Research on Demand and Application of Unmanned Equipment in Anti-terrorist Field of Armed Police Force

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Abstract: With the rapid evolution of cutting-edge technologies such as artificial intelligence, cloud computing and big data, the application scope of unmanned equipment continues to expand, the system framework is increasingly mature, and the operational efficiency is significantly enhanced, which gradually becomes the key factor for shaping the future war form and has a far-reaching impact on the military strategic pattern. At present, under the influence of the accelerated evolution of the century-long changing situation and the continuous upgrading of the game of great powers, the lawbreakers are increasingly advanced in their means of combat, and the unmanned anti-terrorist equipment has demonstrated remarkable capabilities in successfully carrying out anti-terrorist operations. Based on the anti-terrorist task undertaken by the Armed Police Force, this paper starts with the connotation of unmanned anti- terrorism equipment and analyzes the application demand of unmanned equipment in the anti-terrorism field of the Armed Police Force by using the "motivation theory". Through the construction of urban anti- terrorism, mountain anti-terrorism and border anti-terrorism mission scenarios, and sorting out scene behaviors such as on-site reconnaissance, force assault, precision sniping, heavy fire attack and rapid delivery, the concept of three unmanned platforms of combat support, identification strike and support support is proposed, and then the application approach of unmanned anti-terrorism equipment operation and support is constructed, aiming to provide theoretical support for the armed police force to carry out diversified anti-terrorism tasks.

1. Introduction

In recent and current periods, the "three forces" tried to undermine the overall situation of national security and stability under the cover of large-scale gathering activities, relying on international terrorist forces and using violence and terror as means. The armed police force is an important force to prevent and deal with terrorist activities. Facing the increasingly severe anti-terrorism situation, it has become a very urgent task to strengthen the construction of unmanned anti-terrorism equipment, solve the development problems and improve the anti-terrorist assault capability. By deeply analyzing the mission scenarios of unmanned equipment in the anti-terrorism field of the Armed Police Force, studying the key scene behaviors, exploring the requirements of the combat system and constructing the equipment application mode, it has great theoretical guidance and practical significance for accelerating the development of the unmanned anti-terrorism equipment system and improving the overall anti-terrorism level and combat effectiveness.

2. The Connotation of Unmanned Anti-terrorism Equipment

2.1 Concept of Unmanned Anti-terrorism Equipment

Unmanned anti-terrorism equipment belongs to the category of unmanned equipment. It is a kind of equipment or equipment system that does not need human driving, can be operated autonomously or remotely, and can perform anti-terrorism tasks including but not limited to reconnaissance and surveillance, target

indication, communication relay, fire strike and support support. It can not only reduce casualties, but also greatly improve operational efficiency, and is an important carrier leading the development of future operations [1].

2.2 Necessity of Developing Unmanned Anti-terrorism Equipment

2.2.1 Unmanned operations are an integral part of military joint operations

In joint military operations, anti-terrorist operations have the characteristics of full-dimensional battlefield space, multiple participating forces, intense confrontation degree, and accelerated operation rhythm [2]. In the future, a large number of unmanned equipment with advantages of autonomy, multi-domain and three-dimensional, multi-function precision and continuous support will be widely used, and their task positioning will gradually leap from support to operational means to meet the requirements of unmanned operations.

2.2.2 Unmanned equipment as essential components of military equipment system

Currently, military-wide unmanned equipment covers a wide range of platforms, from ground unmanned vehicles (UGVs) to aerial unmanned aerial vehicles (UAVs) to surface unmanned vehicles (USVs), performing important operational and support functions. According to the needs of anti-terrorism tasks, the Armed Police Force has been equipped with a variety of equipment, such as small multi-functional tactical UAVs, HW13A unmanned reconnaissance aircraft and ride-through aircraft, and has initially formed air-ground coordination and three-dimensional combat modes.

2.2.3 Production and application of high and new technology to provide technical support for unmanned anti-terrorism equipment

With the continuous development of new technologies such as artificial intelligence, blockchain and quantum communication, a good material foundation has been laid for the research and installation of unmanned equipment, which is conducive to the realization of order, benignity and high quality development.

