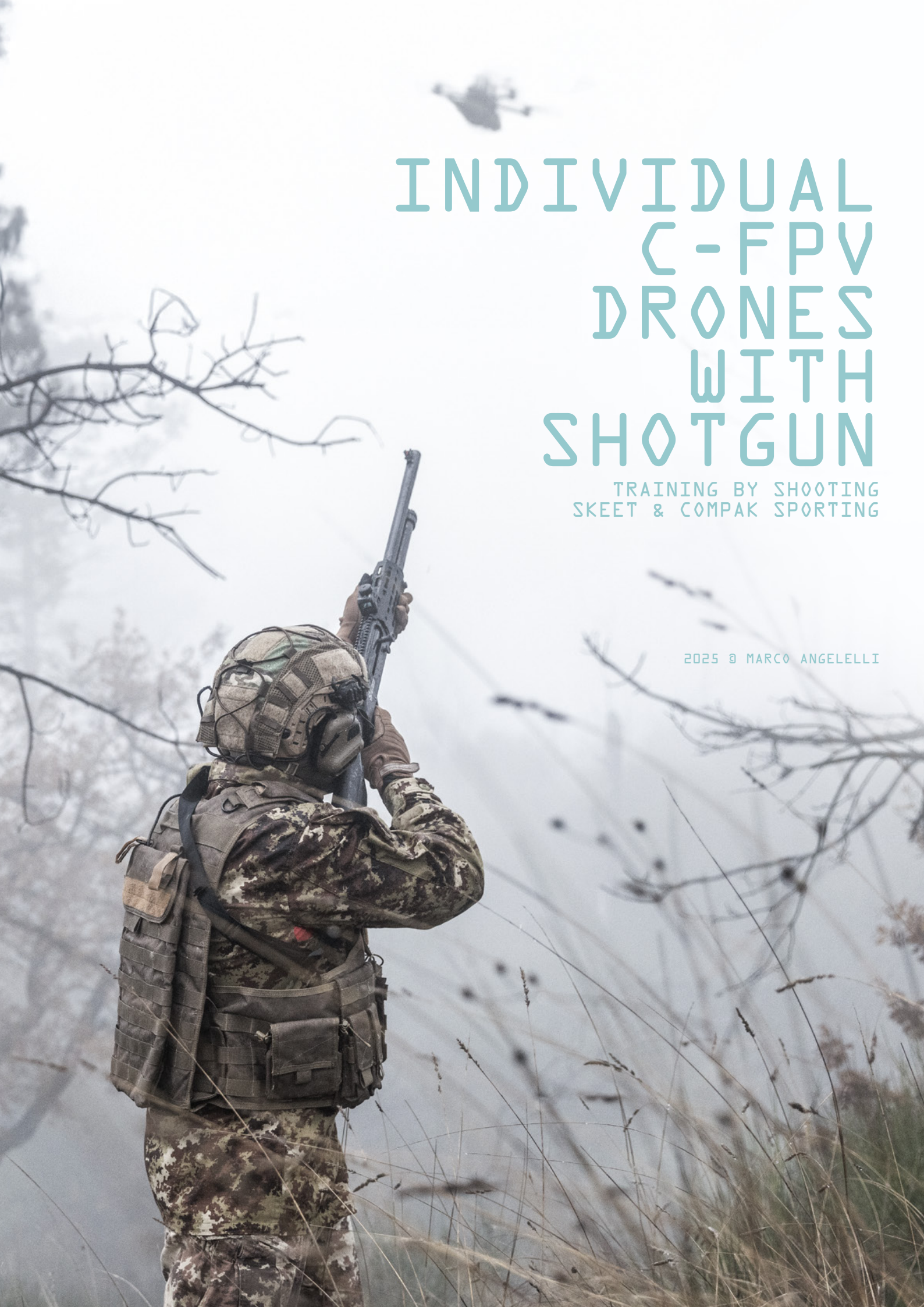


A soldier in full combat gear, including a helmet with a night vision device and a tactical vest, is shown from the side, aiming a shotgun upwards. In the upper center of the frame, a small drone is captured in mid-flight against a pale, overcast sky. The background consists of bare, leafless trees and some dry grass in the foreground, suggesting a late autumn or winter setting.

INDIVIDUAL C-FPV DRONES WITH SHOTGUN

TRAINING BY SHOOTING
SKEET & COMPAK SPORTING

2025 © MARCO ANGELELLI

CONTENT

1. Introduction
2. Training
3. Skeet
4. CompakSporting
5. Operator Training Course
6. Ammunition Training
7. Training Drones
8. International counter and pilot FPV drones school
9. Conclusions

Attached:

- UkrainianArmy War Report
- Tactics of use by the enemy FPV drones and ways to counteractit

INTRODUCTION

In current war scenarios, the threat has evolved, in fact the so-called “suicide drones” or “Kamikaze drones” (the correct term for suicide drones is “Loitering Munitions” LM, micro-munitions usually multi-copters), or “circling munitions”, or even “loitering munitions”, are increasing as masters of the battlefield (the images of soldiers chased and hit by these devices are widely circulated on various social networks).

The “munition”, once launched, flies over the assigned area at a certain altitude to reduce the possibility of detection, waiting in flight (hence the “loitering”) to be able to locate and identify the target through the “remote” operator or through its on-board sensors, and then proceed to engage and destroy the target itself.

In this regard, it is believed that the use of short-range self-defense (from 90 to 10 meters) with 12-gauge armament and split ammunition is the ideal response to the new operational needs of front-line military personnel.

The indisputable advantage of light smooth-bore weapons is that they are cheap, ready for immediate use, require little maintenance, can also be used for other operational needs and are immediately available on the market in multiple versions.

All this must be combined with other means of protection, such as electronic warfare equipment (UAS detection systems, Jammers), interceptor drones, specialized anti-drone air defense systems of various types.

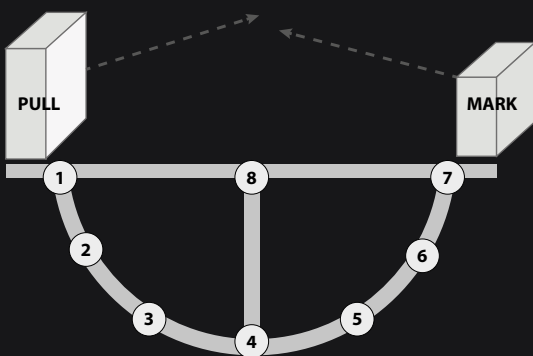
Obviously, the employed the military personnel will have to be trained in the use of the specific armament (and this is where the competitive experience in Armed Forces Clay Shooting comes into play) and indoctrinated in the new employment strategies.

TRAINING

Given the engagement modes, the final trajectory and the speed (60-90 Km/h with a load of 2-3 kg), it can be said that FPV Drones are very close to the clay pigeon shooting in the sporting discipline of Skeet and Compak Sporting. The main advantages in carrying out training in clay pigeon shooting fields are the low cost and the wide diffusion of these sports facilities in most nations.

SKEET

In Skeet the shooters are called to shoot from eight platforms in the shape of a semicircle, over a radius of 19.20 m. At the two ends of the semicircle there are towers with the clay pigeon launchers. Of the eight platforms, seven platforms are placed on the semicircle, while the eighth is placed at the center of the hypothetical diameter that joins the two cabins. The shooter, standing on the platform, waits for the launch of the clays, for which he has only one shot in the barrel available. The engagement of the clay varies from a minimum of 2 m. to a maximum of 40 m. Initial speed of the clay pigeon approximately 27 m/s. (97.2 km/h).



The plates that interest us in training are those that in their flight trajectory come towards the shooter due to the engagement characteristics of the FPV drone. As a consequence, they are mainly:

- 1 MARK
- 2 MARK
- 6 PULL
- 7PULL
- 8 PULL/8 MARK

m4 A.I. DRONE GUARDIAN



M4 A.I. DRONE GUARDIAN



Advanced Impact: improved speed, longer distance and deeper penetration.
A new era for combat shotguns on evolving battlefield and law enforcement scenarios, the ultimate solution against Class I & II FPV-drones and loitering munitions.

 **Benelli**
DEFENSE

STATION 1



Stand with your heels on the rear edge of the platform, close the rifle and position it at a 45° angle to the ground. Your gaze will be focused on the area above the front sight. The shouldering movement will prevent the tip of the barrel from “tilting”. In the 1 mark the advance could be quantified in a few centimeters.

STATION 2



Position yourself with your heels on the rear edge of the platform and after the “concentrating” phase position the barrels approximately 9 meters from the cabin. Freedom of choice is given to the position of the face; the shooter will have to choose whether to look at the exit or remain in line with the weapon. Hooking the clay with the shoulder in rotation at approximately 13 or 14 meters slightly in advance will allow you to break it at least 2 or 3 meters from the center of the field exactly at the point where we will see the second clay appear in our field of vision to the right of the same.

STATION 6



Station 6 is a bit of a synthesis between s2 and s5. From s2 it takes the marked angle and the proximity of the cabin and these factors make it preferable to identify the starting point at 9 meters trying not to rotate the face excessively. The movement will be very short, and the lead minimal. From s5 it takes the position of the body (which must not be too far away from the cabin to offer more space for the stock housing, preventing shouldering on the humerus)

STATION 7



Nothing special to say about this platform except that to give the correct advance to the clay it would be necessary to shoot it "over" or partially cover it with the barrels, but this method of execution makes sense only if you decide to shoot the clay in the "ascending" phase of its trajectory. But if you decide to shoot this clay in a more comfortable way, i.e. almost on the central post, then we will opt to "see" it better and therefore to shoot it "under" as if we saw it floating on the barrels. In both cases we have all the time to check in advance and shoot the 7-pull in complete comfort.

STATION 8

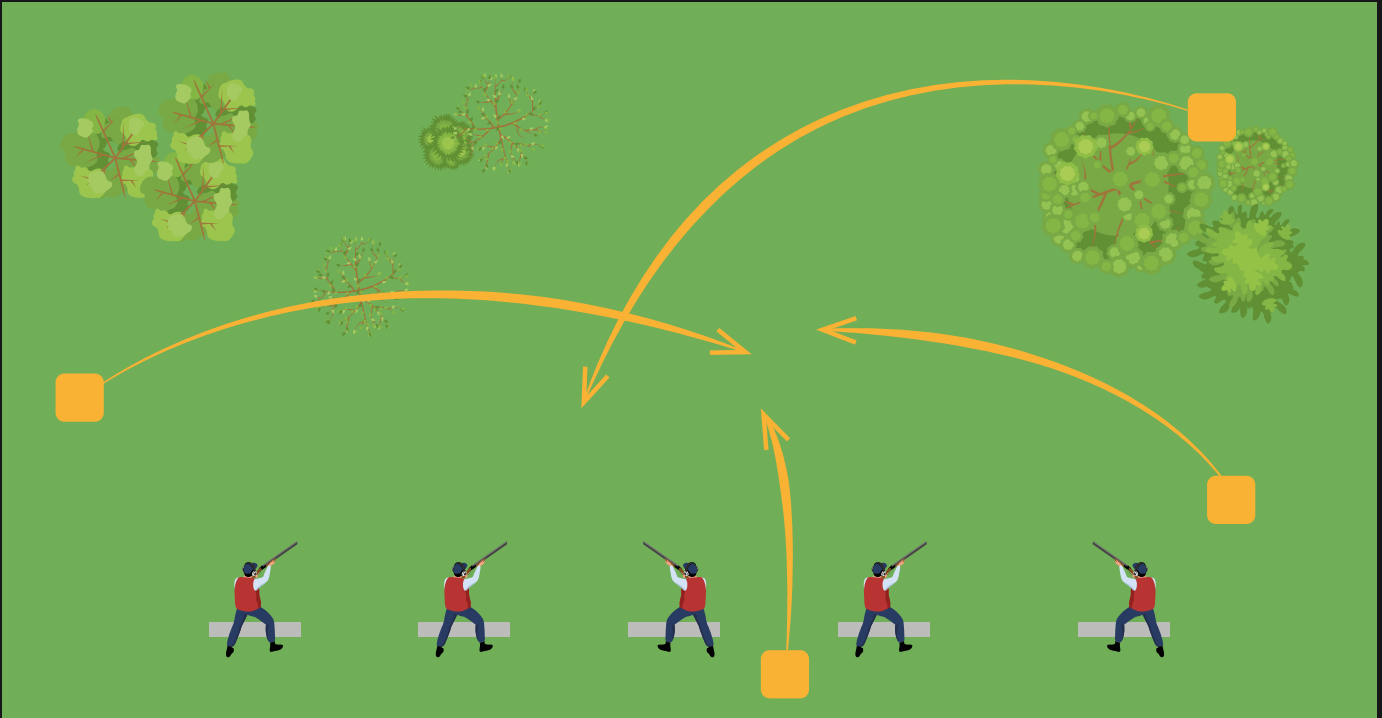


In conditions of feline reflexes, the theory of 8pull and 8mark does not differ from that of other clays. Of course, in this case we should make the closing of the shouldering coincide with the shot since the times are very short. We have already said about the position of the feet and the torso; therefore we will position the barrels near the cabin in such a way that our field of vision has both the barrels and the mouth of the tower inside it. The shouldering will be **RIGOROUSLY** more than ever in rotation and the lead will be minimal but still present (as if we were shooting at the bird's beak).



COMPAK SPORTING

In **COMPAK SPOTING** shooters shoot from 5 platforms in a line at clays with the most varied flight paths possible. Each target must be shot with a maximum of 2 shots from each of the shooting platforms.



The Compak Sporting is very useful for training in clay shooting on the trajectories of clays coming towards the shooter. Its peculiarity is a shot at the max range of the cartridge and the possibility of having more time to calculate the right lead.



TYPICAL SEQUENCE OF PLATES FOR CORRECT TRAINING

SKEET

- 1 MARK
- 2 MARK
- 6 PULL
- 7PULL
- 8 PULL/8 MARK

COMPAK SPORTING

- CandleTrajectory
- Trajectory from left to right
- Trajectory from right to left
- Trajectory approaching the shooter (sx to dx)
- Trajectory approaching the shooter (dx to sx)



Operator Training Course

Counter FPV Drones Operator

C-FPV Operator "qualification course :

- Duration 2 weeks
- 72 hours (10 theory – 62 practice)
- 100 clays per day per operator
- Final practical exam with multi- copter drone shooting simulation

Each operator must take a one-week refresher course at least once a year to maintain their qualification.

It is advisable to have at least one qualified operator for each team operating at a tactical level.

C-FPVO "**Instructor**" qualification course :

- "C-FPV Operator" with 3 years of experience or 5 years of competitive sporting activity in SKEET or COMPAK SPORTING
- Duration 1 week
- 36 hours (6 theory – 30 practice)
- 200 clays per day per Operator
- Final practical exam with multi- copter drone shooting simulation



AMMUNITION TRAINING

The training of an Anti-LM Operator requires training in the specific characteristics of shooting at a target in flight that are completely different from all other shooting modes the soldier has been trained in. This requires intense training that is renewed over time.

Sporting type cartridges are the low-cost ammunition for sports use that comes closest (both in weight and characteristics) to **specific type cartridges** for operational use developed for Counter drone applications.



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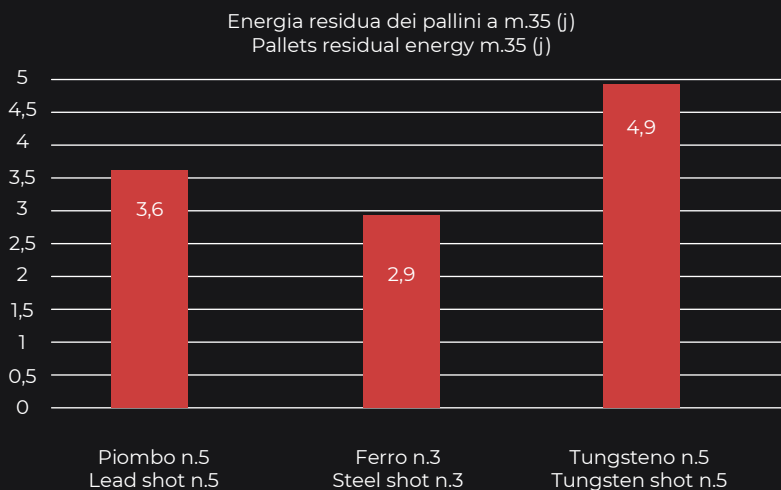
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OPERATIONAL AMMUNITION

Tungsten Cartridges

They are distinguished by their very high performances that are not comparable to those of classic lead cartridges. Tungsten pellets, 10% heavier than lead, allow, at 50 meters, to make 12% more concentrated groups, expressing a residual energy higher by about 40%.



