SOCOM254-008: Silencing with Acoustic Rainbow Emitters (SWARE)

ADDITIONAL INFORMATION
N/A

TECHNOLOGY AREAS:
Air Platform | Materials | Weapons

MODERNIZATION PRIORITIES:
Advanced Materials

KEYWORDS:
acoustic rainbow emitter(s); signature management; UAS; Drone silencing; acoustic signature reduction; acoustic signature;

OBJECTIVE:
The objective of this topic is to develop applied research toward a low-cost acoustic rainbow emitter (ARE) to provide significant reduction in a UAS's acoustic signature. The ARE would provide a means to redirect the acoustic signature of a UAS and change the frequencies of the acoustic signature. Due to the high number of UxS operations that will be conducted at a tactical level, this effort will support ARSOF in maintaining stealth at the tactical edge.

ITAR:
The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with section 3.5 of the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

DESCRIPTION:
This topic seeks innovative research and development efforts toward a low-cost acoustic rainbow emitter attached to a UAS. Acoustic sensors are becoming more prolific on the battlefield and reducing the signature of a UAS will increase the survivability of ARSOF UAS in a non-permissive environment. As a part of this feasibility study, the proposers shall address all viable overall system design options with respective specifications on the key system attributes. Key system attributes include:

1. The ARE should reduce the acoustic signature of a UAS by at least 50%.
2. The ARE should redirect the acoustic signature of a UAS towards the atmosphere and away from the ground.
3. The ARE should filter the frequency of the sound emitted towards the ground to levels inaudible to the human ear.
4. The ARE should be easily applied to a UAS system.
5. The ARE should remain under 1kg for a group 1 UAS and 3kg for a group 2 UAS.
6. The ARE should be colored to maintain a low visual signature.
7. The ARE should be adaptable to multiple UAS systems or easily configured to a specific system.

PHASE I:
Conduct a feasibility study to assess what is in the art of the possible that satisfies the requirements specified in the above paragraphs entitled "Objective" and "Description."

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study ("Technology Readiness Level 3") to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II:

Develop, install, and demonstrate a prototype system determined to be the most feasible solution during the Phase I feasibility study on a low-cost sensor employed from a UAS during terminal attack or when directed from the operator.

PHASE III DUAL USE APPLICATIONS:

This system could be used in a broad range of military applications where Special Operations Forces must be able to operate in the continuum of military operations.

REFERENCES:

1. Published study on acoustic rainbow emitters; https://www.science.org/doi/10.1126/sciadv.ads7497
2. Article on the published study; https://phys.org/news/2025-06-3d-device-white-noise-acoustic.html
3. Article on acoustic rainbow trapping; https://www.nature.com/articles/srep01728
4. Some articles and studies when searching "acoustic rainbow emitters" on internet search engines.

TOPIC POINT OF CONTACT (TPOC):

None