

Project "People's Translation"

GUIDELINES

FIGHT AGAINST UNMANNED AIRCRAFT IRANIAN MADE

"KAMIKAZE" "SHAHED-136" ("GERANIUM-2")



Originally issued by the Ukrainian Armed Forces (VP 7-(01).03.01) in October 2022.

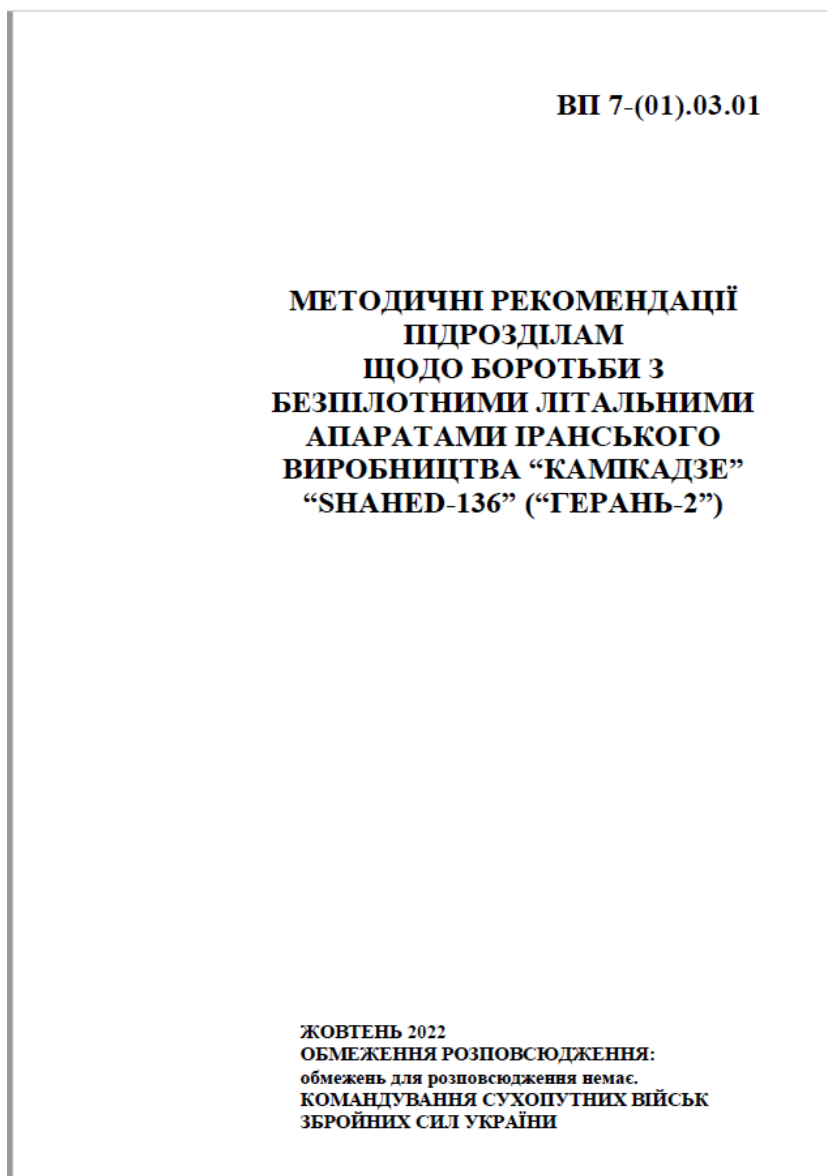
Translated unofficially into Russian in November-December 2022.

No distribution restrictions.

This manual was published for the first time by the Command of the Ground Forces of the Armed Forces of Ukraine in 2022 in the Ukrainian language, without restrictions on distribution.

Approved by the Acting Commander of the Ground Forces of the Armed Forces of Ukraine, Lieutenant General Alexander Pavlyuk.

Original cover:



Translated into Russian by the participants of the People's Translation project.

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1. DESCRIPTION OF THE SHAHED-136 UAV

1.1. Main performance characteristics



Rice. 1- UAV launch from a mobile launcher.

The Shahed-136 kamikaze-type UAV is designed to engage ground fixed objects by targeting and contact detonation of the UAV warhead. Manufacturer - Shahed Aviation Industries Research Center. The vehicles are launched from a mobile launcher (hereinafter referred to as PU), disguised in the back of a civilian truck. The launcher can launch up to five UAVs in one gulp.

