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The Destruction of Enemy Free Rocket Launching Positions

by

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One of the main means in the armies of our possible enemies for the delivery of nuclear warheads is free rockets (neupravlyayemyy reaktivnyy snaryad - NURS) of "Honest John" and "Little John" type, and also the "Lacrosse" guided missile (upravlyayemyy snaryad - URS), which are intended for the tactical support of troop combat operations.

These free rockets form a component part of the armament of the batteries of battalions (divizion) of infantry (armored) divisions, and of the separate battalions (divizion) of the Reserve of the High Command (rezerv glavnogo komandovaniya - RGK). The launching positions of the batteries in the composition of the divisions are positioned 6 to 8 km behind the forward edge in an offensive, and from 8 to 12 km in defense; the positions of the batteries in the composition of an RGK battalion are comparatively positioned at 8 to 10 km, and 10 to 12 km.

Rocket launchers (reaktivnaya ustanovka) are used independently as well as in the composition of a battery. If several launchers are disposed on one position, they are placed not nearer than 200 m to each other. The preparation of the positions lies mainly in camouflage work and the preparation of access routes.

As a rule, the rocket launchers are moved up to their positions just before fire is opened, and after one or two launchings (vystrel) they are immediately withdrawn to alternate positions (zapasnaya pozitsiya) or to the assembly area (vyzhydatelnyy rayon). The total time

that they are at the launching position from the moment of arrival to the beginning of departure can be 30 to 40 minutes, and from the moment of concluding fire to withdrawal from the position - 10 to 15 minutes.

Therefore, rocket launchers, which are intended mainly for firing atomic warheads, must be destroyed immediately in order to deprive the enemy of the possibility of firing from them again.

The most reliable means of destroying the launchers is undoubtedly atomic ammunition and aircraft, though sometimes conventional artillery is used to destroy them.

As is known, conventional artillery carries out neutralizing and destructive fire. Neutralizing fire can only temporarily hold up firing from a rocket launcher or its withdrawal from the position. Therefore, neutralizing fire should only be resorted to as a temporary measure, to be undertaken until an atomic strike is inflicted or until the target's destruction is entrusted to aviation. If it is impossible to make use of these means, then conventional artillery is called upon to bring down destructive fire. Analysis has shown that for carrying out fire for effect against rocket launchers it is best to make use of 122, 130, and 152 mm artillery.

For guns of this caliber it is best to select firing positions 6 to 8 km from the forward edge. Consequently, taking into account the distance of the NURS launching mounts from the forward edge, it can be estimated that the average range of fire for effect against rocket launchers will be 16 km.

Preparation of settings (ustanovka) to fire for effect.

When firing at long ranges, changes in the accuracy of setting preparations for conducting fire for effect have a great bearing on variations in ammunition expenditure. Consequently, if the density of artillery is small, then the necessity to destroy the rocket

launchers forces one to search for and develop those methods of preparation which would facilitate the sudden destruction of a target in any conditions of weather and at any time of the day or night with the minimum expenditure of forces and weapons.

One of the most accurate methods of determining settings, which will at the same time ensure surprise in the opening of fire for effect, is that of full preparation. However, as tests show, neutralizing fire and especially destructive fire against rocket launchers with high-explosive fragmentation shells involves an enormous expenditure of ammunition, and therefore cannot be used extensively. The expenditure of ammunition can, however, be reduced by carrying out adjustment of fire with the help of radar stations. Moreover, the most effective reduction in the expenditure of ammunition is achieved with fire at ranges close to the maximum ones.

Great accuracy in preparing settings and, consequently, economy in the expenditure of ammunition, is achieved when, in determining corrections with the help of radar stations, the accuracy weight (ves tochnosti) of full preparation is taken into account, the accuracy of corrections being equal in this case to:

$$E_{s\ /?/} = \sqrt{E_{\theta}^2 \frac{(E'_{pp})^2 \cdot (E'_{p})^2}{(E'_{pp})^2 (E'_{p})^2}} \qquad (1)$$

where E_{θ} is the average error in determining various factors, which are common both to the carrying out of full preparation and to adjustment of fire with the help of a radar station;

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E'_{pp} and E'_{p} are the average errors, characterizing respectively the accuracy of full preparation and the adjustment of fire on a target with the help of a radar station without taking into account the characteristics of accuracy in determining the general sources of error.

