

The People's Translation Project

METHODOLOGICAL RECOMMENDATIONS

DRONE WARFARE IRANIAN-MADE

"KAMIKAZE SHAHED- 136



Originally issued by WSU (ER 7-(01).03.01) in October 2022.

Translated unofficially into Russian in November-December 2022.

No restrictions on distributions.

Project

This manual was published for the first time by the AFU Ground Forces Command in 2022 in the Ukrainian language, with no restrictions on distribution.

Approved by the Acting Commander of the AFU Ground Forces, Lieutenant General Oleksandr Pavlyuk.

Original cover:

ВП 7-(01).03.01

**МЕТОДИЧНІ РЕКОМЕНДАЦІЇ
ПІДРОЗДІЛАМ
ЩОДО БОРОТЬБИ З
БЕЗПІЛОТНИМИ ЛІТАЛЬНИМИ
АПАРАТАМИ ІРАНСЬКОГО
ВИРОБНИЦТВА “КАМКАДЗЕ”
“SHANED-136” (“ГЕРАНЬ-2”)**

**ЖОВТЕНЬ 2022
ОБМЕЖЕННЯ РОЗПОВСЮДЖЕННЯ:
обмежень для розповсюдження немає.
КОМАНДУВАННЯ СУХОПУТНИХ ВІЙСЬК
ЗБРОЙНИХ СИЛ УКРАЇНИ**

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

This text is a direct translation from the Ukrainian language, has been compiled for scientific, informative and reference purposes, has not been edited, should not be used for training without understanding and interpretation taking into account the circumstances of its origin, does not reflect the position of translators and other participants of the project "People's Translation". Please treat the written material critically and, in case of doubts about the essence and form of the written material, consult experts in the relevant field.

[popular translation](#)

t.me/svo_institute

Table of contents

1. DESCRIPTION OF SHAHED-136 HOVERCRAFT	4
1.1. Main tactical and technical characteristics	4
1.2. Advantages and disadvantages	5
1.2.1. Advantages of Shahed-136 UAV	5
1.2.2. Disadvantages of Shahed-136 UAV	5
1.3. Main applications of UAVs	6
1.4. Kamikaze UAV detection	6
2. PROCEDURE FOR DESTROYING KAMIKAZE-TYPE UAVS	7
2.1. Firing techniques at aerial targets	7
2.1.1. An incendiary method of firing at UAVs	9
2.1.2. Accompanying method of firing - at low-speed targets	9
2.2. Fire control, fire control.	10
Appendix 1	12

1. DESCRIPTION OF SHAHED-136 AIRPLANE

1.1. Main tactical and technical characteristics



Fig. 1 - UAV launch from a mobile .

Kamikaze-type UAV "Shahed-136" is designed to hit ground stationary objects by targeting and contact detonation of the UAV's warhead. The manufacturer is Shahed Aviation Industries Research Center. The vehicles are launched from a mobile launcher (hereinafter referred to as "PU") camouflaged in the back of a civilian truck. The launcher can launch up to five UAVs in a salvo.

Flight range	up to 1500 km
Guidance system	inertial
Flight altitude	60 to 4,000 meters.
Airspeed	about 180 kilometers an hour.
Length	3,3 m.
Wingspan	3 m.
UAV mass	200 kg
Mass of a fragmentation warhead	40 kg
Engine	MD 550

1.2. Advantages and disadvantages

1.2.1. Advantages of Shahed-136 UAV

- The long range of the Shahed-136 kamikaze drone allows it to be used to hit stationary targets deep inside Ukrainian territory;
- possibility to prepare for launch in the field by downloading the flight task using a portable computer (laptop, tablet).

1.2.2. Disadvantages of Shahed-136 UAV

- the tactics of use do not envisage engagement of mobile targets. 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~~ (HIMARS MLRS, air defense, REB, artillery systems, etc.);
- design limitations. The Shahed-136 Kamikaze-type UAVs are not equipped with communications, making it impossible to control them real time, change flight assignments, and the like;
- warheads are less powerful than those of other ~~Russian~~-precision-guided weapons. Multiple UAVs are usually needed to engage a single target.