Swedish **NORMA AB**, a leader in advanced ammunition technology, has announced the release of its latest innovation: the **AD-LER (Anti-Drone Long Effective Range)** shotgun shell, specifically designed to combat modern drone threats. The AD-LER delivers unparalleled performance in anti-drone defense, utilizing a unique load composition and design to provide a highly effective solution for both military and law enforcement applications

Product Highlights:

The AD-LER shotgun shell is a specialized round, engineered to offer maximum efficiency in neutralizing small unmanned aerial systems (sUAS) at extended distances. It is designed to be compatible with shotguns that have been proof-tested to 1,320 Bar, ensuring both safety and high-performance operation.

The AD-LER's tungsten load offers superior density and energy transfer, ensuring maximum impact on targets within its 100-meter effective range. The round is particularly effective in disrupting small drone operations, reducing the threat they pose in both civilian and combat scenarios.

AMMUNITION REQUIREMENTS ESTIMATE PER OPERATOR

As specified in the chapter “Operator Training”, each basic course requires training on 100 clays per day for 10 days of training leading to 1000 clays per course/operator. Calculating an average of 2 shots per clay, the requirement is 2000 cartridges, **Sporting type** *, for each soldier.

The final test of the course is on a real target with operational ammunition.

This requires about 50 cartridges such as Norma **AD-LER**.

To recap, the estimate is for the Basic Course:

- **2000** cartridges, **Sporting** type, per operator
- **50** cartridges, **Operational** type , per operator

For the Instructor Course:

- **1000** cartridges, **Sporting** type, per Instructor
- **100** cartridges, **Operational** type , per Instructor

Annual qualification maintenance:

- **1000** cartridges, **Sporting** type, per operator
- **25** cartridges, **Operational** type , per operator

* Sporting cartridges 12 gauge lead n.7.5 in 28 g

TRAINING DRONES



The training drones are supplied by the Italian company **AURYN**. These FPV Drones have the same performance as those used in war theaters except that, once killed, they can be reused. As you can see from the photos, these drones can be armed or disarmed, depending on the training needs. The **AURYN** company also carries out courses for FPV DRONE pilots at our **International FPV Drones School**.



AURYN[®]AERO

INTERNATIONAL COUNTER AND PILOT FPV DRONES SCHOOL

TAV LA TORRE, located near Pisa, Tuscany, Italy, is a modern shooting range equipped with 6 shooting ranges for training in the disciplines of TRAP, SKEET and COMPAK SPORTING. The following courses are held:

- C-FPV Operator qualification course
- C-FPV Operator Instructor qualification course
- FPV Drone Piloting Course



For all information on the courses write to marcoangelelli@libero.it



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CONCLUSIONS

An integrated and ready-to-use weapon system such as the Benelli M4 Drone Guardian 12-gauge shotgun, easily transportable in a tactical backpack, combined with Norma Adler ammunition and a Red Dot for quick target acquisition (e.g. Steiner MPS) is the answer to the needs of the soldier on the front line who finds himself facing new threats to his safety. Never has a conflict made the soldier's survival so precarious, because it is difficult to escape from "Loitering Munitions", there is no trench or bunker immune to this threat. The last 30-40 meters can make the difference between surviving or succumbing. The psychological factor of the soldier who knows he has an effective defense tool even if he is aware that this is the last chance to defend himself must certainly be considered.

So with the "dronization" of the battlefields, where the marriage between LM and Artificial Intelligence will be increasingly tight, the Jammer countermeasures will be less and less effective because devices will acquire the targets autonomously, will be guided by fiber optic cable, or will head towards the source of the countermeasures (home on jam), the difference will be made by the soldier's ability to eliminate the threat, in the final part of the trajectory, with tools capable of physically destroying it (hard kill).



LGT MARCO ANGELELLI



Lieutenant of the Air Force, currently serving at the 46th Air Brigade of Pisa
- Auditor at the Control Unit of the GEA Flight Department with excellent technical skills for the management and programming of quality systems in aircraft maintenance - acquired by working as the manager of organic units made up of personnel with various skills, training and geographical origins
- and good organizational skills, developed throughout the training and professional path.

Former Athlete of the Air Force Shooting Sports Group (Skeet) and the Italian National Military Team.

President of the FITAV Commission for Relations with the Armed Forces and Law Enforcement.

DIRECTORY

**Tactics of use by the enemy
FPV drones (in diagrams)
and ways to counteract it**



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I. Introduction

An analysis of the large-scale use of FPV drones by the Ukrainian Armed Forces indicates a significant increase in their role in combat operations as **an effective means of fire destruction**. With their low weight, they are capable of lifting a load several times greater than their own weight and carrying it to a target at a speed of 100 km/h and a range of up to 10 km. In percentage terms, kamikaze drones have gradually taken a leading place **(up to 70%)** in causing

losses to manpower and equipment in tactical depth. At the same time, these indicators are typical **for all parties to the armed conflict**.

Technological development of FPV drones and related components for their combat use (increasing the range and flight time, portable payload, increasing resistance to electronic warfare, the ability to use in conditions of limited visibility, expanding the range and types of ammunition, introducing intelligent target acquisition and tracking systems, creating specialized UAV testing centers and training operators) have led to **an expansion of tactical techniques and the range of tasks they solve**.

The presented material briefly and clearly reveals general information about FPV drones, and examines the main tactical techniques for their use.

in the course of counteraction to Russian troops. At the same time, similar methods of combat use are actively being introduced by our "drone operators" on the battlefield.

A separate block presents brief recommendations and advice on how to combat kamikaze drones on the combat line.



II. General information about FPV drones

FPV (First Person View) drones are UAVs equipped with a video camera and transmitting real-time images to the pilot's glasses or helmet (controlled from the first person).

Advantages over quadcopters:

- first-person drone control;
- instant response and maximum control over the drone;
- high maneuverability and flight speed (up to 120 km/h);
- resistance to the impact of electronic warfare (due to the modularity of the device, which allows for quick changes to the configuration and settings);
- the ability to change the drone design to suit the task;
- low cost of the product (on average 40-50 thousand rubles).

The disadvantages include:

- average flight duration 7-10 minutes;
- flight range (without repeater) – up to 10 km;
- the need for selection and high-quality training of the pilot (operational training) Torah – not less than a month).

1. Equipment



FPV drone



Video glasses

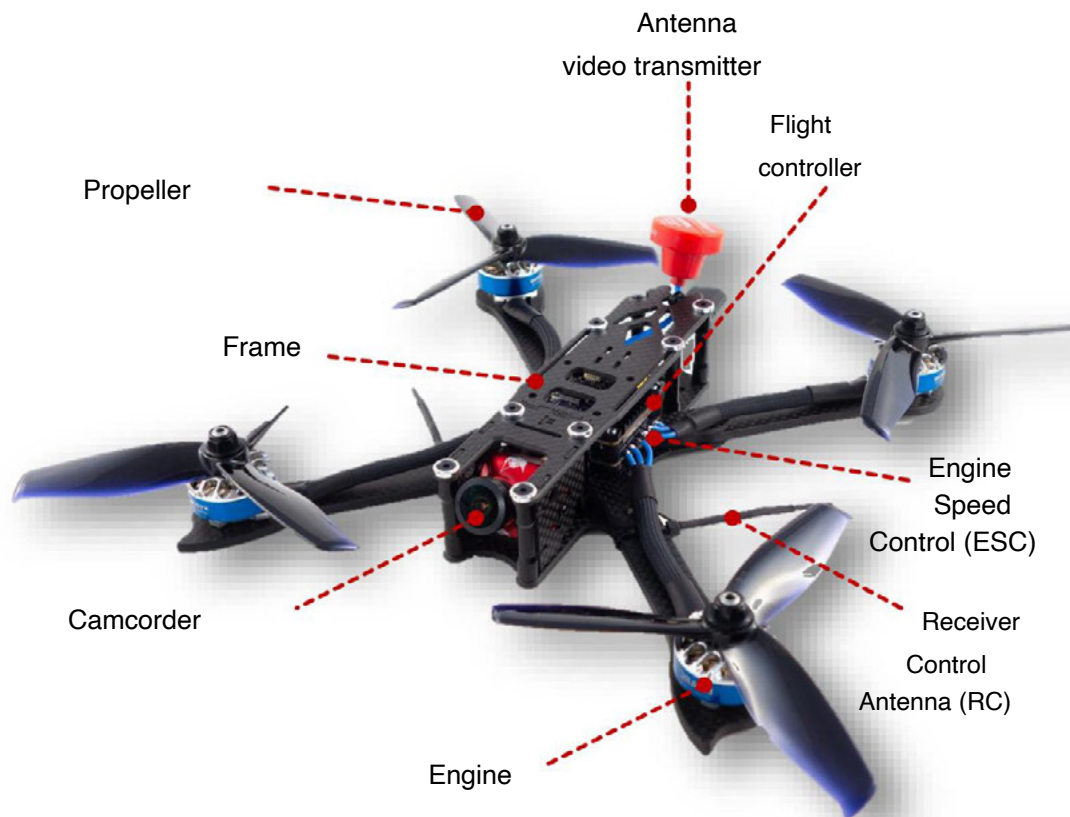


Battery



Remote control

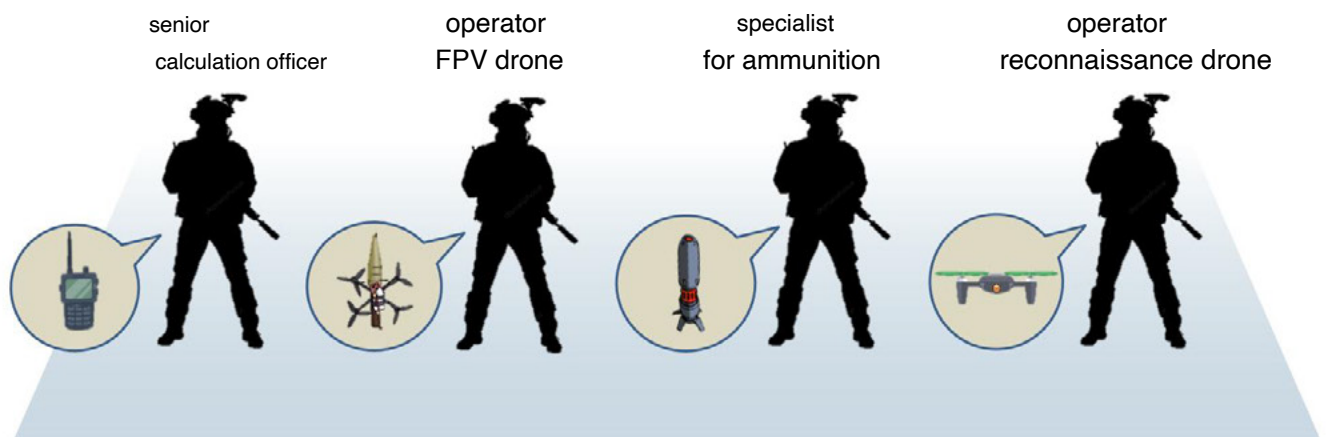
2. General structure of FPV drone



3. General performance characteristics of a typical FPV drone

- drone size – 7 inches;
- load capacity – up to 2.5 kg;
- maximum speed (with load) – up to 120 km/h;
- flight time with load – up to 10 min;
- flight range with load (without repeater) – 10-12 km;
- time to prepare for launch – 2 min.

Calculation of UAVs (option)

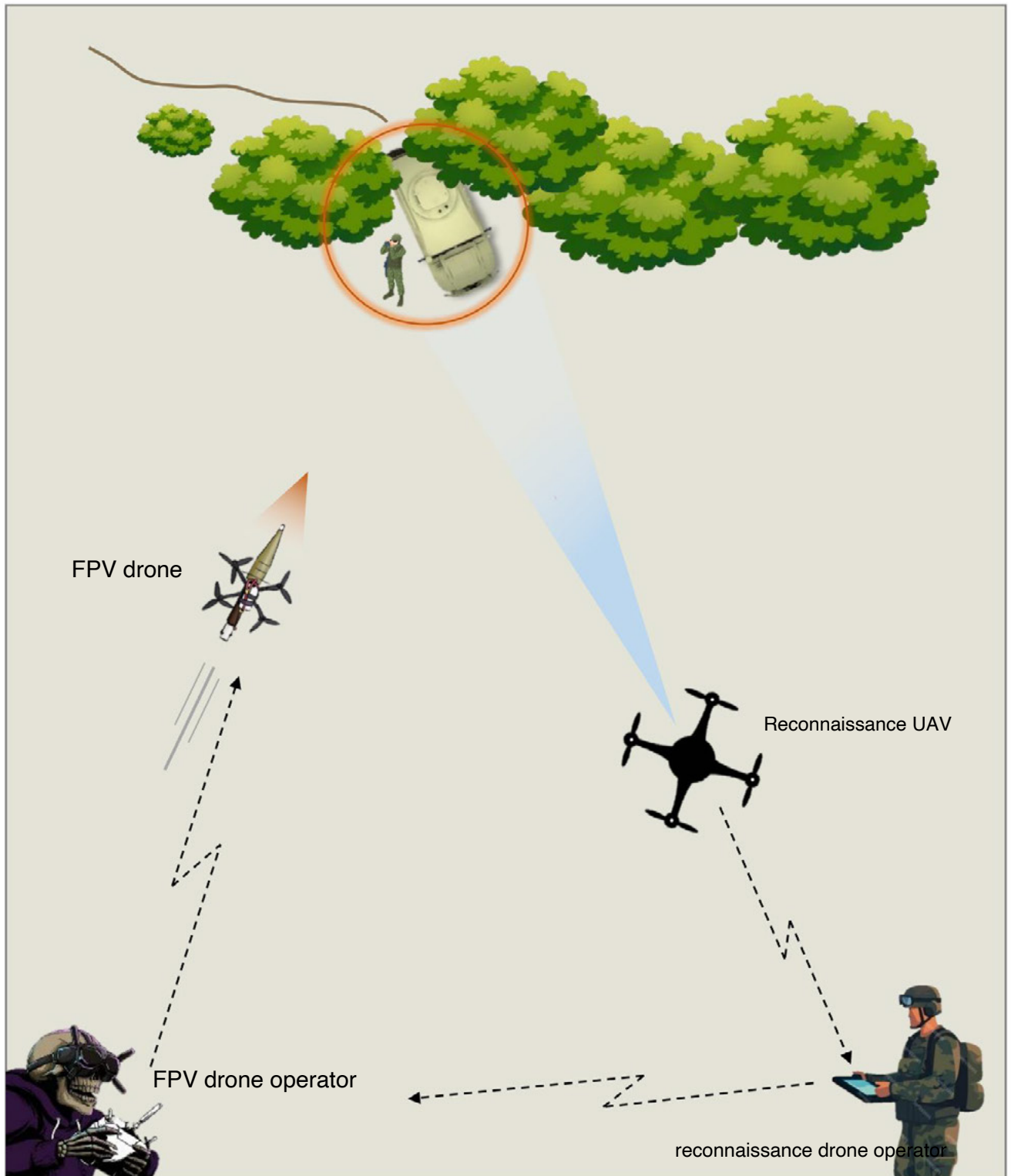


III. Tactical techniques for using FPV drones

1. "Classic"

(identification of the target by a reconnaissance UAV - launching a drone and destroying it)

