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1/16/2006

HR 70-14

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~~TOP SECRET~~

CENTRAL INTELLIGENCE AGENCY

WASHINGTON 25, D. C.

7 MAR 1957

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT : Preliminary Comments on an Article from the
Official Soviet Journal, Information Collection
of Missile Units and Artillery

1. This article presents the first concrete information on the Soviet antitank guided missile program, the existence of which had been estimated for several years. It deals primarily with operational employment, but provides some performance data and technical characteristics for the antitank missiles described. Antitank guided missiles recently displayed in Moscow in connection with the May Day parade may equate to the missiles discussed in this article.

2. Two missiles are identified: the "Shmel" (Bumble Bee) and the "Falanga" (Phalanx). They are described as having ranges of 6,500 to 8,000 feet. These ranges are considerably less than the 6,000 yards previously estimated for Soviet antitank missiles. Guidance is visual from the launch position by wire or radiocommand, depending on the model, with a probability of destruction by one round of not less than

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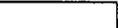
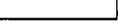


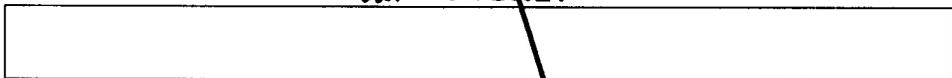
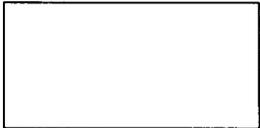
0.70 - 0.80. Armor piercing capability for the "Shmel" is given as about 12 inches, and for the "Falanga", approximately 20 inches.



RAY S. CLINE
Deputy Director (Intelligence)

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CENTRAL INTELLIGENCE AGENCY
WASHINGTON 25, D. C.

MEMORANDUM FOR: The Director of Central Intelligence

SUBJECT : TACTICAL MISSILE AND ARTILLERY COLLECTION:
"The Combat Use of Antitank Guided Missiles
(PTURS) in a Battle and in an Operation"

1. Enclosed is a verbatim translation of an article from the Soviet Ministry of Defense TOP SECRET publication entitled Information Collection of Missile Units and Artillery. This publication was formerly called Information Collection of the Artillery and was renamed to include the term "Missile Units" sometime before mid-1960.

2. In the interests of protecting our source, this material should be handled on a need-to-know basis within your office. Requests for extra copies of this report or for utilization of any part of this document in any other form should be addressed to the originating office.

Richard Helms

Richard Helms
Deputy Director (Plans)

Enclosure

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Original: The Director of Central Intelligence

cc: Military Representative of the President

Special Assistant to the President for
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Department of State

The Director, Defense Intelligence Agency

The Director for Intelligence,
The Joint Staff

The Assistant Chief of Staff for Intelligence,
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1 May 1962

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COUNTRY : USSR

SUBJECT : TACTICAL MISSILE AND ARTILLERY COLLECTION:
"The Combat Use of Antitank Guided Missiles
(PTURS) in a Battle and in an Operation"

DATE OF INFO: August 1961

APPRAISAL OF
CONTENT : Documentary

SOURCE : A reliable source (B).

Following is a verbatim translation of an article entitled "The Combat Use of Antitank Guided Missiles (PTURS) in a Battle and in an Operation" which appeared in Issue No. 54, 1961 of the Soviet military publication Information Collection of Missile Units and Artillery (Informatsionnyy Sbornik Raketnykh Chastey i Artillerii).

This publication was formerly called the Information Collection of the Artillery, and was renamed by Issue 51 of 1960. Issue 54 went to press on 26 August 1961. This publication is classified TOP SECRET by the Soviets and originates with the Tactical Missile and Artillery Headquarters of the Ministry of Defense.

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The Combat Use of Antitank Guided Missiles (PTURS)
in a Battle and in an Operation

The role of armored troops in combat and in an operation is increasing considerably under conditions in which nuclear weapons are used.

The increase in the role of armored large units and units has led to an increase in their relative importance in the composition of the ground troops of the armies of the capitalist states, to the perfection of the principles of their combat use, and to the further perfection of the design of tanks.

Tanks are equipped with various mechanisms and stabilizing devices, which ensure an increase in the rate, the effective range, and the accuracy of their fire, not only at the halt but also from the march.

This all demonstrates that the significance of combat with tanks in modern operations is not only not decreasing but is increasing more and more. In this respect, because of changed principles in the combat use of tank troops and the availability of new and more modern types of tanks, the conditions of combat with the tanks of the enemy have become more complex.

The perfection of a system of antitank defense, taking into account the possible nature of enemy tank operations in an operation and the new weapons of combat adopted for the armament of our troops, is one of the most important tasks.

As we know, in all types of troop combat activity, combat with enemy tanks is organized and conducted in a definite system which envisages the destruction of the tanks even before their entry into combat (at unloading sites, in concentration areas, on the march, and on the lines along which they deploy into combat formation) and during the immediate course of combat.

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The destruction of enemy tanks on distant approaches to the combat formation of our troops is achieved by nuclear/missile strikes, by aircraft strikes, and by artillery fire from concealed firing positions.

In addition to the weapons mentioned, as enemy tanks approach the combat formations of our troops, the antitank weapons of the infantry, the antitank artillery, and tanks enter into combat with them. In this article the use of new weapons, antitank guided missiles (protivotankovyy upravlyayemyy reaktivnyy snaryad -- PTURS) is examined.

The Role and Place of the PTURS in the System of Antitank Defense of the Troops

The PTURS models which exist as armament are remotely controlled (teleupravlyayemyy) missiles. Control of their flight is carried out from the launching mount by wires or by radio. Some PTURS models have distant control (distantzionnoye upravleniye) which allows the operator to conduct fire against enemy tanks outside the firing position.

The maximum range of fire of the PTURS is 2,000 to 2,500 meters and the minimum is 600 meters.

The chassis of the armored reconnaissance patrol vehicle (bronirovannaya razvedyvatelno-dozornaya mashina -- BRDM) and the chassis of the UAZ-69 vehicle, which have good cross-country ability and the ability to overcome trenches and steep ascents, and to cross water barriers independently, serve as combat vehicles for the PTURS. The PTURS considerably exceed conventional antitank artillery in maneuverability on the battlefield, which increases their capabilities in combat with enemy tanks.

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The most important characteristic of the PTURS, which plays a main role when the enemy is making mass use of tanks, is the effective firing range, i.e., the range from which enemy tanks can be destroyed with a high level of reliability, which is characterized by a probability of destruction by one round of not less than $P=0.7$ to 0.8 . The higher the effective firing range of the antitank weapon, the greater the destruction that can be inflicted on the enemy's tanks even before their approach to the line from which they can effectively destroy targets with direct fire. Grazing range for modern tanks, with stabilizing equipment, firing from the march, is approximately 1,500 meters. Therefore, in a system of antitank defense in which there are PTURS, of which the maximum range of fire according to type is 2,000 to 2,500 meters, enemy tanks can be destroyed even before they come up to their grazing range. In practice, the effectiveness of PTURS fire does not depend on the range of fire, speed, or angle of approach of the tanks.

