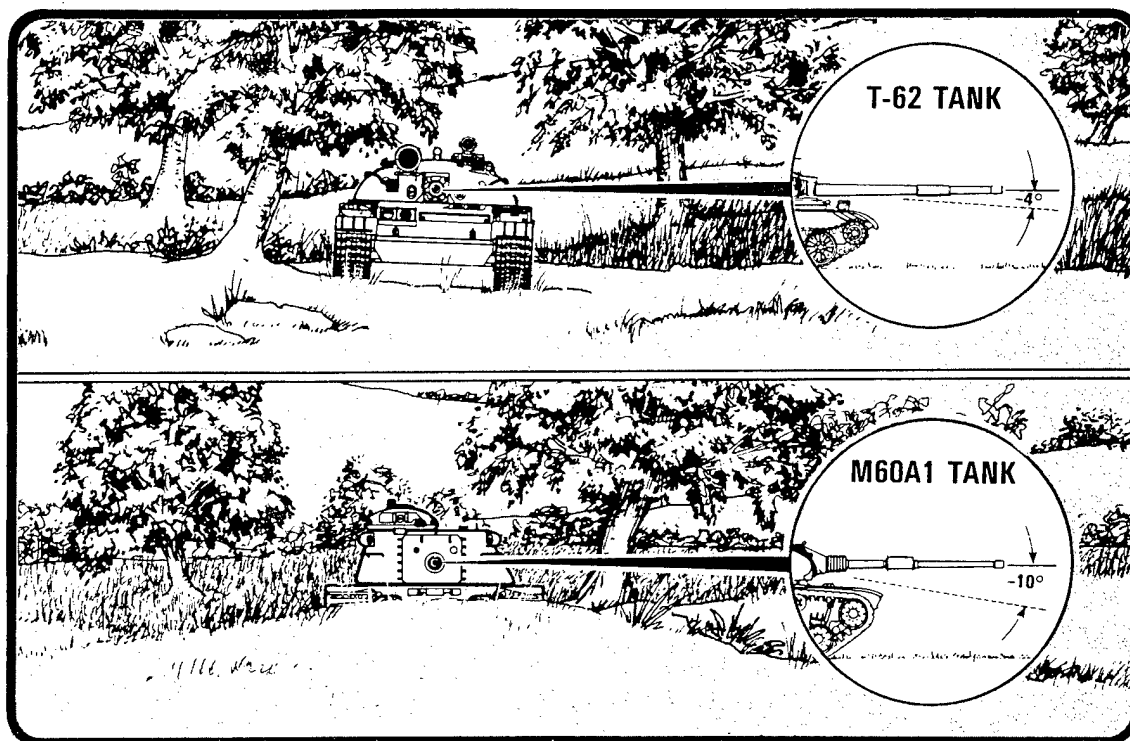
When the main gun is fired in the stabilized mode, the tube automatically elevates after ejection to permit reloading. This action moves the gunner's sight off target and prevents him from applying the burst-on-target (BOT) gunnery technique. More importantly, it consumes time while he resights on the target.

AUTOMATIC SHELL EJECTOR SYSTEM

The T-62 has an integral spent shell ejector mechanism which is activated by the recoil of the main gun. This mechanism ejects the spent casing through a port in the rear of the turret. Although the ejector system keeps the small turret free of spent casings, it has a number of limitations. After a round is fired, all turret power is automatically shut off until the loader turns his safety switch on. This prevents the gunner from tracking targets in power during the reloading cycle. In addition to taking six seconds to complete a cycle, the ejector mechanism opens the tank to nuclear, chemical, or biological contamination.

FIRING FROM COVERED POSITIONS

The T-62 tank cannot depress its main gun as far as the M60A1. This means that the Soviet tank cannot use terrain as effectively. Thus, the T-62 must expose itself more than the M60A1 when firing from covered positions.



This is another important reason for US tankers to use defilade positions.

ADDITIONAL LIMITATIONS

The T-62 has the following additional limitations.

- It takes 20 seconds to traverse the T-62 tank turret 360°. It takes only 15 seconds for the M60A1.
- The stadia reticle on the T-62 is the only optical aid used for determining target range. The M60A1 has a coincidence rangefinder which is more accurate.
- The T-62 gunner is the only crew member who can accurately fire the main gun and coaxial machinegun. On the M60A1, the gunner and tank commander can aim and fire the main gun and the coaxial machinegun electrically from their positions.
- Due to the small size of the turret, crew members are very cramped, and their movement is severely restricted.

V HOW IT IS USED

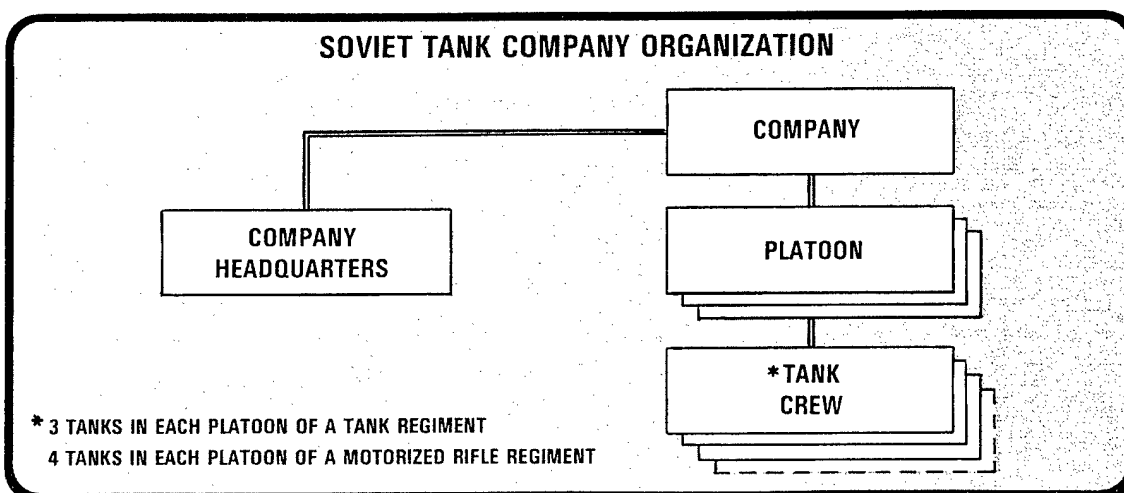
The T-62 main battle tank is an offensive weapon used as the nucleus of the Soviet combined arms team. It provides speed, mobility, momentum, and firepower in offensive operations.

UNIT ORGANIZATION AND TANK CREW

The medium tank company is the basic building block in Soviet tank organization. Usually, a tank company operates as part of a battalion. Tank formations are supported by and in turn support other arms such as infantry and field artillery.

Unit Organization

The tank company consists of three tank platoons and a company headquarters. In a tank battalion of a tank regiment, each platoon consists of three tanks. In a tank battalion of a motorized rifle regiment, each platoon consists of four tanks.