The UAV, due to the size of its effective dispersion surface, its large size and loud engine operation, is a sufficiently conspicuous object to be detected (visually and acoustically), escorted and destroyed by firepower.

1.3. Main applications of UAVs

1. bypassing air defense target zones, see Fig. 2.
2. strikes by large numbers of kamikaze-type UAVs, see Figure 3. 3.

Fig. 2 - Zone bypass
of enemy air defense
operations



Figure 3 - Striking with a
large number of kamikaze
UAVs



1.4. Kamikaze UAV detection

In order to reduce the probability of hitting enemy kamikaze-type UAV objects, 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, each visual observation post should have night vision devices, searchlights (powerful flashlights), and thermal imagers;
- Providing visual observation posts with basic and backup communication means for timely transmission of information about the kamikaze-type UAV overflight.

2. PROCEDURE FOR DESTROYING KAMIKAZE-TYPE

To combat Kamikaze-type UAVs at each platoon stronghold, block post, and personnel locations, assign firing groups to counter UAVs consisting of: 1 machine gunner, 3-4 riflemen armed with AK-74s. If there is a sniper, include him in the firing group.

Assign on-duty firepower to engage kamikaze-type :

- at altitudes up to 400 meters - with concentrated small arms fire;
- at altitudes up to 1500 m - use of DShK machine guns (BROVNING, twin Maxim machine guns, ZU-23 anti-aircraft gun);
- Organize ambushes with DShKs (ZU-23, BROVNING, twin Maxim machine guns) on reconnaissance and probable flight paths of enemy attack UAVs.

2.1. Firing techniques at aerial targets

The automatic rifle (machine gun) is fired at aerial targets from lying, kneeling and standing positions (Figure 1.1).

To shoot, if possible, use local objects as a stop (spire, tower fence, railings, etc.) and assume a shooting position as comfortable as possible (standing, half-bent, kneeling).



Notation:

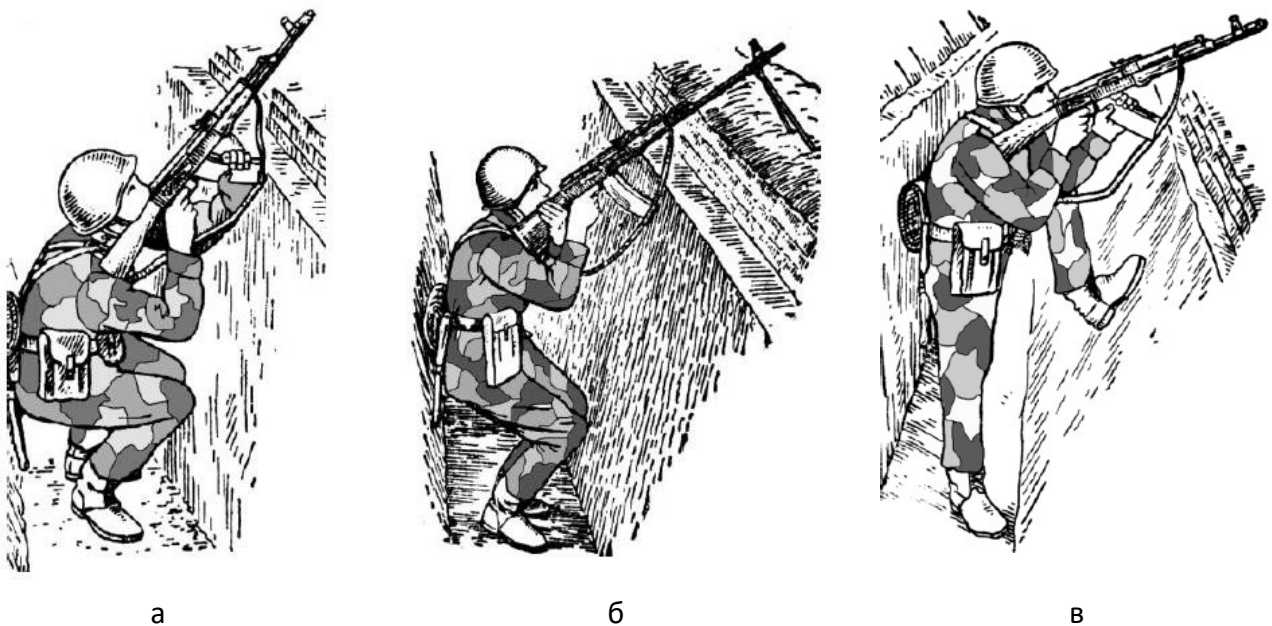
a - lying; b - from the knee; c - standing

Figure 4 - Position when firing at aerial targets.

