QUANTUM SYSTEMS

Quantum Systems closes the capability gap in tactical aerial reconnaissance

Drone technology at NATO's eastern flank

TACTICAL AERIAL RECONNAISSANCE – LIVE INFORMATION ON ALL LEVELS

Tactical aerial reconnaissance varies depending on the unit and leadership regarding its military purpose. Based on experiences from the Ukrainian theater of operations, the following military missions for tactical aerial reconnaissance can be defined: *Monitoring, Surveillance, Change Detection, Targeting, and Battle Damage Assessment.* These missions require flexible and powerful reconnaissance technology that meets the dynamic requirements of the battlefield.

Challenges

Currently deployed systems like *MIKADO* and *ALADIN* offer only limited range, endurance, and adaptability. These systems are technologically outdated and are characterized by low robustness. Furthermore, they are heavily restricted in modern military scenarios by limited communication and sensor technologies, which significantly reduce their effectiveness. A modernization of these systems is therefore essential to fully guarantee mission capability in medium-range combat scenarios.

Systematic Solution: The Family of Systems at Various Command Levels

Quantum Systems' **"Family of Systems"** offers an adaptable solution for modern tactical reconnaissance on all levels of command. This solution ranges from higher leadership with large-range reconnaissance to near-range reconnaissance, including the following categories:

- **Long Range Reconnaissance (LRR):** For large-area reconnaissance missions with more than 100 km range and altitude of more than 1000 meters above sea level.
- **Mid Range Reconnaissance (MRR):** For reconnaissance operations at up to 80 km distance and altitudes of 600-800 meters above sea level.
- **Short Range Reconnaissance (SRR):** For near-range reconnaissance missions at ranges up to 15 kilometers.

Each system is interoperable and allows the optimal adaptation of reconnaissance capabilities to the respective command levels, offering significant advantages over older systems.

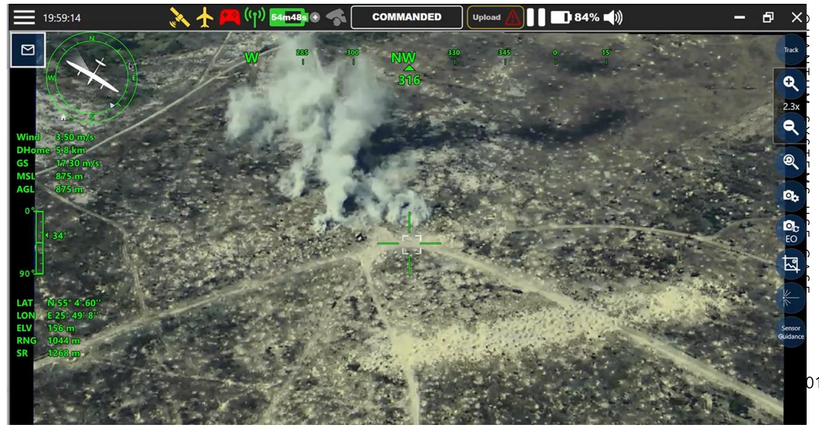
Specifications

ALTITUDE 600-800 m AGL	**WIND SPEED** 6 - 9 m/s	**MISSION DURATION** X*180 min | 10d
TEMPERATURE 33° C |	**NATIONS** 4	**AREA SURVEYED** 14.5 km²
UAS DEPLOYED Vector / Trinity Tactical	**CAMERA** EO/IR	**CONDITIONS** Dust

Over the next five years, Quantum Systems will make significant advancements in artificial intelligence, service, and support, as well as product excellence. We will continue to develop the "Family of Systems" line, enhancing its capabilities while maintaining our focus. Our expertise in interoperability allows us to integrate our system into any organizational structure and to position ourselves within the rapidly growing range of our systems and their classification into different size classes. The **TWISTER** will follow, **VECTOR** will set the standard for the medium range, and **RELIANT** will be the standard for reconnaissance and surveillance technology in the extensive reconnaissance area.