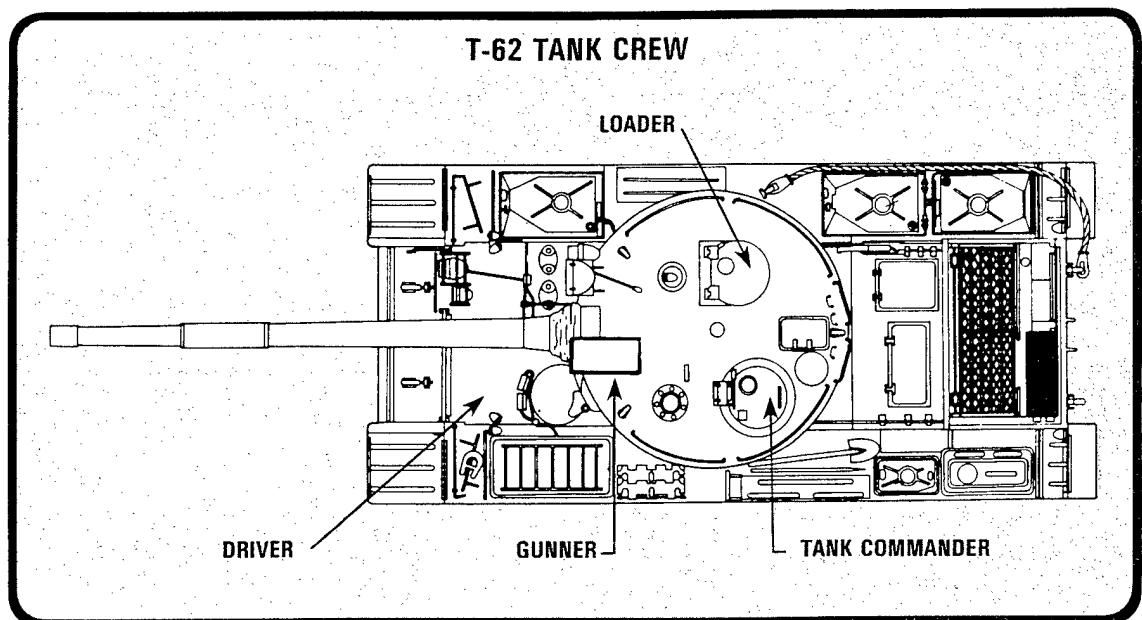


Tank Crew

The crew of a Soviet medium tank usually consists of four soldiers: a tank commander, gunner, driver-mechanic, and loader. There is little evidence of formal cross training within the crew. However, Soviet tank crewmen are likely to be familiar with some of the operating procedures of fellow crewmen and could probably perform some different tasks in an emergency. The four crew members are described below.

- 1 The **tank commander** is in immediate command of the tank. His responsibilities include vehicle maintenance, target acquisition, ranging, fire control, fire selection, and resupply. The commander is the only crew member trained and authorized to use the tank radio. Platoon leaders and company commanders control their own tanks.

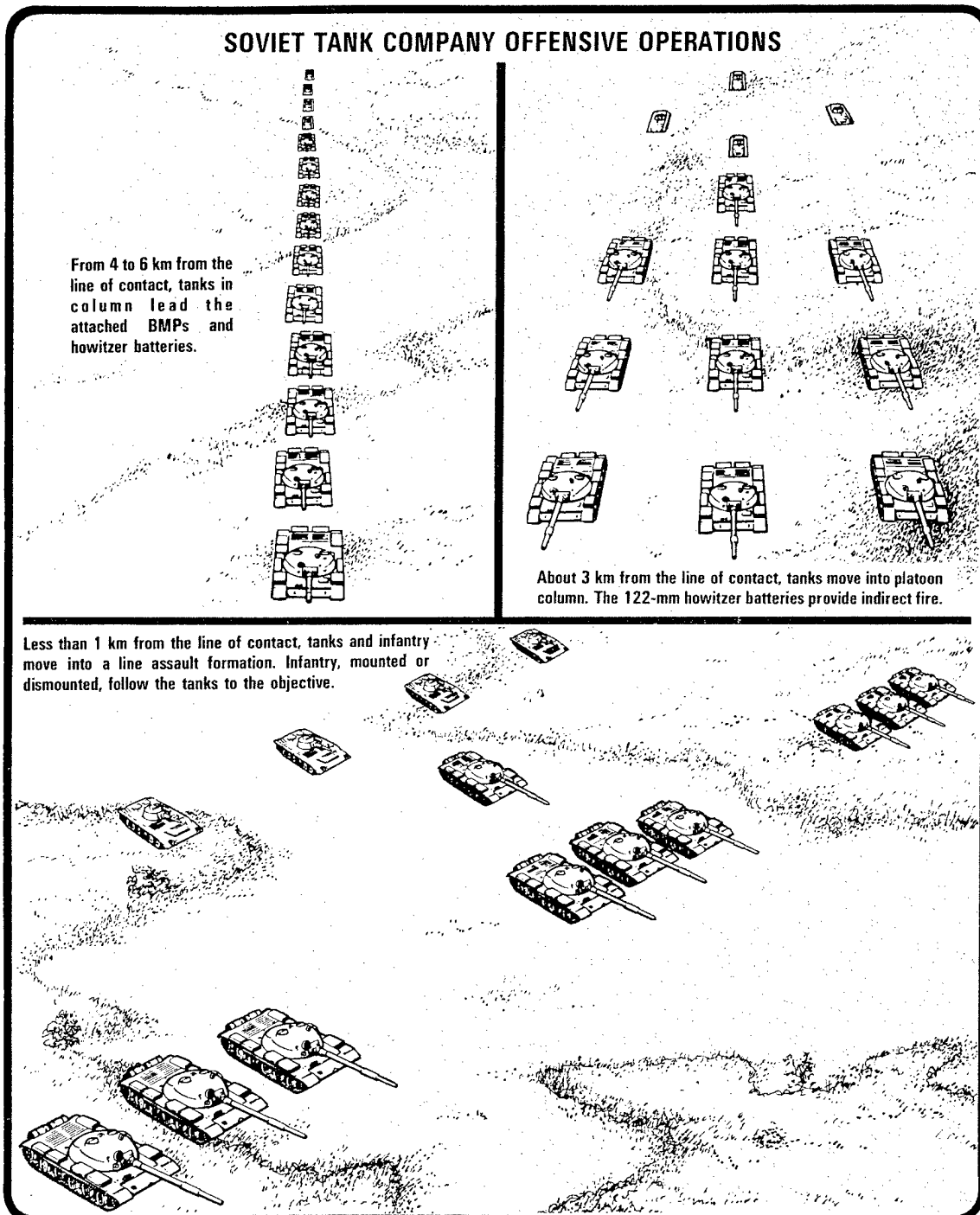
- 2** The *gunner* is second in command of the tank. He is responsible for firing, servicing, and repairing the tank's main gun and for maintaining the tank's optical and gunnery instruments. He assists the driver-mechanic in the technical inspection of the vehicle. In combat, the gunner assists in target acquisition, selects the ammunition for each target, and sets the superelevation for each round based upon range. He fires the main gun and coaxial machinegun.
- 3** The *driver-mechanic* maintains and repairs the tank, obtains spare parts, and inspects the vehicle. In combat, the driver-mechanic selects a route that provides the gunner with good firing positions.
- 4** The *loader* maintains ammunition for the main gun and the machineguns. He assists the gunner in preparing the main gun for combat, aids the driver-mechanic in routine maintenance, and assumes the duties of the gunner if necessary. He also operates the 12.7-mm anti-aircraft machinegun.