2.3 Analytical Methods

According to the "motivation theory" method, this paper analyzes the requirements and application approaches of unmanned anti-terrorism equipment in the field of anti-terrorism of the Armed Police Force according to five steps: firstly, determining the target user, i.e. the user subject of unmanned anti-terrorism equipment; secondly, determining the anti-terrorist task scenario, i.e. the anti-terrorist function undertaken by all levels of special forces of the armed police force; thirdly, analyzing the anti-terrorist scene behavior, i.e. the specific operations and support actions performed by the task force; fourthly, analyzing the target motivation, i.e. the requirements of the anti-terrorism task and action on unmanned equipment[3]; The fifth is to build the application approach of unmanned anti-terrorism equipment for the armed police force. It contains specific application scenarios and development ideas.

3. Research on Task Scene and Scene Behavior

3.1 Target User

In accordance with the general objective of "ability to deal with emergencies and means to carry out anti-terrorism and stability maintenance tasks", the armed police force shall prepare for "anti- attack, anti-explosion and anti-jacking" throughout the time and in all regions, and carefully build a special force with anti-terrorism as its main task. At present, this force is composed of five-level special combat teams, forming a force deployment with professional forces as the main body and part-time forces as the complement, covering the whole country, highlighting the key points, combining points and areas, and highly effective linkage, so as to ensure that the anti-terrorism victory is assured. Among them, Falcon and Snow

Leopard commandos correspond to the national level, mountain, border and anti-hijack forces correspond to the regional level, the headquarters special combat brigade corresponds to the provincial level, the detachment special combat squadron corresponds to the municipal level, and the emergency platoon, emergency squadron and other units correspond to the county level. They are not only the main users of unmanned anti-terrorism equipment, but also the target users of this paper.

3.2 Task Scenario

Based on the task type of preventing and dealing with terrorist activities undertaken by the armed police force, it can be divided into three task scenarios: urban anti-terrorism, mountain anti-terrorism and border anti-terrorism.

3.2.1 Urban anti-terrorism mission scenario

The urban anti-terrorism tasks include dealing with major terrorist attacks, handling ground hijacking at home and abroad, handling major domestic hostage-taking incidents, and participating in security anti-terrorism operations in sensitive periods and major activities. In the above mission scenarios, the scene conditions are complex and the tasks are heavy, and unmanned equipment will play an irreplaceable role in reducing the workload of officers and soldiers. At present, some units have widely used the unmanned equipment represented by "intelligent duty post", "hawk-eye unmanned aerial vehicle" and "anti-riot patrol robot" and achieved good results.

3.2.2 Mountain anti-terrorism mission scenario

The army mainly undertakes the task of anti-terrorist combat in the plateau, mountain, desert, gobi and other special landform. In this mission scenario, there is no significant difference in the level and training level of conventional weapons and equipment between the two sides, and the troops are often unable to form an overwhelming advantage. Once they are equipped with UAVs, unmanned combat vehicles and accompanying support robots, they will greatly promote the realization of combat objectives.

3.2.3 Border anti-terrorism task scenario

The army is mainly responsible for joint inspection of key channels on the western border, joint patrol of key sections, investigation and inspection of passing people and vehicles at the mountain passes and key traffic routes outside the border channels, joint armed attack against the "East Iraq Movement" and other terrorist forces, and joint law enforcement of cross-border illegal and criminal activities. and conducting secret intelligence collection and clearing sources abroad. In this mission scenario, the troops are faced with the dilemma of "more points, long lines and wide areas" on the border, while unmanned equipment has advantages in reconnaissance and strike, explosive search and discharge, transportation and delivery, which greatly enhances the battlefield perception capability of the troops.

3.3 Scene Behavior

Through refining and sorting out the common requirements of the above-mentioned mission scenes, the scene behaviors of unmanned anti-terrorism equipment are obtained, which mainly involve on-site reconnaissance, force assault, precise sniper attack, heavy fire strike and rapid delivery, etc.

3.3.1 On-site reconnaissance

Through the use of various types of unmanned reconnaissance
aircraft, portable reconnaissance equipment and armed combat robots and other high-tech means, the army takes diversified reconnaissance measures, including high-altitude monitoring, approaching reconnaissance and electronic signal interception, so as to carry out comprehensive, multi-level and continuous surveillance on the area three kilometers around the location of the emergency.

3.3.2 Troop assaults

The ground assault is carried out in various extreme environments such as urban blocks, desert wasteland, alpine snowy areas, deep forests and the like, and uses stealth, rock climbing, cross-country, blasting, sniper, combat and field survival skills to achieve rapid and accurate attack targets. Air assault is a rapid deployment to key locations by helicopter landing, cable landing or parachute landing to achieve air assault. The water assault is to move freely in the water, and master the skills of diving, swimming, naval assault, water navigation and surface shooting, so as to launch an attack quickly on the water surface. Under the above scenario behavior, focus on the development of the combat mode of the man-machine mixed formation team, and study the demand and combination mode of the unit and individual soldier on the unmanned equipment.

