

THE STRUCTURE AND OPERATION OF MILITARY DRONES

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ABSTRACT: In this material it will be presented to you "The structure and operation of military drones", the type and role of drones in the military field. Drone that retains in most respects all the qualities of a high-performance aircraft and performs interventions, but the greatest quality of this modern flying device is that it can reach its military targets without exposing the owner to danger.

KEYWORDS: drones, Military, UAV, rotor.

1. Introduction

The drone is a UAV (Unmanned Aerial Vehicle) device capable of flying without being piloted by a person, which was originally used only for military purposes to recognize targets and bomb strategic targets.

These types of drones have exclusive applications on the battlefield, to provide air support or to perform high-risk missions where there is no need to endanger human lives. They can be used to explore the terrain or to perform critical missions. Even when they are state-of-the-art drones, because of the risk of these drones being shot down or destroyed by the enemy, they are usually made of quality but they are still cheaper compared to an airplane. These drones are piloted remotely because military personnel are required to observe the drone's scenario in order to make decisions and order the drone to execute them. There are times when more than two operators are required to control the drone at the same time.

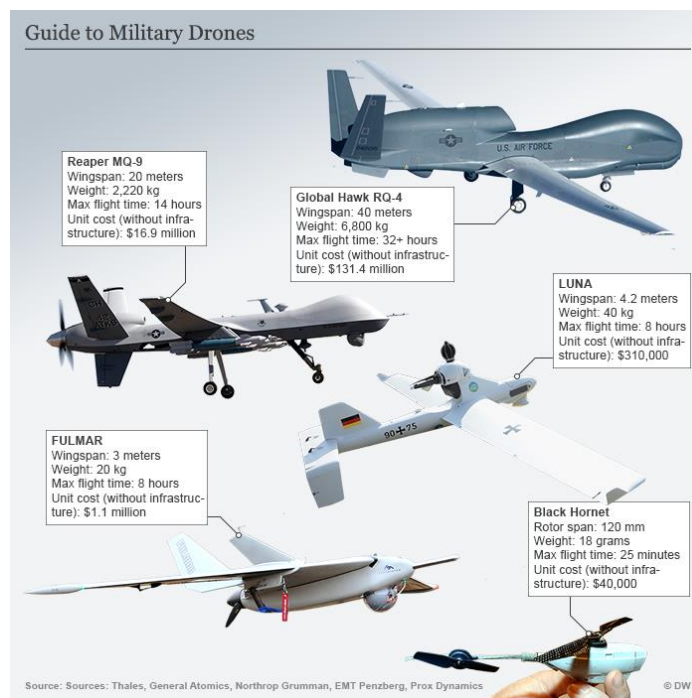


Fig. 1. Types of Drones

2. Current status

Types of drones

Military drones have come to revolutionize the war. Since their inception more than fifty years ago, drones have evolved steadily to the present day, becoming one of the leading artificial intelligence (AI) weapons integrated into military forces around the world.

- Micro drones

Micro drones could be used for field or military surveillance; or to bet on targets before personnel or other aircraft arrive on the battlefield. The most well-known example of this type of drone in action today is the Black Hornet, manufactured for the British military. When they are not in use, Black Hornets can be stored in a special belt. They can fly for up to 25 minutes on a single battery charge, and have a range of up to a mile. In addition, some Black Hornets have been outfitted with infrared cameras.

- Single-Rotor Drones

These are by far some of the most basic types of drones. As the name would imply, it employs only a single rotor (besides the tail unit in some cases) and can often generate thrust more efficiently than their multi-rotor counterparts. This can make them ideal for longer flight times. That said, there are drawbacks to that design. Larger rotor blades mean a higher chance of one accidentally injuring you. In addition, the drones are often not as stable, and while they can still hover over areas, they can also be more difficult to fly than drones that have multiple rotors to keep them balanced and airborne.

- Multi-Rotor Drones

Where a single-rotor drone looks like a helicopter and is able to maintain flight with a single rotor, these units have several rotors positioned at strategic points on the craft. These extra rotors can make it easier for the craft to maintain its balance and keep hovering. However, when it comes to different types of commercial drones, as a general rule of thumb, the more rotors you add, the less time the craft is able to remain airborne. As such, while these units offer good stability, they often top out at half an hour of flight time. In addition, most types of multi-rotor drones are not able to carry a heavy payload, as this would disrupt the balance maintained by its offsetting rotors.