OFFENSIVE OPERATIONS

Soviet offensive operations use *large* numbers of mobile, armored vehicles to first rupture the enemy's defenses and then to exploit, pursue, and completely defeat the enemy. Soviet commanders employ their forces in rigid geometrical formations. Simple, well-rehearsed formations facilitate command, control, and training for combat. But these large, armored formations have difficulty using natural protection afforded by terrain. So, during the attack, most Soviet vehicles may be exposed, perhaps easily acquired, and therefore vulnerable to antitank guided missile (ATGM) and tank fires.

This illustration shows offensive operations employing a Soviet tank company reinforced with a mechanized infantry platoon and a 122-mm howitzer battery.



DEFENSIVE OPERATIONS

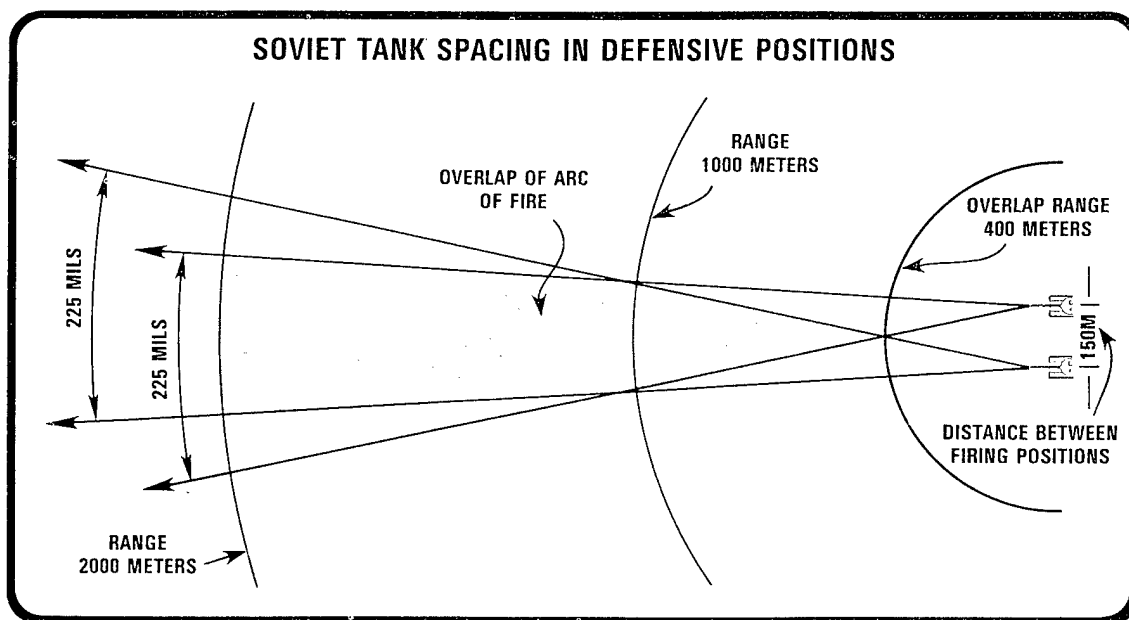
Soviet units conduct defensive operations only as a temporary measure and seek every opportunity to resume the offensive. Tank units defend only until they are relieved by motorized rifle units. Characteristics of a Soviet defense are:

- Depth
- Mutual support between positions
- Antitank orientation
- Counterattacks by tank-heavy forces

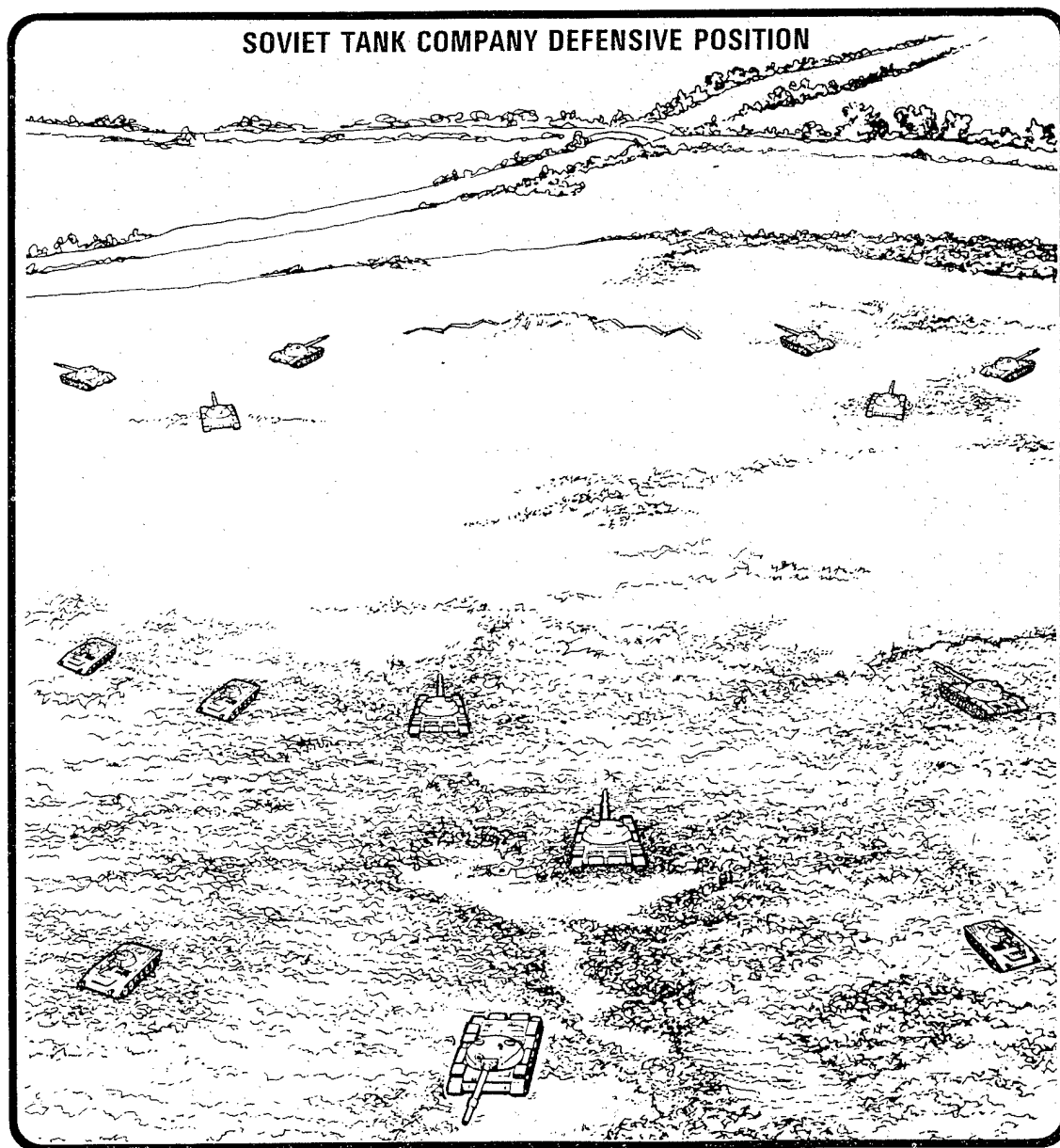
The medium tank company normally defends as part of a battalion, performing one or more of the following roles:

- Holding an area
- Counterattacking an advancing enemy
- Reinforcing a motorized rifle battalion
- Covering a sector between nuclear, biological, and chemical (NBC) contaminated areas
- Conducting a tank ambush

As part of a battalion defense, the tank company usually secures a strongpoint approximately 1000 meters wide and 500 meters deep. Normally, there are 300 meters between platoons. Individual tanks are spaced about 150 meters apart with overlapping fields of fire, as shown below.



