

Topic: N092-110

MaxPower, Inc.

Safe, High-Power Battery for Sonobuoys

MaxPower has developed an 8kW primary lithium battery for high power sonobuoy applications. The Vanadium Pentoxide system is well suited for replacing thionyl chloride and sulfur dioxide batteries traditionally used in high power primary systems such as those found in the SSQ125 sonobuoy. Though presently produced in a 5/4 C sized cell format, this technology is easily adapted to flat plate active cells as well as reserve systems. Full battery testing has demonstrated a power density of 4084 W/l and specific power of 2711 W/kg at discharge rates up to 45°C. MaxPower Incorporated is a battery research and development company with focus in rapid prototyping and low volume production. We are seeking applications in need of mature, scalable, high power density power solutions.

### Technology Category Alignment:

Energy storage

Power Generation/Energy Conversion

Power and Energy

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**SYSCOM:** NAVAIR

**Contract:** N68335-14-C-0030

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-14-C-0030](https://navystp.com/vtm/open_file?type=brochure&id=N68335-14-C-0030)

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2017-719

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## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA 264

**Transition Target:** AN/SSQ 125A/B

**TPOC:**

(301)757-3694

**Other transition opportunities:**

Working with ERAPSCO(Spartan Electronics and Ultra-Undersea Sensors, Inc.) on establishing a supplier relationship for battery technologies.



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## WHAT

**Operational Need and Improvement:** MaxPower is developing a safe high power battery for the Multi-static Active Coherent source sonobuoys(AN/SSQ-125) through the development of a high power lithium /vanadium pentoxide battery solution. The technology addresses higher power demand through the use of a high power cathode material, a high capacity lithium anode and a novel high power cell design which, when combined, yield a battery capable of increasing the energy density by a factor of 2 over the existing technology.

**Specifications Required:** The Navy requires a new battery technology for the SSQ125A sonobuoy capable of delivering 5,500 watts, and have a minimum load voltage of 65V. The dimensions must allow for this power source to fit within a standard A-sized sonobuoy and be no greater than 4.75 inches in outer diameter by 10 inches in length and weigh no more than 8.6 kg. The final battery design must be able to meet Navy environmental and safety requirements.

**Technology Developed:** MaxPower has developed a 42 cell battery based on a primary lithium/vanadium pentoxide(Li/V2O5) chemistry which has proven to be safe, reliable, and functional over a wide temperature range. Battery performance testing has shown this technology to meet the interim goal of 131 watts per cell(5500W per battery). High current discharge up to 60 amps continuous, and 100 amp pulsed(8kw per battery) have been demonstrated at both the single cell and full battery formats. Abusive safety testing of the battery with on-board circuit protection elements have shown the technology to be safe and reliable under such high rates of discharge and abusive conditions.

**Warfighter Value:** This technology provides a 200 percent improvement in sonobuoy power whilst maintaining the existing form factor to be able to retrofit into the existing sonobuoy design fleet.

## WHEN

**Contract Number:** N68335-14-C-0030 **Ending on:** November 1, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
5.5kW Electrical Performance in a full battery configuration	N/A	Delivered 5.5kW to a 100V cutoff potential and 10 percent duty cycle.	5	April 2014
8kW Electrical performance in a sub-module configuration	N/A	Delivered 8kW to a 100V cutoff potential and 10% duty cycle.	5	February 2017
RIF 20 Battery Deliverable	N/A	Delivered 20 batteries, built to spec to NSWCC Carderock for performance and shelf life testing.	6	May 2017
NAVSEA S9310 Battery Safety Certification	Med	Limited approval for testing batteries by NSWCC Carderock after subjecting pre-production batteries to S9310 destructive testing protocol.	6	November 2017

## HOW

**Projected Business Model:** Since 1995, MaxPower Incorporated has been working to advance lithium battery technology through the development of new materials and novel cell manufacturing techniques. MaxPower is unique in it's diverse capability to produce custom lithium, lithium-ion and lithium reserve battery solutions to meet stringent customer requirements. We owe this capability to our full service production capacity which ranges from raw material processing and slurry coating through cell assembly, battery management system design, and safety testing. MaxPower operates an 8000 sqft. R&D facility and a 6000 sqft. manufacturing plant. If this technology is adopted by NAVAIR MaxPower is positioned to begin low rate initial production of this battery within 12 months and full rate production within 24 months.

**Company Objectives:** As part of MaxPower's Phase II.5 SBIR program, MaxPower has established a working relationship with ERAPSCO for the development of this power source for the SSQ125A sonobuoy. We are presently seeking industry and DoD input on the future requirements of high power primary batteries for this and other sonobuoy platforms. We are actively pursuing alternative applications for MaxPower's high power cell technology and welcome discussions with prime contractors to discuss how this enabling technology may fit into future products.

**Potential Commercial Applications:** MaxPower's high power lithium/vanadium pentoxide chemistry is a mature product that can be used in many high power standby applications where the maintenance and charging logistics of lithium-ion secondary batteries is prohibitive. This technology offers a safer, higher power alternative to existing lithium/sulfur dioxide cells without sacrificing capacity. While presently being produced in cylindrical cell formats, this technology has also been adapted to prismatic pouch cell formats and liquid reserve batteries for munitions.

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