- Fixed-Wing Drones

The lack of rotors and fixed-wing style of these drones make them more similar to controllable airplanes rather than the helicopter style of other drones. Rather than rotors, their wings provide vertical lift, which means they only need enough energy to keep moving forward, making them ideal long-range drones. Some fixed-wing drones can be gas powered. Where multi-rotor units cannot remain airborne long, a fixed-wing drone can remain in the air for as long as 16 hours of continuous flight. However, they are not able to hover the way drones with helicopter-style rotors can. The lack of a rotor also makes them harder to land. They must be very carefully brought in for an extremely soft “belly landing,” and in less-than-expert hands, this can go very wrong very quickly.

- Fixed-Wing Hybrid Drones

These types of drones attempt to take the best from fixed-wing and rotor-based designs, making for drones that feature both. A fixed-wing hybrid drone will tend to have a couple rotors attached to the ends of fixed wings. Many of these drones are actually based on designs for aircraft that have been around since the 1950s and 1960s. However, the technology to bring them to life was considered too difficult,

and they were largely shelved before the rise of drones. These units are still rather experimental, and so are far less commercially available than their single-rotor, multi-rotor, and fixed-wing counterparts.



Fig. 2. VTOL UAV prototype by NASA

- Tactical Drones

The preferred tactical drone of the US military is the Raven, which measures 4.5 ft and weighs 4.2 lbs. These types of drones are often used for surveillance work. As with the Black Hornets, the Ravens are capable of being outfitted with special infrared cameras, helping them supply soldiers with an accurate picture of the area even in the nighttime. The units come with onboard GPS technology. While they are on the simple side and do not boast a lot of bells and whistles, this also makes them quite accessible and easy for soldiers to use without the need for special training.

- Reconnaissance Drones

These drones measure around 16 ft long, are launched from the ground, and are called Medium Altitude Long Endurance (MALE) or High Altitude Long Endurance (HALE) drones. These drones are among the most commonly employed by militaries around the world. The Heron, designed by Israeli Aerospace Industries, has manufactured drones of this nature for military recon use for the US, Canada, Turkey, India, Morocco, and Australia. The drones in question can weigh over 2200 lbs and remain in the air for 52 hours straight at a cruising height of 35,000 ft. The German military makes use of another type of drone, the LUNA, which is less expensive than the Heron, but has shorter operational periods.

- Large Combat Drones

Variants such as the Predator and Reaper, used by the US, are around 36 ft long and able to fire on targets with air-to-surface missiles and laser-guided bombs. These units can operate for 14 hours over

a range of a thousand miles. These drones have been used for operations such as military strikes in Pakistan and other countries with which the US is not officially at war. The US may be the most famous (or infamous) user of drones, but they are hardly alone. Fellow NATO nations such as the UK, Spain, and France use them as well, while China has manufactured its own version, the CH-4, which has been bought by Egypt and Iraq.

- Non-Combat Large Drones

For example, the Global Hawk, manufactured by Northrop Grumman, is primarily used over combat zones, but not meant for combat. Rather, it is used for surveillance, such as scanning cell phone calls. Just because these drones do not engage in combat does not mean that they are not expensive. The Global Hawk, for example, can cost as much as \$131 million, and that does not include ground infrastructure.



Fig. 3. Global Hawk Drone

- Target and Decoy Drones

One of the most important things to keep in mind about military drones is that they can serve several functions depending on the situation. For example, while some drones can be used for surveillance and others are meant for strike capabilities, these operate as decoys. What those decoy missions look like, however, is bound to change depending on the individual nature of the mission. As such, these types of military drones must be ready to act as decoys in any number of ways. For example,

some target and decoy drones can carry out their mission by simulating an incoming missile. This can draw fire from ground anti-aircraft units, thereby distracting them from any actual combat drones or incoming missiles.



Fig. 4. MQM 107E Drone

3. The benefits of using drones in the military (Conclusion)

The use of drones in the military field is already common. However, they are playing an increasingly important role in the civilian field - surveillance of borders, road traffic, disaster and calamity areas, conditions for public meetings or high-level meetings. Drones also have a special utility in agriculture - the condition of crops, pests but also for cadastre, for monitoring the environment, the level of pollution in various locations, for establishing the risk of floods on watercourses, for monitoring transport or in case of anti-terrorist operations. There will be many other uses in tourism and family events.

4. References

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