3.3.3 Precision sniper

By capturing the best aircraft, the special forces can use the sniper intelligent auxiliary system to carry out day-and-night, single-point and multi-point accurate sniping, realizing accurate sniping in urban and field environments. In addition, SWAT forces can use sniper detection systems to gain an

advantage in sniper combat against intense operations. This attack mode can better conceal the combat attempt of the enemy, achieve the suddenness of the attack, and make the other party have no time to react, which not only improves the attack difficulty of the enemy, but also plays a good role in deterring the enemy's psychology [4-5].

3.3.4 Heavy fire strike

Unit personnel are proficient in operating a wide range of advanced weapon systems, including unmanned grenade launchers, individual-carried rocket launchers, mortars, airborne machine guns, helicopter-mounted machine guns, and vehicle-mounted heavy machine guns. These heavy-fire equipment provide precise and wide-ranging fire coverage of medium and long-range targets, and are effective in destroying or destroying both solid fortifications, vehicles, and enemy personnel.

3.3.5 Fast delivery

The unit shall be able to use all kinds of unmanned vehicles for rapid maneuvering, accompanying support and long-range delivery within the specified time, and can deliver the required equipment to the mission area by using unmanned aerial vehicles, transport the sick and wounded to the rear by using unmanned vehicles, and improve the carrying capacity of individual soldiers by utilizing the unmanned accompanying support equipment in the whole operation [6-7].

3.4 Motivation Analysis

According to the future anti-terrorist functional tasks and development planning of the Armed Police Force, it can be concluded that the demand for unmanned equipment in this field is mainly reflected in the following points: First, in the link of reconnaissance and surveillance, a multi-dimensional, all-area and all-weather unmanned combat support platform shall be constructed, the joint reconnaissance and surveillance action shall be organized and implemented, the requirements of all kinds of intelligence at all levels shall be comprehensively planned, the communication relay shall be established, the command and control shall be unified, the overall coordinated action shall be conducted, and the information can be obtained from multiple sources, so as to realize the dispatching of unmanned equipment and make scientific decision. Second, in terms of equipment application, the unmanned identification and strike platform shall be constructed to overcome the unfavorable factors of natural environment and battlefield environment, so as to realize the man-machine mixed formation team operation in wartime and peacetime, and give consideration to anti- terrorist training and combat readiness. Thirdly, in the transportation and delivery link, the unmanned support support platform shall be constructed, and unmanned equipment shall be applied to carry out the accompanying support of forward transportation and backward nuclear transportation, so as to effectively improve the support efficiency and safety.

4. Research on Application Approaches

According to the requirements of the above three unmanned equipment platforms, the application approaches and development ideas are analyzed to realize the effective improvement of the combat and support capability in the anti-terrorism field of the Armed Police Force.

4.1 Unmanned Combat Support Platform

4.1.1 Reconnaissance and surveillance

First, in anti-terrorism operations for security during sensitive periods and major events, fixed targets can be equipped with unmanned detection and alarm devices. Long-endurance drones equipped with various sensors and cameras, combined with biometric recognition technologies such as facial recognition, can perform patrol surveillance. They can obtain real-time image data of critical facilities around the site, such as roads, pipelines, and power lines, and build a three-dimensional data model library to conduct 24-hour continuous patrol and monitoring. Any sudden situation can be immediately alerted. Second, in joint law enforcement against cross-border illegal activities, drones can cooperate with tethered persistent surveillance systems to continuously monitor and surveil enemy areas, obtaining key information such as enemy deployments, force distribution, and terrain to provide critical support for command decisions[8].

4.1.2 Command and communication

First, for decision support, intelligent command information systems with program evaluation and self-evolution features can

autonomously generate response strategies and directly issue execution commands through iterative algorithm upgrades, thereby assisting commanders in making scientific and rapid decisions to varying degrees. Second, for mission planning, leveraging vast information data, the system can conduct intelligent simulations, autonomously plan missions, and automate personnel and equipment scheduling based on changes in the battlefield situation and operational objectives. Third, for communication relay, drones can serve as relay nodes by taking advantage of their flight altitude, transmitting signals from the source node to the target node to achieve signal transmission.

