

FEATURES OF USING UNMANNED AERIAL VEHICLE FOR INCREASING POSSIBILITY OF UNIT'S COMBAT CAPABILITIES

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Abstract

This article deals with topical issues of increasing capabilities, Upgrading combat capabilities, forces and intelligence equipment through the introduction of unmanned aerial vehicles. Examples of tactically and technically effective models of unmanned aerial vehicles, their advantages and calculations to increase the probability of detecting an enemy object are given.

Keywords: Reconnaissance Forces, Equipment, UAV, Aerial Reconnaissance, Enemy Object.

Introduction

The combination of the armed forces, military formations, state bodies and organizations (defense-industrial complex), whose joint-activity is aimed at ensuring military security, indicates the effectiveness of State's military organization in country's defense. Intensive development of information technology and digital market can increase the combat and strategic potential of weapons.¹ Against the background of a sharp increase in the combat effectiveness of weapons, especially high-precision weapons increasing the swiftness and dynamism of modern combat and operations, it is necessary to develop the army's qualitative parameters. These parameters include the combat characteristics of equipment and weapons, organizational structure, training of staff and troops, and use of modern reconnaissance equipment for timely identifying the intentions of the likely adversary, both during the initial period of hostilities and during their conduct.²

One of the responses to enhance combat capabilities is the introduction of unmanned aerial vehicles (UAVs) as an advanced form of information technology in the reconnaissance process. It helps commanders of ground forces to clearly present the overall picture of the combat, which provides better understanding of current situation at all levels. The use of UAVs has now become an integral part of modern warfare. They are being used for conducting reconnaissance, targeting high-precision

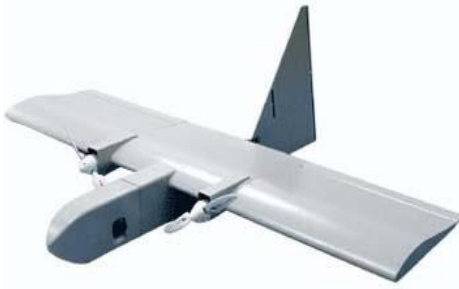
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weapons, electronic warfare, and can be used as a shock weapon. Presently, the armed forces of 41 countries around the world are using about 80 variants of UAVs.

What is a 'UAV complex'; a term that raises questions in mind. A UAV complex is a set of aerial and ground-based technical equipment interconnected into a single functional system that ensures its combat-use in the air and technical operation on the ground. Its composition may vary within fairly wide limits depending on the tasks to be performed, objects of actions, conditions of use, and dimensions of aerial vehicle, etc. Generally, there is a transport-launcher group designed to deliver a UAV to the starting position and launch it; picks it up after landing, delivering it to a technical location or a launch unit; and to prepare it for its next use. Depending on the target destination, the UAV complex can be supplemented with other technical means for percussion purposes, reconnaissance - with ground-based means of checking various onboard equipment, as well as receiving and processing information.³

Analysis of the achieved-level of development of UAVs as well as the experience of their combat-use made it possible to identify the strengths of UAVs. Their compactness and lightness allow transferring the complexes with UAVs directly by members of the reconnaissance group as a combat duffel bag. It is a low-cost operation as compared to a manned aircraft and provides added advantage of flying for a long time over given area. It supports collecting information about the enemy and transmitting it on a timescale close to the real both to ground control centers and aircrew of attack aircraft in the air. It also helps to observe at low altitude from different directions, which allows to get a detailed image of objects from different angles and by their shadows depending on the sun illumination. The high mobility of UAV complexes allows their quick transfer to any region in special containers and mobile control points can be pre-positioned at forward-based points in immediate vicinity of the areas of their combat-use. The transboundary nature of UAVs because of their ability to penetrate deep into the territory and exclusion of loss of manned aircraft crews increase efficient execution of tasks by drones than manned aircraft. Since UAVs can perform tasks deep inside the enemy's territory, therefore, reconnaissance operations and destruction of well-protected objects are the major tasks given to UAV complexes, which are usually considered difficult tasks for a manned aircraft.⁴

The "unmanned" factor of a UAV excludes not only casualties but also reduces weight and size of the aerial vehicle, thus, increasing the proportion of payload. The absence of crew on board allows the execution of more complex and risky combat missions while approaching the object or target for a minimum distance and perform a ram. These features of UAV complexes attract reconnaissance units and compounds to equip them for all types of aerial reconnaissance and electronic warfare.⁵ For example, consider the most widely spread mini-UAV aircraft scheme, which include UAV RQ-11 Raven and RQ-14 Dragon Eye.



RQ-11 Raven



RQ-14 Dragon Eye

These UAVs, equipped with a television and/or thermal imaging camera, can be inducted at unit level of tactical formations. To obtain information about the enemy and remain abreast with the current situation while conducting operation in special conditions, UAVs effectively manage the actions of the unit and reduce losses.⁶ The performance characteristics of UAVs play an important role in achieving effective results. Information on the considered cases of UAVs is reflected in the Table-1, given below.