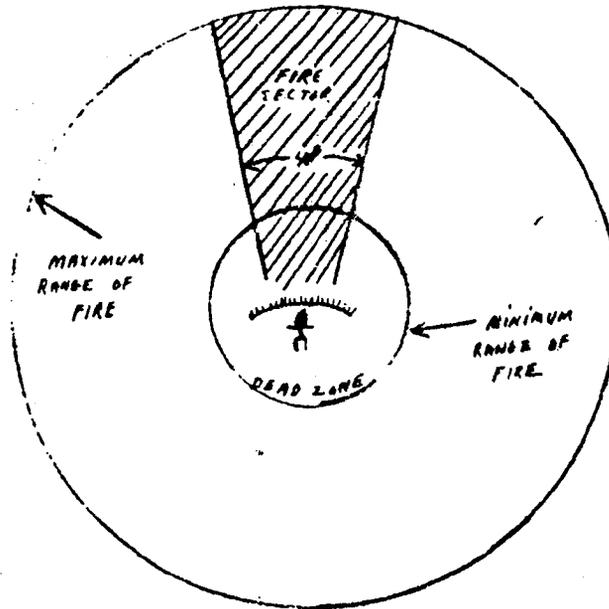
Owing to their great armor-piercing capability (the "Shmel" -- 300 mm and the "Falanga" -- 500 mm), antitank guided missiles will become the basis of modern antitank defense. Possessing high maneuverability and great effective firing range, they can be used equally for combat with enemy tanks both in defense and in offense.

The possibility with a portable coil the enemy to recon and ground observa effectiveness of t

Research and ex been conducted ind is capable of dest enemy tanks with a reliability of destruction of one round of 70 to 80 percent. A PTURS platoon (3 or 4 launching mounts) can repel an attack by a tank company (17 tanks), destroying not less than 40 to 50 percent of the tanks in the process.

The employment of such a powerful weapon as the PTURS permits considerable strengthening of the antitank defense of troops and, at the same time, reduces the requirement for antitank weapons and consequently their density in defense. In the last war, this density, as is generally known, consisted of 25 to 30 units (antitank guns and tanks) for one front kilometer

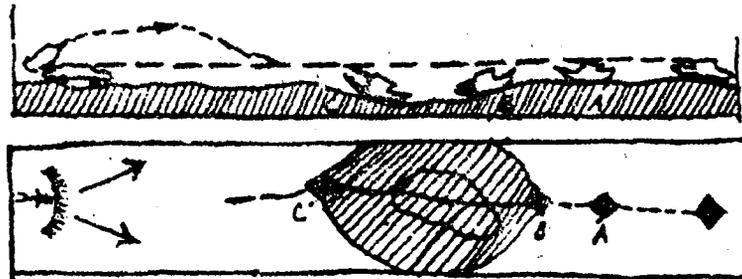
Antitank guided missiles have their own particular deficiencies which should be considered. Among these deficiencies one can cite: the existence of a dead zone within the radius of the minimum range of fire (600 meters) as the result of which they cannot conduct combat with enemy tanks which have broken through to the area of the firing positions; the great influence of the terrain, of the hours of darkness; and of meteorological conditions on the effectiveness of fire (Sketch 1).



Sketch 1. Fire sector of a PTURS launching mount

Open, flat terrain is the most favorable for the use of the PTURS. In operating on such terrain, favorable conditions are created for the observation of targets and the capability of destroying tanks in the entire coverage of the PTURS range of fire is ensured.

Dead spaces (terrain sectors where a tank is temporarily invisible to the operator of the launching mount) are created for the PTURS on average broken terrain, especially terrain affording concealment where there are shrub vegetation, knolls, hollows, and ravines. It is evident from Sketch 2 that if there is concealment on the route of an attacking enemy tank, then while going through it the tank will leave the observer's field of vision for some time (from point B to point C). In order to destroy the tank, the operator must either open fire prior to the tank's arrival at the belt of concealment or after it has negotiated this belt. In the second case, delay in firing a round is not ruled out and the enemy tank will enter the dead zone, delimited by the minimum range of fire (the dead zone is indicated by the hachures in Sketch 2).



Sketch 2. The dead zone of a PTURS launching mount on the route of movement of tanks

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Good visibility of the area of targets is also one of the conditions for the effective use of the PTURS. Precipitation, in the form of rain and snow, and fog and night conditions, considerably decrease the possibility of using remote controlled PTURS.

These deficiencies of the PTURS as an antitank weapon do not lessen their role in combat with enemy tanks, especially since understanding and a complete consideration of these deficiencies largely reduce their harmful effects.

The existence of weak points peculiar to the PTURS necessitates the closest fire coordination between them and other antitank weapons. The principle of the combined combat use of PTURS subunits with subunits of antitank artillery, with tanks, and with the means of the engineer troops is the basis for their use in any type of combat. Only then can a unified and effective system of antitank fire be created, permitting the successful conduct of combat with enemy tanks when these are being used on a mass scale. Furthermore, in organizing combat operations by PTURS, special attention must be given to the selection of their combat formations, taking into account the disposition of the other weapons assigned for combat with tanks, to the configuration of the terrain, and to the probable axes of enemy tank operations, and also to the organization of reliable illumination of the terrain if missions are to be carried out at night.

The main task of the PTURS is the annihilation of the tanks and other armored targets of the enemy. In troop operations in coastal axes, they can be used for the destruction of enemy landing means and amphibious tanks during the latter's approach to the shore.

Antitank weapons, and the PTURS in particular, must be used in such a way that the efforts of the antitank defense can be concentrated on any major axis in an offensive as well as in defense. This task can be accomplished primarily by the decisive maneuver of antitank weapons. Therefore, PTURS can be used in the complement of the antitank reserves.

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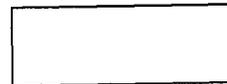
At the same time, the combat formations of motorized rifle companies and battalions must also be able to withstand mass attacks by enemy tanks. Therefore, PTURS can also be used in the complement of motorized rifle subunits.

It should be kept in mind that the use of PTURS in a regiment or a division can have certain special features during troop operations under particular conditions. The experience of exercises indicates that during operations in hills or in wooded and swampy terrain, the antitank reserves sometimes do not succeed in occupying the lines of deployment or in participating in the repulse of tank attacks in front of the main line of resistance. It is clear that, under these conditions, it is advantageous to locate part of the PTURS subunits of a regiment or division on the most probable axes of tank approach beforehand, and to have part of them in the complement of the antitank reserves.

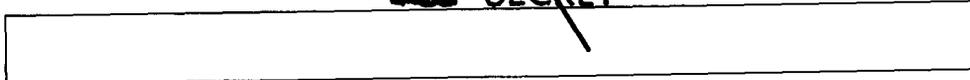
Combat Formations of PTURS Subunits and the Requirements Levied on Them

The combat formations of PTURS subunits are a component part of the combat formations of combined-arms large units (units, subunits). The selection and preparation of combat formations in areas determined by the combined-arms commander are conducted by the commander of the PTURS subunit. If a PTURS subunit is included in the complement of the antitank reserve, the selection of a combat formation is made in accordance with the instructions of the commanding officer of the antitank reserve.

The combat formation of a PTURS battery consists of the combat formations of the platoons, the assembly (vyzhdatelnyy) position of the battery, and the observation post of the battery commander. A battery forms its combat formation, as a rule, by platoons. The distance between



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the platoons, depending on the terrain, can be 800 to 1,500 meters; fire coordination between the platoons is then ensured and the destruction of the entire battery by one nuclear burst during the delivery of a nuclear strike by the enemy is prevented.

The observation post of the battery commander is usually located in a place from which good observation of enemy tanks and of the operations of the platoons is ensured. When possible, it is advisable to locate it near one of the platoons on the most probable axis of tank approach.