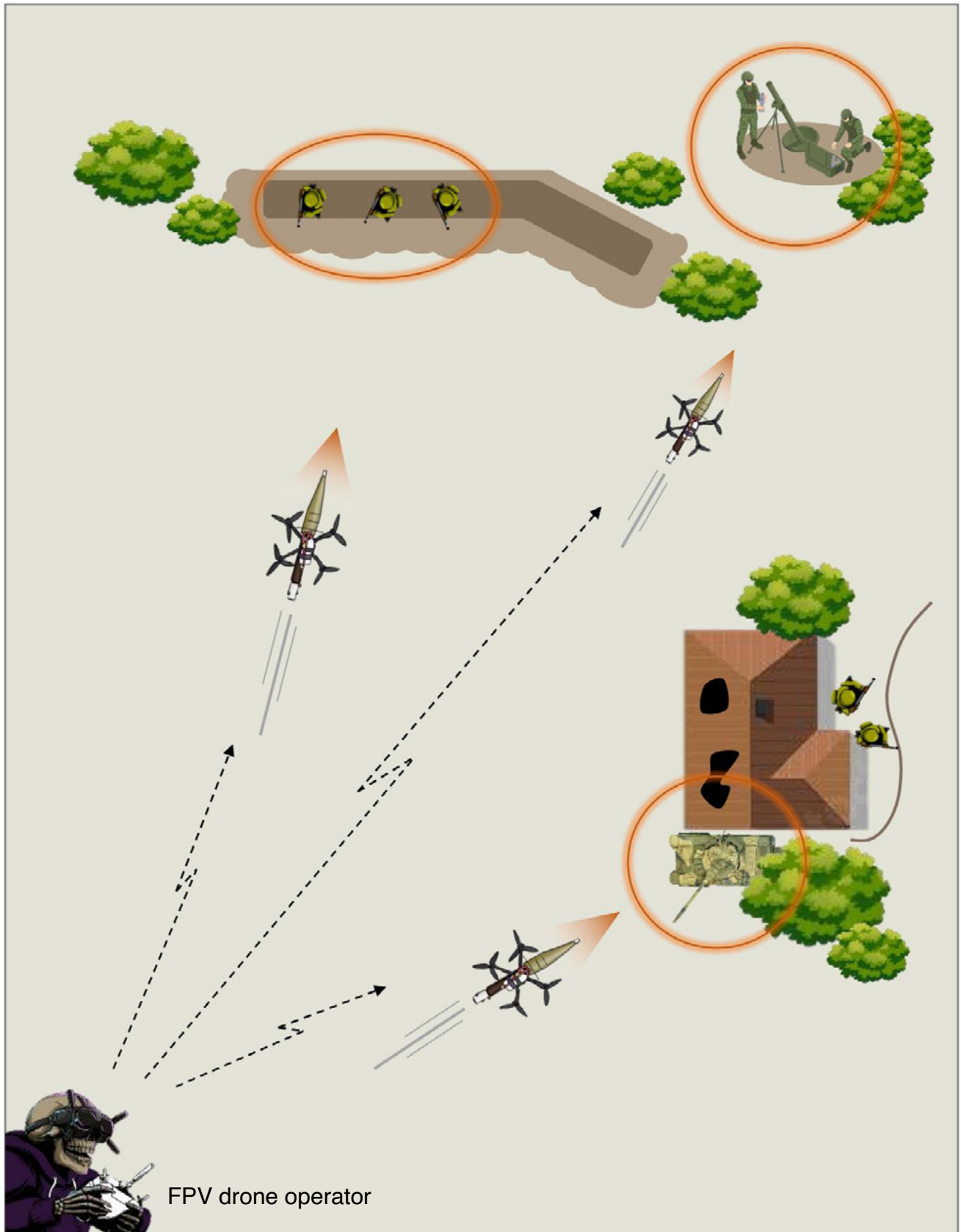
The most common method of combat use. It consists of detecting a target with a reconnaissance drone and transmitting the coordinates to the FPV operator for its destruction. Video recording of the destruction of the object is carried out by the reconnaissance UAV.



2. "Free Hunting"

(FPV strike on pre-detected objects and positions)

The essence of this method is to strike independently FPV drones on previously revealed objects and enemy positions.



3. "FPV swarm"

(FPV group strike on selected targets, objects)

The method is based on the discovery of targets (objects) by a reconnaissance UAV and the mass impact of kamikaze drones in order to destroy them. As a rule, the total consumption is 5-12 devices. Video recording of the destruction of the object is carried out by a reconnaissance drone. It is possible to combine FPV drone strikes with artillery fire and mortars.

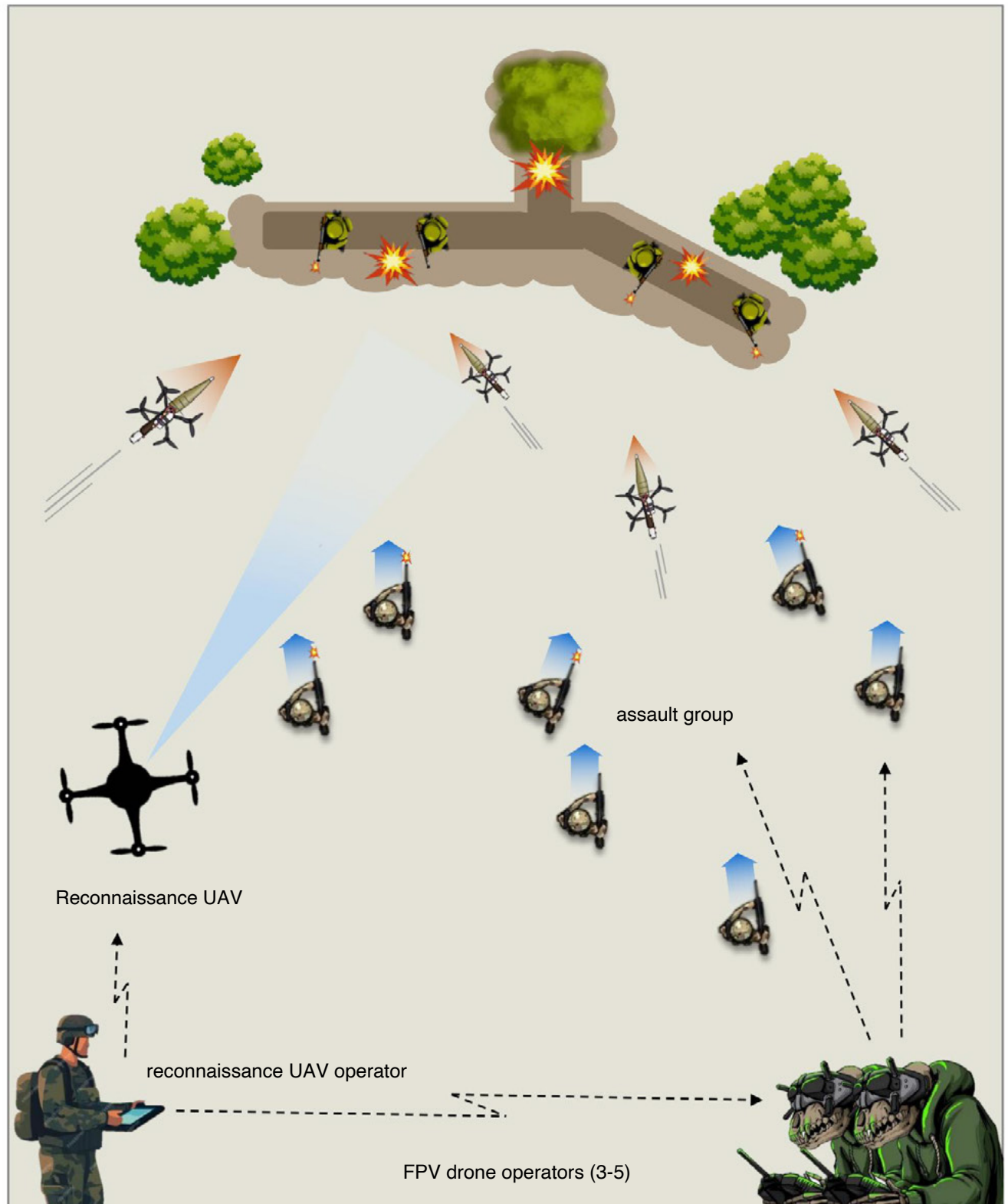


4. "Escorting the attack of the assault group with FPV drones"

(fire support for the actions of advancing units)

This method involves sequentially attacking positions with FPV drones during the advance and offensive actions of the assault group. Control and coordination of the actions of units and operators is carried out through a reconnaissance UAV. It is possible to combine FPV drone strikes with artillery and mortar fire.

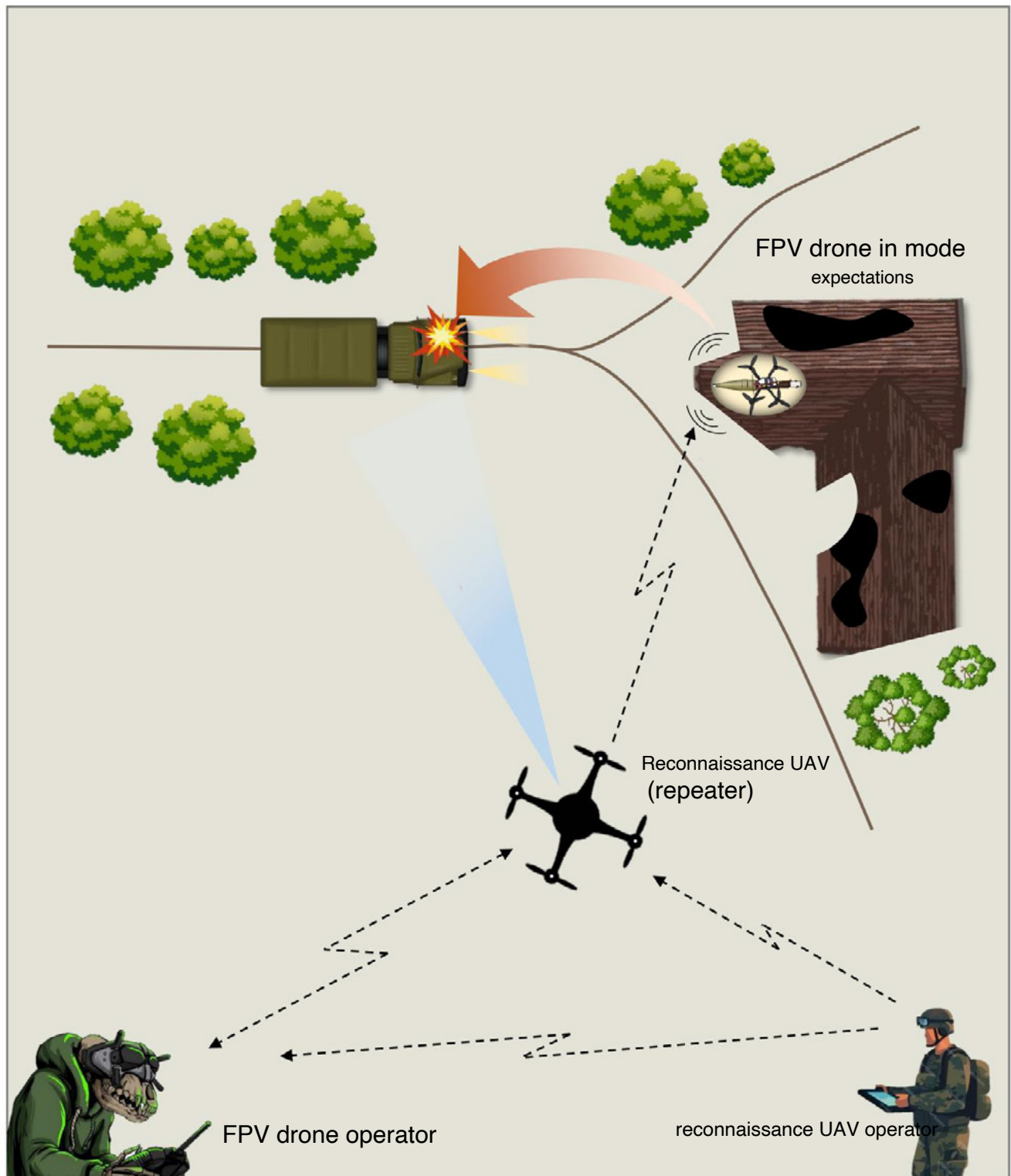
Comrade



5. «FPV-drone in ambush»

(landing and waiting - observation - surprise attack on target)

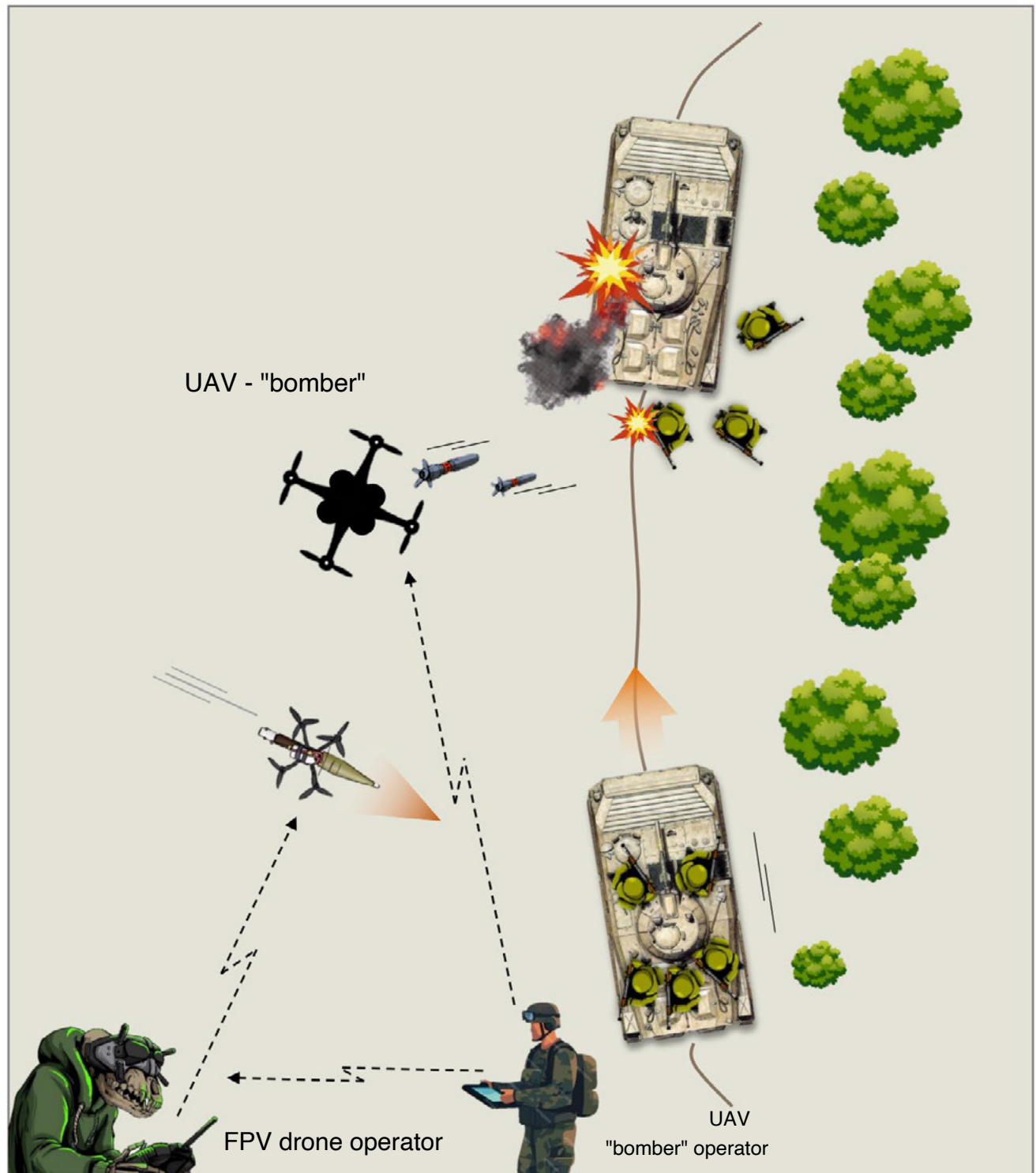
The tactical method is based on landing and taking a hidden position by the FPV drone near busy roads, intersections, places where equipment and personnel may be concentrated, followed by a sudden attack on the target. When working in tandem with a UAV repeater (reconnaissance): depth – more than 5 km, waiting time – up to 6 hours (only the control channel receiver is on). At night, attacks are possible using the headlights of moving vehicles, or using an FPV drone with a thermal imager.