The amount of the correction determined when the accuracy weight of full preparation is taken into account, is equal to:

$$-X = \frac{d.E_{pp}^2}{E_{pp}^2 \quad E_{p}^2} \qquad (2)$$

where d is the deviation of the center of the shell grouping according to data from the radar station;

E_{pp} and E_{p} are the average errors, characterizing respectively the accuracy of full preparation and the adjustment of fire on a target with the help of a radar station.

Tests show that the amount of the corrections, calculated in accordance with formula (2) is, in the majority of conditions of fire, equal as regards range to three-quarters, and as regards direction, to one-half of the amount of the average deviations determined by the radar station.

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However, successive adjustment of fire of a rocket launcher by the basic guns of all batteries of a battalion with the help of a radar station, though providing great accuracy, cannot be regarded as advisable, for it does not ensure surprise of destruction, requires a lot of time, and leads to low density of fire. All this allows the enemy to put our launcher out of action. Therefore, it is essential to make use of the capability of radar station type "ARSOM" for determining with great accuracy and in the minimum time the deviations of the shells from a target by firing battery salvoes and then to continue firing with such salvoes.

The corrections, determined by taking into account the accuracy weight of full preparation in accordance with the intersection (zasechka) of one or two salvoes when firing for effect is started, can be regarded as advisable for all the batteries of a battalion. By taking into account these corrections, the accuracy of preparation of launcher settings in the batteries which have not adjusted on the target, is essentially increased. This has been confirmed by tests.

The expenditure of shells and the number of guns necessary for destroying a rocket launcher. As mentioned, rocket launchers are disposed on positions in a dispersed way. Consequently, firing for effect against a launcher means firing at an individual target.

The index to the effectiveness of fire for effect against a rocket launcher is the probability of getting even one hit on a target (in the dimensions of a target mentioned above). Therefore, the expenditure rate of shells is determined by the possibility of achieving even one hit.

The amount of artillery necessary for carrying out the fire mission also has important significance. Less shells and fewer guns will naturally be required for the neutralization of a rocket launcher than for the destruction of it.

In the course of neutralizing rocket launchers, when shells hit within the zone of their fragmentation action, the members of a launcher's crew who are preparing it for firing and are standing up not under cover, can be put out of action.

We have calculated the rate of shell expenditure in one minute and the number of guns necessary to neutralize a rocket launcher in the time allowed for neutralization. The results of our calculations are given in Table 1.

Table I

Expenditure of shells in one minute, and the number of guns necessary for neutralizing a rocket launcher

Method of Preparation	Time for neutralization	30 minutes									
	Range (km) / Caliber (mm)	12		16		20		24		26	
		Expenditure of shells	Number of guns	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns
Full preparation	122	9	4	13	5	21	8	35	14	-	-
	130	7	3	12	6	19	9	31	14	38	17
	152	6	3	12	6	19	9	-	-	-	-
Determining correction at opening of fire with help of a radar station	122	12	5	12	5	12	5	15	6	-	-
	130	10	5	10	5	11	5	13	6	14	6
	152	8	4	10	5	11	5	-	-	-	-

As illustrated in the table, the determination of corrections when fire for effect is opened, with the help of a radar station, enables one to reduce the expenditure of ammunition and the number of guns considerably as compared with full preparation. Here, for the neutralization of a rocket launcher in 30 to 60 minutes, the corresponding requirements are one to two batteries.

The expenditure of shells, and also the number of guns brought in for destroying a rocket launcher in 30 minutes, are given in Table 2. The table shows that for the destruction of a rocket launcher by means of conventional artillery, a considerable expenditure of ammunition is required, especially when using data of full preparation.

The determination of corrections when fire for effect is opened with the help of a radar station at ranges greater than 16 km enables one to reduce the expenditure of ammunition and the number of guns used by 1.5 to 2.5 times. The task of destroying a rocket launcher can be accomplished by one battalion.

Order of conducting fire while firing for effect at rocket launchers. Settings for firing for effect are determined on the basis of full preparation. One of the batteries of a battalion opens fire in battery salvoes on the computed setting of the sight. After the firing of each salvo, a report is conveyed from the firing position to the radar station. On the basis of the intersection of one or two salvoes by the radar station, a common correction is given for all the batteries of the battalion and fire for effect is continued. After the general correction has been given, the settings of the remaining batteries are mademore precise in succession. The corrections given are equal in range to three-quarters, and in direction, to one-half, of the amount of the average deviations determined by the radar station. Fire is conducted on three sight settings with a jump of 2 to 4 VD /possibly vertikalnoye dvizheniye - vertical movement/, and on one azimuth mechanism setting with a sheaf interval of 0-02.