Project

Shooting aerial targets:

- with the forearm of the left hand and the magazine of automatic rifle resting on **an** object on the deck (with the machine gun bipod placed on the spire, turret railings, railings, etc.); if the angle of ascent is insufficient, squat (Figure 4 a, b);
- with back and left resting on objects on the upper deck: raise the left leg as high as possible and rest its foot on the object, and rest the back on the opposite wall and squat slightly. Hold the automatic rifle (machine gun) in the same way as when firing 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).



Notation:

a - with the magazine resting in the front wall; б - from a machine gun with a bipod; B - from a submachine gun.

Figure 5 - Position when firing at an aerial target from a trench.

Fire from automatic rifles (machine guns) at aerial targets as part of a group, team, , combat team at a range of up to 500 meters with a 4 or "P" sight.

UAVs flying to the side or above the gunner (machine gunner) are fired at in a barrage or escorting manner.

2.1.1. UAV engagement method of fire

When firing barrage fire, a squad or platoon concentrates its fire at the commander's command in the direction of movement of the approaching UAV (Figure 6). In the direction indicated in the command, the rifleman (machine gunner) gives the rifle (machine gun) an elevation angle of approximately 45° - 60° and opens fire, keeping the rifle (machine gun) in this direction. Firing is continuous until the UAV leaves the firing zone or is hit.

If the rifleman clearly sees the direction of the traces of his automatic rifle (machine gun) in the vicinity of the target, he must, without ceasing firing, move the automatic rifle (machine gun) slightly in the direction of the target's flight, achieving alignment of the traces with the target.

During trace fire correction, it is worth bearing in mind that traces aimed at the UAV appear to the shooter to be going above the UAV and slightly ahead of it.

2.1.2. Accompanying method of firing - at low-speed targets

For low-speed aerial targets, fire in an accompanying manner. The elevation of the aiming point is calculated in visible target dimensions (in figures). During escort fire, the machine gunner holds the aiming line in front of the UAV to the required lead and fires a long burst.

