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The United Kingdom and Drone Swarming: The Future of Aerial Warfare

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Introduction

From 13 to 14 July 2022, London hosted the Global Air and Space Chiefs' Conference, where British Air Chief Marshall Sir Mike Wigston announced that the Royal Air Force had successfully conducted the testing of drone swarms with the purpose of striking air enemy defences:

"Our swarming drone trials point to the enormous operational potential for these systems to confuse and overwhelm an adversary's air defences. In the last three years, 216 Test and Evaluation Sqn, alongside the Rapid Capabilities Office, Defence Science and Technology Laboratory and industry will have trialled five drone types in thirteen trials of new payloads, new platforms, and new control systems. We are exploring new models of capability delivery and accelerated production "when we need them" rather than "in case we need them" from the twin jet 3D-printed Pizookie, to commercially available large drones fitted with novel payloads, to large quadcopters."

Wigston then commented that the experiments performed show an "operationally useful and relevant capability" of the RAF drone fleet to be ready for actual use in an armed conflict. The deployment of such technology might considerably impact air warfare, which has historically been crucial in the United Kingdom's military strategy.

a. UK, NATO, and the Importance of Air Power

Since their first large-scale deployment in WWI, it was already clear that aircrafts were destined to change how warfare would be conducted. In its famous treatise, The Command of the Air, Italian General Giulio Douhet, stated that "…In the wars to come, the decisive field of action will be the aerial field" (Douhet, 1921, p. 223).

Air combat was revolutionary, as it allowed to engage enemy forces with a rapidity that had not been witnessed before and because it provided the ability to strike the enemy's forces (on air, land and sea) and economy all at once (Melville, 2014). Aircrafts were fundamental in deciding the course of WWII, as the victory reported by the Royal Air Force (RAF) in the Battle of Britain quashed Hitler's plans to invade Great Britain by 1940 (Rickard, 2011).

To the United Kingdom, establishing effective air power has been seen as essential since the early days of aviation history. The reason for Britain's necessity to dominate the skies lies in its very geographical nature: when French aviator Louis Beriot performed the first aerial crossing of the English Channel in 1909, authors and intellectuals commented that England was "no longer an island" and that the very foundation of British defence, the Royal Navy, could now be, at least theoretically, circumvented (Buckley & Beaver, 2018). This epiphany led to the establishment of the RAF less than ten years later and paved the way for the development of British military air power. As of 2022, the RAF ranks among the world's top fifteen most powerful air forces (World Directory of Modern Military Aircraft, 2022).

Unsurprisingly, the progressive relevance that air combat has acquired over the years has witnessed an equally emergence and development of air defence systems, to the extent that, in modern warfare, the chance to gain an initial advantage during an armed conflict largely depends on the capacity of air defence to detect and deter aerial threats (Kankaraš, 2015). Indeed, among the elements underpinning air operations, fly safety is crucial, ensuring the effectiveness of operations and reducing the risks of dissipating uncountable amounts of money invested in providing aerial fleets with state-of-the-art technologies.

The current conflict in Ukraine offers a practical operation of this principle, as Russian and Ukrainian air defence capabilities have mutually managed to inhibit air threats successfully. Justin Bronk, a senior defence analyst for the Royal United Services Institute attending the London Conference, observed that these circumstances have far-reaching implications for UK and Western powers, as, differently from Russia and Ukraine, they are heavily dependent on air control (Sprenger, 2022). This condition applies not only about the capacity of generating a striking air force, but it involves all air-related operations, with consequences on the deployment of land forces as well. A study performed on the UK, France, and Germany's militaries shows that the more urgently their militaries need to reach the Baltics, the more they need to rely on airlift (Shurkin, 2017). The following table provides a numerical representation of the difference between the UK and Russia's reliance on air and land forces.

