

# Functional Area 4 - Prototyping, Pre-production, Model-Making, and Fabrication

**PSI Contract N00167-02-D-0038 DO 22:** The Naval Surface Warfare Center, Carderock Division (NSWCCD) has the responsibility for submarine acoustic signature measurement and characterization. As part of this responsibility, NSWCCD operates acoustic measurement facilities for the collection and analysis of radiated noise signatures. One such facility is hosted aboard the research ship USNS HAYES. The USNS HAYES measurement system consists of two identical High Gain Arrays (HGAs) that are large cylindrical volumetric arrays of over 1000 channels each. The telemetry systems for the HGAs were originally designed and fabricated in the early 1990's. PSI is currently fabricating new components for this fielded system to replace and upgrade the sample timing portion of the telemetry system.

The original HGA system did not have a precise sample timing requirement. Free-running oscillators in the wet-end Instrument Pressure Vessels (IPVs) provided sufficient timing accuracy to make radiated noise measurements of quiet submarines. However, NSWCCD now faces the task of specifically localizing the sources of radiated noise on the hulls of these quiet submarines. Many techniques that have proven useful require precise timing of data samples to facilitate comparisons between distributed sensors. PSI is designing and fabricating replacement parts to the HGA telemetry system that will guarantee absolute sample timing to within 1 microsecond.

PSI is producing replacement components for both the wet and dry ends of the telemetry system. On the wet end, PSI is designing and producing a timing receive daughtercard, which will receive a timing signal from the dry end, divide that timing signal down to ADC clock rates, and distribute the timing signal to the analog-to-digital converters. If the timing signal is not present, the daughtercard will automatically detect that and revert to using the free-running oscillator currently used. On the dry end, PSI is designing and producing several components. The first is a timing distribution system. This system accepts timing input from a GPS clock, resamples that signal, distributes the timing signal to the wet end daughtercard discussed above via a fiber-optic connection, and distributes the timing signal to other dry end components. These other dry end components are data receive modules. These modules are VersaModule Eurocard (VME) form factor cards that receive acoustic data in the proprietary format of the existing telemetry system, apply a precise timestamp to the data, and convert that data to an industry standard format, Front Panel Data Port (FPDP). Once in FPDP format, the data will be stored and processed by COTS computer components, lowering the technical risk of developing the source localization capability.

**AAC Contract N66604-01-C-4218:** Received a \$29M Phase III SBIR award in 2001 for the Submarine Acoustic Intercept Improvement Program using Sparsely Populated

Volumetric Arrays (SPVAs). This program is a "light-bulb replacement" approach for the aging AN/WLR-9 outboard sensor domes. NAVSEA PMS-415 is the sponsor and NUWC Newport is the technical agent. PSI under subcontract to AAC was tasked to develop the architecture for a network-based telemetry system for SPVA. As part of this tasking, PSI hosted three design reviews with AAC and NAVSEA, culminating in a January 2003 contract award to develop and fabricate five SPVA Outboard Electronic (OBE) pre-production units at a contract value of \$1.64M. After initial early success in hardware development, the contract was modified to include an additional four units with the following milestones: three early prototype units for shock/vibration testing by July 2003; five pre-production units for sea trial support by January 2004; and two production units by April 2004. The contract value was increased to \$1,964M at this time. As of January 2004, PSI has met these milestones, having completed Government acceptance testing of the five pre-production units. In addition to the primary development effort, PSI has been tasked to develop a timing/synchronization unit that will operate with up to five OBEs and with an accuracy of one nanosecond. This effort is in development and expected to deliver in April 2004.

**AAC Contract N00178-98-C-2011:** As part of the task to design and develop the Surface Network Embedded Analysis Tactical Trainer (SNEATT), AAC performed prototyping of the final SNEATT system. This portion of the SNEATT project consisted of production of pre-production SNEATT units for engineering analysis, testing, and demonstration.

## **Additional Contracts:**

NTI Contract N00167-01-D-0016, Contact K. Harris, 301-227-3932 AHA Contract N00039-97-C-0031, Contact Loretta Bourne - 619-524-7154 AHA Contract N00024-96-C-6231, Contact Richelle Sweeney-703-885-7765 AHA Contract N00024-00-C-4125, Contact Tom Higgins-202-781-2892 AHA Contract N00024-99-C-6304, Contact John Dennard-703-604-6013