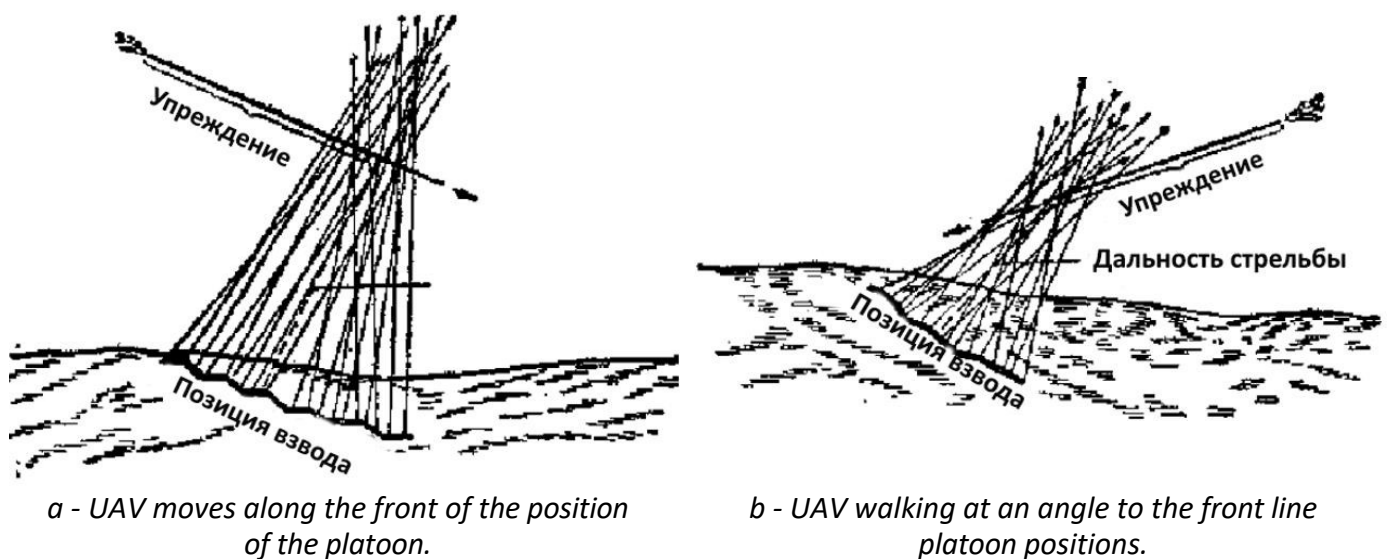


Figure 6 - Engaging in barrage fire against aircraft

2.2. Fire anticipation calculation, correction of fire

In order to determine the aiming point drift when firing at UAVs, it is necessary:

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

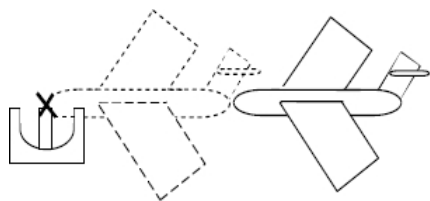


Fig. 7

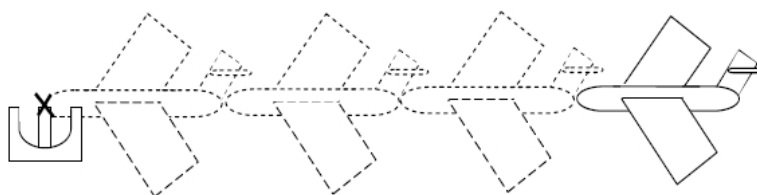


Figure 8.

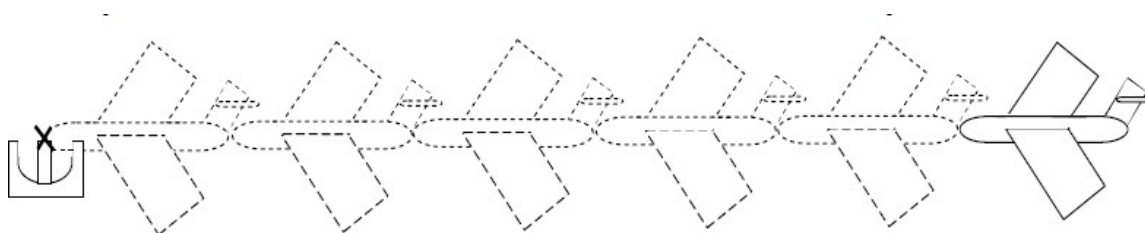


Figure 9.

Command submission options:

1. "To the machine gunner, machine gunners, ..., UAV
landmark (azimuth)...., sighting constant,
one figure to the left, long - FIRE".
2. "Machine gunner and machine gunners, landmark (azimuth)...., drone, to the
right three figures, long - FIRE."
3. "Detachment, landmark (azimuth)...., UAV, 4, right five figures, long -
FIRE."
4. "To the team. (combat formation,) Landmark
(azimuth...), UAVs, five figure lead, barrage - FIRE".
5. "Group (team), landmark (azimuth)...., UAV, right three figures, long -
FIRE."

The "FIRE" command is given when the UAV is 500m away from the firing unit and is executed for 20-25 seconds of continuous fire.

In order to correct tracer fire, it is necessary to fire regular and tracer bullets in a ratio of three rounds of regular bullets to one round of tracer , with the first round being the one with the

Project

with a tracer bullet. Firing only tracer bullets increased wear on the barrel bore.

Tracking speed is determined in kilometers per hour by the type of air target, the nature of the task, and the experience of previous firing. The point of view on the reticle ring is selected so that the continuation of the fuselage axis passes through the crosshairs of the reticle.

At 0/4 foreshortening, the point of view is the crosshairs of the .

When firing at descending (ascending) UAVs, the descent (ascent) bias should be 0 - 20.

When firing at a UAV in the hovering position, you do not take the reprojection, but aim the crosshairs of the reticle at the center of the target.