Range of flight	up to 1500 km
Guidance system	inertial
Flight altitude	from 60 to 4000 m.
Airspeed	about 180 km/h
Length	3.3 m
Wingspan	3m.
UAV weight	200 kg
Mass of high-explosive fragmentation warhead	40 kg
Engine	MD 550

1.2. Advantages and disadvantages

1.2.1. Advantages of Shahed-136 UAV

- long range of "kamikaze drones"Shahed-136" allows it to be used to destroy fixed targets in the depths of the territory of Ukraine;
- the possibility of carrying out preparation for launch in the field due to downloading a flight task using a portable computer (laptop, tablet).

1.2.2. Disadvantages of the Shahed-136 UAV

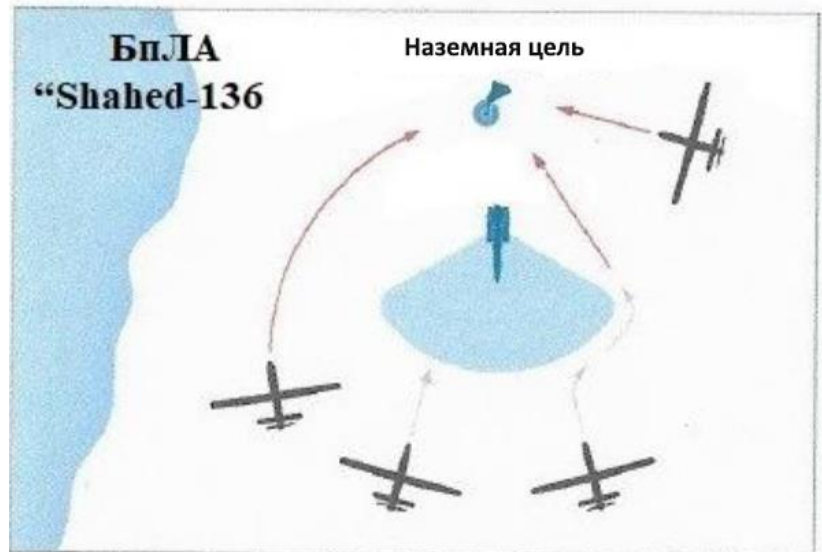
- tactics of use does not provide for the destruction of moving targets. WITH in order to reduce the probability of defeat, it is necessary to intensify the movement of military equipment, which is a high-priority target for the Russian Federation (MLRS HIMARS, air defense systems, electronic warfare, artillery systems, etc.);
- design limitations. UAV type "kamikaze"Shahed-136" are not equipped with communications, which makes it impossible to control them in real time, change the flight mission, and the like;
- warheads are less powerful than other Russian high-precision weapons. To hit one target, it is usually necessary to use several UAVs.

The UAV, in terms of its effective dispersion surface, large size and loud engine operation, is a fairly noticeable object for detection (visually and acoustically), tracking and destroying it with fire weapons.

1.3. The main applications of the UAV

1. bypassing the affected areas of air defense systems, see Fig.2.
2. strikes with a large number of kamikaze-type UAVs, see fig. 3.

Rice. 2- Zone Bypass
enemy air defense



Rice. 3- Striking
a large number of UAVs
kamikaze type



1.4. Detection of UAVs of the "kamikaze" type

In order to reduce the probability of hitting enemy kamikaze-type UAVs, it is necessary to ensure their timely detection, for which it is necessary:

- deploy a system of visual observation posts;
- to detect kamikaze-type UAVs at night on each visual observation post to have night vision devices, searchlights (powerful lights), thermal imagers;
- provision of visual observation posts with main and backup means of communication for the timely transmission of information about the passage of UAVs of the "kamikaze" type.

2. PROCEDURE FOR DESTRUCTION OF UAV TYPE "KAMIKAZE"

To combat UAVs of the "kamikaze" type, at each platoon stronghold, checkpoint, and at the locations of personnel, appoint fire groups to counter unmanned aerial vehicles consisting of: 1 machine gunner, 3-4 gunners armed with AK-74. If there is a sniper, include him in the fire group.

