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# Countering the Drone Threat: Steps for the U.S. Military

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#### **KEY TAKEAWAYS**

Adversary development of drone technology is currently outpacing that of the U.S., as well as U.S. drone countermeasures.

America's lack of integrated detect-anddefeat mechanisms presents a significant threat to personnel, weapon systems, and critical military and civil infrastructure.

Drones are revolutionary, but they are not so for every aspect of warfare—to protect the U.S. and its interests, procurement of proven combat systems must continue. ice President J.D. Vance has warned that unmanned drone systems pose a serious challenge to national security. He emphasized the urgent need to equip U.S. forces with the tools and capabilities required to defend the homeland and U.S. interests from these emerging technologies, which have the potential to disrupt military operations and endanger the lives of American troops on the battlefield.<sup>1</sup>

The United States must invest in and adapt to the rise of unmanned aerial systems (UAS) while pursuing integration and interoperability in counter-unmanned aerial systems (C-UAS) to optimize joint capabilities. This need is underscored by the increasing frequency of drone incursions on U.S. military bases, attacks against U.S. forces, lessons from the war in Ukraine, and the expanding UAS capabilities of

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non-state actors. Of particular concern is the potential for drone swarms coordinated masses of unmanned systems that can overwhelm traditional defenses through sheer volume. To defend itself against such threats, the United States must prioritize the rapid development and deployment of countermeasures capable of neutralizing both individual drones and drone swarms. Equally important will be the development of C-UAS that is economically sustainable in light of the growing number of cheap drones among U.S. adversaries.

A cautionary note: Despite some claims to the contrary, drones have not revolutionized every aspect of warfare, and traditional systems—such as armor, manned warships, and fighter jets—will continue their prominent roles in military operations. The proliferation of drones among non-state actors and the potential for large states to deploy drones at scale do, however, present an increasingly lethal challenge to which the United States will need to adapt. Militaries around the planet are engaged in the development of C-UAS to deal with this threat, and the impressive success of Israeli and U.S. air defenses in shooting down the drones and missiles of the large Iranian salvo in April 2024 should be some comfort to defense planners contemplating the threat posed by unmanned systems.

#### Context and Background

One of the most sobering examples of this new threat came on January 29, 2024, when three U.S. service members were killed and more than 40 injured after a drone slipped past air defenses at a remote base in Jordan near the Syrian border. The Department of Defense later confirmed that the attack was carried out using a one-way attack UAS by the Islamic Resistance in Iraq, an Iranian-backed militia coalition. Just months later, in August 2024, U.S. troops stationed in Syria were attacked once again by a similar system, resulting in eight service members suffering traumatic brain injuries and smoke inhalation.<sup>2</sup> The concern is not just for military forces currently serving in harm's way, as drones have frequently violated airspace over military bases outside conflict zones. According to the North American Aerospace Defense Command (NORAD), more than 600 drone incursions have taken place at U.S. military installations since 2022.<sup>3</sup>

Given the recent pattern of drone attacks, the threat posed by adversarial UAS is both real and rapidly evolving. In the Russo–Ukrainian war, Ukrainian and Russian forces have each inflicted heavy casualties on the other through the use of drones. Both sides have deployed inexpensive drones not only for direct assaults but also to target armored vehicles, tanks, and critical infrastructure with impressive precision. Experts note that the rise of small drones has created a new operational domain often referred to as the "air littoral"—a space where drones can loiter, surveil, and strike at minimal cost.<sup>4</sup> This shift has also enabled the widespread use of loitering munitions and commercially available grenade-dropping drones, offering battlefield intelligence and strike capabilities that were once limited to much more expensive, military-grade platforms.

While the U.S. military has gained substantial combat experience over two decades of operations in the Middle East, militias and terrorist groups in that region are not near-peer adversaries, though they do now possess power projection capabilities similar to those of conventional air forces as a result of UAS proliferation. Large and wealthy states like China and Russia, of course, have an even greater ability to develop and deploy UAS, and the ongoing war in Ukraine provides examples of how UAS are used in a modern conflict between nation-states.