If the enemy launches an attack, the Soviet tank company commander concentrates his fire on the most threatened position. The order to fire is given when the enemy is about 1500 meters from the company. Attached infantry and supporting artillery engage the enemy with the aim of separating infantry from tanks. When a reserve tank company is positioned in depth within a battalion area, it is not only prepared to hold terrain but also to counterattack on order. The following illustration shows a typical defensive position employing a tank company reinforced with a motorized rifle platoon.

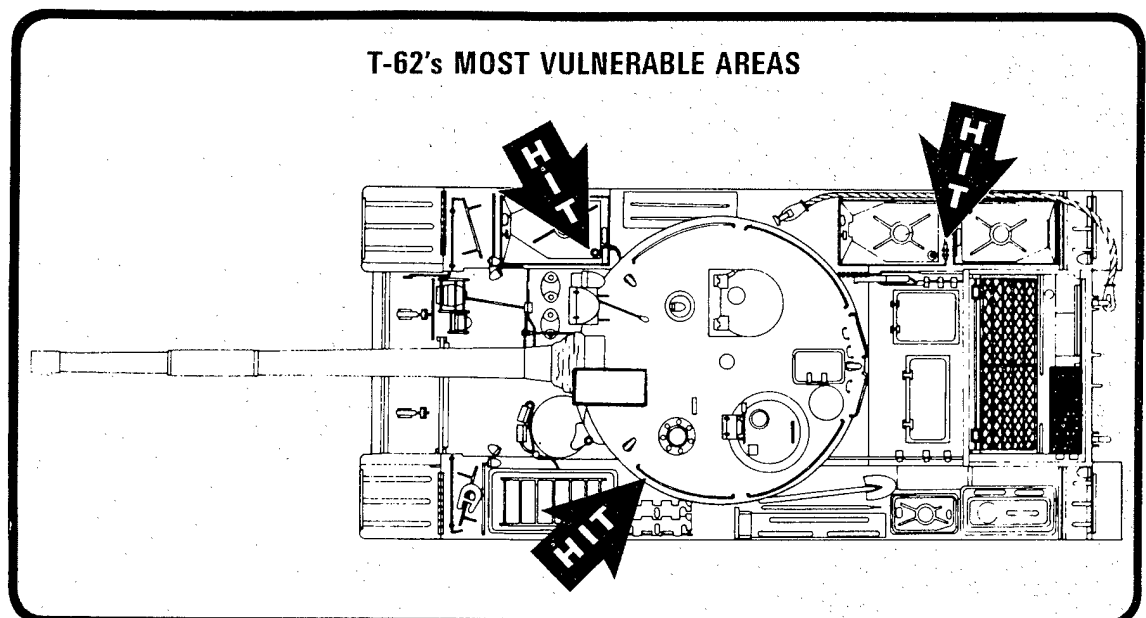


VI HOW TO DEFEAT IT

The T-62 medium tank is vulnerable to a number of antitank weapons and defensive techniques. These include the following:

- Tanks
- TOW and Dragon antitank guided missiles
- Light antitank weapons
- Close air support
- Field artillery weapons
- Mines and obstacles
- Smoke
- Field expedient techniques
- Terrain

The best way to completely destroy the T-62 is to hit the fuel cells or the main gun ammunition. Internal fuel cells are located along the right side of the tank with the majority around the driver's compartment. External fuel cells are located along the right fenders. Auxiliary fuel drums are usually jettisoned prior to combat. The main gun ammunition is stowed throughout the turret, both in the floor and on the bulkheads. A flank shot, which hits the fuel cells and ignites both fuel and ammunition, is the most effective method of attack.



TANKS

To defeat Soviet armored formations, US tankers must follow four rules of tank gunnery. That is, they must engage at long ranges, fire first, fire fast and accurately, and fire flanking shots.

Engage at long ranges.

US tank crews must engage T-62s at maximum range with Shillelagh missiles and APDS rounds.

Fire first.

The tank crew, which is well trained and can fire first in a tank duel, normally has a substantial edge in winning.

Fire fast and accurately.

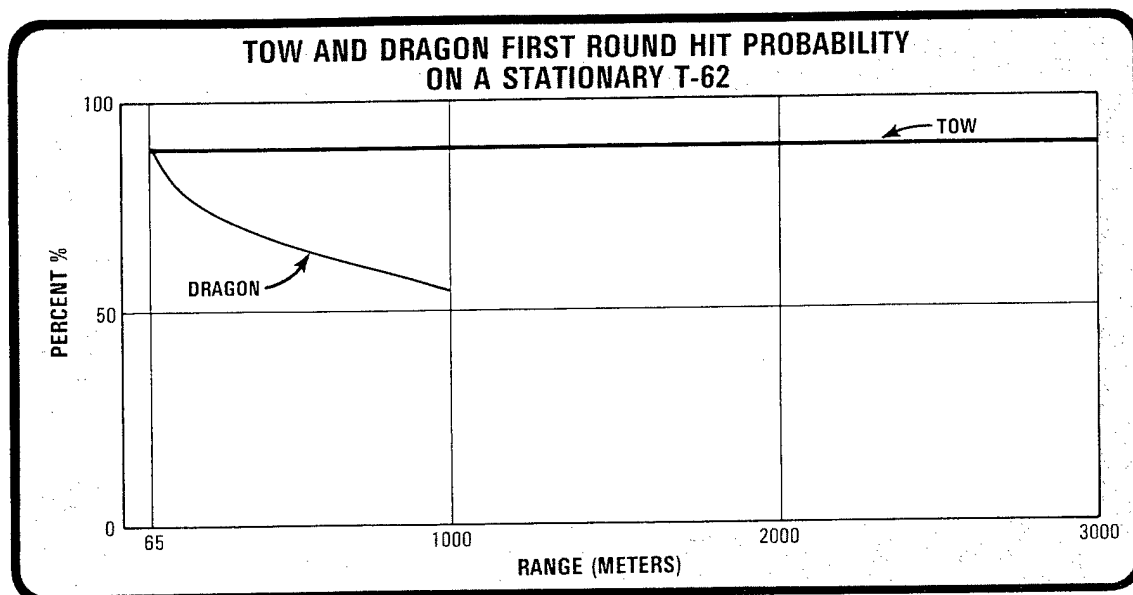
The crew that fires fast increases its hit probability. Battlefield gunnery techniques give US crews a high probability of first round hits at 1500 meters, firing 5 to 8 seconds after target identification.

Fire flanking shots.

US tank crews that fire at the left flank have a good chance of hitting the external fuel cells and the stowed ammunition. This is the T-62's most vulnerable point. Based upon normal T-62 tactics, the top and rear of the tank are rarely open to attack.