Platform and Camera:

VECTOR – EO GIMBAL



INTEGRATION OF THE VECTOR AT VARIOUS COMMAND LEVELS DURING AN INTERNATIONAL LARGE-SCALE EXERCISE IN LITHUANIA

MODERNIZATION OF THE MEDIUM FORCES

The medium forces of the German Army form a highly mobile and adaptable combat force, which plays a pivotal role in ensuring the security of NATO's eastern territory. The range of units comprises infantry, reconnaissance, artillery, engineering and logistics. Their high mobility allows for flexible deployment over longer distances without the need for extensive logistical support. It is essential to maintain the combat effectiveness of the medium forces, which requires the capability of aerial reconnaissance, particularly for long-range missions. However, the current systems in use, such as ALADIN and MIKADO, are technologically outdated and are therefore limiting the effectiveness of operations. It is vital that these systems are modernized in order to enhance the flexibility of deployed reconnaissance assets.

TACTICAL AERIAL RECONNAISSANCE AS A KEY COMPETENCY

Tactical reconnaissance is a key component of the deployment capability of medium forces. However, systems like ALADIN and MIKADO are no longer fit for purpose, which significantly reduces their effectiveness in modern military operations. To address these challenges, modernization is essential. This includes increasing the range, endurance, and flexibility of the deployed reconnaissance systems. There is a need for products that are a complex system to manage all the tasks on the battlefield but easy to handle by one operator without lengthy and intensive training.

INTEGRATION OF THE VECTOR

In recent weeks, Quantum Systems has introduced a new standard in tactical reconnaissance. The capabilities of the VECTOR drone were showcased to great effect during the international Grand Eagle exercise in Lithuania. With a flight time of up to 3 hours and a range of 30 kilometres, the VECTOR drone offers significant advantages at both battalion and company level, providing a highly versatile and cost-effective solution for a range of operational requirements. A single VECTOR can transform movement, tactical decision-making, situational awareness and execution control into a significant advantage for the deployed platoon, company or battalion. A second Vector is already capable of providing an overview of the movements of both friendly and enemy forces at brigade level, as demonstrated during the Grand Eagle II exercise in Lithuania.

Voice of the end user

Media feedback on the integration of the two VECTOR drones on different levels.
Paul Strobel, Political Communications & Public Affairs

"The VECTOR, among other things, took over the target acquisition for artillery and mortar operations, while TRINITY drones delivered highly detailed 3D mapping material for command guidance. Especially impressive was the live transmission of reconnaissance images to the battlefield and leadership areas, enabling unified situational awareness across different command levels–a level of interoperability that has not been achieved before. This showed the potential of the medium forces as a leader in tactical reconnaissance."

MODERNIZATION OF THE MEDIUM FORCES: AN EXAMPLE FROM LITHUANIA

The straightforward incorporation of the Vector drone into existing Battlefield Management Systems (BMS) markedly enhances the volume of data accessible, enabling more accurate military decision-making. During the exercise, decisions could be made directly from the data stream, and an additional data transfer to the battalion commander was enabled. This provided commanders with an accurate overview of the positions of friendly and opposing forces. Furthermore, the system enabled the precise detection and engagement of artillery targets to within one meter. This resulted in more rapid and precision-targeted decision-making in combat scenarios. The Vector drone is set apart by its cutting-edge EO/IR dual sensor gimbal, which provides unparalleled clarity in images and videos, regardless of the time of day. The Vector drone's technological superiority makes it an indispensable tool for modern tactical reconnaissance and ensures its place as a key component for the future viability of medium forces. The medium forces of the German Army, crucial to NATO's eastern security, depend on mobility and adaptability across various unit types, including infantry, reconnaissance, artillery, and logistics. However, their current aerial reconnaissance systems, like ALADIN and MIKADO, have become outdated and struggle to meet the demands of modern military operations.

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About Quantum Systems

Quantum Systems specialises in the development, design, and production of small Unmanned Aerial Systems (sUAS). The company's range of electric vertical take-off and landing (eVTOL) sUAS are built to maximize range and versatility and to provide operators with a seamless user experience.

By integrating cutting-edge software capabilities, like edge computing and real-time AI-powered data processing, Quantum Systems is building next-generation UAS for clients in defence, security, public sectors.

Quantum-Systems was founded in 2015 and is headquartered at Special Airport Oberpfaffenhofen, 20 km west of Munich. For more information about Quantum-Systems visit www.quantum-systems.com.