

# GENERAL ATOMICS UPDATE

## GA-ASI NEWS

**New Aircraft Systems President** – After 25 years of dedicated service, GA-ASI Aircraft Systems President Frank Pace retired in April, 2016. Frank pioneered the development of the Predator® RPA and managed the growth of the company from a small group in the early 1990s into a major aerospace company that changed the face of airborne surveillance forever. Frank is succeeded by Dave Alexander, who has been with GA-ASI since 1996 and formerly served as Senior Vice President of Engineering for Aircraft Systems, where he was responsible for the development of nearly every company RPA for series production, ranging from Predator to Avenger®.



GA-ASI Aircraft Systems welcomes Dave Alexander as its new President.

**Dutch Partner Joins Predator B Team** – In June 2016, GA-ASI announced it would collaborate with GKN Aerospace's Fokker business unit, a leading Dutch aircraft systems and components manufacturer, to produce and support next-generation landing gear systems for the Predator B. Fokker is GA-ASI's Dutch in-country partner. The landing gear may be leveraged by current and future Predator B customers.

**Italian Predator B to Integrate Israeli Sensor** – In June 2016, GA-ASI announced it will integrate RecceLite™, a versatile imagery reconnaissance pod, onto an Italian Air Force Predator B/ MQ-9, signifying the first occasion of an international customer integrating a national sensor onto the company's fleet.

**Capital Predator B Visits Berlin** – In June 2016, a full-scale, company-owned Predator B Block 5 was displayed at the ILA Berlin Air Show (Internationale Luft- und Raumfahrt ausstellung). The aircraft promoted the company's capability to the German government as well as other international customers in attendance. Predator B Block 5 is currently operated by the U.S. Air Force, Royal Air Force, French Air Force and Italian Air Force, and also has been acquired by the Spanish Air Force.



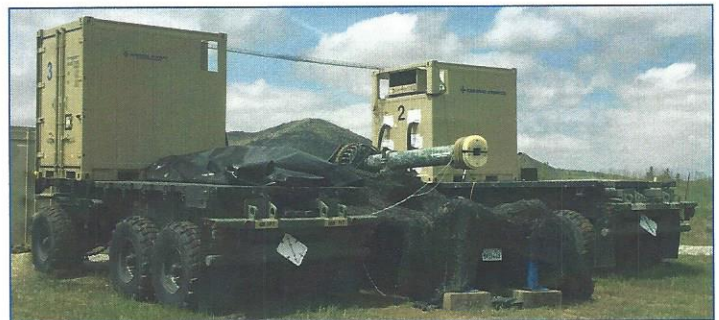
Predator B, shown next to a B1 bomber aircraft, attracted many visitors at the ILA Berlin Air Show.

**GA-ASI RPA Training Academy Grows** – In May 2016, GA-ASI announced two contracts in support of the company's new RPA Training Academy in Grand Forks, North Dakota. The company will collaborate with the University of North Dakota Aerospace Foundation located at the University of North Dakota, which will provide its existing flight simulator that accurately reproduces Predator and Reaper® pilot and sensor operator crew stations, allowing students to fly and operate a GA-ASI RPA system. Ground and simulator training has begun, with flight instruction planned to begin in July 2016.

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## RAILGUN SYSTEM DEMONSTRATED AT U.S. ARMY EVENT

GA's Electromagnetic Systems group (EMS) demonstrated the Blitzer® electromagnetic railgun system at the U.S. Army's Fires Center of Excellence annual Maneuver and Fires Integration Experiment (MFI), April 4-21, 2016 at Ft. Sill in Oklahoma. The event marked a significant milestone for the railgun team. After successful firings at Dugway Proving Ground in Utah, the railgun system was disassembled and transported to Ft. Sill, showing how the advanced weapon system can be efficiently transported from site-to-site. There were 11 firings of the Blitzer railgun at Ft. Sill, all at a target with a range greater than previous firings. The Blitzer railgun system has been transported back to Dugway Proving Ground for further testing later this year.



Blitzer railgun system set up at Ft. Sill, OK for firing demonstration.

Also demonstrated at the MFI event was EMS' Acoustic Detection System, an unattended ground sensor system or multi-target simultaneous detection and tracking. This system, developed by the EMS Huntsville team, is intended to monitor multiple sensors simultaneously and provide visual detection and tracking of acoustic and seismic sources.

## AAG PROGRAM SUCCESSFULLY COMPLETES FIRST AIRCRAFT ARRESTMENT



F/A-18E Super Hornet arrestment by AAG at Lakehurst, NJ.