TOW AND DRAGON ANTITANK GUIDED MISSILES

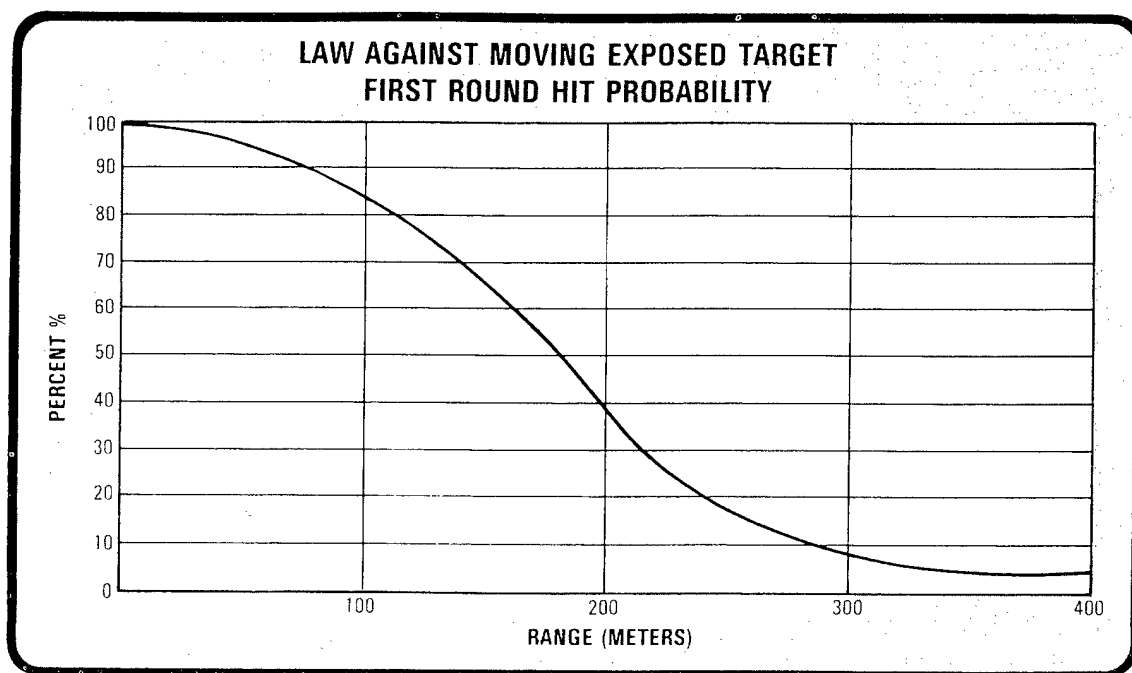
Given a hit, the TOW and Dragon ATGMs can penetrate and kill a T-62 tank. The chart below shows the probability of a first round hit on a T-62 by both weapons.



ATGM accuracy is relatively unaffected by target speeds up to 32 kmph. TOW gunners usually engage T-62 tanks at maximum ranges (3000 meters). When the enemy formation moves to within 1000 meters, Dragon gunners are also committed. Flanking shots are preferred from well-covered and concealed positions.

LIGHT ANTITANK WEAPONS (LAW)*

The M72A2 LAW is a round of ammunition with a shaped charge, contained in a throwaway launcher. It's designed for close protection against armor. The chart shows the effectiveness of the LAW against a moving target.



The LAW has a maximum range of 200 meters for moving targets and 250 meters for stationary ones. It is best to fire at the most vulnerable points on the T-62 such as the turret, engine, fuel cells, tracks, and turret rings.

To maximize hit and kill probabilities with the LAW, the following factors are essential:

- Thorough training.
- Volley, pair, and sequence firing to reduce ranging errors.
- Sufficient LAWs to saturate target density.
- Obstacles to slow and confine enemy tanks.

**Detailed discussion of the LAW may be found in TRADOC Bulletin No 5, Training With LAW.*

CLOSE AIR SUPPORT

US Air Force close air support aircraft and US Army attack helicopters can engage and destroy T-62 tanks. Recent field tests indicate that the best results are achieved when they operate together as a joint air attack team.

The A10 close air support aircraft has—

- A GAU-8, 30-mm Gatling gun which can penetrate and destroy a T-62.
- Precision guided bombs, such as the Maverick, which can destroy T-62 tanks with a high first round hit probability.
- Conventional munitions, such as machineguns or bombs, which can disrupt enemy formations and cause extensive mobility kills to both T-62 tanks and infantry carriers.

The AH-1S attack helicopter carries—

- TOW missiles which can destroy enemy tanks at long ranges.
- 2.75-inch rockets which can cause mobility kills and cause enemy crews to button up.
- 7.62-mm guns and 40-mm grenade launchers which can degrade infantry formations.

FIELD ARTILLERY WEAPONS

Field artillery weapons have a significant effect on Soviet battle formations. They slow the enemy's rate of advance and increase US weapon engagement time. They also strip supporting infantry from tank units and destroy tanks with precision munitions.

Field artillery weapons can fire a variety of munitions. Each has a different effect on the enemy.

Cannon launched guided projectile (CLGP) munitions, soon to be fielded, can destroy enemy armored vehicles by using artillery projectiles guided into point targets by a laser beam.

Improved conventional munitions (fuel-air munitions or bomblets) can immobilize the T-62 tank by creating an overpressure which ruptures lines in the tank engine.

High explosive and white phosphorous munitions can force enemy tank crews to remain buttoned up, thereby decreasing their ability to maneuver and acquire targets. Also, these munitions can cause damage to personnel carriers and dismounted infantry. But, they are not expected to kill tanks.

MINES AND OBSTACLES

All standard US emplaced or scatterable antitank mines can either immobilize or kill the T-62 medium tank. Mines should be thoroughly integrated into the defense plan. All mined areas must be covered with both antitank and antipersonnel fires. Scatterable mines can be fired into moving T-62 formations, thus placing them in the center of a minefield.

SMOKE

Smoke is an effective counter to the T-62 tank. When placed in front of known or suspected enemy tank locations, it degrades the enemy gunner's ability to acquire targets. Smoke is also an extremely effective cloaking device which can be used during attacks and during movement to alternate positions or new battle locations. Smoke can be delivered by field artillery weapons, mortars, smoke pots, smoke generators, smoke grenades, or vehicle smoke grenade launchers.

FIELD EXPEDIENT TECHNIQUES

The intensity of modern battle increases the likelihood that enemy tanks may infiltrate rear areas which have few antitank defenses. In such situations, the initiative of the individual soldier can help defeat the enemy. Here are a few techniques used to immobilize the T-62 tank.