The mutual disposition of the platoons in the combat formation of a battery depends on the conditions of the terrain and on the expected nature of the operations of enemy tanks.

On terrain which is accessible everywhere for tank operations, and where the enemy tanks can operate on a wide front (for example, as battalions in single-echeloned formation), it is more advantageous to locate the PTURS platoons on one line in relation to the front (axis) of the tank operations, while echeloning the platoon launching mounts in depth. If the terrain restricts enemy tank operations on the entire front, it is advisable to echelon the PTURS platoons in depth, taking the probable axes of enemy tank operations into consideration.

In organizing the combat formation of a battery, it is necessary in all cases to provide for maneuver by the platoons or the individual PTURS launching mounts in the event of a change in the operational axes of the enemy tanks.

Depending on the composition of the PTURS battery and the situation, the make-up of its combat formation can be varied. Sketch 3 shows a basic scheme for the combat formation of a PTURS battery when it has two platoons with three launching mounts in each.

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The combat formation of a PTURS platoon consists of the firing positions of the combat vehicles, the assembly position, the control point of the platoon commander, and the control points of the commander-operators of the combat vehicles (in the case of distant control). Control points for commander-operators may not be selected in the case of rapid(s khodu) deployment of the platoon. In this case, the operator will control the flight of the missile directly from the launching mount.

The mutual disposition of the launching mounts of a PTURS platoon in combat formation is conditioned mainly by the technical characteristics of each launching mount, in particular by the zone of destruction, which is limited in range by the maximum and minimum range of fire, and in direction by the capabilities of the traversing mechanism of the launching and sighting devices of the control system, and also by the flight characteristics of the missile itself (in addition, for PTURS which are controlled by radio, by the capabilities of the receiving and transmitting antenna apparatus).

The dimensions of the fire sector can be varied, depending on the type of launching mount, the type of missile, and the control system. An average fire sector for the existing PTURS models and types of combat vehicles is shown in Sketch 1.

To ensure all-around fire, canting (razvorot) of the launching mount is necessary, which entails an increase in the time for a firing. Therefore, while combat formation is being taken up, the launching mounts are located in firing positions so that their launch rails (napravlyayushchiy) are oriented in the primary fire sector. A secondary fire sector is assigned for each launching mount, taking its cant in the direction of possible enemy tank operations into consideration.

The location of the launching mounts in firing positions must ensure the conduct of fire in one direction by not less than two launching mounts and the mutual coverage of zones of destruction; it must preclude the simultaneous destruction of the launching mounts of a platoon by enemy artillery and tank fire; and it must ensure the maneuver of the launching mounts as a unit and fire to the maximum range. Linear disposition of launching mounts at the firing positions, as investigation

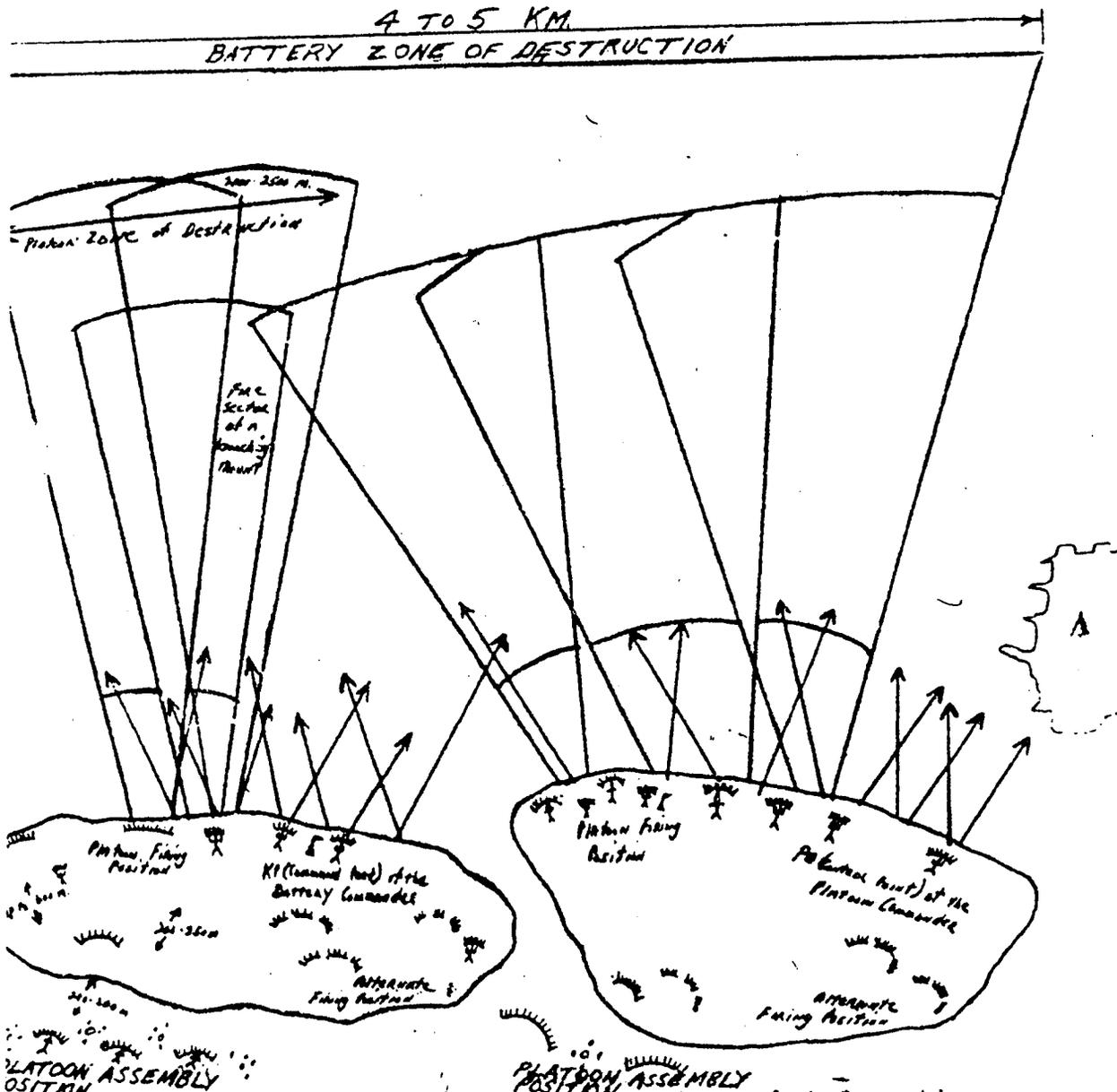
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shows, does not meet this requirement. It is advisable to distribute them in platoon combat formation by echelon to the right (to the left) (ustup vpravo (vlevo)) or angled to the rear (ugol nazad), depending on the terrain and the possible axes of enemy tank operations. The distance between the launching mounts can average 200 to 600 meters (Sketch 3).



Sketch 3. Fundamental scheme of the combat formation and fire of a PTURS battery.

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With this mutual disposition of launching mounts, a platoon's zone of destruction at the minimum range will be 600 to 800 meters or more, which corresponds to the front of an attacking tank company. At maximum range it can be 2,000 to 2,500 meters or more.

It is necessary to select PTURS firing positions in places providing observation of enemy operations and the ability to destroy his tanks at maximum range.