The first successful aircraft arrestment made with the Advanced Arresting Gear (AAG) was completed on March 31, 2016. In collaboration with the U.S. Navy, EMS conducted the arrestment of an F/A-18E Super Hornet at the Runway Arrested Landing Site, Joint Base McGuire-Dix-Lakehurst, in Lakehurst, New Jersey. AAG is a state-of-the-art turbo-electric system designed for controlled and reliable deceleration during aircraft recovery operations on carriers.

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## GA-ASI

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**Women in Engineering Day Held** – In May 2016, GA-ASI hosted the company's second high school outreach program, coordinated by the General Atomics Women's Internal Network (WIN@GA) and supported by the General Atomics Sciences Education Foundation. Employees led girls from two local high schools on a manufacturing facility tour and promoted careers in engineering. The event was made possible by over 30 company volunteers and concluded with a fun, hands-on engineering project.

**Predator B Big Wing Makes Big Strides** – In April 2016, Predator B Big Wing, a next-generation derivative of the combat-proven Predator B, completed its longest endurance flight of 37.5 hours without incident. Big Wing's wing span is 13 feet longer than Predator B and incorporates greater fuel capacity, increasing the aircraft's endurance from 27 to 42 hours. Its bigger wings are the first components to be produced as part of GA-ASI's Certifiable Predator B development project, which will lead to a certifiable production aircraft in 2018. An earlier version of Big Wing featured two wing-mounted fuel tanks and is currently operational with the U.S. Air Force as MQ-9 Reaper ER.

**Guardian Integrates Due Regard Radar** – In April 2016, GA-ASI and its industry partners completed the successful operational testing of a Detect and Avoid (DAA) system, including Mission Systems' Due Regard Radar (DRR) aboard a U.S. Customs and Border Protection Guardian aircraft, a maritime variant of Predator. The test flights demonstrated DRR's functionality in national and international airspace as it detected "intruder" aircraft such as a Cessna C-210 and a UH-60 Blackhawk. During each encounter, DAA information was streamed to Guardian's pilot, providing the pilot with the ability to remain well clear of and avoid collisions with the intruder aircraft. The flights mark the first integration and evaluation of DRR aboard a customer aircraft.

**Tests Validate CPB's Airworthiness** – In April 2016, GA-ASI successfully completed fuselage integrity testing of the Certifiable Predator B (CPB), signifying that the fuselage's design will be able to meet the strict requirements for type-certification and routine operations in national airspace. Structural integrity testing of CPB's wings and tail design was previously completed in December 2015 under a separate effort, ensuring that the aircraft meets its intended design requirements. Fuselage integration of cables, propulsion system, avionics, and landing gear began in May 2016 and is on schedule to be completed by the end of July 2016.

**Honors Received from The American Institute of Aeronautics and Astronautics (AIAA)** – In the category of Outstanding Achievement by an Aerospace Organization, GA-ASI was recognized by AIAA's San Diego Section in April 2016 for the development of its Due Regard Radar (DRR), an air-to-air radar produced under company-funding to enable RPA systems to fly safely in domestic and international airspace. In the category of Outstanding Contribution to Aerospace Engineering, Aircraft Systems Technical Director of Advanced Programs, Mike Atwood, was recognized for his achievements which have proved instrumental in advancing the company's aircraft design and development. Lastly, in the category of Outstanding Corporate Contribution to the AIAA San Diego Section, the General Atomics Sciences Education Foundation was recognized for its support of young peoples' experiences with Science, Technology, Engineering and Math (STEM).

**Avenger Flies with Long-Range Sensor** – In February 2016, Predator C Avenger successfully completed flight testing with UTC Aerospace Systems' MS-177 EO/IR sensor. A more technically advanced version of the SYERS two flying on the U-2 aircraft, MS-177 delivers high-resolution imagery from significant standoff ranges. During the flights, Avenger demonstrated its ability to collect imagery of land-based and littoral objects with the MS-177 at altitudes above 37,000 feet.

## AAG

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More than 1,200 successful dead load arrestments have been completed at the Lakehurst Jet Car Test Site. This first aircraft arrestment marks a major milestone in demonstrating AAG performance and capability, and represents the culmination of a significant number of man-hours of design and development efforts to bring the technology into the next phase of testing and optimization. AAG is now installed aboard Pre-Commissioning Unit Gerald R. Ford (CVN 78), and is scheduled for installation on the future John F. Kennedy (CVN 79), which is currently under construction.

## RIBBON-CUTTING CEREMONY MARKS LAUNCH OF EXPANDED HUNTSVILLE OPERATIONS

GA held a ribbon-cutting ceremony on May 6, 2016 to mark the expansion of operations in Huntsville, Alabama. Local community and state dignitaries participated in the ceremony, including Senator Jeff Sessions, Representative Mike Rogers, and Mayor Thomas Battle, Jr. GA's chairman and chief executive officer, Mr. Neal Blue, was present to cut the ribbon. Mr. Blue and Scott Forney, president of EMS, spoke to attendees and local media regarding the company's capabilities.