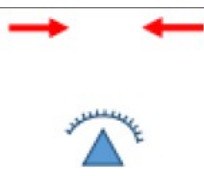

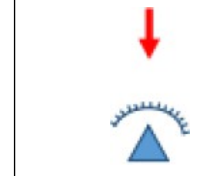
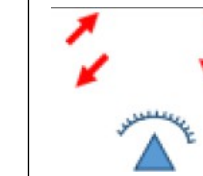

Correction of firing in elevation and direction is made by moving the aiming point to the side opposite to the traces by the amount of deviation of the trace grouping center. Trace firing is used when there is no time to determine the magnitude of the target movement lead and to aim at the target with the aid of the sights. The shooter opens fire by pointing the machine gun barrel slightly forward in the direction of target movement, observes the position of the bullet traces relative to the target and, without stopping firing, turns the machine gun so that the traces pass through the target.

Conducting small arms fire at the Shahed-136 UAV:

Speed and type of target		50 m/s, Shahed-136
Proactive		5 target cases
Caliber	Max. distance	
5.6 mm.	300 m	Little is effective up to 300 meters.
12.7 mm.	1200 m	Good efficiency up to 600 m; Low efficiency from 600 to 1200 m
23 mm	1800 m	Good efficiency up to 1000 m

Recommendations

On the choice of aiming point when firing at UAVs - kamikaze type Shahed-136 (range to UAV - 300-400m)

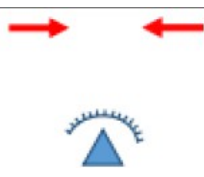
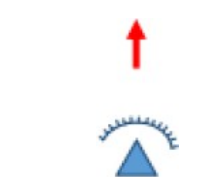
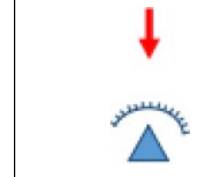
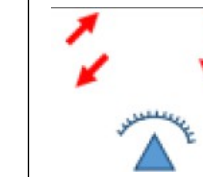
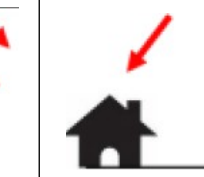
№ n/a	Bullet caliber (shot), mm	Bullet velocity (shot), m/s	Number of UAV figures to take for preemptive action					Note
			Course (direction) of horizontal motion of Shahed-136 UAV ($V \approx 45$ m/s; $H \approx 200$ m)				When diving ($V \approx 60$ m/s) (The UAV is closing in on the target)	
			The UAV moves perpendicular to the position	The UAV is moving out of position	The UAV is moving into position	The UAV is moving along the 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	30	960	6	7	5	6	8	
7	57	1000	5	6	4	5	7	

The calculations were performed under the following conditions:

- the speed of the UAV in horizontal flight is 150-170 kilometers per hour;
- UAV horizontal flight height - 200 meters,
- the speed of the BGLA when diving on the target is 200-230 kilometers per year;
- range to the UAV projection on the ground - 300 m.

Recommendations

On the choice of aiming point when firing at UAVs - kamikaze type Shahed-136 (range to UAV - 750m)

№ n/a	Bullet caliber (shot), mm	Bullet velocity (shot), m/s	Number of UAV figures to take for preemptive action					Note
			Course (direction) of horizontal motion of Shahed-136 UAV ($V \approx 45$ m/s ; $H \approx 200$ m)				When diving ($V \approx 60$ m/s) (The UAV is closing in on the target)	
			The UAV moves perpendicular to the position	The UAV is moving out of position	The UAV is moving into position	The UAV is moving along the position		
								
1	5,45	900	12	13	11	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	11	12	10	11	15	
6	30	960	11	12	10	11	15	
7	57	1000	11	12	10	11	15	

The calculations were performed under the following conditions:

1. the speed of the UAV in horizontal flight is 150-170 kilometers per hour;
2. UAV horizontal flight height - 200 meters,
3. the speed of the BGLA when diving on the target is 200-230 kilometers per year;
4. range to the UAV projection on the ground - 700 m.

Acting Commander-in-Charge of Training

Command of the Ground Forces of the Armed Forces of the Armed Forces of Ukraine Col. Oleksandr SHLYUEV