6. "Combination Strike"

(FPV strike on target - dropping ammunition from a "bomber" drone)

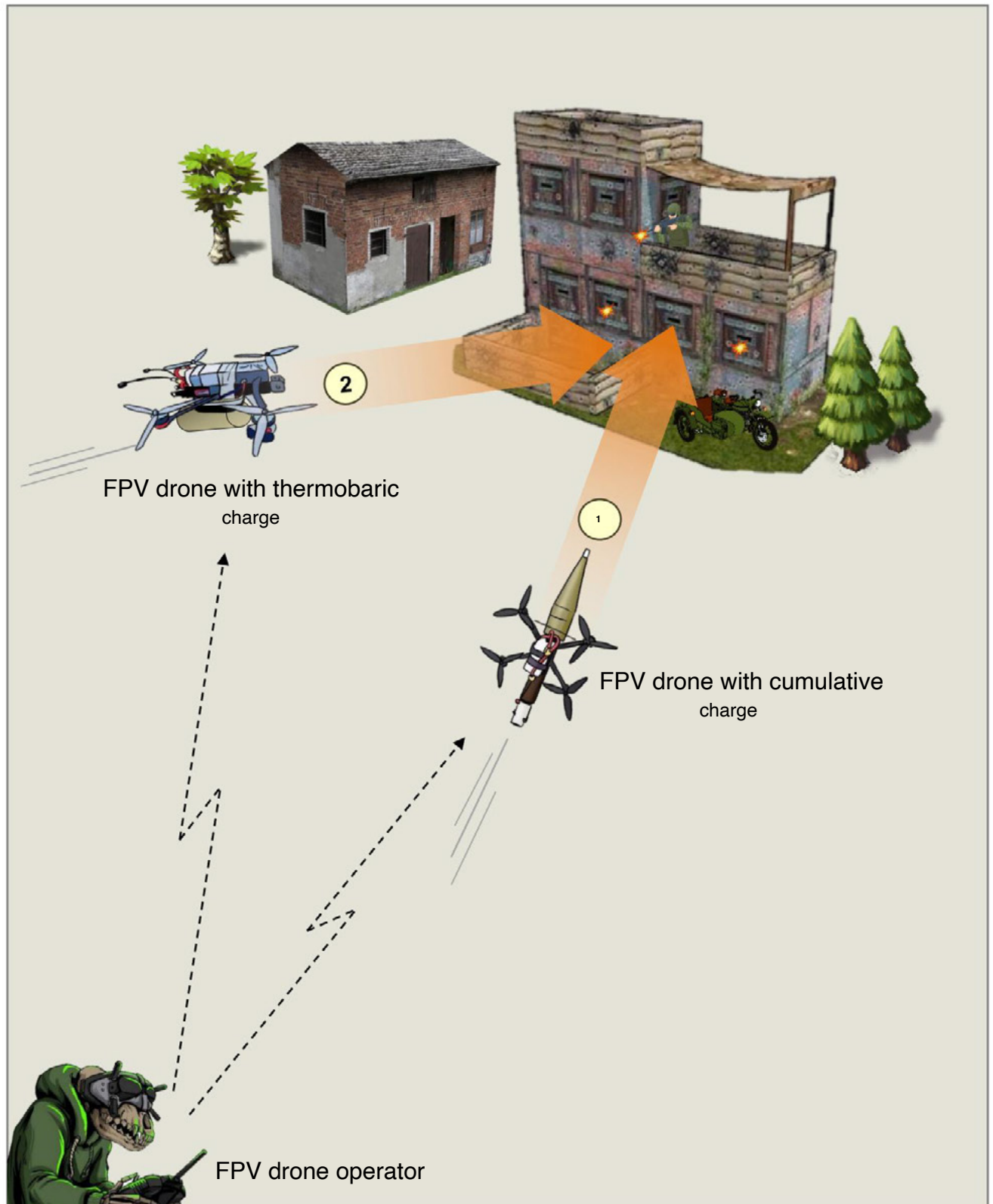
This method consists of solving the joint problem of FPV drones and UAVs. "bomber" for inflicting complex fire damage on identified targets. After the destruction (disabling) of armored vehicles (object) by an FPV strike, the drone-"bomber" drops ammunition on personnel during the evacuation. Another option: inflicting fire damage on personnel (unarmored vehicles) by dropping them in order to immobilize them, followed by the use of FPV drones.



7. "Double Impact"

(use of two or more FPV drones with different charges to breach a shelter and destroy personnel)

In order to destroy manpower in protected shelters, several FPVs are used in sequence: the first with a cumulative charge - to penetrate the barrier, the second, as a rule, with a thermobaric action to inflict fire damage on personnel in internal premises.



8. "FPV trap" (variants)

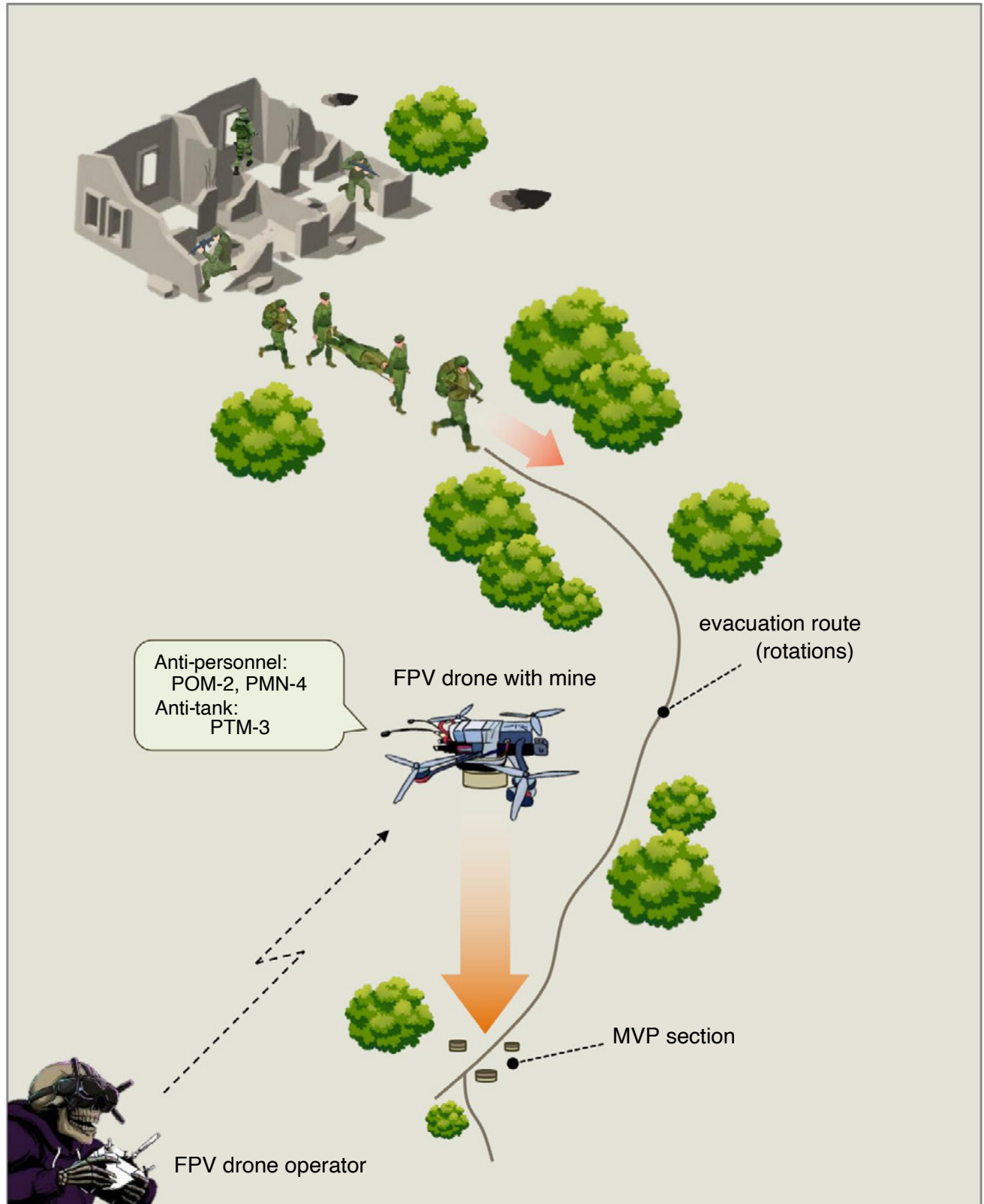
- drone landing and sound signal – when approaching (captured) the FPV operator carries out a controlled detonation via a reconnaissance UAV (repeater);
- when its position changes (due to a “jonik” type device) – self-detonation (in addition, it is possible to install a magnetic target sensor on metal);
- loading a 20-50 g charge into the drone’s structure, which is activated when it dismantling;
- built-in GPS beacon, its tracking and “arrival” to the signal location;
- treatment of the FPV drone body with potent toxic substances with skin-blistering action



9. "FPV-miner"

(delivery and installation of anti-personnel (anti-tank) mines, camouflaged IEDs on rotation and evacuation routes)

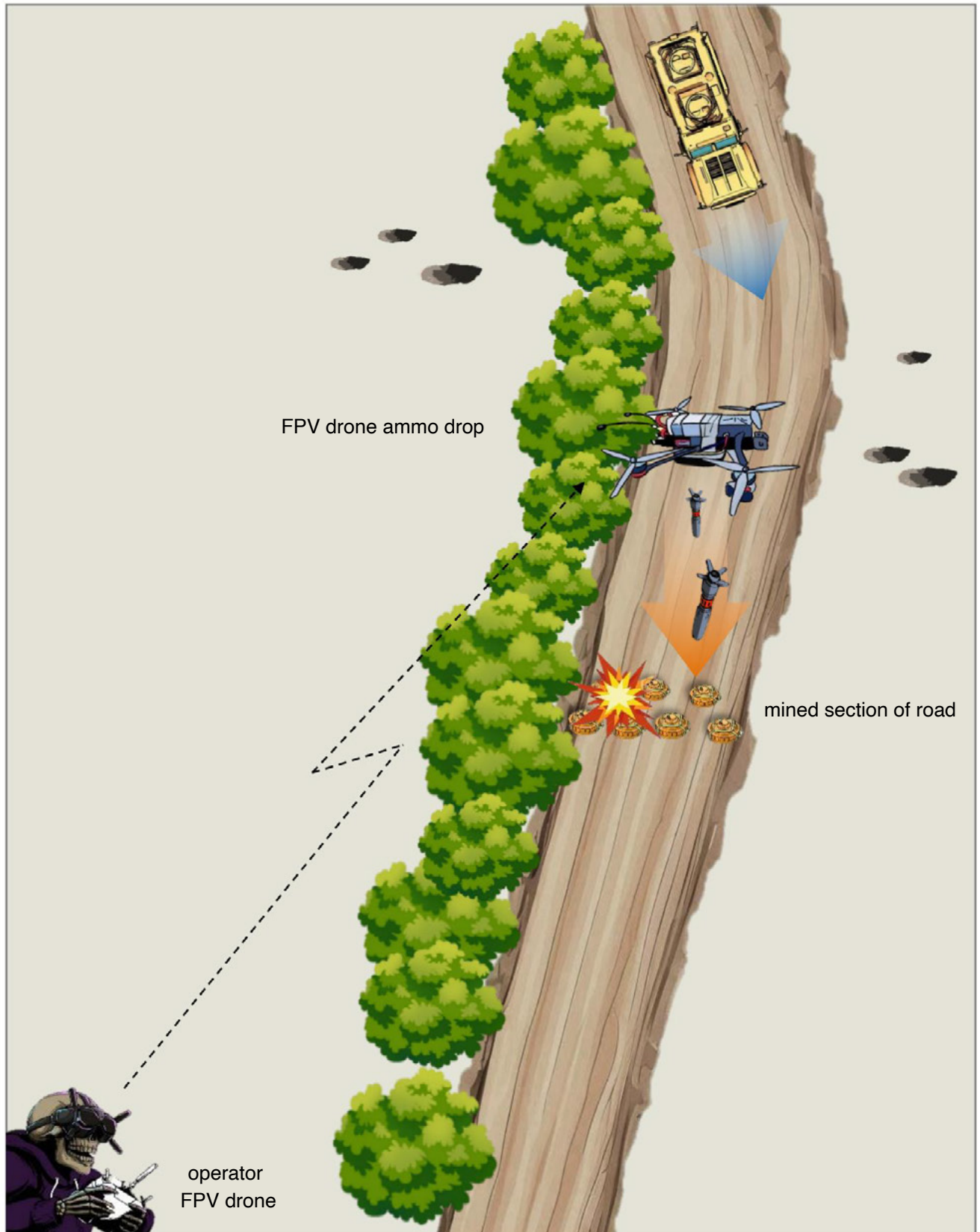
This tactical technique is used for covert installation of anti-personnel, anti-tank mines, as well as camouflaged IEDs by FPV drones on rotation routes, evacuation routes or near positions (objects) to destroy living strength and technology.



10. "FPV-sapper"

(dropping ammunition or installing a charge on mines)

Demining of an area, usually roads and paths, is carried out by dropping ammunition from an FPV drone or by installing a surface charge on openly located and uncamouflaged mines.



11. "FPV reset"

(dropping ammunition on target)

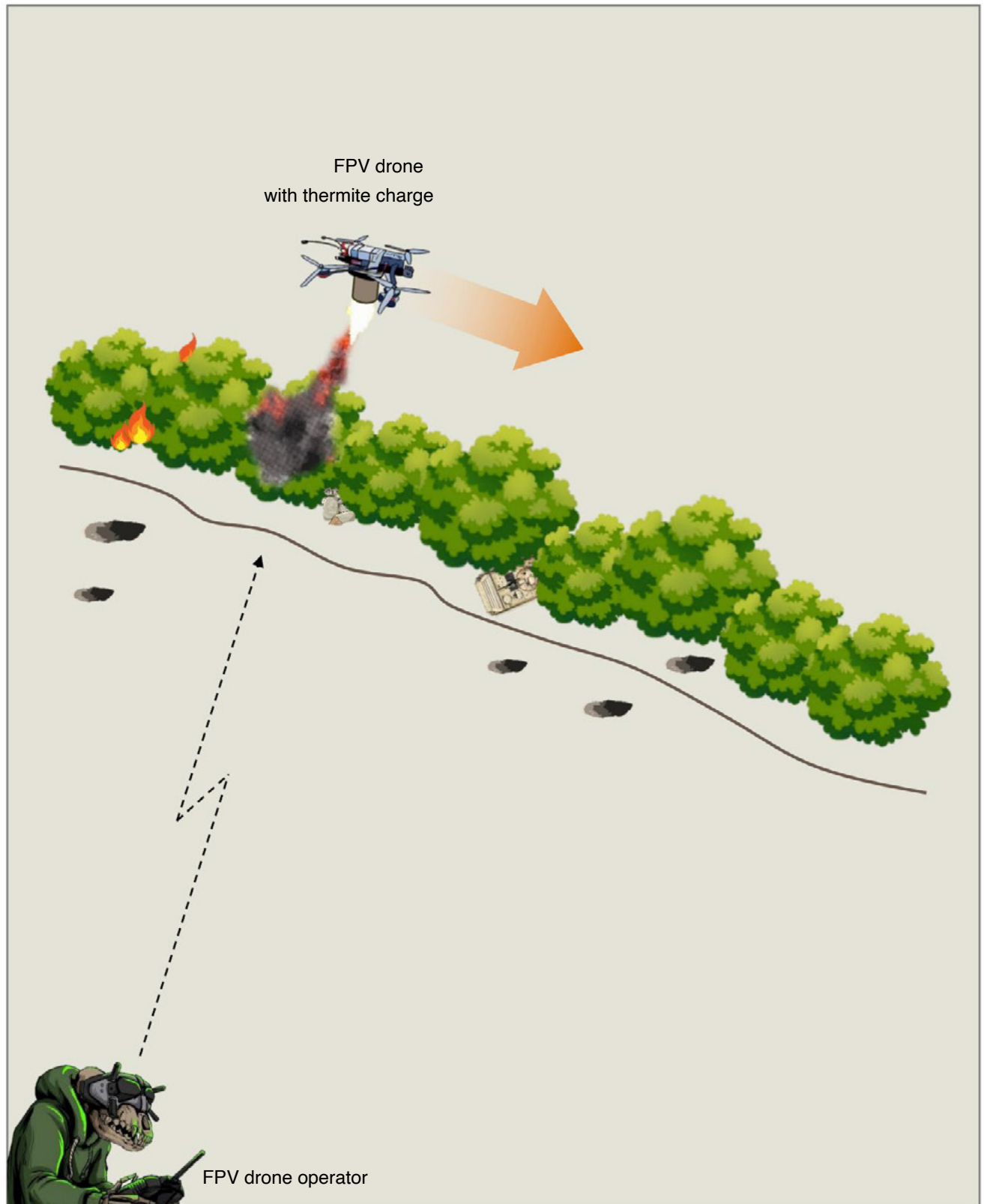
The tactic involves dropping ammunition from an FPV drone to kill personnel in open areas or in poorly protected shelters. ("hole"). The reconnaissance UAV directs the FPV to the target. There have been cases of using ammunition with toxic substances. In addition, this method is often used to drop payloads to friendly troops.