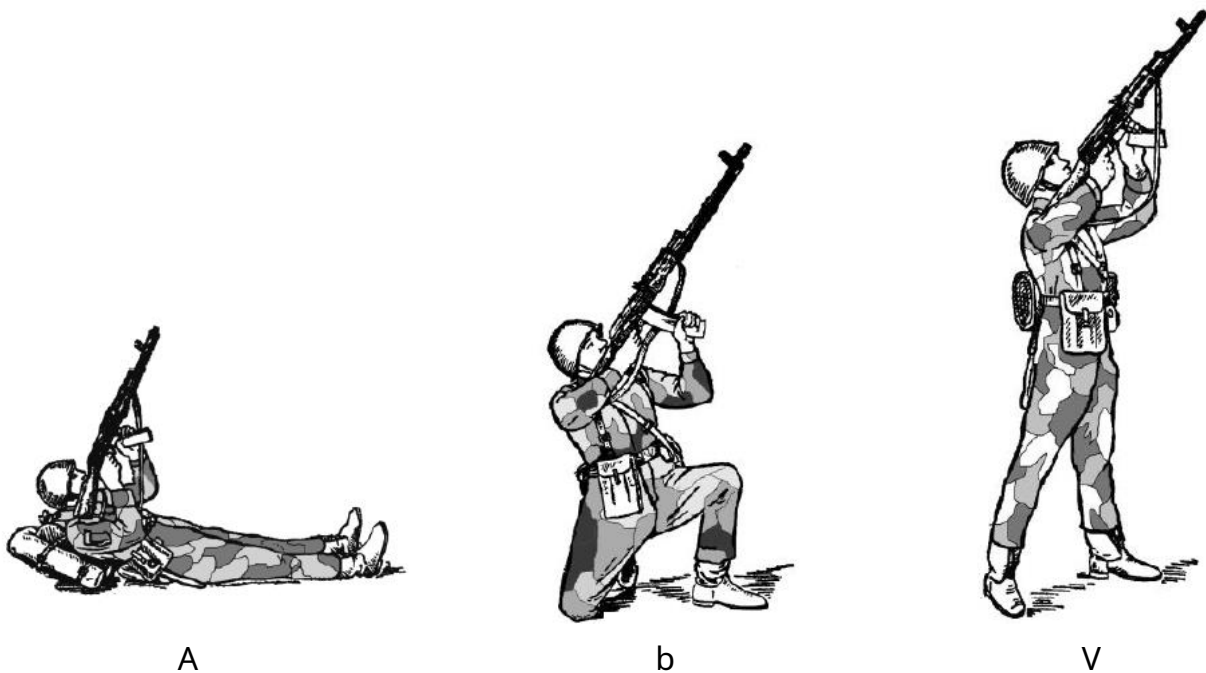
To defeat UAVs of the "kamikaze" type, assign fire weapons on duty:

- at altitudes up to 400 m - concentrated fire from small arms;
- at altitudes up to 1500 m - use of DShK machine guns (BROWNING, coaxial machine guns "Maxim", anti-aircraft gun ZU-23);
- on reconnoitered and probable routes of flight of enemy strike UAVs organize ambushes with DShK crews (ZU-23, BROWNING, coaxial machine guns "Maxim").

2.1. Shooting techniques for air targets

Shooting from a machine gun (machine gun) at air targets is carried out from the prone, kneeling and standing positions (Figure 1.1).

For shooting, if possible, use local objects as an emphasis (spire, tower fencing, handrails, etc.) and take a position for shooting as convenient (standing, half-bent, kneeling).



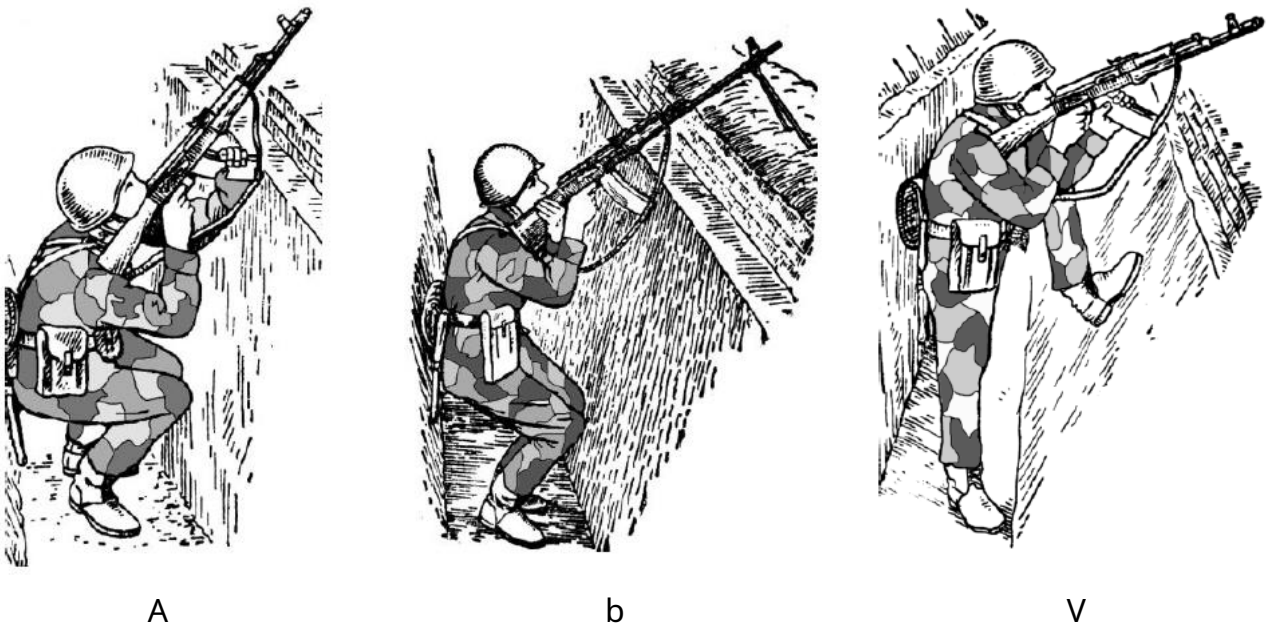
Legend:

