

Topic: N181-022

## Beam Engineering for Advanced Measurements Company

### Laser Periscope Detection

Timeliness of detection and recognition of threat periscopes is key to defending surface combatants from weapons launched from submarines. Our proposed gated imaging system with non-mechanically steering laser illuminator beam and gated imaging system, mounted on an airborne platform such as an MH-60 or P-8, will be capable of recognizing whether a possible periscope is actually a periscope within a time of less than a second provided a sufficiently accurate cue is available, for example from a search radar. The deployment of such a threat confirmation system will deter enemy submarine commanders from raising their attack periscope if they suspect such a U.S. Navy system is in operation in their vicinity.

### Technology Category Alignment:

Sensors

Air Platforms

Materials & Manufacturing Processes

### Contact:

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**SYSCOM:** NAVAIR

**Contract:** N68335-20-C-0156

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2020-857

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Laser Periscope Detection

Beam Engineering for Advanced Measurements Company

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PEO (A), PMA-299

**Transition Target:** MH-60R

**TPOC:**  
(301)342-3378

**Other transition opportunities:** P-8, DDG-51, CVN



<https://www.navy.mil/management/photodb/photos/200627-N-CU072-1013.JPG>

## WHAT

**Operational Need and Improvement:** Detection of periscopes masts, and proper discrimination to avoid false alerts, must be done rapidly before the mast is lowered. This system is fast, passive, neutral SWaP impact and not susceptible to countermeasures.

**Specifications Required:** The technology does not depend on optically-augmented returns from the periscope optics and is not subject to well-known countermeasures based on spectrally selective filtering or on polarization filtering within the threat periscope.

**Technology Developed:** An electronically-scanned periscope detection system is being developed utilizing breakthroughs in laser systems, gated imagers, and electronic optical path switching to enable detection of periscopes at long range, and discrimination of periscopes from clutter objects based on high-resolution imaging of periscopes and clutter, without the use of conventional optical gimbals. Electronic switching of the angular location and the size of the field of view (FOV) of the gated imager electronically combined with electronic switching of the beam divergence and of the pointing direction of the laser illuminator allows for fast and light-weight systems.

**Warfighter Value:** Rapidly detect and discriminate periscopes. The system is not susceptible to countermeasures due to the periscope detection system being outside the FOV of the periscope. The approach leverages existing deployed Navy airborne and shipborne radar systems that are capable of detecting threat periscopes, and provides an independent and unambiguous identification capability. It also provides an autonomous search capability independent of radar assets.

## WHEN

**Contract Number:** N68335-20-C-0156 **Ending on:** February 14, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Fabrication / tests of beam deflector	Low		5	October 2020
Fabrication and tests of FOV steering system	Med		5	February 2021
Fabrication and tests of breadboard illuminator beam shape control system	Low		5	May 2021
Software and electronics development for laser integraion with gated imaging system	Med		5	October 2021
Integrating imager and telescope with beam control and laser illuminator systems	Low		5	June 2022
Field testing the system from the seashore with simulated periscope	Med		5	February 2023

## HOW

**Projected Business Model:** The Laser Periscope Detection System will be integrated with existing or planned future laser systems, including Electro-Optical and Infrared (EO/IR) systems

**Company Objectives:** BEAM offers advanced optical technologies and materials based on the expertise of its world-renowned founders and researchers in nonlinear- and electro-optics, lasers and photonics, liquid crystals, polymers, composites and complex materials, solving extraordinary problems in optics.

**Potential Commercial Applications:** All electronic beam steering and shaping systems would allow developing thin and compact LiDARs to be used in numerous auto-navigation systems (cars, drones, robots) as well as carry out search and rescue operations at sea.

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