Let us examine one of the possible variants in the order of giving corrections to settings with the help of a radar station while in the process of firing to destroy an enemy rocket launcher.

Table 2

Expenditure of shells and the number of guns necessary for the destruction of a rocket launcher

Type of Launcher	Method of Preparation	Range, km	Time of destruction 30 minutes									
			12		16		20		24		26	
		Caliber, mm	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns	Expenditure of shells	Number of guns
Honest John	Full preparation	122	500	7	950	12	1600	21	2600	33	-	-
		130	480	7	910	12	1480	21	2350	34	2900	42
		152	470	7	850	12	1460	21	-	-	-	-
	Determining correction at opening of fire with help of a radar station	122	660	9	760	10	900	12	1100	14	-	-
		130	640	9	720	11	830	13	990	15	1000	16
		152	620	9	680	10	810	12	-	-	-	-
Little John	Full preparation	122	850	11	1600	20	2600	33	4300	54	-	-
		130	800	12	1520	22	2500	36	3900	56	4750	68
		152	790	12	1400	20	2300	34	-	-	-	-
	Determining correction at opening of fire with help of a radar station	122	1100	14	1250	16	1460	20	1300	23	-	-
		130	1050	15	1200	18	1380	20	1600	24	1650	25
		152	1040	15	1100	16	1300	19	-	-	-	-
Lacrosse	Full preparation	122	440	6	870	11	1480	19	2500	32	-	-
		130	360	6	810	12	1370	20	2200	32	2750	39
		152	390	6	750	11	1290	19	-	-	-	-
	Determining correction at opening of fire with help of a radar station	122	580	8	690	9	830	11	1050	13	-	-
		130	480	8	650	10	770	11	930	14	950	15
		152	510	8	600	9	720	11	-	-	-	-

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A battalion of 130 mm guns ("Don") was given the following task: within 30 minutes to destroy the enemy's rocket launcher "Honest John" - target No. 101.

The battalion commanding officer ordered his chief of staff to determine the settings for firing for effect on the basis of full preparation, and with the opening of fire to make them more precise with the help of radar station "Leningrad".

At the battalion's headquarters, the following were determined: the settings for firing for effect; the order of conducting fire; the initial data for the radar station, and data as to the point when accompanying fire begins (for the lst battery).

When the data were ready, the battalion commanding officer gave the command: "'Don', ready (stoy)! Target No. 101, charge two (zaryad vtoroy), angle of elevation (uroven) 30-04, scale two (shkala dva), main direction (osnovnoye napravleniye), sheaf (veer) 0-02, one round (odin snaryad), volley (beglyy), load.

First, sight (pritsel) 328, right (praveye) 0-52.

Second, sight 332, right 0-82.

Third, sight 330, right 1-32.

"'Leningrad', observe salvo firing of first battery 16150, 30-85, charge two, time of flight 47, height of trajectory 2930. Beginning of accompanying fire 7120, 30-75."

After the chief of the radar station reported that he was ready, the battalion commanding officer commanded: "First, sight 328, two rounds at 50 seconds, by salvoes. 'Don', fire!".

After each intersecting salvo (firing), the chief of the radar station reported the amount and marks of the deviations to the battalion headquarters:

"'Don', first - plus 220, right 13; second - plus 180, right 11."

In battalion headquarters they calculated:

-average deviation on basis of two rounds: plus 200, right 12;

-amount of correction: 200:3/4 = - 150 m and -0-12.$\frac{1}{2}$ = -0-06.

The battalion commanding officer gave the command: "'Don', ready! sight minus 3, left 0-06, six rounds, volley, six rounds at 12 seconds, fire!"

"'Leningrad', observe fire of second battery 16250, 30-42, beginning of accompanying fire 7240, 30-35.

"Second, ready! Sight 329, two rounds salvo fire (after the report of readiness from the 2nd battery and the radar station), fire!"

After a correction has been given to the second battery, the settings for the 3rd battery are made more precise in the same way. Subsequently, firing is conducted in the normal way.