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# COUNTERING MODERN DRONES IN ARMED CONFLICTS

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**Abstract**

The article examines the growing role of unmanned aerial vehicles (UAVs) in modern armed conflicts and analyzes the main methods of countering them. Particular attention is paid to the evolution of combat drones, their tactical and strategic application, as well as technical, organizational, and tactical measures to counter unmanned threats. Based on confirmed examples from the conflict in Ukraine and the Middle East region, it is shown that drones have significantly changed the nature of combat operations and have had a substantial impact on the security of both military personnel and the civilian population. The conclusion considers the prospects for the development of counter-drone technologies and their significance for future conflicts.

**Keywords**

unmanned aerial vehicles, drones, counter-drone warfare, electronic warfare, air defense, modern armed conflicts.

Modern armed conflicts are characterized by rapid technological development and a shift in emphasis toward high-precision, remotely controlled means of destruction. One of the most significant elements of this transformation has been unmanned aerial vehicles. Drones have changed perceptions of airspace control, reconnaissance, strike delivery, and troop command and control.

If at the end of the twentieth century UAVs were regarded as expensive and limited-use systems available only to technologically advanced states, in the twenty-first century the situation has changed radically. The availability of electronic components, the development of navigation systems, and the reduction in production costs have turned drones into mass weapons. This has led to the urgent need to revise defense doctrines and develop specialized countermeasures.

The development of combat drones took place in stages. In the early phases, they performed exclusively reconnaissance functions, providing information gathering and observation of the enemy. Gradually, drones began to be used for

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artillery fire adjustment, which significantly increased its accuracy and effectiveness.

The next stage was the emergence of strike UAVs equipped with guided munitions. Such systems made it possible to deliver precision strikes without risk to the pilot and with minimal collateral damage. Loitering munitions acquired particular importance, combining reconnaissance and weapon functions. Their ability to remain airborne for extended periods and independently select the moment of attack made them an important element of modern combat.

Commercial dual-use drones deserve special attention. Initially intended for civilian purposes, they can be easily adapted for military use, which significantly expands the arsenal even of irregular armed formations.

One of the most notable directions in the development of UAV technologies during the conflict in Ukraine has been the emergence and active use of fiber-optic drones. Unlike traditional UAVs, such systems are controlled via a thin fiber-optic cable connecting the drone to the operator. This fundamentally reduces their vulnerability to electronic warfare, since control and video transmission do not depend on radio channels or satellite navigation.

Fiber-optic drones began to be widely used in 2024, primarily for precision strikes against armored vehicles, fortified positions, and firing points of the enemy. They are especially effective under conditions of dense electronic suppression typical of the modern front line. High video signal quality allows the operator to guide the drone accurately even in complex urban environments or enclosed positions.

Despite the limited flight range caused by cable length (at present there are analogues capable of striking targets at distances of 15–20 km), fiber-optic drones have demonstrated high combat effectiveness and have become an important element of tactical actions, forcing opposing sides to seek new methods of physical and engineering countermeasures.

Main threats posed by drones

Drones pose a threat not only because of their strike capability but also due to their comprehensive impact on the conduct of warfare. They provide constant surveillance, reducing the element of surprise, and enable strikes against targets in real time, both along the line of contact and deep in the enemy rear, destroying military facilities and critical infrastructure.

Small size and low thermal and radar signatures make drones difficult targets for traditional air defense systems. Mass and swarm attacks, involving dozens or

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hundreds of UAVs simultaneously, are particularly dangerous. Such tactics allow the depletion of air defense resources and the identification of their vulnerabilities.

An additional threat factor is psychological impact. The constant presence of drones in the air has a demoralizing effect on military personnel and the civilian population, creating a sense of continuous danger.

At present, electronic warfare (EW) is one of the most effective and widely used methods of countering drones. Suppression of control, navigation, and data transmission channels makes it possible to neutralize UAVs without their physical destruction. However, the development of autonomous control modes and inertial navigation systems reduces the effectiveness of classical EW means. Modern drones are capable of continuing their mission even after losing communication with the operator. This requires continuous improvement of electronic suppression means and their integration with other defense elements.

Short-range air defense systems and physical destruction of drones

Experience from recent conflicts has shown that traditional medium- and long-range air defense systems are not always economically and tactically justified for countering drones. In response, short-range air defense systems optimized for engaging small-sized targets are being actively developed.

Automatic anti-aircraft guns, missile-gun systems, and man-portable air defense systems are used. In addition, laser and microwave systems are being developed that are capable of destroying drones with minimal cost per engagement.

Countering drones is impossible without adapting tactics and force organization. Camouflage, force dispersion, frequent relocation, and the use of decoys significantly reduce the effectiveness of UAV reconnaissance and strikes.

Against the background of limited effectiveness of electronic warfare and a shortage of specialized air defense systems at the tactical level, physical destruction of drones using small arms, particularly shotguns, has attracted special attention. Conflict experience shows that shotguns are not a substitute for:

- air defense;
- electronic warfare;
- specialized counter-drone systems.

Their real niche is the last line of defense, applicable:

- at the squad or platoon level;
- in the event of sudden UAV appearance;
- in the absence of other means.

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In practice, the shotgun plays the role of an "anti-drone bayonet" — a primitive but sometimes decisive means.

Of particular importance today is personnel training. A modern soldier must be able to recognize drone threats, use personal protective measures, and operate under conditions of constant aerial surveillance.

Development of counter-drone warfare means

The conflict in Ukraine has become the largest example of mass drone use in the twenty-first century. Since 2022, UAVs have been used by both sides for reconnaissance, strikes, and fire correction. Iranian Shahed-136 kamikaze drones have been used to attack infrastructure facilities deep in the rear, as confirmed by reports from international organizations and the media.

According to UN monitoring structures, in 2024–2025 drones became one of the main causes of civilian deaths and injuries, underscoring their impact on the humanitarian situation.

In the Middle East region, drones are used as long-range strike means. A drone attack on Tel Aviv in 2024 showed that even states with developed air defense systems remain vulnerable to new types of threats.

An important feature of drones is their economic efficiency. The cost of a single UAV is often disproportionally lower than the cost of the means used to intercept it. This creates asymmetry and forces a reassessment of defense spending approaches.

From a humanitarian perspective, drones complicate the protection of the civilian population. High precision does not always mean reduced civilian casualties, especially when drones are used in urban environments.

Prospects for the development of counter-drone warfare will remain a major challenge in the near future, as drone development and application tactics are flexible and continuously advance drones to a new stage of evolution.

In the future, further evolution of autonomous UAV systems with elements of artificial intelligence is expected. This will complicate countermeasures and increase the role of automated counter-drone systems.

Promising directions include laser weapons, cyber methods of influence, and the creation of integrated detection and engagement systems.

Conclusion

Countering modern drones has become one of the key problems of armed conflicts of the twenty-first century. The mass use of unmanned systems has changed the tactics, strategy, and economics of war. Effective countermeasures are possible only through a comprehensive approach combining technical, tactical, and

organizational measures. The Russian–Ukrainian conflict has clearly demonstrated that even primitive means, when properly assessed tactically, can temporarily compensate for technological inferiority. Under conditions of rapid technological development, countering drones will remain a priority direction of military development in the coming decades.

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