a - lying down; b - from the knee; in - standing

Rice. 4 - Position when firing at air targets.

Shooting at air targets to conduct:

- with the emphasis of the forearm of the left hand and the magazine of the machine in the object, located on the deck (with the installation of a machine gun bipod on the spire, turret railing, handrail, etc.); if the angle of elevation is insufficient, then sit down (Figure 4 a, b);
- with back and left foot resting on objects located on the upper deck: raise the left leg as high as possible and rest its foot on the object, and lean with your back against the opposite wall and sit down slightly. Hold the machine gun (machine gun) in the same way as when shooting while standing, but rest the elbow of the left hand on the thigh of the left leg or put it slightly forward behind the knee (Figure 4 c).



Legend:

a - with the machine resting with the magazine against the front wall; b - from a machine gun from a bipod;
in - from the machine from the hand.

Rice. 5 -Position when firing at an air target from a trench.

Fire from machine guns (machine guns) at air targets is carried out as part of a group, team, squad, combat crew at a distance of up to 500 m with the installation of a sight 4 or "P".

A UAV flying to the side or above a submachine gunner (machine gunner) is fired in a barrage or escort manner.

2.1.1. Barrage method of firing at UAVs

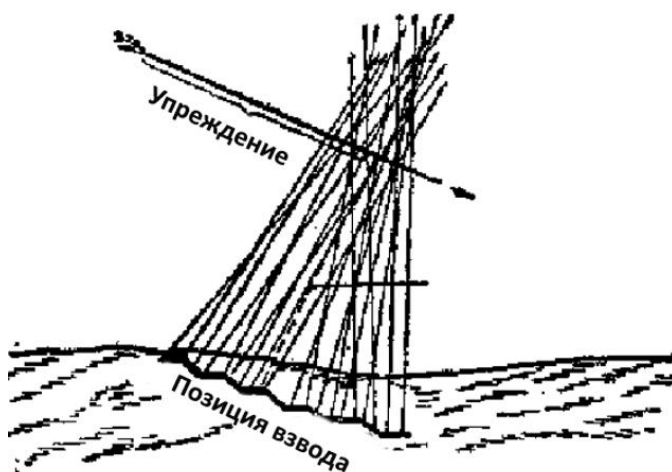
When firing in a barrage way, the fire of the squad or platoon is concentrated at the command of the commander in the direction of movement of the approaching UAV (Fig. 6). In the direction indicated in the command, the submachine gunner (machine gunner) gives the machine gun (machine gun) an elevation angle of approximately $45^\circ - 60^\circ$ and opens fire, holding the machine gun (machine gun) in this direction. Shooting is carried out with continuous fire until the UAV leaves the fire zone, or it is destroyed.

If the submachine gunner clearly sees the direction of the tracks of his machine gun (machine gun) near the target, then he must, without stopping firing, slightly move the machine gun (machine gun) in the direction of the target's flight, achieving alignment of the tracks with the target.

When adjusting fire on the paths, it should be borne in mind that the paths aimed at the UAV seem to the shooter going above the UAV and slightly ahead of it.