Ukraine is now developing more sophisticated drones and is shifting away from the traditional "one drone, one operator" model. Instead, it is moving toward large-scale deployment of drone swarms, with this transition expected to begin as early as 2025.<sup>5</sup> At the same time, Ukraine plans to prioritize anti-drone defenses in response to relentless attacks by Iranian-made Shahed drones launched by Russia. These drones, designed to target and destroy critical infrastructure, have proven increasingly difficult to counter as Russia and Iran continue to refine their designs.<sup>6</sup> Ukraine and Russia have both rapidly adapted to drone threats and have already begun to deploy their own countermeasures, a clear signal that the U.S. must do the same or continue to fall behind.

The U.S. Army has been developing and testing anti-drone systems at Yuma Proving Ground in Arizona.<sup>7</sup> In 2023, five defense companies were invited to demonstrate their capabilities, with the goal of evaluating how effectively their systems could counter one-way attack drones. These tests followed the Pentagon's creation of the Joint Counter-small Unmanned Aircraft Systems Office (JCO), a move that reflected growing concern over the proliferation of drone threats. The drones used in these demonstrations were classified as Group 3 unmanned aircraft systems—larger platforms that are typically preprogrammed to fly autonomously, without direct operator control.

The military must place a specific emphasis on countering the proliferation of small drones, as their low cost and wide availability allow non-state actors to conduct sophisticated attacks with minimal resources. The threat is no longer theoretical. The previously mentioned attack in which three U.S. service members were killed by a drone strike illustrates the deadly potential of these systems. Further examples can be seen in Ukraine, where drone warfare has been fully realized across multiple domains, including intelligence gathering, one-way attack drones and long-range strike capabilities.<sup>8</sup>

#### **Current Challenges and Systems**

Currently, the U.S. military deploys a diverse array of counter-drone systems, including kinetic interceptors, electronic warfare tools, directed-energy weapons (DEWs), and integrated platforms. These systems either physically destroy drones or neutralize them through signal disruption, offering a layered and adaptive approach against a wide range of unmanned aerial threats.

In ground combat especially, drone attacks are a low-risk, high-reward tactic. Drones can degrade enemy manpower, destroy vehicles and equipment, or disrupt logistics operations, all without placing the attacker's personnel in harm's way, as has been demonstrated in Ukraine.<sup>9</sup> Despite being significantly smaller in size, Ukraine has leveraged drone technology to multiply its combat effectiveness, leveling the battlefield both on the ground and in the air. This should serve as a warning to the United States. As the traditionally larger and more powerful military force, the U.S. must take seriously the threat posed by adversaries that perfect and exploit modern drone warfare to offset conventional power advantages.

Despite growing threats, significant gaps remain in America's defensive capabilities against drones. Few current U.S. weapons systems are equipped to counter small military-grade or commercially available drones. Even more concerning, the counter-drone systems that do exist have not been widely fielded, and only a limited number of military units are properly trained and equipped to operate them. Additionally, installation commanders in the homeland often lack the authority to engage drones.<sup>10</sup>

Among the most promising technologies that should be rapidly deployed to frontline units are two kinetic systems: the Thales Lightweight Multirole Missile (LMM) and the Advanced Precision Kill Weapon System (APKWS).<sup>11</sup> These systems provide the versatility and precision needed to neutralize a range of threats, from swarming commercial drones to small tactical drones, and must be made readily available across U.S. forces.

While potentially promising, DEWs have not yet been effectively employed in combat. U.S. Navy ships operating in the Red Sea have been using kinetic weapons to intercept drones and missiles, even when equipped with DEWs. Indeed, Navy ships defending against UAS prefer to use kinetic options because DEWs do not work at a far-enough range for ship operators to feel comfortable relying on it. Target discrimination is also an issue, with the potential for lasers to negatively affect friendly systems well beyond the intended target—a huge limiting factor in densely populated areas. Perhaps most problematically, high-energy lasers and similar systems are extremely energy intensive, which presents a logistics problem in particular for forward-deployed Army units relying on generators for power.<sup>12</sup> Although DEWs merit study, for the time being the military should explore more realistic kinetic options for C-UAS.