On terrain not meeting these conditions, firing positions can be selected in places which permit the commander-operators to observe individual sectors of the possible routes of movement of the enemy tanks over not less than 150 to 200 meters, i.e., to such an extent as to ensure the combat vehicles the capability of firing at least two rounds against the moving tanks.

In mountainous and wooded terrain, the firing positions of the launching mounts can be located at bends before straight stretches on roads, on mountain plateaus from which the most important road junctions, mountain passes, crossings over mountain rivers, gorges, etc, in the enemy's disposition within the limits of the range of fire can be observed.

In wooded and swampy terrain, the firing positions can be selected on the edges of forests turned toward the enemy, on roads, wide lanes, and cleared areas with a view to conducting fire along them.

In cities, the most convenient places for firing positions may be wide streets, prospects, and squares. Here, attention should be given to existing suspension equipment in the form of power lines for street transport, trolleys, and trolleybuses, since the possibility arises that the missiles may be caught by them during ascent between the moment of launch and a height of 6 to 10 meters.

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The disposition of PTURS firing positions in places ensuring a good view of the fire sector facilitates the enemy's reconnaissance of them, particularly of those positions which do not have distant control. Therefore, it may not always be advantageous to locate the PTURS directly at firing positions. Sometimes it is advisable to locate the PTURS at selected assembly positions at a distance of not more than 200 to 300 meters from their firing positions before the beginning of an enemy tank attack. These positions can also be used for the storage of reserves and of ammunition and for the reloading of the combat vehicles.

So that the launching mounts can occupy the firing positions in the shortest period of time, routes (roads) from the assembly positions to primary and alternate firing positions are prepared in advance.

In the operation of PTURS in combat, assembly positions are not, as a rule, designated; in this case, the launching mounts occupy firing positions during deployment in combat formation.

For PTURS with distant control, control points are selected and prepared for the operators in locations with good conditions for the observation of enemy tank operations and at a distance from their firing positions within the limits of the length of the control cable.

Close coordination between PTURS and other antitank weapons is ensured by:

-the advantageous mutual disposition of combat formations;

-coordination between the fire and maneuver of PTURS subunits, other antitank weapons, and the artillery, which is located at concealed firing positions;

-the existence of uninterrupted communications and of a unified system of control and orientation, knowledge and skilful use of the methods of target designation and of the signals established for fire requests;

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-the advantageous assignment of targets among PTURS subunits and the other antitank weapons by lines and axes during the repulse of enemy tank attacks.

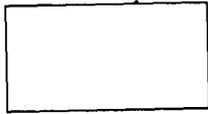
For the purpose of fire coordination, depending on the range of fire and the terrain, subunits of other antitank weapons can be located directly in the area of the firing positions of PTURS subunits or at some distance, with the primary mission of destroying enemy tanks in the dead zone of the PTURS. In particular, as experience from combat firings which have been conducted shows, anti-tank guns can fulfil the tasks of destroying enemy tanks in the PTURS dead zone, taking up combat formation at a distance of between 400 and 900 meters from the PTURS firing positions with the tanks not more than 400 to 600 meters away.

Coordination of the fire of the artillery, located in concealed firing positions, consists of destroying enemy tanks even before they reach the line of the maximum range of fire of the PTURS.

By its fire, the artillery must also impede the maneuver of enemy tanks, their conduct of reconnaissance and of aimed fire against the combat formations of the PTURS and of the other antitank weapons, and must destroy infantry operating jointly with the tanks.

While repelling enemy tank attacks at night, the artillery provides illumination of the terrain in support of PTURS firing and destruction of lighting means which the enemy is using for reconnaissance and the conduct of fire against the PTURS combat formations.

Coordinated action by PTURS subunits and engineer subunits consists in helping PTURS subunits to prepare combat formations, especially in the preparation of routes and approach roads to the firing positions, and also in setting up antitank minefields in front of the firing positions on the most important of the probable axes of tank approach.



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Communications are organized for the control of PTURS subunits and of the individual launching mounts in combat, and also to ensure uninterrupted coordination with the subunits of other antitank weapons.

Communications can be organized with radio, wire, mobile, and signal means. However, in view of the fast-moving and mobile nature of combat with tanks, radio communications will be the basic means of communication with PTURS subunits. At the same time, signal communications will be widely used for control, especially of the PTURS launching mounts.

For the control of PTURS combat operations, communications are organized:

-within PTURS subunits;

-between PTURS subunits and the antitank weapons and artillery operating in coordination with them, which provide illumination of the terrain while enemy tank attacks are being repelled at night;

-for combined-arms commanders (chiefs of the anti-tank reserves) with PTURS subunits which are either permanently or temporarily subordinated to them.

Within PTURS subunits, communications with each launching mount are organized by their own means of radio communication. Furthermore, the platoon commanders, for communications with the battery commander, and the commander-operators of the launching mounts for communications with the platoon commander, use the radio sets of the launching mounts at which they are located. During combat, radio communication is duplicated by signal communications, particularly by signal flares, in accordance with the previously established control signals which are provided to all personnel.

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Communications for coordination between PTURS subunits and other antitank weapons and the artillery are organized by radio by the forces and means of the subunits operating in coordination with them.

Commanding officers or chiefs to whom PTURS subunits are subordinated, establish communications with them by their own forces and means.

Control of the Fire and Maneuver of PTURS Subunits

The fast-moving and highly mobile nature of combat, in the course of which abrupt changes of the situation are inevitable, makes great demands on the control of antitank weapons, particularly of PTURS subunits.

The respective commanding officers or chiefs (the commander of a battalion or company, the chief of an antitank reserve) control the PTURS subunits which are subordinate to them. They assign combat missions to them, organize reconnoitering of the areas of disposition of the combat formations and coordination, control their fire and maneuver during combat, exert constant control over the timeliness of fulfilling tasks, and take measures for the political, combat, materiel, and engineer support of combat operations.

The following are indicated to the commander of a PTURS battery (platoon) in the assignment of combat missions:

-the area of the primary and alternate firing positions;

-the probable axes of tank approach and the nature of possible enemy tank operations;

-the order for opening fire against tanks, the general reference points, the signals for control and coordination;

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-the antitank weapons operating in coordination with the PTURS subunits, and their missions;

-the primary and secondary firing zones;

-possible maneuver by the battery (platoon) during combat;

-measures for protection from nuclear weapons and other weapons of mass destruction;

-the order and timing of engineer work, the forces and means for carrying it out, the locations of explosive and mine obstacles set up in support of the combat operations of the PTURS;

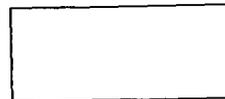
-the time of readiness for firing.

In addition, the chief of the antitank reserve indicates the following to the commanders of PTURS subunits operating in the complement of the antitank reserve:

-the location of the reserve before the beginning of combat;

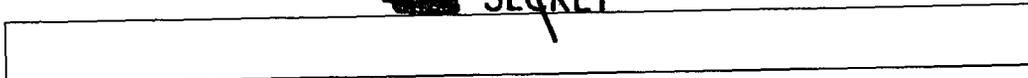
-the possible lines of deployment, the routes of movement to them, and the order for moving up to and occupying the lines of deployment (while moving the antitank reserve in a combined-arms column which is executing a march in anticipation of a meeting engagement, he indicates the formation of the reserve column and its place in the march order of the combined-arms columns).

Depending on the situation, on the nature of the combat operations, and on the availability of time, missions are given verbally to the PTURS subunit commanders during the issuance of the combat order or in short combat instructions. In the course of combat, missions are continually amplified in accordance with changes in the situation.



