

# Department of the Navy SBIR/STTR Transition Program

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Topic # N151-026

Small Non-Cooperative Collision Avoidance Systems Suited to Small Tactical Unmanned Systems

Scientific Applications & Research Associates, Inc.

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA 263 Small Tactical UAS Program Office

**Transition Target:** Boeing Insitu RQ-21 Blackjack

**TPOC:**  
(301)995-6450

**Other transition opportunities:** MQ-8 Fire Scout, ScanEagle, RQ-20 Puma, PAE ISR Resolute Eagle and other Unmanned Aerial Surveillance (UAS) would benefit from an air collision avoidance sensor like Scientific Applications & Research Assoc., Inc.'s (SARA) PANAMA (Passive Acoustic Non-cooperative Aircraft Motion Analyzer). PANAMA is a key enabling technology for beyond visual line of sight (BVLOS) operations in the National Air Space (NAS) and offers a solution path to satisfy Due Regard.

**Notes:** PANAMA acoustic detect-and-avoid (DAA) system flown on RQ-20 Puma testbed. PANAMA alerts the remote operator to nearby aircraft. As a last resort, PANAMA commands an autonomous maneuver to avoid collisions. Probes are outfitted with rugged breakaway connectors.



Courtesy U.S. Navy

## WHAT

**Operational Need and Improvement:** A collision avoidance system that does not rely solely on cooperating aircraft that are automatic dependent surveillance-broadcast (ADS-B) equipped is needed to ensure safe integration of UAS into the airspace. PANAMA meets this need, allowing UAS to stay well clear of manned aircraft in the National Airspace System as well as improving the integrated UAS mission capability of all military applications.

**Specifications Required:** A detection range of 2 to 5 miles for small radio frequency (RF) cross-section targets is needed. All UAS flyable weather performance is desired. All airborne hardware should weigh less than 12 ounces and consume less than 27 cubic inches of total space, with a power draw of less than 25 watts average. The solution is required to fit on a Group 2/3 UAS, with an additional project goal of compatibility with smaller Group 1 Small Unit Remote Scouting Systems (SURSS).

**Technology Developed:** In Phase II, PANAMA was independently evaluated in relevant environments, first as part of the FAA's Pathfinder II program and later during an Air Force Test Pilot School evaluation. PANAMA has demonstrated aircraft detection at ranges as great as 10 km. When PANAMA was flown on an RQ-20 Puma UAS against an approaching Cessna-172, PANAMA properly classified 13 out of 13 approaches as well-clear violations and provided sufficient time to maneuver to safety 100% of the time. PANAMA meets size, weight, power, and cost (SWaP-C) requirements and works in all visibility day/night conditions and senses in all directions.

**Warfighter Value:** PANAMA-equipped UAS will be capable of operating safely beyond visual line of sight in the National Airspace and offer a solution path for Due Regard requirements. This translates to increased mission availability and makes new missions possible.

## WHEN

**Contract Number:** N68335-17-C-0522 **Ending on:** July 30, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Flight test in relevant environment (RQ-20 Testbed)	N/A	Declare collision hazard aircraft >18 seconds before Point of Closest Approach	6	March 2018
Flight test in RQ-21 Blackjack	Med	Declare collision hazard aircraft with sufficient time to maneuver to safety	7	November 2019
Initial Operational Test & Evaluation	Med	System must be operationally effective and suitable	8	November 2020

## HOW

**Projected Business Model:** SARA plans to manufacture the PANAMA system and deliver it to the UAS manufacturer (Boeing Insitu for RQ-21 Blackjack) for integration in new deliveries or block upgrades. SARA will begin integration on the RQ-21 in 2019, with production design and manufacturing beginning quickly thereafter. SARA will leverage synergies with its commercial sensors which share common components. Given the commercial tech-pull for SARA's acoustic detect and avoid sensor technology, SARA expects to stand up production on the commercial side before PANAMA is deployed in military applications.

**Company Objectives:** SARA has a highly integrated PANAMA solution for the RQ-20 Puma and is eager to find military users who are interested in adopting PANAMA to enable their RQ-20 UAS to operate beyond visual line of sight. SARA is also eager to explore the applicability of PANAMA to other military UAS platforms. PANAMA offers enhanced mission capability to Group 1, 2 and 3 UAS.

**Potential Commercial Applications:** PANAMA is a military variant of SARA's Passive Acoustic Non-cooperative aircraft Alert System (PANCAS). In 2018, SARA selected PrecisionHawk (experts in beyond visual line of sight services) to be a strategic partner and the exclusive global distributor of PANCAS. SARA and PrecisionHawk are currently designing BVLOS drone systems that will provide commercial services. PANAMA technology is excluded from this partnership, as SARA intends to manufacture PANAMA and sell directly to the UAS manufacturers.

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