2.1.2. Accompanying firing method - at low-speed targets

On low-speed air targets, the fire is carried out in an accompanying way. Removal of the aiming point is calculated in the visible dimensions of the target (in figures). While firing in an accompanying way, the submachine gunner (machine gunner) holds the aiming line in front of the UAV by the amount of the required lead and makes a long burst.



a - UAV moves along the front of the position platoon.



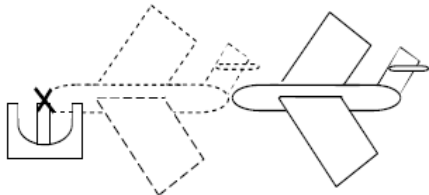
b - UAV going at an angle to the front line platoon positions.

Rice. 6-Barrage fire on aircraft

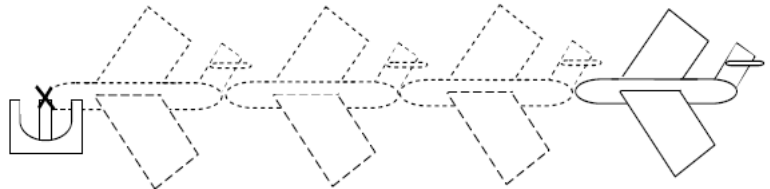
2.2. Lead calculation, fire adjustment

To determine the offset of the aiming point (lead) when firing at the UAV, it is necessary:

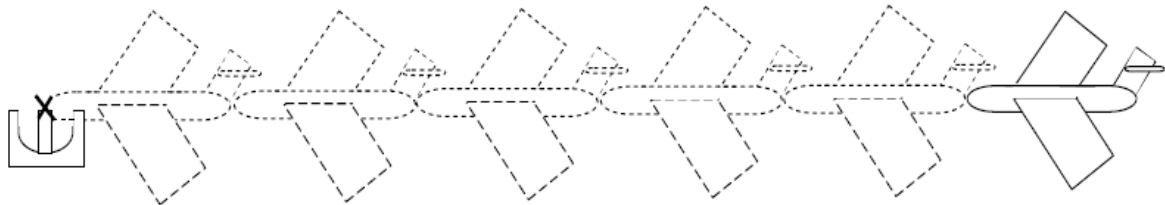
- At range 100 m (Figure 7) - 4 m (1 target body);
- At range 300 m (Figure 8) - 12 m (3 target hulls);
- At range 500 m (Figure 9) - 21 m (5 target hulls).



Rice. 7



Rice. 8.



Rice. 9.

Command options:

1. "To the machine gunner, machine gunners ..., ..., UAV landmark (azimuth) ..., sight Constant, one figure to the left, long - FIRE."
2. "To the machine gunner and machine gunners, landmark (azimuth) ..., unmanned vehicle, three figures to the right, long - FIRE."
3. "Squad, landmark (azimuth) ..., UAV, 4, five figures to the right, long - FIRE."
4. "Team (combat crew), landmark (azimuth ...), UAV, lead five figures, barrage - FIRE."
5. "Group (team), landmark (azimuth) ..., UAV, three figures to the right, long - FIRE."

The "FIRE" command is given at the moment when the UAV is 500 m away from the fire weapon, and is carried out for 20-25 seconds with continuous fire.

To adjust the fire along the tracks, it is necessary that the firing be carried out with cartridges with conventional and tracer bullets in the ratio: for three cartridges with ordinary bullets, one cartridge with a tracer bullet, the first should be a cartridge with

tracer bullet. Shooting cartridges with only a tracer bullet leads to increased wear of the bore.

The ground speed is determined in kilometers per hour according to the type of aerial target, the nature of the task, as well as the experience of previous firing. The point of view on the sight reticle ring is chosen so that the extension of the fuselage axis passes through the cross hairs of the sight reticle.

With an angle equal to $0/4$, the point of view is the cross hairs of the sight reticle.

When shooting at descending (ascending) UAVs, the descent (ascent) lead is taken equal to $0 - 20$.

When firing at the UAV in the hovering position, the lead is not taken, the crosshairs of the sight reticle are directed to the center of the target.

Correction of firing in height and direction is carried out by moving the aiming point to the side opposite to the tracks, by the amount of deviation of the center of the grouping of tracks. Fire along the tracks is used when there is no time to determine the amount of lead on the movement of the target and to carry out aiming at the target with the help of a sight. The shooter opens fire, directing the barrel of the machine gun slightly forward in the direction of movement of the target, observes the position of the bullet tracks relative to the target, and, without stopping firing, turns the machine gun so that the tracks pass through the target.

