

Department of the Navy SBIR/STTR Transition Program

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Topic # N182-136

Compact Low Noise Acoustic Sensors for Sonobuoys

MSI Transducers Corp.

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research

Transition Target: DIFAR AN/SSQ-53 ERAPSCO A-Size Sonobuoy

TPOC:
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Other transition opportunities:
ERAPSCO A-Size Sonobuoy Current System

FNC ER-DIFAR or VADAR

NAVSEA Volumetric Surveillance Array

Notes: Image of a MSI Transducer with several key Innovations:

- Advanced design of precisely optimized acoustic sensor to increase sensitivity-to-size ratio
- Proprietary PZT injection molding ceramic manufacturing and automated manufacturing techniques facilitating low-cost, high-volume production
- Custom-designed low-noise electronics

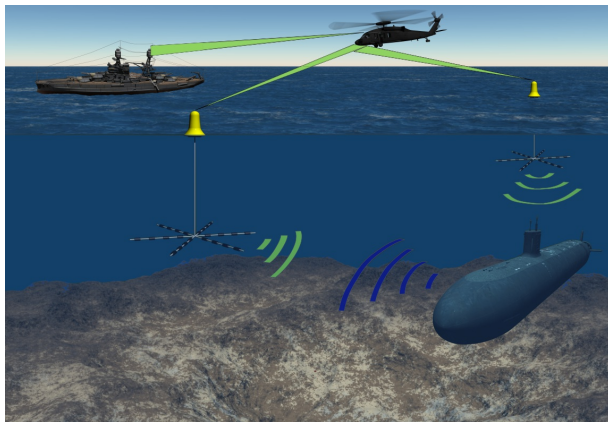


Image courtesy of MSI Transducers

WHAT

Operational Need and Improvement: U.S. Navy sonobuoy is a small, expendable sonar system used by Navy forces to detect and track enemy subs in open ocean and littoral battle space that potentially threaten assets.

The Navy needs a low-noise, sensitive underwater acoustic sensor for use in sonobuoy applications with reduced size to package more sensors into a fixed volume to increase probability of target detection. Navy wants to make use of distributed sensor arrays to increase anti-submarine performance, but needs to increase the density of sensors stored in the sonobuoy to enable this capability.

Specifications Required: Maximum Length: 2.25"

Maximum Diameter: 0.9"

Maximum Noise at 1 kHz: 30 dB

Maximum Noise at 10 kHz: 22 dB

Resonance: >50 kHz

Cost in Production: <\$50/unit for large orders

Technology Developed: MSI's technology enables production of a highly optimized compact acoustic sensor at low-cost. Advanced design of precisely optimized acoustic sensor to increase sensitivity-to-size ratio. Proprietary PZT injection molding manufacturing techniques facilitating low-cost, high-volume production. Bespoke low-noise electronics. Enables application of high-density distributed arrays which augments target detection probability and range.

Warfighter Value: MSI has developed technology that will directly impact the performance of sonobuoys in the naval battle space. The reduction in volume of the acoustic sensor by 48% will nearly double the number of sensors able to fit into a fixed-volume sonobuoy, enabling more robust distributed sensor arrays. This will lead to improved target detection range, resolution, and probability.

WHEN

Contract Number: N68335-20-C-0104 **Ending on:** December 31, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Initial MSI Sensor Design Concept Validation	Low	Measure ceramic ring based on initial design for key acoustic parameters	3	4th QTR FY20
Navy Verification Testing of MSI Initial Prototype Sensor with Integrated Pre-amp	Low	Build iterated prototype and test it to predicted component performance specification	4	2nd QTR FY21
Navy Validation Testing of MSI EDM Sensor w/ Integrated Pre-amp Manufactured with Low Cost Tooling	Low	Meet sensor level performance specifications	5	1st QTR FY22
Navy Collection of Acoustic Data using Partial 30-element Array of MSI EDM Sensors in Test Sonobuoy Platform	Med	ONR Testing demonstrates subarray performance meets system expectations	6	3rd QTR FY22
Navy Qualification Testing of Volumetric Array with MSI's Sensor on Sonobuoy Platform	Med	ONR Testing demonstrates array performance meets system goals and test successfully in an operational environment	7	1st QTR FY23
NAVAIR Qualification of FNC Sonobuoy	Med	NAVAIR testing and development qualifies new	8	1st QTR FY26

HOW

Projected Business Model: MSI will start commercialization by working with the government and primes to make sure that the sensor meets all the requirements. Sparton and Ultra are currently partners in the Sonobuoy joint venture, ERAPSCO, and are the anticipated customers for the Compact Low Noise Acoustic Sensor. MSI has been in contact with Sparton while writing the Phase II proposal to help guide product development and qualification. As an example, an acoustic and noise test in a Sparton sonobuoy testbed is planned for the Phase II Option. MSI will also engage Ultra during Phase II. Early testing such as this ensures that MSI's product will integrate properly with the sonobuoy system and perform as expected in the fleet.

Company Objectives: MSI Transducers plans to approach Sparton, Ultra, and Triton Systems to provide a lower cost solution with improved performance for existing and new opportunities. MSI is already partnered with Sparton and Triton Systems leveraging this new technological capability and will continue to do so to take advantage of the superior technology demonstrated through this SBIR.

Potential Commercial Applications: Commercial applications are certainly possible as the technology is further developed. This compact, low-cost acoustic sensor is very attractive to commercial customers due to its extremely low price point when compared to similar options on the market. This makes it very attractive especially in Acoustic Communications (ACOMMs) where omnidirectionality is preferred for many applications, especially at low frequencies. MSI will utilize parent company's AIRMAR's worldwide sales and distribution channels that include wholly owned subsidiaries such as Gemeco and Marport in France, Iceland, Norway, Spain and Asia. MSI will determine if there are any ITAR restrictions on this product before starting marketing and sales effort. The low noise hydrophone will either be incorporated into other products such as those for commercial fishing or as stand-alone products. Marport currently has a hydrophone product line that this product naturally fits into.

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