12. "FPV-dragon"

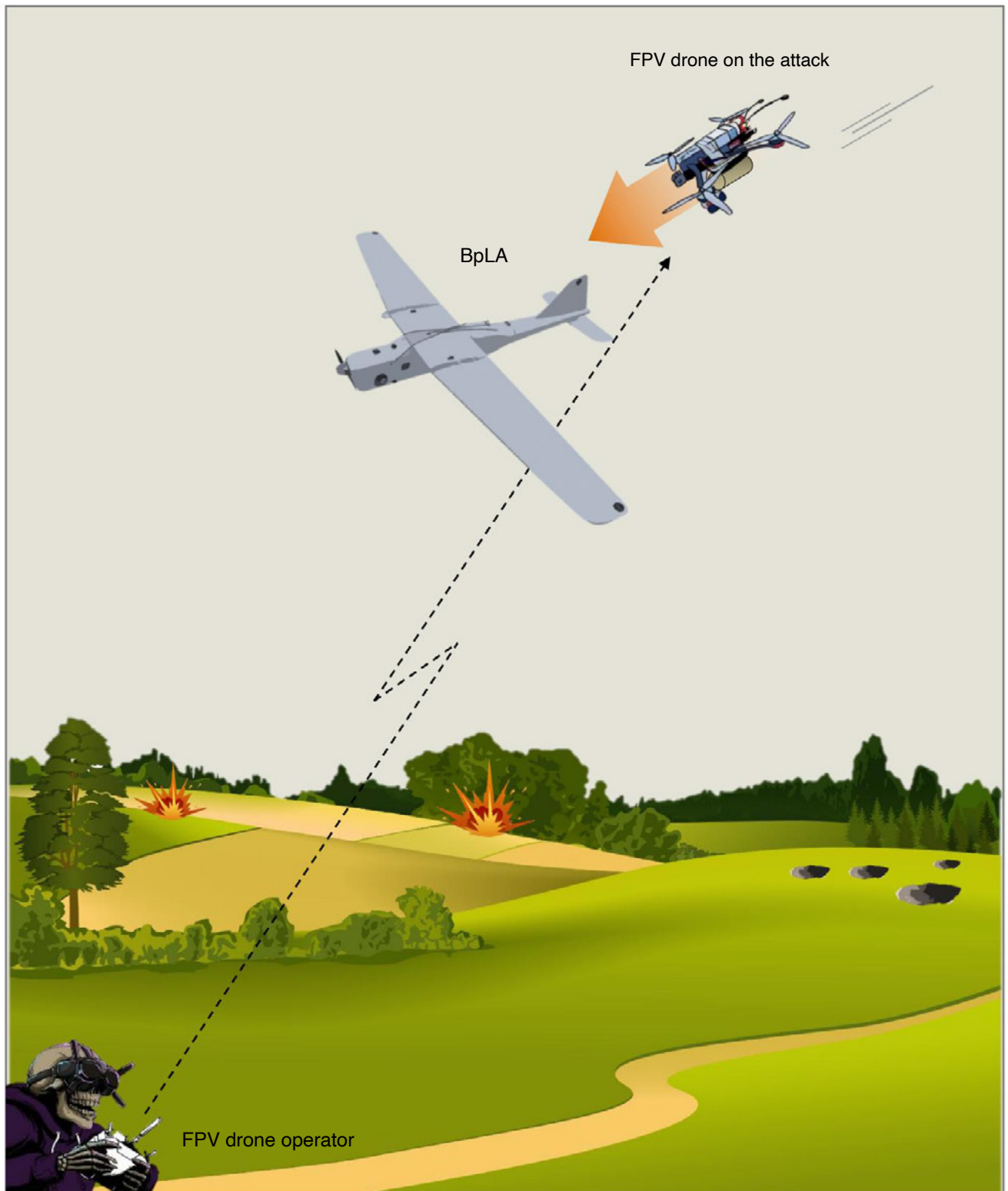
(spraying incendiary mixture over enemy positions)

For the purpose of setting fire to and disabling personnel, equipment, openly located ammunition and property, an FPV equipped with a thermite charge (based on a 120-mm artillery incendiary munition) is used. The average height of spraying the incendiary mixture is 20-50 m. Burning time is up to 2 minutes, temperature is over 2300 degrees C.



13. "FPV-PVO" (UAV destruction)

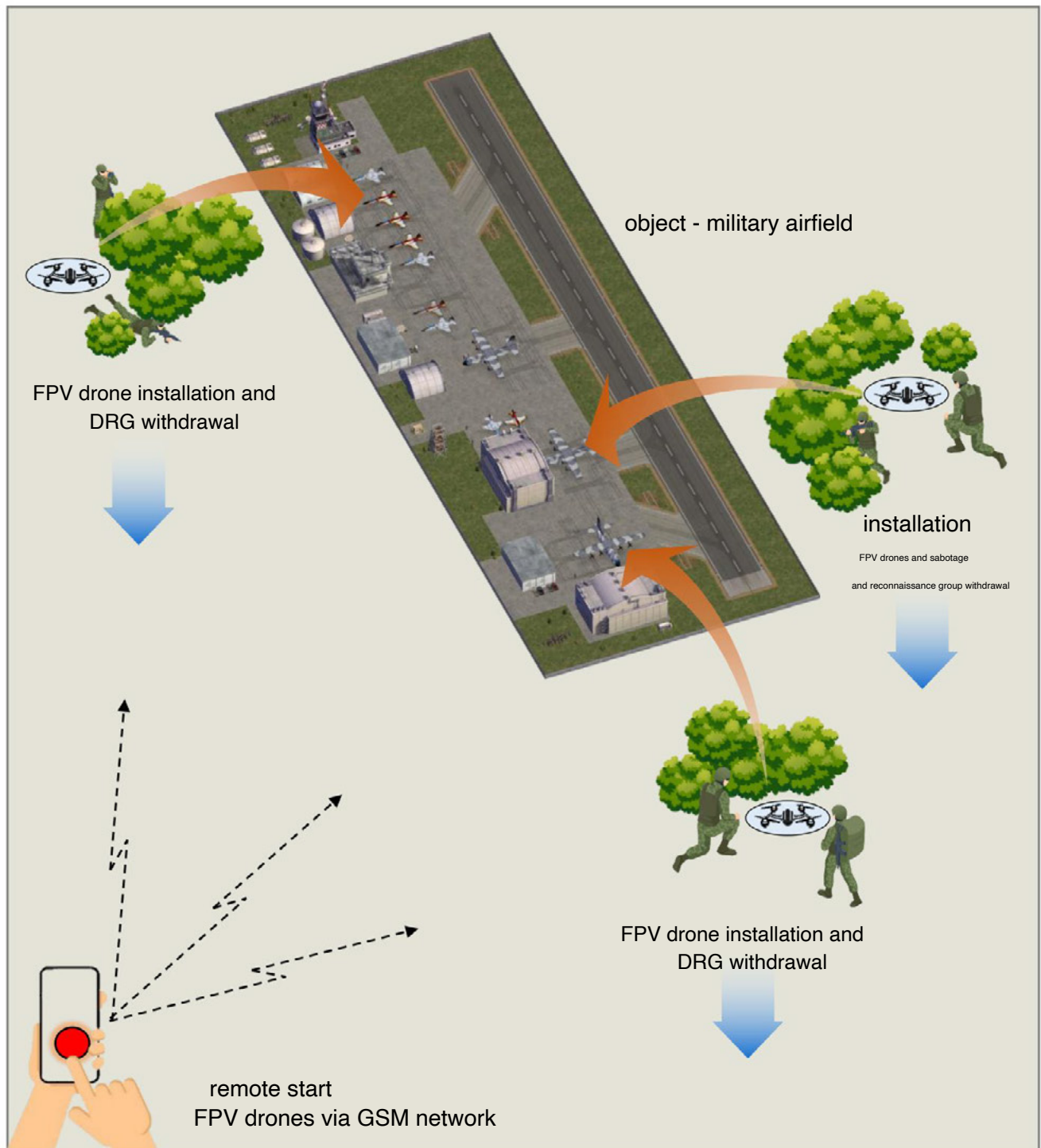
FPV drones are used to combat aircraft-type reconnaissance UAVs and hexacopters. When UAVs are detected by radio-technical means, (operating altitude – up to 3 km, speed – up to 110 km/h) FPV drones are launched to intercept and destroy them. UAVs are disabled by detonating a fragmentation charge when approaching or by ramming. Target designation is performed by the radar operator.



14. "FPV-saboteur"

(covert installation of FPV drone sabotage and reconnaissance systems at objects in the rear – remote activation of them according to pre-loaded coordinates)

This method of using FPV drones is used by sabotage and reconnaissance groups to destroy (disable) enemy military equipment and facilities. After the sabotage and reconnaissance group has covertly installed kamikaze drones (4-6 pcs.) near the facility at a distance of up to 2-3 km and switched to the "standby" mode, the UAVs are remotely activated by a GSM network signal to strike targets in accordance with pre-loaded coordinates.



15. "FPV-on the uterus"

(increase in combat radius)

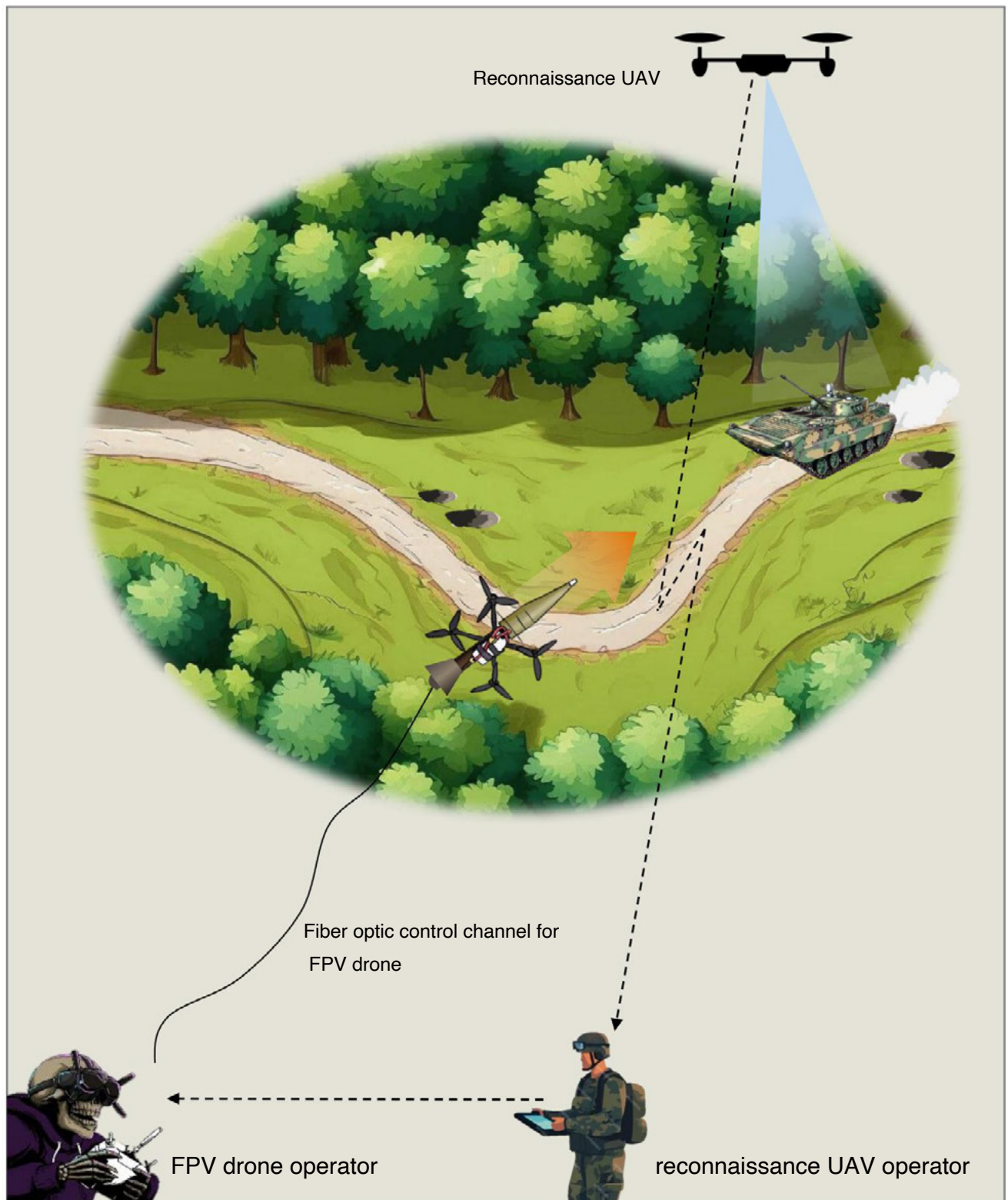
In order to increase the combat radius of FPV drones, UAVs are used - "mother" of both aircraft and "copter" types, which also act as a repeater. The total load capacity is two or three FPV. At the same time, their range of use (depending on the type of "mother") can be up to 60-70 km. In addition, unmanned boats (UBC) can act as "mothers" for FPV drones.



16. "FPV-on-wires"

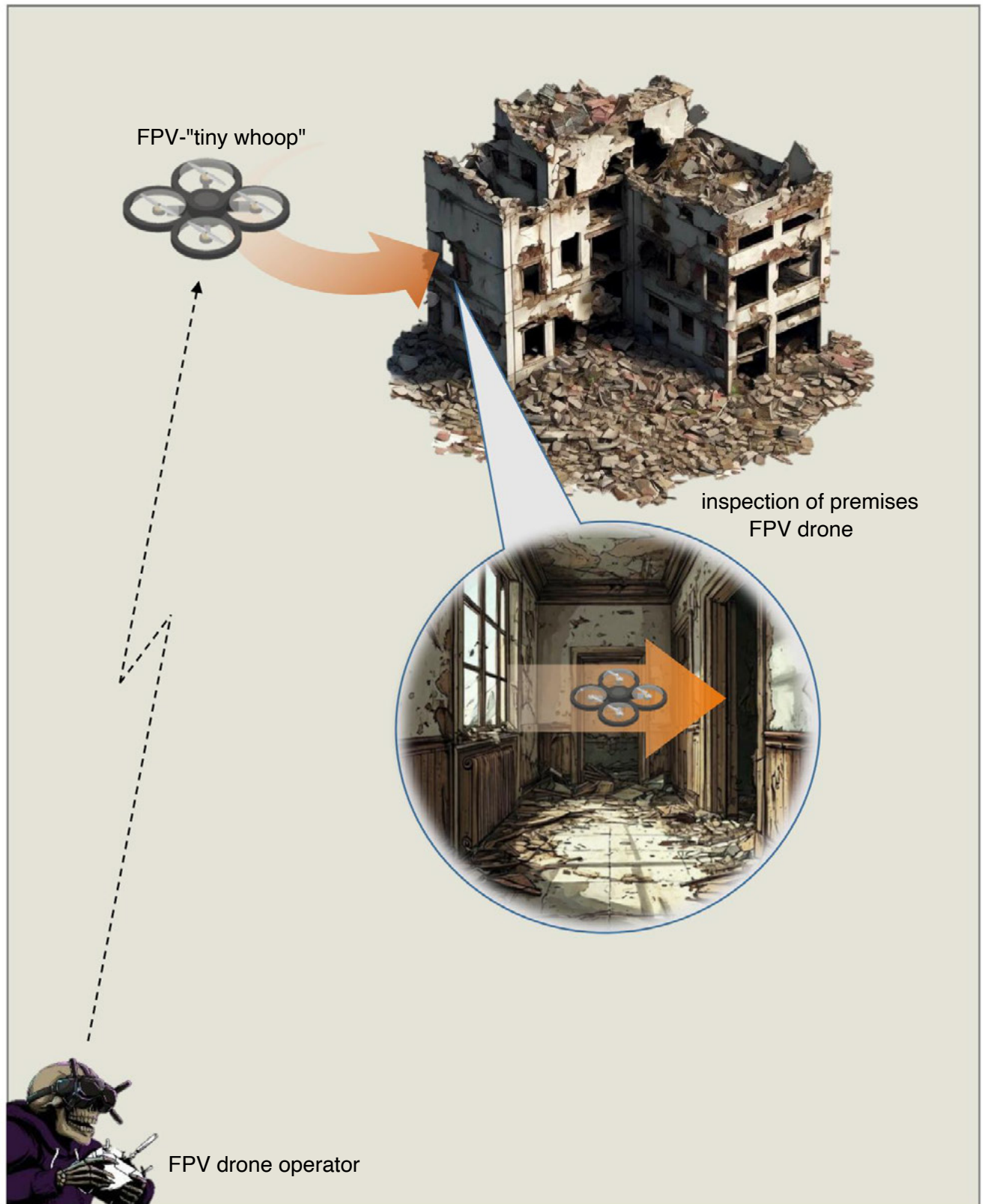
(ensuring stable control of the drone)

To ensure stable control of the FPV drone from the impact of electronic warfare systems and guaranteed target destruction at a range of up to 10 km (in some models up to 25 km), UAVs on a fiber-optic cable are being introduced. A characteristic feature of their use is the clarity of the video image to the final point of the route. Features of use - preventing abrupt maneuvers, avoiding fires along the route.