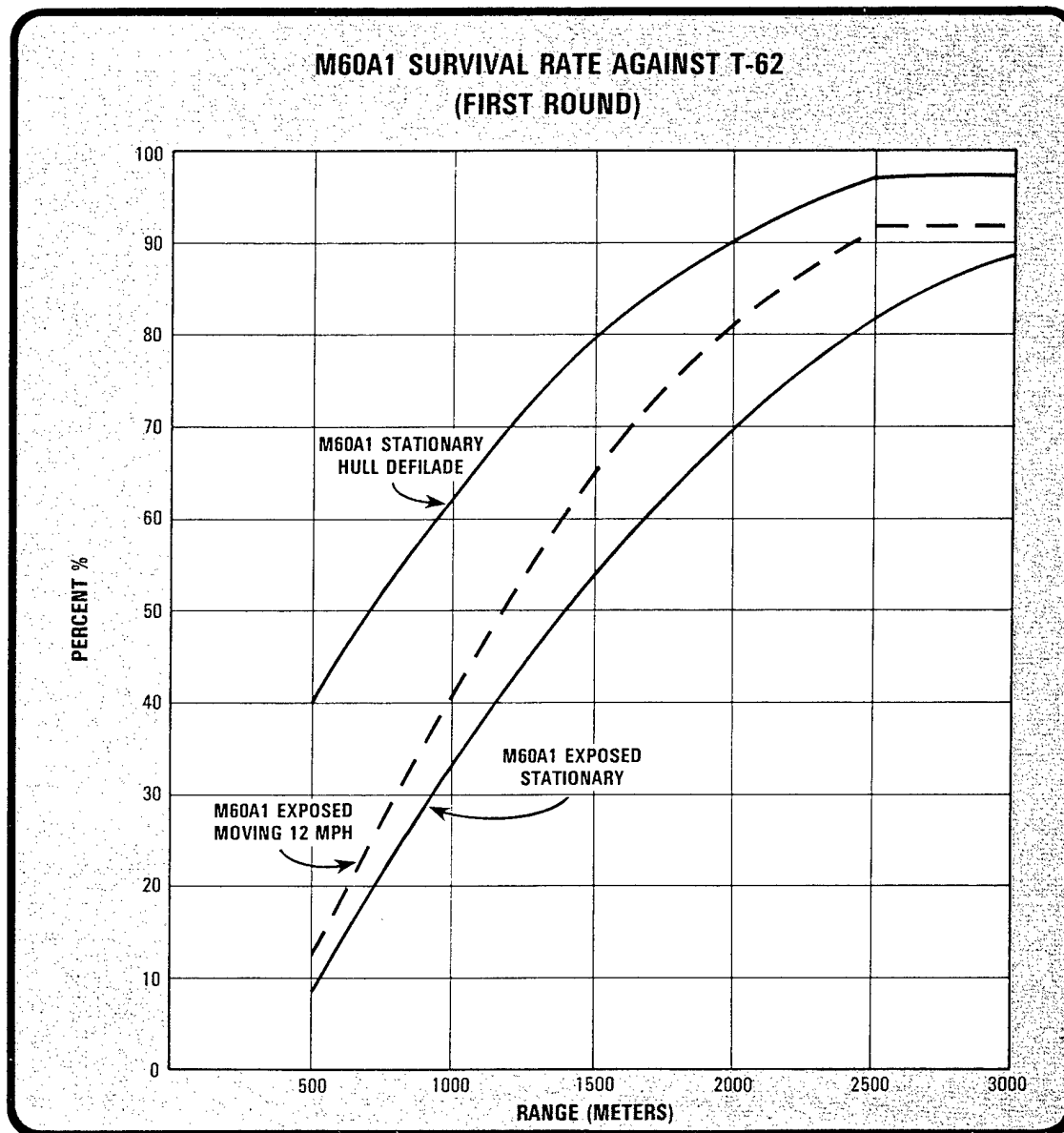
- Handgrenades can be thrown in an open hatch thereby killing the crew.
- Molotov cocktails (glass bottles filled with gasoline and ignited by a cloth wick) can be thrown on the back deck. When the glass bottle breaks, the gasoline ignites and seeps into the engine compartment. This destroys the rubber hoses in the engine and disables the tank. Any fire inside the engine compartment activates the automatic fire extinguisher system. This releases a mixture of highly toxic gas (carbon dioxide and ethylene bromide) which forces the crew to leave the vehicle or suffocate.
- Satchel charges (large, fuzed packages of plastic explosive or dynamite) can be thrown on the back deck or under the tank immobilizing the T-62.
- Antitank mines can be placed directly in the path of an oncoming T-62, immobilizing the tank.

TERRAIN

Armored and mechanized forces ***must always use carefully selected routes that provide cover and concealment.*** Vehicle commanders and drivers must also use terrain skillfully, selecting good hull-down firing

positions. Continuous, rapid movement makes it difficult for T-62 tank gunners to acquire targets and fire accurately.

The ground can provide cover and concealment. Tank commanders must shoot and move rapidly. They must fire, back off, and move to an alternate firing position. Then, they must engage the enemy again. The graph below shows how defilade positions increase a tank crew's chances of survival.



The following table explains how US units on the defensive can defeat a formation of Soviet main battle tanks.

How to defeat the Soviet main battle tank

BEYOND 3000 METERS	OUT TO 3000 METERS	WITHIN 1500 METERS	LESS THAN 1000 METERS	LESS THAN 500 METERS
Close air support is employed, using the 30-mm Gatling gun, precision-guided bombs, and conventional ordnance. Artillery and mortars are employed, firing conventional munitions and dual purpose improved conventional munitions (DPICM).	Artillery and mortar fires are continued. Smoke is employed to obscure the vision of tank crews. Scatterable mines are fired by field artillery weapons. M60A1 tanks are employed using APDS rounds. (P _h = 1 out of 3 or 4 rounds) M60A2 Shillelagh missiles are employed. (P _h = greater than 3 out of 4 rounds) (P _{hk} = greater than 75%) TOWs are employed. (P _h = greater than 3 out of 4 rounds) (P _{hk} = greater than 75%)	Artillery and mortar fires are continued. Standard minefields are used. M60A1 tanks continue to engage with APDS rounds. (P _h = 2 or 3 out of 4 rounds) (P _{hk} = greater than 50%) M60A2 tanks continue to engage with Shillelagh missiles. TOWs engage with flanking fires. (P _h = greater than 3 out of 4) (P _{hk} = greater than 75%)	Artillery and mortar fires are continued. Minefields are used. M60A1 tanks continue to engage. (P _h = greater than 3 out of 4 rounds) M60A2 tanks continue to engage with Shillelagh missiles. (P _h = greater than 3 out of 4 rounds) (P _{hk} = greater than 75%) TOWs continue to engage from the flanks. (P _h = greater than 3 out of 4 rounds) (P _{hk} = greater than 75%) Dragons are employed. (P _h = greater than 1 out of 2 rounds) (P _{hk} = greater than 75%)	Protective mines are employed. Dragons continue to engage. (P _h = greater than 3 out of 4 rounds) (P _{hk} = greater than 75%) LAWs are employed. (P _h = greater than 1 out of 2 rounds) (P _{hk} = greater than 33%) Field expedients are employed.
	<div>The main gun of the T-62 tank is now in range of defensive positions. Commanders must employ good hull-down positions.</div>		<div>The machineguns of the T-62 tank are now in range of defensive positions.</div>	
<div>KEY</div> <div>All US armor and ATGM systems can penetrate the T-62 at any place on the tank. The probabilities indicated in this table are at 0° obliquity.</div> <div>P_h = Probability of hitting a moving (0-32 kmph) T-62 tank at given distance.</div> <div>P_{hk} = Probability of killing a T-62 tank, if hit, at given distance.</div>				