4.1.3 Situational awareness

By setting up a state monitoring system integrating intelligence, informationization, visualization and remoteization, automatic perception, automatic detection, automatic analysis and automatic generation of state monitoring reports can be realized for the type, position, quantity and combat effectiveness of the carried equipment, so as to provide equipment managers and users with comprehensive, visual, visual and clear equipment situation [9], which is convenient for cooperative implementation of operation control and other combat activities, as well as management activities such as allocation, daily maintenance and preventive maintenance.

4.2 Unmanned Identification Striking Platform

4.2.1 Target recognition and tracking

The first is target recognition. With the help of big data analysis technology, we can create an intelligence anti-terrorism feature database, especially collect and match the information of personnel with criminal record of terrorist activities and terrorists at home and abroad in real time, and check people in advance at the stage of premeditated plan and serial operation. The second is target tracking. Unmanned equipment combined with virtual New technologies such as Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) for searching, locating, tracking and monitoring target objects in complex environments

4.2.2 General fire strike

First, drones can be used to execute bombing missions. Utilizing the aerial surveillance, swarm hunting, and special attack capabilities

of drone swarms, targets can be precisely eliminated. Especially in environments where human forces cannot quickly reach or sustain operations, continuous unmanned equipment operations can achieve the task of locating and killing targets around the clock. Second, FPV drones can be used for suicide attacks. After precisely locking onto a target, the FPV drone, carrying explosives, utilizes its speed advantage to compensate for the shortcomings of precision strikes and quickly chase and eliminate moving enemy targets[10-11]. Third, unmanned combat vehicles and combat robots can be used for man-machine mixed strike operations. Supported by unmanned combat vehicles and ground robots, flexible and varied man-machine collaborative combat methods can be employed, adjusting tactics quickly based on the battlefield environment to enhance combat capabilities.

4.2.3 Placement and removal of barriers

Three-dimensional scanning is carried out on the accident scene by the detection equipment carried by the unmanned aerial vehicle, the position, the volume and the possible explosion time of the explosives are determined, and the unmanned aerial vehicles are used for carrying water cannon guns, laser emitters and other explosion- removing devices to destroy the explosives by means of inducing explosion, burning, shooting and the like. Make full use of the "zero casualty" advantage of the "manned and unmanned" mixed formation combat system to cooperate to complete the operational tasks such as obstacle clearing and explosive removal [12].

4.3 Unmanned Support Platform

4.3.1 Equipment forward delivery

A series of equipment forward-delivery UAVs with differential performance can be developed according to different combat distance, combat intensity and material demand scale, following the example of its K-MAX unmanned cargo helicopter in the task area with fierce confrontation. The carrying capacity covers a wide range from dozens of kilograms to 3,000 kilograms, and the efficiency of horizontal lifting operation is mainly solved.

4.3.2 Man-machine mixed carrying

In extreme climatic condition and complex landform, when the special combat unit performs the anti-terrorism mission in the

mountain region, the traditional equipment convey tools are not capable. In the next step of equipment research and development, the U.S. Army's "Crusher" unmanned transport vehicle can be used for reference, and the self-planning route and safe driving in complex environment can effectively reduce the risk that soldiers carry and supply materials in high-risk areas [13], and implement accompanying support for the troops. The "lead-follow" mode can also be used to cooperate with the manned vehicle to form a mixed formation to complete the equipment together The carrying mission enhances the agility and adaptability of the supply line and provides safer, faster and more flexible material support for the battle front.

4.3.3 Evacuation of casualties

With the rapid development of unmanned autonomous driving technology, it is expected that vehicles for patient evacuation will be transformed into autonomous unmanned platforms in the future, effectively reducing the need for support personnel. Especially in extreme and high-risk nuclear, biological and chemical environments, unmanned equipment can pass through fearlessly, perform critical medical resources such as blood, medicine and sick and wounded transportation, strengthen the medical rescue capability in operation and reflect the positive role of science and technology in humanitarian relief.

5. Conclusion

Unmanned anti-terrorist equipment, as an important support of new-quality and new-domain combat power, has been widely used to deeply influence the form of military struggle and become a powerful tool to seize the initiative in war in the new era. In order to effectively fulfill the duty and mission, build the modern armed police, and realize the practical requirements of "four guarantees" with high standards, the armed police force should develop its own unique unmanned equipment force, actively explore and conceive the application mode and process of unmanned equipment in the field of anti-terrorism, improve the support system of unmanned equipment in anti-terrorist operation, improve the operational efficiency of unmanned equipment, and realize the leap-forward improvement of anti-terrorism level.

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