17. "Inspection of buildings" (control of premises inside buildings)

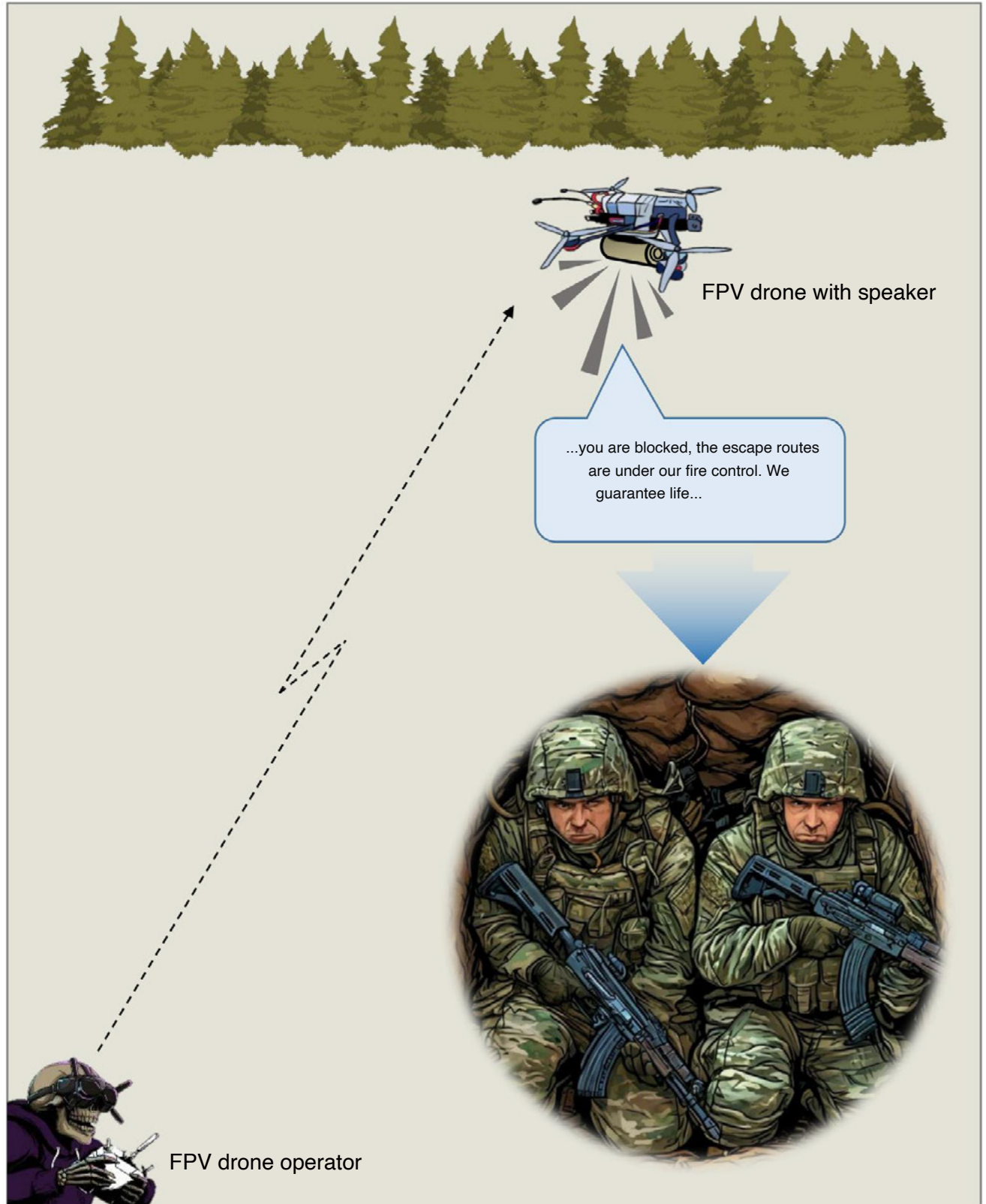
To detect the enemy and control the interior of buildings during assault operations, short-range FPV drones "tiny whoops" (microcopters with blade protection) are used. General performance characteristics: dimensions up to 100 mm in diameter, weight - up to 50 g, flight time - up to 4 min. Communication range (in buildings) - up to 500 m.



18. "FPV-swearing speaker"

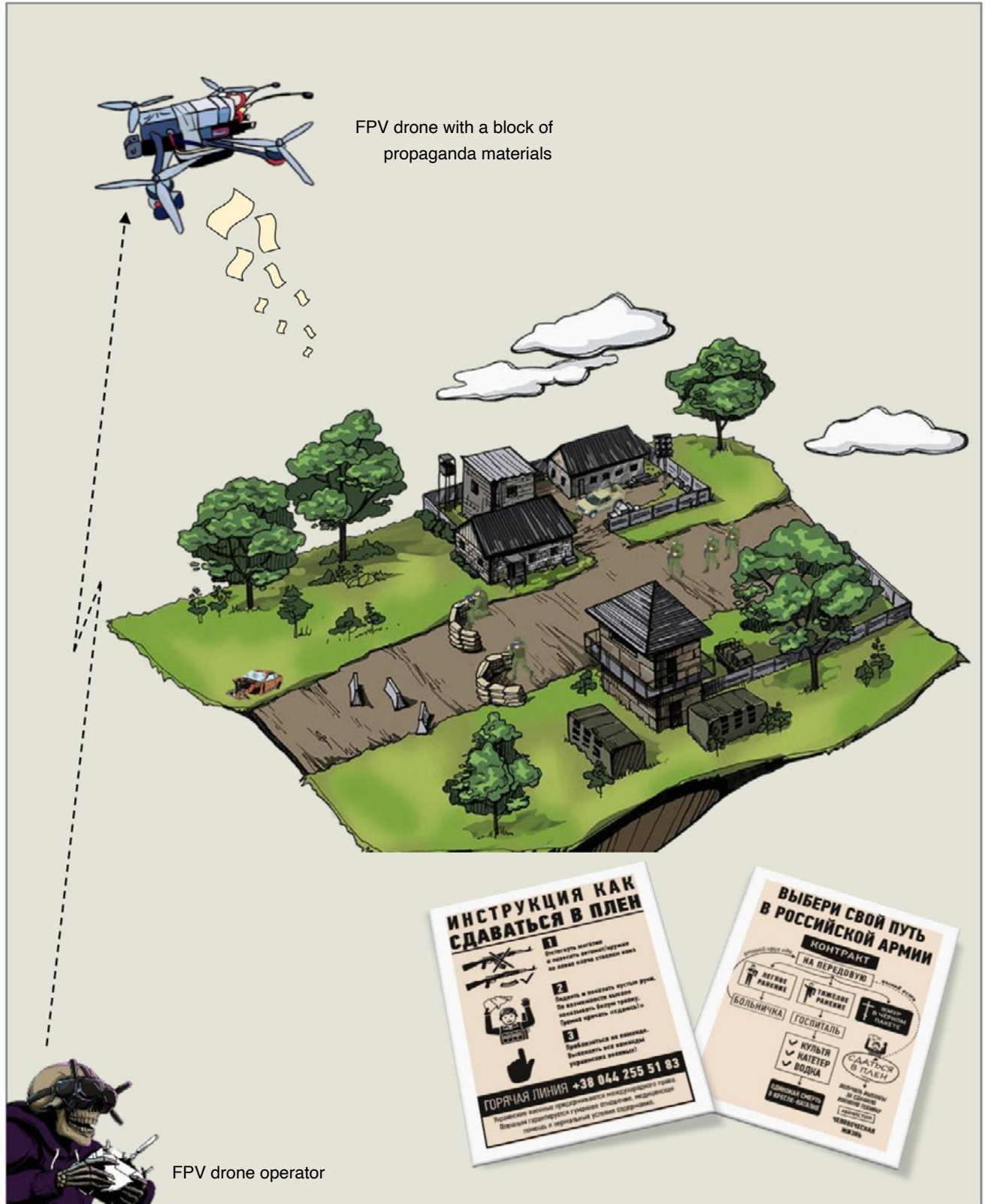
(information and psychological impact on the enemy)

In order to reduce the moral and psychological state of the personnel and forced to surrender, FPV drones with speakers for broadcasting audio messages are sent to the positions. Hovering height is up to 50 m.



19. "Flying" (dropping leaflets from an FPV drone onto enemy positions)

As part of the information and psychological impact on personnel and the population, FPV drones are used by the enemy to drop leaflets. The weight of the printed materials dropped is up to 2 kg (about 200 leaflets).



IV. Methods of countering FPV drones

The fight against FPV drones requires a comprehensive approach to protection from UAVs in the form of **active** and **passive** measures that must be implemented both in the unit and as individual elements by each serviceman.



Active events include :

identification and destruction of kamikaze drone operator crews (probable launch sites, presence of antennas, specially prepared area for FPV launch, traces of ammunition dismantling, packaging and boxes, inconspicuous passenger cars, repeaters on high-rise buildings and infrastructure elements);

early detection of UAVs (visually, by ear, by detector or analyzer signal) **and notification** (receiving a command or message from a senior officer, observation post, neighbors about the presence of a drone in the area of your operations);

electronic suppression of radio frequencies of control channels by means of electronic warfare transmission of video signals and satellite navigation;

reducing the time spent in the potential affected area due to the speed of the vehicle (an Induro-type motorcycle at a speed of about 80 km/h covers 5 km in 4 minutes);

fire impact - destruction of drones by small arms fire, primarily from smoothbore guns (up to 50 m);

mechanical impact – capture of drones by using special devices – “net throwers” – at close range (20-30 m);

maneuver – actions of personnel to avoid being hit by a drone (dispersal, taking cover, active movement in open areas in case of threat of defeat);

Providing logistics of ammunition, water, and food to units on LBS through the use of “heavy copters” and ground-based robotic systems for delivering cargo and evacuating the wounded.

As a promising method of countering UAVs, developments are underway to **optically influence** the drone's camera by using a laser device with a wide light beam.

Passive activities:

additional fortification equipment of positions (preparation of anti-drone niches and "holes", bends at the entrance to dugouts and shelters, installation of hanging protective nets and barriers);

camouflage of positions and equipment (installation of camouflage nets with irregular geometric shapes at a distance of 0.3-0.5 m from equipment in the shade of trees and bushes, inside destroyed buildings, use of heat-protective capes, monitoring of unmasking signs from a drone);

creation of false positions (equipped with heat and light sources)
with the installation of models of military equipment and transport (including unsuitable ones) to exploitation) and imitation of their activities;

installation of protective nets (screens) from fishing nets on rotation routes, evacuation of personnel, delivery of ammunition, water and food;

installation of hanging protective elements (canopies, awnings) and "domes"
electronic warfare systems for equipment;

taking into account weather conditions, terrain features and time of day when planning active actions and movements;

setting up aerosol curtains, creating smoke sources in positions (objects) **and routes of movement** (including false ones).



General recommendations for personnel to counteract FPV drones (based on SVO experience)

The number of UAVs at the front is growing exponentially. Drone duty in the air has led to decentralization and a reduction in troops at the front. Where there used to be a platoon, now they make do with a squad. Where there used to be a "support", there are now three "holes" with 2 people each. Both sides are trying to minimize movements on the LBS. One "armor" can attract up to a dozen "birds", and 2-3 drones participate in the race for a soldier. In the LBS area, reconnaissance drones, "bombers" and FPV crews take turns in their sectors to conduct surveillance in readiness for work. Some search, others strike.

Disguise.

1. Camouflage yourself from aerial observation, use awnings, fabric nets, branches, grass, foliage. The following things will give away your position: polyethylene film, white bags, household garbage, fresh earth, and the movement of fighters.

2. You are less visible from the air if you: are not moving; are in the shadow of buildings (objects); are sitting instead of lying down (reducing your dimensions); match the color of your uniform with the terrain, that is, do not fuss and do not "reflect"

"you're chilling."

3. It is better to move and hide in the shade of trees and slopes. Do not make sudden movements and do not run - it is noticeable. Relatively safe time and weather - twilight, night, fog, rain. Protective capes from "hothouses" - in the theme.

4. Place and camouflage equipment in forest belts, along (inside) buildings and hangars, change its location, equip simple camouflaged canopies. Pay special attention to covering car windows - they glare. If the enemy is in the north, place the equipment behind the building on the south side.

5. Do not place transport near the positions, put it in a hidden place for a quick "move". Collect all the garbage in bags and a separate pit. Scattered packages of rations, cans, plastic bottles, polyethylene perfectly unmask the position. To control the camouflage "quietly" launch your drone and inspect the area to identify unmasking signs.

6. Camouflage nets are always needed in large quantities. When installing, change their configuration, the more unclear and blurry the silhouette, the more difficult it is to detect the object. Satellite dishes heat up, they should be hidden in a hole and camouflaged from both daytime and thermal imaging cameras.

7. Create false positions with unmasking signs. Install mock-ups of military equipment or disabled transport. Simulate their activity. Make a fire at night in empty shelters, place "trenches"

"new" candles.

8. Observe light masking at night. Light from a cigarette, a campfire, light flashlights, headlights, phone screens – attracts drones like moths to a flame.

9. Conversations about life should only be made in cover. No need to huddle together with cigarettes if you are bored. Do not wander around your positions without doing anything. If you are called on command, warn another soldier. The main criterion for the enemy to detect you from the air is movement during the day and heat reflections at night. Keep quiet, try to communicate in a whisper and with gestures, listen to sounds.

Fortification and transport.

10. When equipping a trench, make a side niche at the bottom - it will protect against shrapnel during shelling, FPV strikes and ammunition drops. Exits from dugouts - in the shape of the letter "G". Hang a protective blanket at the entrance to the shelter. Equip a second entrance to the dugout (the first can be blocked as a result of a hit).

11. As obstacles for FPV drones, prepare and secure cord anti-drone curtains made of 4-5 mm thick ropes in front of the positions: length – 6 m, height – up to 4 m, interval between hanging ropes – 20 cm.

12. Another option for protection is to install screens made of cheap fishing nets (length - up to 80, height - 4 m, cost up to 1000 rubles) - they are invisible to the operator, equip additional awnings and canopies. No ingenuity - no shelter!

13. It is advisable to prepare and install smoke grenades in advance at the position (at a distance of 20-30 m) for their activation in the event of a threat of strikes by kamikaze drones. Each person has instant-action hand smoke grenades.

14. The presence of additional protective elements on equipment ("visors", "barbecues", shields, nets, chains, anti-fragmentation protection in the form of 1 cm thick pieces of rubber on "self-tapping screws") will increase the survivability of the crew and passengers when attacked by drones. The main thing is not to overdo it.

15. The desired ideal version of technical means of electronic warfare at the platoon position: spectrum analyzer and UAV detector, device for intercepting video images from FPV drones, portable broadband "dome" system of electronic suppression, individual mobile "suppressors". On the equipment - a mobile version of the "dome system". Bold, but it does no harm to dream.

16. Getting a proven electronic warfare drone suppressor for your vehicle is a military blessing. Don't cover it with a camouflage net. Monitor the battery charge of the miracle device. It's sad when you thoughtlessly "jam" the vehicle during a mission and are unknowingly left without a "dome". Wait for the evil spirits...

17. In order to combat the "hunters" of aircraft-type UAVs, It is necessary to install onboard electronic warfare systems.