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Reconnoitering the disposition areas of the combat formations (lines of deployment) of PTURS subunits is conducted in all cases, if time is available and if the situation permits. It is conducted by the appropriate chiefs of the antitank reserves. As a rule, the commanders of PTURS subunits are brought into the composition of the reconnoitering groups.

The task of reconnoitering is study of the terrain in the area of the firing positions with the aim of:

- determining the most suitable locations for the disposition of the combat formations of the PTURS subunits and locations for the launching mounts;

- selecting the battery commander's observation post, the control points for the platoons, and, if necessary, for the commander-operators;

- selecting assembly positions for the disposition of the PTURS subunits before repelling enemy tank attacks;

- selecting routes for the movement of the combat vehicles up to the primary (alternate) firing positions from the assembly positions and routes for maneuver of the battery (platoon) and of the individual launching mounts;

- defining precisely the locations of the firing positions for the antitank weapons operating in coordination with the PTURS.

In the course of reconnoitering, clarification of the combat missions of the PTURS on the terrain and the coordination of their operations with the other anti-tank weapons are carried out, the problems of engineer preparation of the combat formations are resolved, routes for maneuver and measures for security and camouflage are planned.

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In studying the terrain, on the basis of the mission assigned to him, the commander of a PTURS battery defines the primary and secondary firing zones for the platoons precisely and plans the fire sectors for each launching mount, with the aim of creating solid zones of destruction along the axes of possible enemy tank operations and of ensuring fire coordination between PTURS platoons, individual launching mounts, and the other antitank weapons. At the same time, the reference points indicated by the superior commander are defined in detail on the terrain or are selected independently. It is advisable to plan the reference points so that it is easy to determine on the terrain the lines for opening fire at the maximum and minimum range for each launching mount, together with the fire sectors, and the lines where dead spaces might be formed in the PTURS zone of fire.

Knowledge of the exact distances to the reference points is extremely important for the conduct of firing and for control of the fire of PTURS subunits. The distances to reference points can be determined on a map and with the aid of azimuth instruments.

In the course of combat, situations will frequently arise in which PTURS subunits are compelled to assume combat formations precipitately, without preliminary reconnoitering and preparation of the firing position areas. Under these conditions, questions connected with the preparation of PTURS subunits for combat operations must be resolved during the approach to the designated area. Specifically, the firing position areas, the firing zones for the subunits, and the fire sectors of the launching mounts can be determined on a map. While combat formation is being assumed, the missions and the order of operations of the PTURS subunits are clarified on the terrain. In this process, all organizational measures must be completed not later than the moment when the enemy tanks reach the line of maximum range of the PTURS.

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For the control of the fire of a PTURS battery (platoon), a chart of antitank fire is compiled, on which the firing positions of each launching mount, the firing positions of the antitank weapons operating in coordination, the primary and secondary firing zones, the dead spaces in these zones and the near limits of fire in front of them, the reference points with an indication of their distances (the distance is indicated for the observation post of the commander of the PTURS subunit), and the signals for control and coordination are indicated.

It is advisable to compile the chart for antitank fire on a map with a scale of 1:25,000 or on a blank sheet of paper. The fire chart is forwarded to the commander-operators of the launching mounts in the units concerned.

Maneuver by PTURS subunits or by individual launching mounts during combat can be executed for the purpose of changing the firing positions within an occupied siting area and also for the purpose of reaching threatened axes to occupy lines of deployment. For the rapid execution of maneuver, alternate firing positions or lines of deployment, routes for maneuver, control signals, and the order for execution of a march and for the occupation of firing positions (lines of deployment) are indicated beforehand to the commanders of the PTURS subunits (commander-operators of the launching mounts).

Control of the fire and maneuver of the PTURS subunits and launching mounts during combat includes:

- the conduct of continuous observation of the enemy's operations, especially the operations of his tanks;
- distribution of the fire of PTURS subunits against groups of enemy tanks or of the fire of the launching mounts against individual tanks;

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-determination of the moment for opening fire against moving tanks and issuance of the appropriate commands or signals for opening and ceasing fire;

-determination of the beginning of a change of firing positions or of movement to another line and of periods of readiness for the conduct of fire from the new firing positions (lines).

At the beginning of an enemy tank attack, the PTURS battery commander allocates the groups of moving tanks among the platoons and assigns fire missions for their destruction. The platoon commanders in turn assign fire missions to the commander-operators, indicating specific targets for each launching mount. Target designation is mainly conducted from the reference points, or in their absence, from easily visible features of the terrain.

The commander of a PTURS subunit also determines the time for opening fire and at the necessary moment gives the appropriate commands (signals). Usually, fire is opened at the approach of the enemy tanks to the line marking the maximum range of fire. Subsequently, the commander-operators carry out missions independently, taking into account the nature of the enemy's tank operations, the conditions for observation, and the terrain in the fire sector of the launching mounts. If necessary, while repelling enemy tank attacks the battery (platoon) commander can change the order of conduct of fire and can redistribute missions among the platoons (launching mounts).

When the tanks approach the line of the effective firing range of the other antitank weapons which are operating in coordination with the PTURS, the former open fire against them, in the first place against the tanks located in the dead zone of the PTURS, ensuring their elimination from combat and the assumption of new firing positions.

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After performing the task of destroying one group of enemy tanks, the battery (platoon) commander assigns missions for the destruction of another group, if the range of fire permits. In cases when the fulfillment of a new mission from the firing positions which have been assumed is impossible, the decision to change firing positions can be taken.

In determining the time needed to carry out a maneuver, it should be taken into account that loaded launching mounts can move on surfaced roads at a speed of up to 50 kilometers per hour, on country dirt roads at a speed of 20 to 25 kilometers per hour, and cross-country at a speed of up to 10 to 15 kilometers per hour. The time spent in evacuating firing positions or in preparing the launching mounts for fire from new firing positions averages 1.5 to 2 minutes.

In all cases, one should strive to conceal the execution of a maneuver, using natural terrain features and natural concealment for this purpose.

Operations by PTURS Subunits in the Main Types of Combat

PTURS subunits operating within the complement of the antitank reserves of units, large units, and formations, in coordination with other antitank fire weapons can fulfill the following missions.

In an offensive:

- repel enemy tank counterattacks in the departure position and during the offensive;
- support the deployment of the main forces in a meeting engagement;
- support the commitment to battle of the second echelons and reserves;

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-support the consolidation of lines and important installations seized in the course of an offensive;

-cover the areas (sectors) subjected to enemy nuclear strikes.

In defense:

-reinforce the antitank defense of the combined-arms subunits, units, and large units of the first echelon along the axes on which the enemy is making mass use of tanks;

-destroy tanks and other armored targets as they reach the line of the maximum range of fire, and also tanks and other armored targets which have broken through to the depth of our defense.

PTURS subunits operating in the complement of motorized rifle battalions in an offensive are used to repel enemy tank counterattacks and to consolidate captured lines and installations.

When the battalions go over to the defensive, PTURS subunits can be used to combat enemy tanks ahead of the defense front and in gaps between the defense areas of the battalions and companies.

The number of PTURS subunits assigned to the complement of the antitank reserves and motorized rifle battalions is determined in each particular case.

Under the conditions of modern combat, with troop operations on separate axes, the antitank reserves must be highly mobile and, at the same time, sufficiently strong to resist massed tank strikes by the enemy.