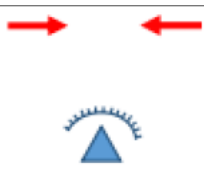
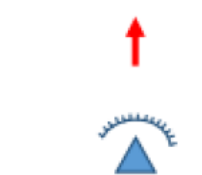
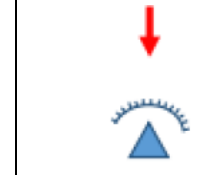
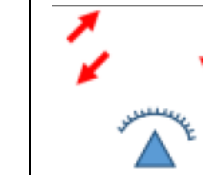
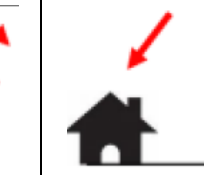
Firing from small arms at the Shahed-136 UAV:

Target speed and type		50 m/s, Shahed-136
preemption		5 target hulls
Caliber	Max. distance	
5.6 mm	300 m	Not very effective up to 300 m.
12.7mm	1200 m	Good efficiency up to 600m; Low efficiency from 600 to 1200 m
23 mm	1800 m	Good efficiency up to 1000m

Annex 1

Recommendations

By choosing the aiming point when firing at the UAV - Shahed-136 kamikaze (range to UAV -300-400m)

No. p/p	bullet caliber (shot) mm	Speed bullets (shot) m/s	The number of UAV figures to take for preemption					Note
			The course (direction) of the horizontal movement of the Shahed-136 UAV ($V \approx 45 \text{ m/s}$; $H \approx 200 \text{ m}$)				When diving ($V \approx 60 \text{ m/s}$) (UAV comes to target hit)	
			UAV is moving perpendicular positions	UAV is moving from position	UAV is moving to position	UAV is moving along position		
								
1	5.45	900	6	7	5	6	8	
2	7.62	730	7	8	6	7	10	
3	12.7	800	7	8	6	7	9	
4	14.5	850	6	7	6	6	8	
5	23	980	6	7	5	6	7	
6	thirty	960	6	7	5	6	8	
7	57	1000	5	6	4	5	7	

The calculations were made under the following conditions:

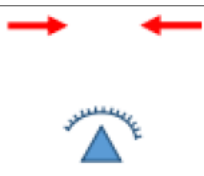
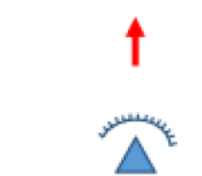
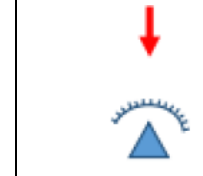
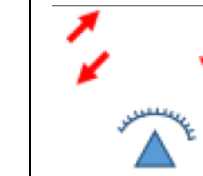
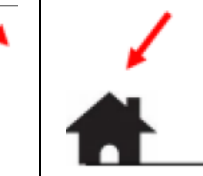
1. UAV speed in level flight - 150-170 km/h;
2. UAV horizontal flight height - 200 m.,

3. BGILA speed when diving on a target - 200-230 km/year;
4. range to the projection of the UAV on the ground - 300 m.

Continuation of Appendix 1

Recommendations

By choosing the aiming point when firing at the UAV - Shahed-136 kamikaze (range to UAV - 750m)

No. p/p	bullet caliber (shot) mm	Speed bullets (shot) m/s	The number of UAV figures to take for preemption					Note
			The course (direction) of the horizontal movement of the Shahed-136 UAV ($V \approx 45$ m/s; $H \approx 200$ m)				When diving ($V \approx 60$ m/s) (UAV comes to target hit)	
			UAV is moving perpendicular positions	UAV is moving from position	UAV is moving to position	UAV is moving along position		
								
1	5.45	900	12	13	eleven	12	16	
2	7.62	730	15	16	14	15	20	
3	12.7	800	14	15	13	14	18	
4	14.5	850	13	14	12	13	17	
5	23	980	eleven	12	10	eleven	15	
6	thirty	960	eleven	12	10	eleven	15	
7	57	1000	eleven	12	10	eleven	15	

The calculations were made under the following conditions:

1. UAV speed in level flight - 150-170 km/h;
2. UAV horizontal flight height - 200 m.,
3. BGILA speed when diving on a target - 200-230 km/year;
4. range to the UAV projection on the ground - 700 m.

Interim Commander of the Training of the Command of the Ground Forces of the Armed Forces of Ukraine Colonel

Alexander Shlyuev