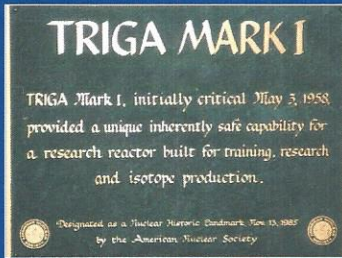


Mr. Neal Blue, GA's chairman and chief executive officer, cuts the ribbon at GA's facility in the Cummings Research Park, Huntsville, AL.

## LITHIUM-ION BATTERY SYSTEM COMPLETES ON-HULL DEMOTESTING

EMS' LiFT™ (Lithium-ion Fault Tolerant) battery successfully underwent on-hull demonstration testing on a Special Operations Command (SOCOM) undersea vehicle. The LiFT battery was integrated on the undersea vehicle by the Naval Surface Warfare Center, Crane Division and achieved certification and over 60 hours of at-sea "underway under battery power" time with no failures. Developed for both manned and unmanned underwater vehicles, the LiFT battery system offers a single cell fault tolerance to prevent uncontrolled cascading failure. Unlike prior lithium-ion battery technologies, the LiFT battery is capable of surviving a catastrophic failure, ensuring the safety of on-board personnel and equipment. EMS is also developing LiFT battery technology for ground vehicle and aircraft applications.

## GENERAL ATOMICS TRIGA® DESIGNATED NUCLEAR HISTORIC LANDMARK



The American Nuclear Society (ANS) has honored another General Atomics' TRIGA research reactor as an ANS Nuclear Historic Landmark.

Designed, constructed and commissioned by GA in 1960, the 1.5 MW University of Illinois TRIGA Mark II reactor, with pulsing capability to 6,500 MW, was one of the earliest TRIGA reactors to go into operation. It was shutdown permanently in 1998 and then decommissioned. During its operation, the reactor was cited for groundbreaking research in numerous areas, including early fundamental research in fission fragments, reactor kinetics, nuclear pumped lasers, nuclear batteries and neutron activation analysis, among others. The numerous research, education and training opportunities provided as a result were instrumental in its designation as a historical landmark by ANS.

General Atomics' own TRIGA Mark I reactor was designated by the ANS as a Nuclear Historic Landmark in 1985, being cited for providing "... a unique inherently safe capability for a research reactor built for training, research and isotope production."

## RADIATION MONITORING SYSTEMS SUPPORT POST-FUKUSHIMA DAICHI SAFETY ORDER

EMS was awarded multiple contracts to deliver Radiation Monitoring Systems (RMS) to support U.S. nuclear power plants required to conform to the Nuclear Regulatory Commission Order EA-13-109, which calls for the installation of reliable radiation monitors and Hardened Containment Vent Systems (HCVS) at plants with Boiling Water Reactors (BWR) with Mark I and II containments per post-Fukushima Daichi recommendations. To date, EMS RMS products have been ordered for 23 out of 24 BWR's undergoing HCVS modifications across the U.S. The RMS team is also working with plant operators internationally to evaluate RMS requirements at facilities looking to install a HCVS to align with U.S. NRC safety guidelines.

## NEW LEADERSHIP FOR THE DIII-D NATIONAL FUSION PROGRAM

David Hill has joined GA as Vice President and Director of the DIII-D National Fusion Program, the nation's largest magnetic fusion research program supporting over 500 researchers from 90 institutions worldwide. Dr. Hill has spent 33 years in fusion research, 20 of those years working on DIII-D and the last nine years as Deputy Director of the DIII-D program. David is a former employee of Lawrence Livermore National Laboratory.



*Dr. David N. Hill, Vice President and Director of the DIII-D National Fusion Program.*

Dr. Hill is well respected in the US and international fusion communities. He is passionate about fusion research, the success of ITER and the promise of fusion energy. Under his leadership, DIII-D will continue to serve as a world-class fusion research program.

Dr. Wayne Solomon has joined GA as the Deputy Director of the DIII-D National Fusion Program. Dr. Solomon has been working on the DIII-D program for 14 years as a scientist and Post-Doc from Princeton Plasma Physics Laboratory and was the group leader of the Plasma Dynamics and Control Group for the last three years.



*Dr. Wayne Solomon, Deputy Director of the DIII-D National Fusion Program.*

Dr. Solomon's enthusiasm both for the DIII-D program and for fusion energy research will ensure a continued successful DIII-D program.