The antitank reserves are distributed among the operational formation of the troops of an army (the combat formations of large units and units) in areas determined for them, on the most important of the axes along which tanks will probably approach, in constant readiness for maneuver.

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Depending on the situation, PTURS subunits located in a disposition area can either take up combat formation or can be dispersed. With a view to executing rapid maneuver during combat on threatened axes, the possible lines of deployment, the missions for each line, the routes for moving up to the lines of deployment and the order for their occupation, and also the order and periods of time for the engineer preparation of the lines of deployment, are indicated beforehand to the commanders of the PTURS subunits.

In an offensive, the lines of deployment designated to PTURS operating in the complement of the antitank reserves are on the most important axes, taking into account the missions of their troops and the possible operations of enemy tanks. In particular, they can be designated to the axes of possible enemy counterstrikes (counterattacks) and on the lines of commitment to combat (battle) of the second echelons.

At the beginning of an offensive and during its course, the PTURS subunits in the complement of the antitank reserves are moved on indicated routes behind the first echelons of the large units and units in readiness for deployment along selected lines.

The PTURS subunits are deployed according to the orders of the commanding officer of the antitank reserve in the complement of which they are operating. Mobile obstacle detachments, operating jointly with the antitank reserves, mine the terrain for use by the PTURS.

Organic and attached PTURS subunits, operating in the complement of a battalion assigned to an advance guard or to a forward detachment, are deployed in combat formation together with the other antitank weapons from the beginning of combat and conduct combat with enemy tanks by supporting the battalion in the holding of an advantageous line until the approach of the main forces.

The deployment of an antitank reserve in combat formation depends largely on its place in the combat formation of the troops.

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During the execution of a march by a division in anticipation of a meeting engagement, its antitank reserve will move, as a rule, behind the advance guard. (forward detachment) or in front of the column of the main forces. An army antitank reserve will usually move behind the divisions of the first echelon. The command for deployment can be given either on the approach to the probable line of encounter with the enemy or with the initiation of combat by the advance guard (forward detachment).

Under these conditions, from the moment when the mission is received until readiness for opening fire, time will usually be greatly limited. . . An antitank reserve, including the PTURS subunits, will therefore be deployed into combat formation rapidly. The commanders of PTURS subunits, having received a mission from the commander of the antitank reserve, move up to the assigned area, select the locations of the launching mounts, and organize control. If time permits, the launching mounts are assigned fire sectors, but in the absence of time they can be given a primary direction of fire.

In defense, the lines of deployment of the antitank reserves are assigned on the most important of the probable axes of tank approach, taking into account the missions of their troops echeloned in depth. The lines of deployment closest to the main line of resistance must be sufficiently near to ensure their timely occupation by the antitank reserves and the readiness of the subunits to conduct fire before the enemy tanks reach the line of maximum range of fire.

During a shift to the defensive, it will often be possible to reconnoiter the lines of deployment and routes of movement in advance, to prepare them from the engineering standpoint, and to organize a traffic control service on the routes. At the first opportunity, routes for moving up to the lines of deployment must be studied by the commanders of the PTURS subunits until the actual departure of the individual launching mounts.

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Night battles and engagements acquire great significance under the conditions of modern troop operations. Thorough organization of PTURS operations is necessary for success in combat with enemy tanks at night.

Before nightfall, the commanders of PTURS subunits must study the terrain held by the enemy, and their own missions; designate reference points and determine their distance; define in greater detail on the terrain the disposition of their troops in the primary and secondary fire sectors, the missions of the cooperating antitank weapons, and coordinate with them the procedure for requesting and conducting fire.

The commanders of PTURS subunits must also study thoroughly the routes for maneuver in the course of battle and must carry out their preparation for a night maneuver.

Special attention must be given to the organization of uninterrupted illumination of the terrain in the zone of enemy tank operations. Commanders of PTURS subunits must know who is called on for the illumination of the terrain and how to submit a request for fire. For this purpose, a plan of the illumination of the terrain for the area with which they are concerned, worked out by the division staff, is sent to them.

The Firing of PTURS

The difference between guided missile fire and the fire of other weapons is that the trajectory of a missile can be changed in flight, thus eliminating aiming errors and the effect of external factors on the deviation of the missile from its target. This all considerably increases the accuracy of fire and, consequently, the effectiveness of PTURS fire. Moreover, the ability to control the flight of a missile after its launching, essentially changes the content of a number of questions in the theory and practice of firing, by comparison with corresponding questions in the theory and practice of firing, by comparison with corresponding questions of firing a free-flight projectile.

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The flight of a PTURS is controlled with an appropriate control system, which is an aggregate of instruments, determining the position of target and missile and introducing the necessary corrections into the flight trajectory of the missile. Consequently, the nature of the control of a missile in flight is determined primarily by the instruments of the control system and by its technical capabilities.

Remote control (telepravleniye) is used in the PTURS examined in this article.

Control of the movement of a missile which is executed at a distance from the control point, is called remote control. The position of the target and of the missile is determined at the control point and on this basis the necessary commands are worked out. During the entire flight time, contact is maintained between the control point and the missile.

The control system of the PTURS includes:

-measuring devices which determine the position of the target and of the missile or the deviation of the missile from the target during the entire flight time to the target;

-computing (schetno-reshayushchiy) devices which work out the command on the basis of data from the measuring devices;

-control devices which change the position of the missile's steering mechanism (rul) in accordance with a received command;

-stabilizing devices which ensure the missile's flight in a prescribed direction.

In remote control, the elements of the control system are located separately: the measuring and computer devices at the control point¹ and the control and stabilizing

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1. The control point can be located on the launching mount or can be portable.

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devices on the missile. Radio or wire links are established between the elements of the control system located at the control point and those on the missile.

The degree of automation of the system of remote control of the PTURS can be varied. At the present time, non-automated control systems (systems with manual control), as the most simple and economical, have been widely used. The commander-operator of the launching mount controls the missile in flight. This to some extent simplifies the control process but at the same time it imposes on the operator great responsibility for the results of each firing. Insufficient training of the operator, fatigue, and difficult external conditions decrease the effectiveness of PTURS fire greatly. Therefore, particular attention must be given to the selection and training of commander-operators of PTURS mounts.

During the control of a missile's flight, the operator performs the following operations:

- he observes and estimates the relative positions of the missile and target;
- on the basis of the results of his observation, he determines the command for guiding the missile to the necessary trajectory and holding it on this trajectory;
- he transmits the command to the control instruments of the missile.

Impact of the missile on a moving target can be achieved from various trajectories, depending on the technical data of the missile, the instrumentation equipment of the control system, the nature of the target's movement, the terrain, and the possibility of carrying out practical aiming.

Guiding the PTURS to a target is executed on two planes:

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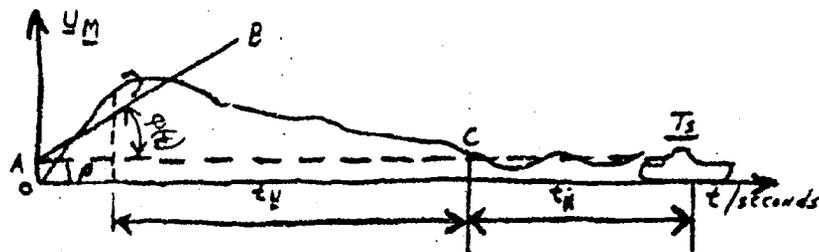
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a. On the vertical plane passing through the control point and the target (longitudinal aiming);

b. On the plane passing through the control point and the target and the perpendicular plane of the longitudinal aiming (lateral aiming).