1 Comparison Between UK and Russia Land and Air Forces (2021)

Country	**Tot. Aircraft Units**	**Tot. Land Combat Equipment Units**	**Air/Land Power Ratio**
Russia[3]	4,173	60,078	**6,95%**
UK[4]	840	3,985	**21,8%**

Sources: NATO Russia military comparison 2021 | Statista; UK armed forces equipment and formations 2021 - GOV.UK (www.gov.uk)

Bearing in mind these considerations, the ability to neutralise air-defence systems to perform military operations becomes essential. It is no surprise that the UK has been investing massive resources in developing innovative technologies to counteract enemy defences. The project of employing unmanned aerial vehicle swarms (UAS) to this end dates back to 2019, when then Secretary of State for Defence, Gavin Williamson, announced that swarm squadrons could be operational by the end of the year (BBC, 2019), albeit the project had been subsequently delayed due to the Covid-19 Pandemic.

b. Concept, Aspects and Limit of Drone Swarming

Swarming refers to the employment of many expendable drones against integrated air defence systems (IADS), such as detection and tracking radars coupled with Surface-to-Air Missiles (SAM) so as to confuse or overwhelm them. With lower human and economic risks, they can substitute manned aircraft in traditional "layered attacks," where the disablement of air defences paves the way for following air-strikes on high-value targets (Filbert, 2016). The UAS popularity among the militaries has substantially increased over the last few years, as technological advancements granted access to a wide range of vehicles, especially those that are smaller and cheaper. As far as the latter is concerned, experts believe that their development might significantly change the way air warfare is conducted, as traditional air defence systems benefit from early warning that allows multiple engagements of fighters and ground-based air defences against air threats. In contrast, the use of UAS may nullify this advantage, by allowing attacks to be executed from the targets' immediacy. Furthermore, the means of attack may be assembled from commercially available components within minutes before striking (Cieslack, 2021).

Drone swarms attacks have proven effective in Syria, where the Turkish Army has successfully deployed UAS technology to overwhelm the Syrian Arab Army (SAA) tanks and air defence systems, such as the Russian-made Buk-M1 and Pantsir S-1. However, analyses of the conflict show that the SAA tanks were neutralised due to their poor positioning, showing a lack of consistent training and tactical knowledge (Flannelly, 2020). This might also be the case with the SAA's use of their air defence devices, as it has been evidenced that the Syrian forces lacked the training time necessary to employ newly acquired effectively, difficult-to-operate aerial defence equipment (Parachini & Wilson, 2020).

Indeed, according to Russian military doctrine, SAM units like the ones quoted above should not be considered an air defence system themselves, but rather as a part of a broader system which includes other, different-range SAM units, C2 vehicles and engineering equipment. Thus, the sole employment of SAM without integrating into an efficient, multi-layered system will likely not produce desirable outcomes. This seems to be reinforced by information provided by the Pantsir S-1 manufacturer, Rosoboronexport. This air defence unit is often used to reinforce air defence groupings when countering massive air attacks (Mattes, 2019).

Therefore, when planning to employ UAS against air defences, such considerations cannot be left out of the picture. After all, Wigston himself remarked at the London Conference that "technology is nothing without the conceptual framework in which it is employed." As Bronk highlighted, drone swarming can be feasible if the expendable drones can be acquired cheaply. However, he commented, to be effective, drones need a range and speed that only jet-propulsion can grant, a technology that would inevitably increase their price. Bronk added that closing the distance between drones and the advanced air defence systems might require expensive insertion tactics, further impairing the economic advantages of drone use. Moreover, advanced IADS rely on different modern means of communication such as satellite transmission, cellular, wi-fi and cloud networks,the communications within efficient air defence systems are not "linear" anymore, meaning that critical subjects can receive information frommultiple sources, despite single units inside the system being damaged. This could seriously hinder drone swarms' ability to disable enemy tracking capabilities.

Thus, the consistent use of drones to effectively disable highly advanced and intelligently employed air defence systems might need further developments to become a reality.

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