APPENDIX A

T-64 AND T-72 TANKS

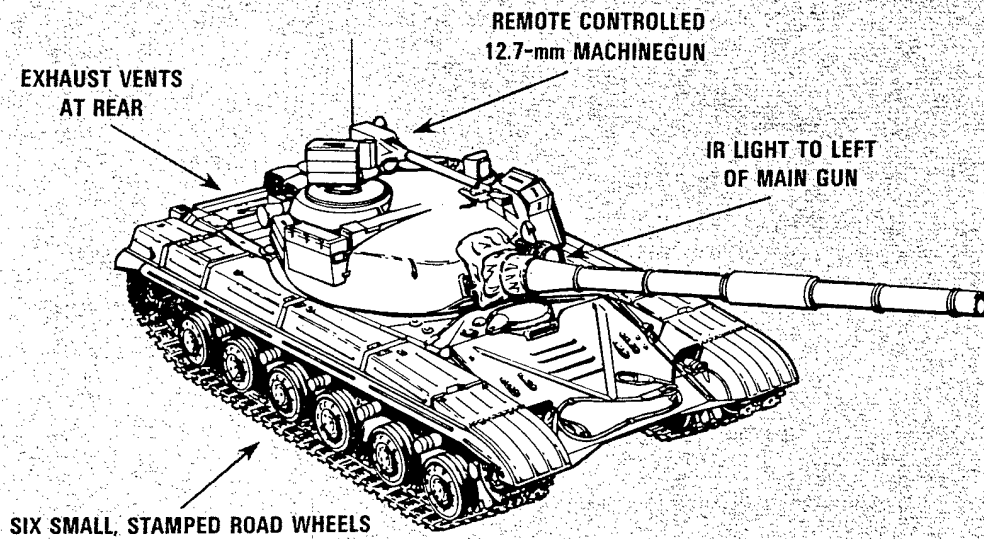
The Soviet Union has recently deployed two new main battle tanks: the T-64 and the T-72. Since its issue in 1973, about 2000 T-64s have been fielded in the Group of Soviet Forces in East Germany. The T-64, however, is only an interim improvement over the T-62, and many of its features now appear on the T-72.

During a parade in Moscow's Red Square on 7 November 1977, the T-72 tank made its official debut. While an evolutionary improvement on the older T-54, T-55, and T-62 models, the T-72 medium tank has some significant advances. Compared with older Soviet tanks, the T-72 features a lower silhouette and a shorter length. But it weighs about one ton more than the T-62. Its diesel engine develops 750 horsepower, and the Soviets claim the tank can reach a speed of 100 kmph. Its cruising range has been increased by about 10%. The track is now of the live-type, using rubber bushings in the pads and three support rollers rather than the traditional Christie system of Soviet armor. The suspension system is protected by a series of adjustable skirts, designed to reduce damage from shaped-charge warheads.

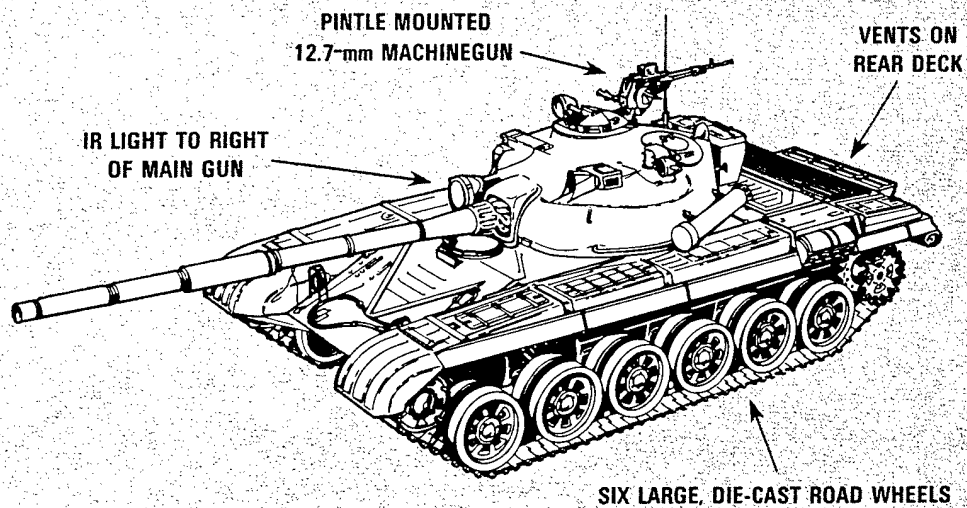
The T-72 fire control system has been greatly improved giving the commander the ability to accurately range, using an improved rangefinder. The main gun is of a larger caliber (125-mm) but the smoothbore, hypervelocity, armor-piercing capability remains. The increased caliber of the gun is due, perhaps, to the fact that a shorter main gun round is required to operate the new automatic main gun loading system. This system eliminates the need for a fourth crew member—the loader. The T-72 can track and shoot on the move, having its gun system stabilized on both vertical and horizontal planes.

Basic load for the main gun is 40 rounds. Secondary weapon systems include the 7.62-mm coaxial machinegun and a new 12.7-mm antiaircraft machinegun. Both are similar to the machineguns on the T-62 model. Unlike other Soviet tanks, external stowage is extensive on the T-72, with the attachment of boxes to the outside of the turret. The principal characteristics of both the T-72 and T-64 tanks are shown in the table on page 32.

T-64



T-72



The following table explains how US units on the defensive can defeat a formation of Soviet main battle tanks.

How to defeat the Soviet main battle tank

BEYOND 3000 METERS	OUT TO 3000 METERS	WITHIN 1500 METERS	LESS THAN 1000 METERS	LESS THAN 500 METERS
<p>Close air support is employed, using the 30-mm Gatling gun, precision-guided bombs, and conventional ordnance.</p> <p>Artillery and mortars are employed, firing conventional munitions and dual purpose improved conventional munitions (DPICM).</p>	<p>Artillery and mortar fires are continued.</p> <p>Smoke is employed to obscure the vision of tank crews.</p> <p>Scatterable mines are fired by field artillery weapons.</p> <p>M60A1 tanks are employed using APDS rounds.</p> <p>(P_h = 1 out of 3 or 4 rounds)</p> <p>M60A2 Shillelagh missiles are employed.</p> <p>(P_h = greater than 3 out of 4 rounds)</p> <p>(P_{hk} = greater than 75%)</p> <p>TOWs are employed.</p> <p>(P_h = greater than 3 out of 4 rounds)</p> <p>(P_{hk} = greater than 75%)</p>	<p>Artillery and mortar fires are continued.</p> <p>Standard minefields are used.</p> <p>M60A1 tanks continue to engage with APDS rounds.</p> <p>(P_h = 2 or 3 out of 4 rounds)</p> <p>(P_{hk} = greater than 50%)</p> <p>M60A2 tanks continue to engage with Shillelagh missiles.</p> <p>TOWs engage with flanking fires.</p> <p>(P_h = greater than 3 out of 4)</p> <p>(P_{hk} = greater than 75%)</p>	<p>Artillery and mortar fires are continued.</p> <p>Minefields are used.</p> <p>M60A1 tanks continue to engage.</p> <p>(P_h = greater than 3 out of 4 rounds)</p> <p>M60A2 tanks continue to engage with Shillelagh missiles.</p> <p>(P_h = greater than 3 out of 4 rounds)</p> <p>(P_{hk} = greater than 75%)</p> <p>TOWs continue to engage from the flanks.</p> <p>(P_h = greater than 3 out of 4 rounds)</p> <p>(P_{hk} = greater than 75%)</p> <p>Dragons are employed.</p> <p>(P_h = greater than 1 out of 2 rounds)</p> <p>(P_{hk} = greater than 75%)</p>	<p>Protective mines are employed.</p> <p>Dragons continue to engage.</p> <p>(P_h = greater than 3 out of 4 rounds)</p> <p>(P_{hk} = greater than 75%)</p> <p>LAWs are employed.</p> <p>(P_h = greater than 1 out of 2 rounds)</p> <p>(P_{hk} = greater than 33%)</p> <p>Field expedients are employed.</p>
<p>The main gun of the T-62 tank is now in range of defensive positions. Commanders must employ good hull-down positions.</p>		<p>KEY</p> <p>All US armor and ATGM systems can penetrate the T-62 at any place on the tank. The probabilities indicated in this table are at 0° obliquity.</p> <p>P_h = Probability of hitting a moving (0-32 kmph) T-62 tank at given distance.</p> <p>P_{hk} = Probability of killing a T-62 tank, if hit, at given distance.</p>		