In firing the PTURS, it is most difficult to carry out aiming on the vertical plane, since the guidance of the missile to the target cannot begin immediately after it has left the launching rails, since, when it has an air steering mechanism, it becomes controlled only when it attains a certain speed. So that the missile does not crash to the ground immediately on leaving the launching rails because of the delay in beginning control and because of the existence of trajectory dispersion, its launching on a vertical plane is carried out at a certain angle of elevation, Q . During movement in the initial (uncontrolled) sector of the trajectory, the missile travels 80 to 100 meters and rises to an altitude averaging 5 to 8 meters (Sketch 4). Control of the flight of the PTURS begins approximately 1 second after launching.

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A - position of the observation device (sight)

Sketch 4. Diagram of the trajectory of a PTURS on a vertical plane.

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The most advisable method of guiding the remotely controlled PTURS to a target on the vertical plane, is a combined method based on the successive employment of the angle method (uglovoy metod) and the target straddling method (metod nakrytiya tseli) (the three-point method). Initially, the angle method is employed in the guidance sector during the time t_u , and the target straddling method is used in the final sector of the trajectory during the time t_n (Sketch 4).

The essence of the angle method of guiding the PTURS to a target is that, during the time of its movement, the missile must be held on beam AB (Sketch 4), comprising the variable angle $\phi(t)$ from the target sighting line ATs. During the time of movement of the missile the angle $\phi(t)$ changes in such a way that at the transition to guidance by the target straddling method, it equals zero.

The target straddling method is based on the fact that during the time of its movement, the missile must be located on the target sighting line ATs, i.e., at every moment of time, the control point, the missile, and the target must lie on a single straight line (another name for this method is derived from this -- the three point method).

Before firing, the operator must determine the moment when the transition from the angle method of guidance to the target straddling method should be carried out. The guidance of the missile to the target by the target straddling method must take the minimum time. This is explained by the fact that a missile under the influence of various factors may be deflected from its assigned direction and, at a low flight altitude, may crash to the ground. The likelihood that the missile will crash to the ground is greater when the time during which it is guided at a low altitude is longer.

In firing the PTURS against a tank, the center of the visible configuration of the tank is usually taken as the aiming point. On the average, the height of the aiming point above the surface is 2.8 to 3.0 meters.

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By tests and theoretical calculations it has been established that the time during which a missile is guided by the target straddling method with the aiming point at the above height, can be from 0.5 to 5 seconds, depending on the range.

It was noted above that the guidance of the missile when control starts after launching is carried out by the angle method. The time for which a missile is guided by this method depends on the range; the greater the range, the longer the time. In practice, guidance by this method consists of a gradual lowering of the missile to the height of the aiming point.

The changeover from one method of guidance to another is not carried out instantaneously, but takes some time. During the time of movement in the transitional period the missile must take a position which is determined by the subsequent method of guidance. The average duration of the transitional period for the modern models of remote-controlled PTURS is 3 to 4 seconds. Therefore, in practice, when firing at a range of up to 1,000 meters, guidance is carried out by the target straddling method. When firing at a range of from 1,000 to 2,000 meters, guidance of the missile during the first 5 to 9 seconds is carried out by the angle method and subsequently by the target straddling method.

Guidance of a missile in a lateral direction is carried out only by the target straddling method. Here, longitudinal and lateral aiming can be conducted both simultaneously and consecutively. In guiding the missile to a target, the operator works as follows:

-when firing at a range of up to 1,000 meters, he immediately directs the missile toward the outline of the target and holds it near the aiming point during the entire flight time;

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-when firing at a range greater than 1,000 meters, he lowers the missile to the height of the aiming point gradually, in order to hold it at the height of the aiming point for 2 to 5 seconds before contact with the target; when there is a significant lateral deviation, the missile is lowered to the height of the aiming point after it has been guided to the target laterally.

It should be kept in mind that while firing the PTURS, deviations from the target of individual missiles, which lead to firing errors, are not precluded. The factors causing the PTURS to deviate from a target are varied in their nature. When the control devices are working perfectly, deviations can occur, because the system for controlling the missile in flight cannot ensure precise achievement of the required trajectory of movement. Such deviations in the control of a missile's movement are called dynamic errors. Another group of errors in firing guided missiles includes deviations resulting from inaccurate measurement of various magnitudes, imperfect working of the control system devices, errors in the work of the operator, accidental deviations of the various parameters of the missile, and accidental disturbances affecting the missile during its flight and launching. These errors in the firing of guided missiles are called accidental errors.

The accuracy of the modern models of remote-controlled PTURS is represented by the following average errors, in altitude $E_n = 0.3$ to 0.5 meters and in direction $E_n = 0.6$ to 0.8 meters.

The greater accuracy in guiding the PTURS by altitude is explained by the fact that the operator, in preventing the missile from crashing to the ground, gives primary attention to the altitude of the missile during guidance.

In order to eliminate a number of accidental errors, extremely thorough training of commander-operators of combat vehicles and the execution of a number of measures in preliminary preparation for firing are necessary.

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Preliminary preparation for firing the FTURS includes:

- reconnaissance and study of the terrain in the primary and secondary fire sectors;
- clarification or selection of reference points and determination of the distance to them;
- preparation of the missiles and observation devices, and control of the launching mount;
- the compilation of a range card (kartochka ognya) for the launching mount.

Reconnaissance and study of the terrain are conducted by the forces of the launching mount crew. In the course of reconnaissance and study of the terrain, the following are determined:

- the most probable directions of movement of enemy tanks;
- the sectors of the terrain which are out of view and the distances to the nearest and furthest boundaries of these sectors;
- the position on the terrain of the line corresponding to the minimum range of fire and the near limits of fire ahead of which enemy tanks cannot be observed;
- the routes of movement up to the firing position, if the launching mount is located at the assembly position.

In studying the terrain, a map must be used.

The range card (Sketch 5) is compiled by the commander-operator of the launching mount. The following are indicated on it:

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-the station (tochka stoyaniya) of the launching mount;

-the reference points, their numbers and their distances;

-the line of the minimum range of fire;

-the primary and secondary fire sectors.

-the near limits of fire ahead of the sectors which are out of view and the distances to them;

-the stations of the weapons operating in coordination with a given launching mount and their fire sectors.

It is advisable to indicate the distances to the reference points and the near limits of fire on the fire chart in missile flight times (rounded off in full seconds).



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In the conduct of fire against tanks by a PTURS platoon or battery, each launching mount is assigned an individual target. After receiving the target, the commander-operator determines the missile's flight time, aims the launching mount in the direction of the target, and then fires.

Proper aiming of the launching mount at the target before firing facilitates the work of the operator and ensures greater reliability in the performance of the mission. Since a missile is controlled in its trajectory, aiming can be carried out visually with sufficient accuracy.

Some Problems of the Combat, Materiel, and Engineer Support of the Operations of PTURS Subunits

Reconnaissance in the interests of the combat use of PTURS subunits, is conducted with the aim of establishing the nature and possible operational axes of enemy tanks, the lines for their deployment in combat formation (departure lines), the time for the beginning of an attack, and the expected number of tanks in each of the possible operational axes.