Table-1: Characteristics of RQ-11 Raven and RQ-14 Dragon Eye

Details	Raven	Dragon Eye
Weight (kg):		
• Maximum Take-off	2.3	1.8
• Payload	0.18	0.1
Range (km)	10	10
Maximum Flight Speed (km/hour)	64	73
Flight Duration (minutes)	90	40
Geometrical Dimensions (meter):		
• Wingspan	1.33	0.95
• Fuselage length	0.9	1.1

(Source: Authors' Own Compilation)

Another project that deserves attention is the unmanned system based on the mini-UAV with vertical takeoff and landing capabilities, i.e., RQ-16 T-Hawk. It is considered as a means of intelligence support for the actions of the units at company and platoon level. The device, which is made according to the screw in the ring scheme, as well as the compact ground control station are placed in special containers and can be transported by one military person as shown below.



RQ-16 T-Hawk

The airborne equipment of the UAV located in two rotary fairings, includes an equipment control system, a CRNS NAVSTAR receiver, a television and infrared camera, and equipment for transmitting intelligence information up to a distance of 10 km. The system has passed successful troop tests in the US, during which, in particular, the possibility of transferring video from a UAV to an Apache attack helicopter AN-64 was worked out. Due to the high level of automation, the machine is easy to manage, and the training time for the operator to operate it is about 16 hours. The main tactical and technical characteristics of the RQ-16 T-Hawk are presented in Table 2, given below.

Table-2: Characteristics of RQ-16 T-Hawk

Maximum Starting Weight (kg)	8.4
Maximum Radius of Action (km)	8
Maximum Radius of Flight (km)	45
Geometrical Dimensions (mm):	
• Outer Diameter	350
• Screw Diameter	280
• Height	560

(Source: Authors' Own Compilation)

Operators equipped with unified equipment for controlling army unmanned vehicles can set the flight path of UAVs, issue target designations and command the use of their onboard armaments. In order to provide the possibility of bringing intelligence data from unmanned vehicles directly to attack vehicles and to the commanders of ground units, remote terminals for receiving video information are being developed. On the whole, analysis of the experience of using unmanned systems of various classes by armed forces of different countries, confirms the high effectiveness of this type of weapon in the context of modern military operations of any intensity. According to military experts, the number of UAVs in the troops, as well as the range of tasks they perform, will steadily increase. The inclusion of unmanned

systems in reconnaissance units and formations will significantly increase the effectiveness of reconnaissance and provide the commander and headquarters with more extensive intelligence information.

Using the formula to calculate the probability of opening an enemy object with the addition of an additional-intelligence unit (UAV), one can check the increase in the probability of enemy objects:

$$P \text{ Total} = 1 - ((1 - P_1) * (1 - P_2) * (1 - P_3) * (1 - P_4)).$$

Where:

- P₁ - The probability of opening the OSA;
- P₂ - The probability of opening the BDI;
- P₃ - The probability of opening the NP;
- P₄ - The probability of opening the UAV.

$$P \text{ total} = 1 - ((1 - 0.5) * (1 - 0.5) * (1 - 0.3) * (1 - 1)).$$

$$P \text{ total} = 1.$$

(Source: Authors' Own Compilation)

Thus, with the induction of UAVs subunits into reconnaissance units, the effectiveness of reconnaissance forces and facilities significantly increase, which in turn, allows commander and headquarters to collect extensive information by organizing real-time reconnaissance in the interests of all-arms forces. The duration of information obtained from a UAV in real-time is 6-8 minutes. This helps the commander to make a timely decision on a fire attack, as well as planning similar activities. Analyzing the tasks, realization of what is possible through the introduction of UAVs into the number of forces, and means of reconnaissance, there is a high probability to move in this direction. It is based on the requirements of the military doctrine of the Republic of Kazakhstan, which determines the main directions of state activity in the military-political, military-strategic and military-economic sphere on the mobilization preparation of the state as well as the main measures for the development of the military organization of the Republic of Kazakhstan, the introduction of modernizations in the form of UAVs may contradict.

References

- ¹ Military doctrine of the republic of Kazakhstan. - decree of the president of the republic of Kazakhstan dated 09.29.2017. No. 554. - Adlet, P.1.
- ² Zhusupov E.V. The collection of materials of the international scientific-practical conference on the theme: "The military-technical policy of the republic of Kazakhstan: problems and prospects for the development of the military-industrial complex" - Almaty. Nur-Print, 2010. - p. 359-370.
- ³ Rostopchin V.V., Rumyantsev S.S. Unmanned aircraft systems. // Bulletin of the air fleet. - 2001, No. 2. - P. 12-19.
- ⁴ Korzhov D. Blah with remote recharge laser energy / D. Korzhov // Foreign military review. - 2010, No 12. - p. 77.
- ⁵ Prokofiev S. Training of operators of unmanned aerial vehicles / S. Prokofiev // Foreign military review. - 2004, No 8.- p. 37-43.
- ⁶ Chekunov E. The use of us uavs in military conflicts / E. Chekunov // Foreign military review. - 2010, No 7. - pp. 42-50.