Characteristics of the T-64 and T-72 Tanks

	T-64	T-72
Crew	3	3
Weight	34.5 metric tons	41 metric tons
Height	2.27 m	2.37 m
Length (gun forward)	9.02 m	9.24 m
Width (without skirts)	3.38 m	3.49 m
Width (with skirts)	4.64 m	4.75 m
Ground clearance	.377 m	.42 m
Engine	750-hp diesel V-12	750-hp diesel V-12
Cruising range	500 km	500 km
Cruising range with auxiliary fuel tanks	700 km	700 km
Suspension system	Torsion bar with support rollers, six road wheels	Torsion bar with support rollers, six road wheels
Maximum speed	70 kmph	100 kmph (questionable)
Main armament	125 mm smoothbore gun	125 mm smoothbore gun
Main gun basic load (separated, semi-combustible)	40 rounds	40 rounds
HVAPFSDS	12 rounds	12 rounds
HEAT	6 rounds	6 rounds
HE	22 rounds	22 rounds
Muzzle velocity	Greater than 1615 m per second	Greater than 1615 m per second
Practical rate of fire	Greater than 4 rounds per minute	Greater than 4 rounds per minute
Primary fire control sight	Articulated telescope	Articulated telescope
Secondary fire control sight	Unknown	Improved
Range finding device	Improved	Improved
Effective range (50% Ph)	2000 m	2000 m
Traverse	360°	360°
Elevation main gun	-5° to +18°	-5° to +18°
Gun stabilization	Vertical and horizontal-electric/hydraulic	Vertical and horizontal-electric/hydraulic

	T-64	T-72
Coaxial machinegun	7.62 mm	7.62 mm
Antiaircraft machinegun	12.7 mm (remote controlled)	12.7 mm (pintle mount)
Maximum gradient	30°	30°
Ditch crossing width	2.72 m	3.07 m
Wall scaling height	0.8 m	0.8 m
Water fording depth	1.4 m	1.32 m
Water obstacle depth (using snorkel)	5.5 m	5.5 m
Water obstacle width (using snorkel)	1000 m	1000 m

NOTE: To compare the characteristics of the T-62, T-64, and T-72 tanks, simply fold out page 2.

APPENDIX B REFERENCES

THREAT OPERATIONS

DDI-1120-129-76, Soviet Tank Company Tactics (see note)
DDI-1100-77-76, The Soviet Motorized Rifle Company (see note)
FM 30-40, Handbook on Soviet Ground Forces
FM 30-102, The Opposing Forces, Europe
TC 30-3, Soviet Equipment Recognition Guide
TC 30-4, The Motorized Rifle Regiment

US OPERATIONS

TC 7-1, The Rifle Squad (Mechanized and Light Infantry)
FM 7-7, The Mechanized Infantry Platoon and Squad
FM 17-12, Tank Gunnery
FM 71-1, The Tank and Mechanized Infantry Company Team
FM 71-2, The Tank and Mechanized Infantry Battalion Task Force
FM 90-3, Desert Operations

TRADOC BULLETINS

#1 (C) Range and Lethality of US and Soviet Antiarmor Weapons (U)
#1 (U) Range and Lethality of US and Soviet Antiarmor Weapons
#2 (C) Soviet ATGMs: Capabilities and Countermeasures (U)
#2 (U) Soviet ATGMs: Capabilities and Countermeasures
#3 (C) The Soviet RPG-7 Antitank Grenade Launcher (U)
#3 (U) The Soviet RPG-7 Antitank Grenade Launcher
#4 (C) Soviet ZSU 23-4: Capabilities and Countermeasures (U)
#5 (U) Training with LAW
#6 (U) Camouflage and Countersurveillance
#7 (U) BMP: Capabilities and Limitations
#9 (U) Infantry Fighting Positions

TRAINING FILMS (TF)

Battalion Task Force in the Active Defense (TF 21-6112) (television tape (TVT) 120-66) (running time (RT) 35 min)

The BMP - Capabilities and Countermeasures (TF 21-4993), (RT 17 min)

Field Artillery Battlefield Techniques (TVT 6-104) (RT 27 min)

Infantry Fighting Positions, Part I (Individual/Crew Served) (TVT 2E-071-INF I) (RT 54 min)

Infantry Fighting Positions, Part II (Desert) (TVT 2E-071-INF II) (RT 55 min)

Modern Battle (TF 21-4925) (RT 25 min)

T-62 Tank Capabilities and Countermeasures (TF 21-4995) (RT 23 min)

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APPENDIX C

ORDERING TRADOC BULLETINS

PURPOSE

A series of TRADOC Bulletins is being published by HQ TRADOC to provide commanders with timely technical information on weapons, tactics, and training techniques. The bulletins are not intended to supplant doctrinal publications, but to supplement "How-to-Fight" material with data derived from tests, intelligence, or other sources which probe "why?"

APPLICABILITY

TRADOC Bulletins are developed by Headquarters, TRADOC, using the most comprehensive and current military and civilian data available. Army Training and Evaluation Programs (ARTEP), Field Manuals (FM), and Training Circulars (TC) continue to be the primary training references. TRADOC Bulletins supplement them with an explanation of why we are training in a given manner. TRADOC Bulletins should enable commanders to better stimulate and motivate subordinates to understand why we train the way we do.

INDEX OF SERIES

TRADOC Bulletins are cataloged in DA Pamphlet 310-3 (Index of Doctrinal, Training and Organizational Publications). The series is numbered consecutively, and each TRADOC Bulletin is announced at the time of printing in the information bulletin distributed to all pinpoint account holders by the US Army AG Publications Center.

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DA Pamphlet 310-10 explains the pinpoint distribution system and how to establish or update an existing account at the US Army AG Publications Center.

TRADOC BULLETIN 10

9 FEBRUARY 1979



DONN A. STARRY
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