## WINDING COMPLETED ON FIRST ITER CENTRAL SOLENOID MODULE

GA successfully completed winding the first module for the central solenoid, a giant electromagnet considered to be the "heartbeat of ITER." This major milestone was completed ahead of schedule on April 6, 2016. The feat was accomplished at GA's Magnet Technologies Center (MTC) in Poway. Winding of the second of seven modules will begin this summer.



*The final turns of the first central solenoid module on the winding table.*

Each of the seven central solenoid modules GA is fabricating is made from approximately 3.5 miles of conductor. When assembled, the giant electromagnet will consist of six stacked modules surrounded by a support structure. When completed, the entire 13 Tesla central solenoid and associated structures will be 59 feet tall and weigh 1,000 metric tons.

To make a module, conductor from six spools is wound to form 6 separate hexapancakes (six layers) with each layer containing 14 turns. A seventh spool is wound to form a quadpancake (4 layers).

After winding, the completed pancakes will be joined together for heat treatment followed by wrapping with insulation, resin impregnation and full current testing at 4.7 K. For the manufacturing, the MTC is currently outfitted with the equipment necessary to produce each 250,000 pound module. The manufacturing process time for each module is approximately two years.



*GA's winding team of Misha Stapleton, Alan Stephens, Joshua Hahn, Ryan Cartledge and Chris Mora behind the final hexapancake.*

# HUNTSVILLE CHALLENGER ELEMENTARY SCHOOL COMMEMORATION OF THE SPACE SHUTTLE CHALLENGER



January 28, 2016 marked the 30<sup>th</sup> anniversary of the Space Shuttle Challenger accident. Members of the GA Huntsville operations team organized educational classes about space travel and engineering for the students of the Huntsville Challenger Elementary and Middle School, along with speakers from HAL5, NASA, and a MSFC Planetary Sciences group member and aspiring astronaut. After the classes, the students illustrated the 9 successful missions, while the teachers and staff illustrated the Challenger STS-51-F failure. The final products were displayed on a wall that joined the two schools together.

## CONTRACT AWARDS

U.S. Air Force – Contractor Owned Contractor Operated MQ-9 support, MQ-9 spares (**GA-ASI**).

U.S. Army – Gray Eagle engineering services (**GA-ASI**).

Beechcraft Defense Company – Iraq Peace Dragon Contractor Logistics Support (**GA-ASI**).

U.S. Department of Homeland Security/Customs and Border Protection – Operations and maintenance (**GA-ASI**).

U.S. Department of Energy - DIII-D National Fusion Program (**John Smith**).

U.S. Department of Energy – Molybdenum-99 Supply System (**Katherine Murray**).

Princeton Plasma Physics Laboratory – Toroidal Interferometer Polarimeter (**Raymond O’Neill**).

Princeton Plasma Physics Laboratory – Wide Angle Viewing System (**Raymond O’Neill**).

U.S. Department of Energy – ICF Support (**Christina Back**).

Public Service Electric & Gas – Salem Phase I (**Dennis Odin**).

Oman Oil Refineries and Petroleum Industries Company (**Ronald Mecum**).

Naval Air Systems Command – EMALS & AAG CVN 79 Production (**Dean Key**).

Naval Air Warfare Center, Lakehurst – EMALS BOA Logistics Support (**Sue Wojtowicz**).

## NEW PATENTS

U.S. Patent No. 9,327,839, May 3, 2016, “Method And Apparatus For Inhibiting Formation Of And/or Removing Ice From Aircraft Components” by **James Machin, John Geriguiz, and Alan Giles**.

## RECREATION ROUNDUP

By **Katherine Partain**

*General Atomics Employees Recreation Association*

There are five GA ERA events coming up in July, August, and September 2016 – two childrens’ and three adult events. The San Diego area Childrens’ Summer Social is on July 23, at the Wave Waterpark in Vista. Admission includes the entry from 11 a.m. to 5:30 p.m. and lunch. The High Desert Childrens’ Summer Social is scheduled for August 6. It will be at DryTown Waterpark in Palmdale. Admission includes entry from 11 a.m. to 6 p.m. and lunch.

August 19 is a Friday night adult trip to the San Diego Padres in Petco Park to see them play the Diamondbacks. Admission to the game includes seating in the Sun Diego Beach and Pier area with a Taco buffet and beverages. The other two adult events are two, ¾-day fishing trips – one on August 26 and one on September 10. Both will be out of H&M Landing on the Fisherman III and include lunch. An unexpired passport, or a passport card, is required to go on either trip.

Contact information, ticket prices, purchase dates, locations, etc. are on the event flyers. All event flyers are publicized in the GA ERA newsletter and on the ERA’s own website at: [www.ga-era.org](http://www.ga-era.org)



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