In addition to the lack of fielded anti-drone systems and the limited training among U.S. troops to operate them, significant costs are also a consideration. One of the key lessons from Ukraine underscores the need for cost-effective air defense solutions: Relying on high-end systems is unsustainable, especially when used to counter inexpensive threats, such as drones.<sup>13</sup> In one particularly egregious case, a U.S. ally shot down a \$200 quadcopter drone with a \$3 million Patriot missile. Deploying such costly systems against drones will quickly deplete critical resources and expose strategic vulnerabilities. Employing multimillion-dollar interceptors to neutralize these low-cost threats is not only economically inefficient but also risks exhausting high-end air defense munitions needed to counteract enemy precision-guided munitions early in a conflict.

Another key concern lies in the difficulty of identifying and distinguishing between friendly and hostile drones, a capability that remains underdeveloped on the modern battlefield. To address this vulnerability, the Pentagon must place greater emphasis on advancing detection technologies and improving coordination within the air defense community. Additionally, defense companies must prioritize the development of systems that can rapidly classify and respond to diverse drone threats in real time. Without reliable identification protocols, there is a heightened risk of fratricide or delayed engagement, both of which could prove disastrous in high-tempo operations.<sup>14</sup> Establishing standardized drone-recognition systems and ensuring interoperability across military branches and allied forces will be critical to minimizing these risks.

#### **C-UAS** Training

Although the U.S. possesses promising counter-drone weapon systems, they are of little value if the troops assigned to operate them are not properly trained. This concern was raised in 2023 by Major General Sean Gainey, director of the JCO, who acknowledged that training had not been a primary focus in counter-UAS measures. He emphasized that the rapid proliferation of drones has outpaced the military's ability to adequately prepare their forces, resulting in a significant gap between technological capability and operational readiness.<sup>15</sup>

The Joint C-sUAS University at Fort Sill (JCU) offers five training modules for service members across all branches, covering the fundamentals of UAS threats and the operation of C-UAS equipment.<sup>16</sup> However, the JCU is undermanned and unable to accommodate all personnel that need training, and the Army falls short of its goal of jointness by not providing adequate training on the systems and kit used by sister services. Offering training on a wider variety of systems would make JCU more truly joint—and making service members proficient on a wider variety of C-UAS systems is critically important in a domain with so many options and constant updates.

## **Recommendations for the Department of Defense**

In order to counter the threat posed by the proliferation of UAS, the Pentagon should:

- **Prioritize the deployment of kinetic C-UAS** like the Advanced Precision Kill Weapon System (APKWS) and the Thales Lightweight Multirole Missile (LMM). DEWs may be promising, but their expansive energy needs and limited range mean that the services should continue to prioritize C-UAS that is cheap and kinetic.
- Expand training at the Joint C-UAS University to all C-UAS across services. UAS and C-UAS technological upgrades are in constant movement in Ukraine and relevant U.S. personnel need to be proficient on numerous systems.
- Ensure that installation commanders have sufficient authority to manage the threat. The United States should expand the existing authority under Section 130i of Title 10 to all military installations, allowing bases to prevent drone incursions.

## Conclusion

UAS are a challenge to be met, but they do not render legacy systems obsolete. Even in Ukraine, drones are a force multiplier, not a substitute for other methods of warfare. In no country do drones replace manned fighter aircraft, armor, artillery, or warships. The proliferation of cheap drones, in particular among non-state actors, does, however, pose a threat that must be met with C-UAS capabilities.

While the U.S. has taken important initial steps to develop advanced C-UAS and training programs, these steps remain fragmented, underfunded, and unevenly implemented across the joint force. To maintain its strategic advantage, the U.S. must not only accelerate the deployment of scalable, cost-effective counter-drone technologies but also institutionalize mandatory training and doctrine updates across all military branches. The wars of the future will be fought, and decided, in contested airspace, with drones acting as key enablers across multiple domains.

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# Endnotes

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