18. How else can you influence the video transmission channel of an approaching enemy FPV drone? To detect it, you can use an FPV monitor or glasses, with which you search for the transmission channel (usually 5.8 GHz). On your drone's video transmitter, set the same channel and maximum power. After launch, interference is created in the control of the video transmission channel (the drones "work" on the same frequency).

19. Mechanical robotic platforms and "heavy" drones for providing logistics of ammunition, water, food and evacuation of the wounded significantly reduce personnel losses from FPV drones. We are looking forward to
nim.

Actions when a drone is detected.

20. Always listen to sounds, feel the "sky". First, detect by sound (you can hear better at night), then visually. Spread your ears like Cheburashka and keep your eyes open. Notify in a timely manner. Treat all UAVs as hostile.

21. Learn to distinguish between a Maywick and an FPV by sound. The first one works quieter and smoother. no, the second one is more piercing and has sharp changes during acceleration.

22. In order to increase security, movement should be carried out (in time and place) based on an analysis of the activity of enemy drones in a specific combat zone (the enemy knows about the "gray" time).

23. Try to avoid the "postcard", move along the plantings, in a populated area - from building to building. The interval in the "troika" is at least 5 m. It is advisable to move covertly along the "troikas" to the checkpoint (shelter).

24. Reconnaissance drone – a precursor to FPV. If you spot an enemy UAV while moving (including in a car), don't lead it to yours. Take cover, wait, observe and don't reveal your unit's position. When landing, lean against a tree trunk and don't move.

25. Always control the "sky" in sectors while moving. Keep your distance and notice the nearest shelters (destroyed buildings, "holes", plantings, bushes, etc.) for a "dash" when there is a threat of being hit by a drone. A shell crater, as a "safe place", will act as a grave. Do not gather "in a bunch" in one place. Dispersion, maneuver and speed.

26. Heard FPV – take cover immediately. If you are on a "postcard" – make sudden sharp movements. Leave the operator's observation sector, (fall) to the side during an attack. The chances are better for the masters of "shuttle" running. It is advisable to practice.

27. If the drone is in close proximity (20-30 m) – don't try to "freeze" in the hope that it won't notice and will fly past. Move the tomatoes! Salvation is in reaction and movement.

28. Firing from small arms is ineffective (small target size, high speed). In addition, when shooting you are static, which makes it easier for the operator to aim the drone. At close range (up to 50 m), there is a chance for a shooter (better two) with hunting or pump-action shotguns. To prepare them, practice on "skeet".

29. There have been cases of the operator playing with the "victim". If you are quick and skillfully dodge, hide behind cover (a 40 cm tree trunk is also an option), and are also able to attack the drone by throwing a "club" or other objects - the chances of survival increase. Almost recorded.

30. When driving a vehicle, pay special attention to monitoring the "sky" from the rear and flanks (up to 80% of FPV drone attacks are on the rear and sides of the vehicle).

31. In dangerous areas, move at the maximum safe speed. Do not choose long routes. If a kamikaze drone is detected, it is advisable to move to the side (preferably to a forest plantation, to buildings), stop and quickly disperse. The chances of escaping from FPV along the route are negligible.

a little.

32. When the vehicle stops, everyone leaves the vehicle very quickly, no one "huddles" or argues about who will unload the ammunition. Otherwise, the target's priority increases. Time is against you.

33. The availability of high-speed motorcycles such as "induro", "buggy", and quad bikes with trained drivers contributes to increased survivability and cargo logistics in the LBS area. At the same time, electric models ensure silent movement and higher sensitivity of drivers and passengers to early detection of drones by sound.

34. Extreme driving requires serious training of drivers. Train day and night. Be able to identify and remember landmarks during the day and then find them at night.

35. If you spot an FPV drone on the ground (especially if it "beeps" near your positions), don't run to it with joy and spread your fingers in the hope of a new trophy. It could be a "trap". Don't approach it from the camera's side (the operator is waiting for you to appear in the frame), don't touch it, mark it with a marker, and report it to the commander. A specialist will sort it out.

V. Conclusion

Thus, the technical leap in the application and adaptation of FPV drones to the modern theatre of military operations has led to a significant expansion of the range of combat missions they perform.

The demand of combat units for trained and provided kamikaze drone crews exceeds the supply on the war market. Innovative development of this type of weapon will undoubtedly entail the search for and implementation of new technical solutions and methods of counteraction (electronic, optical, mechanical, etc.), and will also lead to the creation of separate structural units (crews), both for their use and for combating them.

At the same time, in the near future, individual elements of counteraction touch every serviceman in combat units. The competition in the drone-anti-drone confrontation category is just beginning...





INFORMATION BULLETIN No. 1

"EXPERIENCE IN USING 12 CALIBER GUNS BY UNITS OF THE RUSSIAN FEDERATION FOR THE DESTRUCTION OF UAVS" (SEPTEMBER 2024)



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PREFACE

In this newsletter, we will look in detail at the experience of using 12-gauge rifles by servicemen of the Russian Federation to shoot down UAVs. This information should be taken into account by us, as it allows us to better understand how the enemy adapts to modern threats and develops new tactical approaches. By analyzing such actions, we can better prepare to counter such methods, improve our tactics, and stay one step ahead in asymmetric warfare.

INTRODUCTION

In the modern conditions of the war with the Russian Federation, drones have become an indispensable tool for conducting reconnaissance, adjusting artillery fire, delivering precise strikes and performing other critically important tasks. Their maneuverability and relatively low cost make them a powerful asset on the battlefield. However, the enemy does not stand still and constantly improves methods of combating UAVs. One of the unexpected, but quite effective solutions was the use of 12-gauge guns to shoot down low-flying and low-speed drones.

The popularity of guns is explained by several factors: wide availability, low cost, ease of use. With special ammunition such as shot, the 12-gauge gun is capable of engaging drones up to 75 meters away, making it a relatively effective weapon for destroying low-flying UAVs. In addition, this tactic allows the enemy to save resources, avoid the use of expensive anti-drone systems and operate in conditions where electronic means of combat are ineffective.

This bulletin examines in detail the testing and use of 12-gauge rifles by the enemy against drones. We analyze the specifics of such tactics, their advantages, limitations and potential risks.

CHAPTER 1. TACTICAL APPROACHES OF UNITS OF THE RUSSIAN FEDERATION USING 12 GAUGE GUNS AGAINST UAVs

Units of the Russian Federation are looking for a temporary solution to protect their servicemen from low-flying UAVs of various types. One such solution was the use of 12-gauge shotguns with the appropriate ammunition. Below is a detailed review of the development of the enemy's capabilities in combating SOU UAVs.

The enemy uses the following tactics in the fight against UAVs, using 12 gauge shotguns:

1. **Arming the crews of buggies, ATVs, motorcycles, etc take part in assault actions.**

One serviceman armed with a 12-gauge rifle is assigned to each buggy crew or mobile assault team. This allows mobile units to quickly respond to the appearance of drones in their sector, quickly destroying them at close range. Numerous videos show that the enemy, placing himself on top of the "armor", assigns one serviceman armed with a 12-gauge rifle to be in charge of the inspection sector opposite to the direction of movement of the equipment, thereby covering the vehicle from a blow from the rear.

2. **Use of drone detectors.**

The enemy uses portable drone detectors that detect the appearance of UAVs within the range of the detector. Thanks to these devices, enemy crews can quickly detect a threat and prepare their guns.



Photo 1. "**BULAT-3**" drone detector

*For reference: currently, the enemy has started using **BULAT** drone detectors of the 4th generation. The manufacturer claims that the detector can detect UAVs in the range of 300-6200 MHz. Detection range up to 1000 meters.*

Designed to detect DJI, AUTEL, and some types of "FPV" drones. The price is 1400 dollars. It is noted that the enemy still does not have mass distribution of this type of detectors. A significant improvement in the tactical and technical characteristics of the device is observed. From the moment of appearance to 4

the generation of the detector has passed 9 months, this indicates that the enemy is trying to develop an effective device for the protection of its own troops.



*Photo 2. Complete set of the **BULAT** 4th generation drone detector*

3. Coordination of 12-gauge rifles with ERW rifles. It was noted that the enemy uses 12-gauge guns in cooperation with electronic warfare equipment. EW guns interfere with the control of drones, block their GPS signals and video communication, forcing UAVs to lower altitude or lose control. At this point, 12 gauge shotguns become effective for physically engaging drones at low altitude.

4. Creation of fire ambushes. The enemy organizes ambushes on the probable flight routes of SOU drones. Enemy military personnel take up positions with 12-gauge rifles at points where drones can fly at low altitude, such as near buildings, wooded areas, or in difficult terrain. This allows you to suddenly attack the drone at its most vulnerable moment.

5. Combined fire groups. The enemy creates combined groups in which different types of weapons are used simultaneously. Fighters with 12-gauge rifles operate in conjunction with machine gunners or soldiers armed with assault rifles, thereby increasing the probability of downing drones.



Photo 3,4. The enemy demonstrates equipment for combating UAVs

For reference: in these photos, the enemy demonstrates equipment for detecting drones using the BULAT-3 drone detector, an electronic warfare device in a backpack for suppressing UAVs, a battery for power supply, and a TOZ-34 gun for shooting at UAVs.

Using these tactics allows the enemy to quickly adapt to combat conditions and counter the UAV threat, using 12-gauge guns as an effective and cost-effective means of combating drones at low altitudes.

SECTION 2. TYPES OF 12 GAUGE GUNS USED BY THE UNITS OF THE RUSSIAN FEDERATION FOR ANTI-ASV.

From the second half of 2023, the Ministry of Defense of the Russian Federation began the purchase of 12-gauge rifles to combat the "FPV drones" of the SOU. Rifles are supplied to units of the ground forces of the Russian Federation, namely assault units. The purchase of 2 types of rifles was officially noted.

Rifle "MR-155"

The length of the barrel is 71 centimeters. Type – semi-automatic. The number of bullets is 5. The use of a magazine extension has been observed, which increases the number of bullets to 8.



Rifle "VEPR-12"

The length of the barrel is 51 centimeters. Type – semi-automatic. The number of cartridges (stores for 5, 8, and 10 cartridges).



CHAPTER 3. NON-STANDARD MEANS OF FIRING 12 CALIBER BULLETS.

Taking into account the great need for rifles, the Russian military is simultaneously developing "substitutes" for 12-gauge rifles in factory and artisanal conditions in order to achieve saturation of the means of defense against drones of the Defense Forces of Ukraine on the battlefield.

Means of firing 12-caliber bullets against drones "ROSYANKA"

It is a plastic insert in the GP-25 underbarrel grenade launcher.



Photo 5. General view of the "ROSYANKA" device



Photo 6. The moment of charging the "ROSYANKA" device



Photo 7. The moment of equipping the device in the "GP-25" underbarrel grenade launcher



*Photo 8. Readiness for use of the "**ROSYANKA**" device*



Photo 9. The moment the enemy fired from the **"ROSYANKA"** device



Photo 10. The moment of hitting from the device on the UAV.
(distance 25 meters)



Photo 11. The moment of sleeve extraction.

This type of "artisan" weaponry has a number of disadvantages, namely:

- 1 charge
- Long recharging process
- Short barrel (which affects the range of the shot)
- Lack of aiming devices (affects shot accuracy)

Home-made means of firing 12 caliber bullets

Has 1 round of 12 gauge. Disadvantages and characteristics are identical to those described above.



Photo 12. Shooting from a home-made 12 gauge device

A sample of a remote-controlled 12-gauge shotgun

Considering the large amount of destroyed equipment of the units of the Russian Federation "FPV drones" SOU, the Russian military began to experiment with the protection of equipment. The photo shows a prototype of a 12-gauge remote-controlled module that is installed on a vehicle. The sample uses a barrel from a **"VEPR-12" rifle**.

It has been noted that the moving barrel of the 12-gauge remote-controlled shotgun is slow and cannot keep up with the speed of the "FPV drone". The probability of destroying the drone is minimal.

The number of cartridges in a drum-type magazine is 12-20 cartridges. Effective firing range (destruction) up to 25 meters. During the shooting of this gun, problems with stabilization are noted, which, accordingly, affects the accuracy of shooting. The estimated risk for the destruction of SOU drones is minimal.



Photo 12, 13. Experimental sample of a remote-controlled 12-gauge rifle

CHAPTER 4. TYPES OF AMMUNITION FOR 12 CALIBER RIFLES USED BY UNITS OF THE RF FOR AGAINST AIRCRAFT

12-gauge cartridge **"PEREKHVAT" (12x70)**

- The length of the thread is 50 cm, the total diameter of the thread is 1 meter. (area of damage 1 meter x 1 meter).
- The material of the thread is Kevlar.
- **"PEREKHVAT"** cartridges are manufactured in Izhevsk at the weapons factory.
- Each cartridge is equipped by hand.
- The thread breaking force is 35 kilograms.
- The range declared by the manufacturer is up to 100 meters. (real range according to the tests of the Russian military is up to 75 meters).
- Speed 550 m/s.



Photo 14. General view of the "PEREKHVAT" embankment



Photo 15. Composition of the "PEREKHVAT" charge (in enemy language)



Photo 16. The process of equipping the "PEREKHVAT" charge (Izhevsk Plant)

The results of enemy testing of the **PEREKHVAT charge**.

The type of gun is MP-155. The length of the barrel is 71 centimeters.

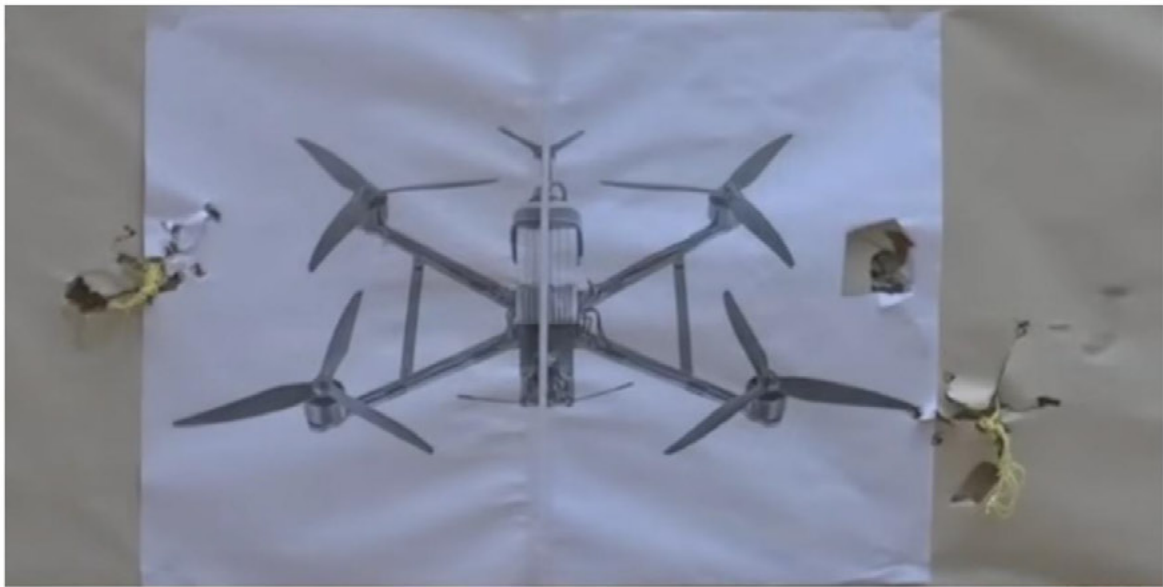


Photo 17. The testers fired 2 shots from a distance of 5 meters in order to show the diameter of the opening of the charge