In addition, the task of reconnaissance includes: study of the terrain and relief, determination of the radiation and chemical situation in the areas of the PTURS combat formations, and observation of the position and operations of friendly troops and of the results of the fire of the launching mounts.

The commanders of PTURS subunits are responsible for the organization and conduct of reconnaissance. The commanders of batteries and platoons must personally conduct reconnaissance of the enemy and the terrain, and must also supervise the operations of their troops and the results of the fire of the combat vehicles. They must: assign missions to commander-operators for the conduct of reconnaissance; organize continuous observation in the

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platoons along the axes of possible enemy tank operations in order to give the command in good time to repel their attacks. If the launching mounts are located at assembly positions before the beginning of combat, reconnaissance from the area of the firing positions is carried out by specially assigned observers. The observers must have means of communication to transmit a signal at the appearance of enemy tanks.

PTURS subunits possess extremely limited capabilities for the conduct of reconnaissance, especially for the conduct of reconnaissance of the operations of enemy tanks before the beginning of their combat operations. Reconnaissance data must therefore be obtained by the forces and means of the combined-arms, artillery, and air reconnaissance elements and must be conveyed in a timely manner to the commanders of PTURS subunits.

Radiation and chemical reconnaissance on behalf of the PTURS subunits is conducted by chemical observation posts, assigned by the commanders of the antitank reserves, or by the combined-arms commanders. On the march, it is conducted by the forces of the PTURS subunits.

The security and self-defense of PTURS subunits are organized by the commanders of the batteries and platoons in all cases, independently of measures undertaken by the chiefs and commanding officers under whose subordination these subunits are located.

In organizing security and self-defense, the commanders of subunits must provide for all-around observation which should, as a rule, be charged to those spotting for enemy tanks. In addition, they must determine the order for operations by the personnel in destroying enemy infantry and tanks which have broken through to the location of the subunit, making use of personal small arms and organic antitank hand grenade launchers (RPG-2) (ruchnoy protivotankovyy granatomet).

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However, for security and self-defense, measures undertaken by the commanders of PTURS subunits should not be considered sufficient. While conducting fire against enemy tanks, the crews of the combat vehicles cannot be diverted to the performance of other tasks. Therefore, a number of measures for the security and defense of the PTURS subunits operating in the complement of the antitank reserves or of the combined-arms subunits (units), must be taken by the chiefs of the reserves or by the respective combined-arms commanders. They must assign missions to the antitank fire weapons, operating in coordination with the PTURS subunits, for the destruction of enemy tanks and infantry in the dead zone of the launching mounts, and must make extensive use of engineer antitank and anti-infantry obstacles in the areas adjacent to the combat formations of the PTURS subunits.

Protection of the PTURS subunits from nuclear weapons and other weapons of mass destruction is organized along normal lines.

The camouflage of combat operations of PTURS subunits has great significance for the successful performance of tasks. The camouflaging properties of the terrain and local means must be used primarily to camouflage the launching mounts and the PTURS subunits as a whole, when they are occupying combat formations. The mobile nature of the operations of PTURS subunits greatly restricts the use of artificial camouflage materials. However, in a number of cases when they are operating on open terrain, standard (tabelnyy) means of camouflage, in particular, camouflage nets, can be used. Under these conditions, such a method of camouflage as artificial scarring of the terrain (iskusstvennoye raspyatneniye mestnosti), can be employed especially in combination with the use of camouflage nets.

The materiel support of PTURS subunits is organized by the commanding officers or the chiefs under whose subordination they operate. Of all the questions of materiel support of the combat operations of PTURS subunits, the transport of munitions and the provision to the launching mounts of fuel and lubricants are of paramount significance.

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The existing models of launching mounts carry with them 4 to 6 missiles each. It will therefore be repeatedly necessary to reload them during battle and this, as a rule, is carried out at the assembly positions, i.e., away from the firing positions. In these places, it is advisable to create the requisite stockpile of missiles, which must constantly be replenished. The commanders of PTURS subunits must make timely reports on the expenditure of munitions and the requirements for it and for other types of materiel support, particularly for fuel and lubricants.

Missiles, fuel, and lubricants for the servicing of the launching mounts are transported by the transport of those units in which the PTURS subunits are organizational components. The organic PTURS subunits of motorized rifle battalions are supplied by the regiment's transport.

Depending on the situation, missiles are brought up by this transport from battalion or army depots either to the assembly positions of the platoons or directly to the firing positions. The servicing of the launching mounts is carried out at their disposition areas.

During a march, PTURS subunits must have, besides the missiles on the launching mounts, a reserve of not less than two loadings for each launching mount. This reserve is brought up either by the transport of the unit in which the PTURS subunits are organizational components or by the transport of the motorized rifle regiments and divisions.

Engineer support of the operations of PTURS subunits includes:

- engineer preparation of combat formations;
- the preparation of approach routes to the firing positions and routes for the maneuver of the PTURS subunits;
- the installation of explosive and mine obstacles in support of the operations of the PTURS subunits.

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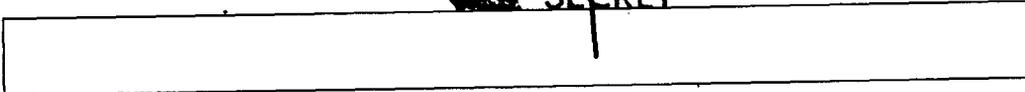
The engineer preparation of combat formations of PTURS subunits must ensure a reduction of the effects of the destructive factors of nuclear weapons on personnel and materiel. The fulfilment of this general requirement is achieved by the maximum use of terrain conditions, and also by the preparation in the area of the assembly positions of shelters for the personnel and of appropriate trenches (pits) for materiel.

In the majority of cases the construction features of the launching mounts and the necessity for all-around fire, do not permit their firing positions to be prepared with regard to antiatomic protection. The depth of the trench for a launching mount at the firing position for firing in any direction cannot exceed 0.8 to 1.2 meters, or firing becomes impossible. On terrain where the use of tanks by the enemy is limited and where there is no necessity for all-round fire, firing positions can be prepared with regard to antitatomic protection. In this case, the ability to fire only in the primary fire sector of the launching mount is provided for.

In all cases, if time permits, it is necessary to carry out engineer preparation of firing positions. Even the small depth of the trench (not more than 0.8 to 1.2 meters) reduces the effect of the return fire of enemy tanks and artillery to a significant degree (15 to 20 percent).

In the absence of time, engineer preparation can be limited to the preparation of platforms for the launching mounts to ensure that they can turn to fire in any direction, and to the digging of slit trenches for the protection of personnel.

Explosive and mine obstacles in the form of antitank minefields supporting PTURS operations are set up to cover their combat formations and to ensure the most advantageous conditions for inflicting destruction on enemy tanks. With this aim, it is advisable to



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establish two belts of antitank minefields: one at a distance of 1.2 to 1.5 or 1.5 to 2.0 kilometers from the firing positions of the launching mounts, depending on the type of PTURS, calculated so that the enemy tanks in front of the minefield will be located in the zone of the most effective fire; the other, in front of the dead zone of the launching mounts, so that it covers the firing positions and, at the same time, ensures effective conduct of fire by the antitank weapons operating in coordination with the PTURS subunits.

The principles stated in this article on the use of the PTURS were determined as a result of scientific-research work and experimental combat firings which have been conducted. These principles must therefore be used, not as a matter of routine, but with regard to the experience accumulated in the troops and the specific conditions of a situation.

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