DSIAC TECHNICAL INQUIRY (TI) RESPONSE REPORT

Kinetic Counter-Unmanned Aircraft Systems

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The Defense Systems Information Analysis Center (DSIAC) was tasked with collecting information of kinetic kill counter - unmanned aircraft systems (C-UAS) in support of the U.S. Army. Specifically, user feedback on C-UAS was desired. DSIAC contacted representatives from the Joint Integrated Air & Missile Defense Organization, Defense Threat Reduction Agency, U.S. Army Fires Battle Laboratory, and the Pentagon C-UAS group for points of contact and relevant information from various live-fire tests and events such as Black Dart and Maneuver and Fires Integrated Experiment.

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A chief service of the DoD IACs is free technical inquiry (TI) research, limited to 4 research hours per inquiry. This TI response report summarizes the research findings of one such inquiry jointly conducted by DSIAC.

ABSTRACT

The Defense Systems Information Analysis Center (DSIAC) was tasked with collecting information of kinetic kill counter - unmanned aircraft systems (C-UAS) in support of the U.S. Army. Specifically, user feedback on C-UAS was desired. DSIAC contacted representatives from the Joint Integrated Air & Missile Defense Organization, Defense Threat Reduction Agency, U.S. Army Fires Battle Laboratory, and the Pentagon C-UAS group for points of contact and relevant information from various live-fire tests and events such as Black Dart and Maneuver and Fires Integrated Experiment.

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1.0 TI Request

1.1 INQUIRY

Is there existing guidance or user feedback on kinetic counter - unmanned aircraft systems (C-UAS) systems?

1.2 DESCRIPTION

The inquirer was particularly interested in any C-UAS that may have come from Black Dart exercises (ideally, but not necessarily, unclassified information). Except for weight, any applicable kinetic system factors would be considered.

2.0 TI Response

In defending against UAS, military units can target them through either kinetic or nonkinetic means. Some examples of nonkinetic methods include electronic warfare, microwave attacks, and cyberattacks, while examples of kinetic methods include rockets, missiles, lasers, nets, and explosives. Oftentimes, the UAS defeat method depends on the area of operations and rules of engagement (ROE). While kinetic systems have the advantage of destroying the UAS, they also risk collateral damage, fratricide, and violations of ROE [1]. Therefore, it is important to have feedback and understanding of various C-UAS platforms when deciding on a defense system, especially with the rapid advancements of adversary UAS platforms.

The need for state-of-the-art C-UAS technologies was shown in the U.S. Army's fiscal year (FY) 2019 (FY19) funding request, as its largest request was the "Air Defense Command, Control and Intelligence – Eng Dev (Counter Unmanned Aerial Systems [CUAS])" program ($188 million for FY19 - $69 million base, $119 million Overseas Contingency Operations) [2]. This program would develop, integrate, and test kinetic defeat solutions into the low-slow-small UAS Integrated Defeat System. The FY19 budget included other requests from the U.S. Army, Navy, Special Operations Command, and Air Force. According to their FY20 budget, the U.S. Department of Defense (DoD), plans to spend at least $373 million on C-UAS research and development and at least $200 million on C-UAS procurement [3].

2.1 BLACK DART AND OTHER TEST EVENTS

DSIAC initially reached out to points of contact (POCs) for Black Dart for information on C-UAS and user feedback. Black Dart was run by the Joint Integrated Air & Missile Defense Organization (JIAMDO) from 2010 to 2018. The reports resulting from those events are hosted on the SIPRNet/Intelink [4].

However, in 2018, C-UAS testing and evaluation (T&E) was transferred to the Defense Threat Reduction Agency (DTRA), though JIAMDO still executed the event that year. DTRA hosted the last Black Dart event in 2019, although they hosted a new C-UAS T&E event, Apollyon, in 2020 and have hosted other counter drone events in the past [4]. They have a C-UAS data repository and other information that are on the SIPRNet [5].

The Maneuver and Fires Integrated Experiment (MFIX) is the U.S. Army's Fire Center of Excellence's live, prototype experimentation campaign that takes place at Fort Sill, OK, that brings industry and Programs of Record together to test emerging technologies in various scenarios, including various UAS countering scenarios. The last MFIX was held in 2019 from October 15 to November 6 and included a joint effort between the U.S. Army and U.S. Air Force (USAF) to test directed energy (DE)-based C-UAS solutions. There were five DE systems tested in the USAF portion of MFIX: Applied Technology Associates' Locust system, Boeing's Compact Laser Weapons System, Lockheed Martin's Advanced Test High-Energy Asset Laser, the Air Force Research Laboratory's Tactical High-Power Operational Responder Microwave Weapon, and the Army's Mobile Expeditionary High-Energy Laser (MEHEL) [6, 7]. The Fires Battle Lab assessed many C-UAS technologies dating back to 2015, and those reports can be requested by a government entity (due to reports contain proprietary and classified information) [8].

In 2017, the Naval Surface Warfare Center (NSWC) Crane Division had a call for experiment proposals and abstracts, including systems and components that can be rapidly integrated together as a C-UAS platform. At Camp Atterbury, IN, where fires can range up to 3.2 km, a scenario was developed for kinetic defeat of Class 1 and Class 2 UAS [9].

2.2 PENTAGON TEAM

The DoD has recently established a new office to address the growing challenge to target enemy drones. The 60-person team will be led by a two-star U.S. Army general, Maj. Gen. Sean Gainey, to draft policy and develop new methods to counter drone strikes. The Pentagon will then choose three to five systems that will be used by the U.S. forces to counter drones [10, 11]. DSIAC reached out to the group and received the contact information for the Unmanned Systems (UxS) technical director of the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD[A&S]) where additional information can be obtained [12].

2.3 KINETIC C-UAS PLATFORMS

DSIAC searched for kinetic-based C-UAS platforms in open sources, including Unmanned Airspace's "Counter-UAS Directory" [13]. This directory, a freely-available list that includes over 160 C-UAS suppliers, is continually updated with new product information, companies, and services employing the various systems.

2.3.1 Counter-UAS Mobile Integrated Capability (CMIC)

The U.S. Combat Capabilities Development Command Aviation & Missile Center (AvMC), formerly the U.S. Army Aviation and Missile Research, Development, and Engineering Center, developed a fully-developed, Soldier-tested, U.S. government-owned, integrated, and upgradable C-UAS platform called the CMIC. The CMIC system uses common military parts to integrate electro-optical, thermal, and electronic sensors into one easy-to-interpret display to provide the Warfighter with awareness of hostile UAS and the location of the pilot. It can coordinate nonkinetic or kinetic effects to defeat a UAS and triangulates the source of the command signal to locate the pilot [14]. In 2017, the CMIC system was mounted on to a General Dynamics Stryker armored vehicle, armed with a 5-kW laser (with a 10-kW laser planned), and tested at the April 2017 MFIX [15].

2.3.2 Mobile Expeditionary High-Energy Laser 2.0

The MEHEL, a U.S. Army Space and Missile Defense Command/Army Forces Strategic Command-developed laser testbed on a Stryker-armored fighting vehicle chassis, serves as a platform for research and development. The MEHEL 2.0 is an improved version of the original MEHEL system, with the laser upgraded from 2 kW to 5 kW and other C-UAS capabilities added. The system incorporates a number of AvMC C-UAS, mobile, integrated components to increase the robustness of its capabilities. The MEHEL 2.0 platform participated in the Joint Improvised-Threat Defeat Organization's 2017 UAS Hard-Kill Challenge at White Sands Missile Range, NM [16].

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