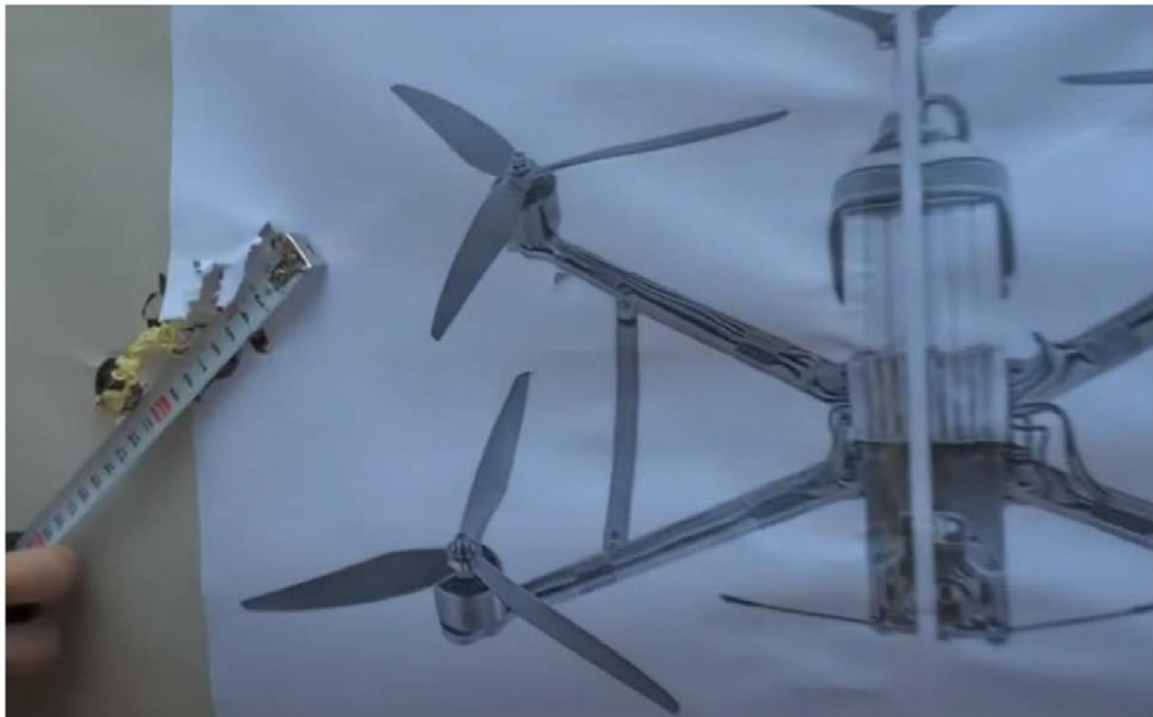


Photo 18. Showing the opening of striking elements at a distance of 5 meters (makes 12 centimeters)



Photo 19. The testers fired 2 shots from a distance of 10 meters in order to show the diameter of the opening of the charge

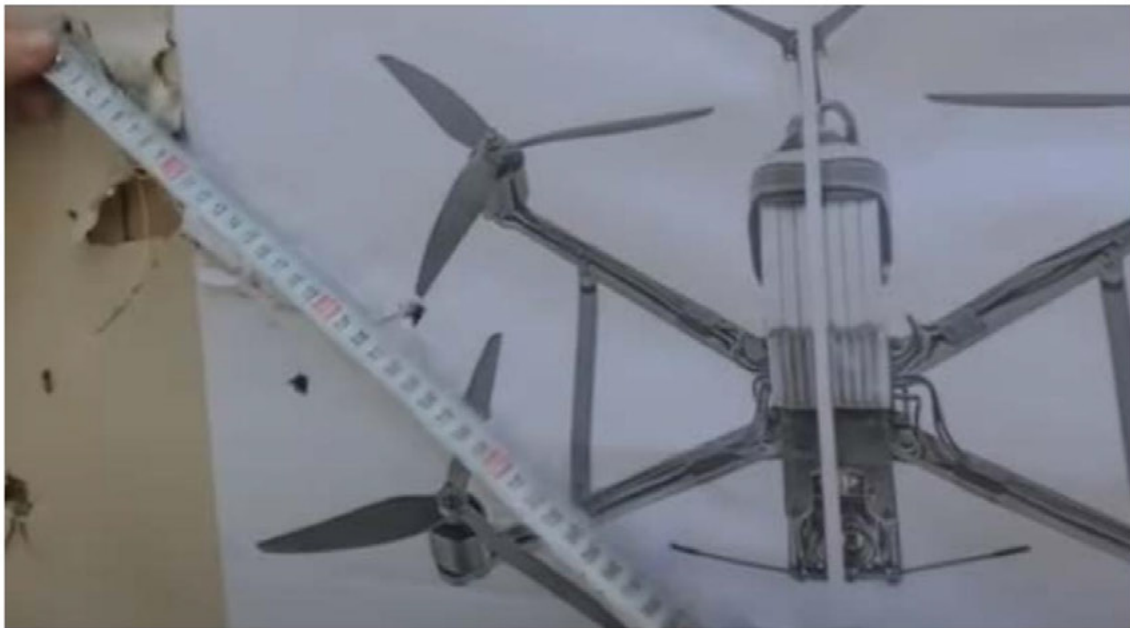


Photo 20. Showing the opening of striking elements at a distance of 10 meters (makes 22 centimeters)

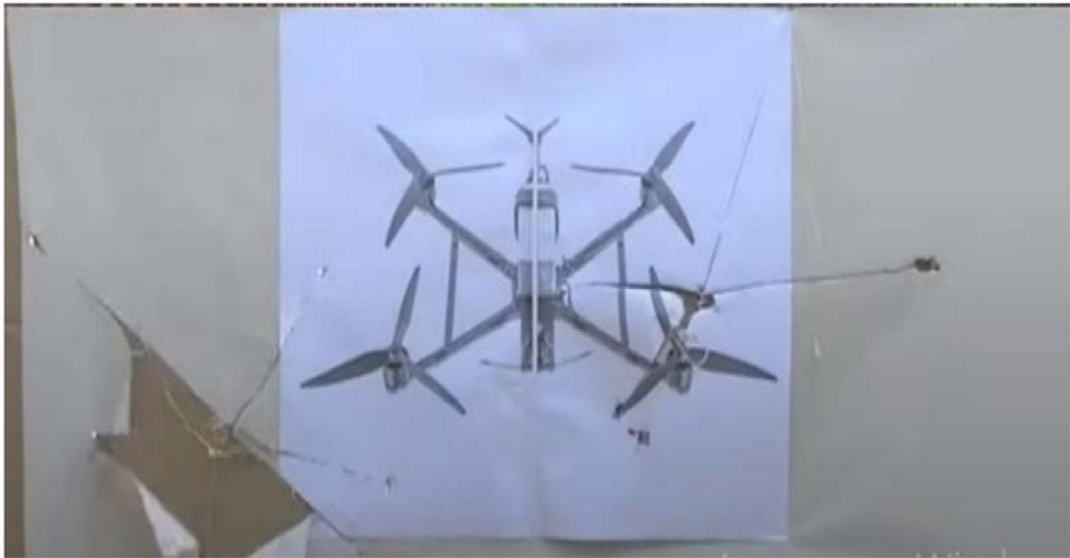


Photo 21. The testers fired 2 shots from a distance of 20 meters in order to show the diameter of the opening of the charge

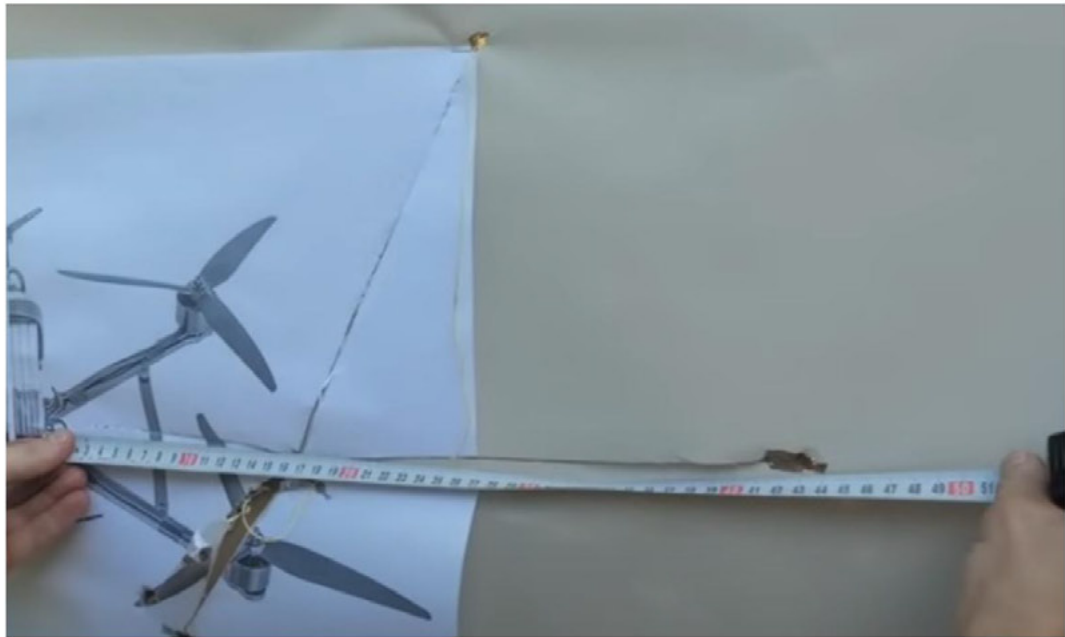


Photo 22. Showing the opening of striking elements at a distance of 20 meters (makes 43 centimeters)

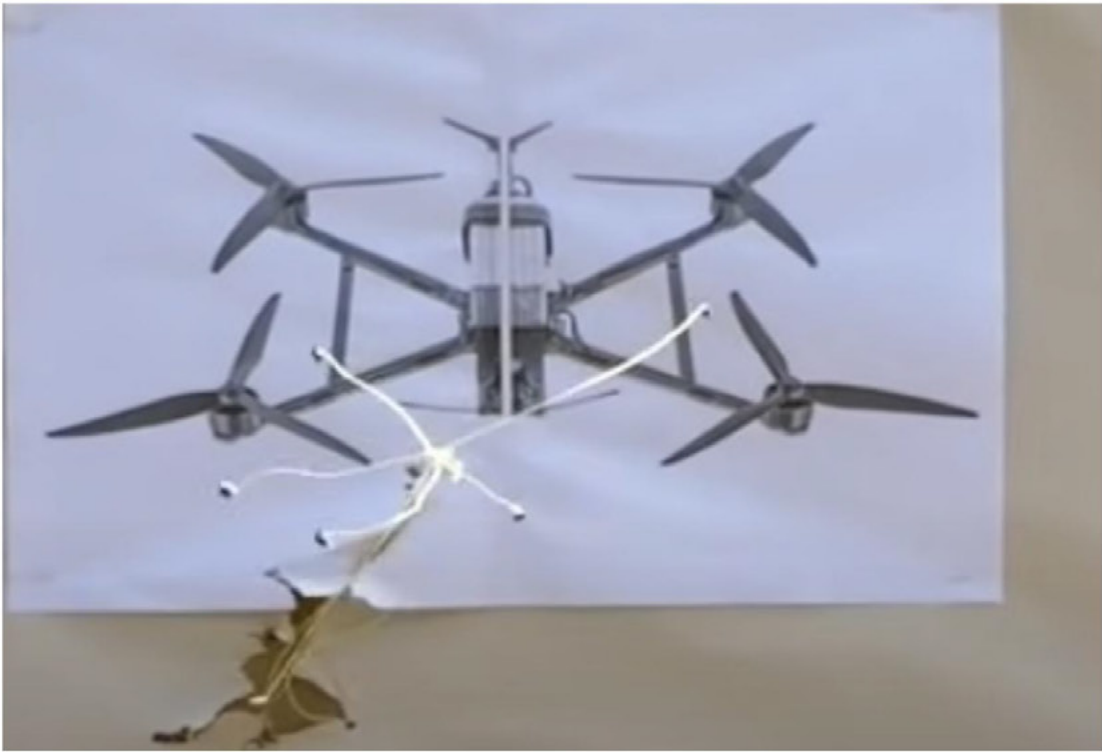


Photo 23. Visualization of the moment of the opening of an impressive charge at a distance of 30 meters



Photo 24. Showing the opening of striking elements at a distance of 30 meters (makes 33 centimeters)

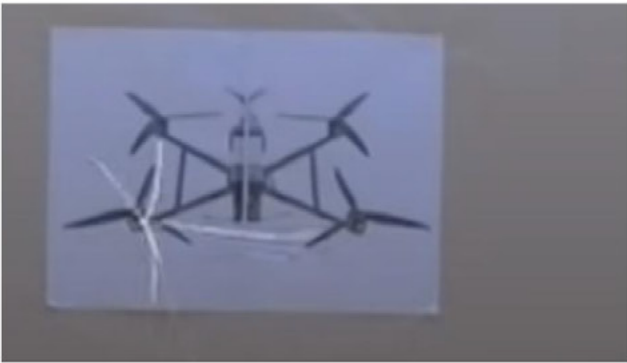


Photo 25. The moment of hitting a target at a distance of 50 meters

So, according to the results of testing, the **"PEREKHVAT"** charge shows the following results:

From a distance of 20 meters, the charge acquires the maximum diameter of the opening, after that the opening of the charge varies with the distance, due to the weight of the striking elements (increasing or decreasing). The maximum target damage range was 75 meters. It should be noted that the target is static, so the shooting conditions are almost ideal. But this testing gives a clear understanding of the effectiveness of this charge.



*Photo 26. The result of defeating the drone with the **"PEREKHVAT"** bullet (Kevlar thread tangled the drone blades, 1 blade was cut off by the thread)*

12-gauge "**KS**" charge.



*Photo 27. General view of the "**KS**" bullet*

Impressive elements - meal No. 3, diameter 3.50 mm.

The weight of the striking elements is 43 grams (approximate quantity – 150-170 pcs.) The range of effective firing (depending on the length of the gun barrel) is 50-75 meters.

The speed is 500 m/s.

CHAPTER 5. PREPARATION OF SUBDIVISIONS OF THE RF FOR ATTACKING DRONES USING 12 CALIBER GUNS

The adversary is showing interest in this topic and is training its units to destroy drones with 12-gauge rifles. The photo below shows a training ground that fully simulates the VOP. A bench shooting machine is installed.



Photo 28-29. Arrangement of the training place





Photo 30. The process of training a soldier of the Russian Federation. (uses a semi-automatic MP-155 rifle with a magazine extension for 8 rounds and a barrel length of 71 centimeters)



Photo 31. A Russian serviceman shows the results of the destruction of the "FPV drone".



Photo 32. Training of Russian servicemen using a combination of different types of small arms

(the enemy trains skills and tactical techniques for the combined use of 12-gauge rifles together with AK-74-type assault rifles to increase the probability of defeating FPV drones.)

CHAPTER 6. COMBAT EXPERIENCE OF UNITS OF THE RF IN DESTROYING SOU UAVS WITH THE HELP OF 12 CALIBER GUNS.



Photo 33. Shows the moment of destruction of the Ukrainian FPV drone by the enemy (the Russian serviceman was in an ambush out of sight of the UAV and hit the Ukrainian drone with 3 shots at a distance of 35-40 meters)



Photo 34. Russian servicemen display as a trophy the downed Ukrainian FPV drone of the "wing" type with the help of a 12-gauge gun

THE FINAL PART

The Ministry of Defense of the Russian Federation is actively implementing the use of 12-gauge rifles, in particular the MP-155 type, to counter SOU UAVs. The purchase of these rifles is part of a vision aimed at improving anti-drone systems, which has become one of the priority areas in the training of the Russian military.

Units of the Russian Federation pay considerable attention to training personnel in the effective use of 12-gauge rifles to shoot down drones. This includes both training in the field, close to actual combat, and the involvement of civilian range instructors to improve marksmanship skills. The development of the infrastructure and the organization of training emphasize a serious approach to the adaptation of the enemy's units to the fight against SOU UAVs.

The inculcation of the culture of using 12-gauge rifles in military units of the Russian Federation is noted. Enemy personnel undergo training in full equipment, simulating the conditions of real combat operations, which increases readiness for operational use of weapons on the battlefield. This approach provides them with an additional tool in the arsenal of means of countering drones.

In addition, the Ministry of Defense of the Russian Federation initiated and developed two types of specialized cartridges for the destruction of drones, which indicates the technological adaptation of weapons for specific purposes. This gives the units of the Russian Federation greater flexibility and effectiveness in countering unmanned aerial vehicles on the battlefield.

the Russian military has also developed various tactical approaches to the use of 12-gauge rifles. This includes using weapons in coordination with others means of combating drones, such as EW, equipment with rifles of assault groups or crews of combat vehicles. Such tactics reduce the effectiveness of reconnaissance and strike drones of the SOU, creating additional difficulties for their use.

So, we can see that the Russian Federation has significantly strengthened its capabilities in the field of countering SOU drones, using guns, ammunition and tactical techniques. This confirms the seriousness of the approach to the use of small arms in the fight against UAVs, which indicates the adaptation of the Russian military to the modern challenges of combat operations, where drones play a key role.

