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**National Association of Rocketry  
Educator's Newsletter**

**August 2014**  
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**Flying High in Colorado**



While attending a NAR event this summer I got to see the largest rocket ever launched in Colorado. United Launch Alliance (ULA) and Ball Aerospace have an [intern program](#) where their summer workers put together and fly some big sport rockets to help them learn professional systems engineering. But to further realistically model the exercise like they are launch contractors they offer spaces in the rocket for high school payloads. The instruments ride on the large booster and then are ejected at apogee to perform their own experiments and land separately. The rockets were fully successful and impressive to watch because they were made to work so well by the young people. And well, big rockets are fun. The launch was directed by ULA and Ball, flown at a NAR range operated on a 4-H ranch. It's quite a combined effort by many groups who all want young people to learn STEM

Aim high!

Vince Huegele  
NAR Education Chairman



**Team America Rocketry Challenge 2014 and 2015**

Five students from Creekview High School of Canton, Ga., took home silver medals in the seventh annual International Rocketry Challenge at the Farnborough International Air Show. The U.S. team, sponsored

by Raytheon Company, won second place, while the French team captured first and the U.K. team took third.

Competing teams designed, built and launched rockets with a goal of reaching an altitude of exactly 825 feet during a 48- to 50-second flight window. The payload, two raw hen eggs, had to return to the ground undamaged using two identical parachutes. Scores are determined by how close teams come to the required height and time; cracked eggs disqualify the flight.

The five-member team representing the United States consists of Amanda Semler, 18; Andrew White, 16; Nick Dimos, 16; Austin Bralick, 16; and Bailey Robertson, 15. The team posted the top flight score of 9.88 and was just nine feet shy of the target altitude. The team from France posted the next highest flight score of 448.32 followed by the UK team with a flight score of 715.2. Flight score counts for 60 percent of the total score in the international competition, while in the US it is 100 percent of a team's score.

The students also gave a presentation on their rocket design to a panel of international judges at Raytheon's air show headquarters. The judges' score counted for 40 percent of their total score. "I had a great time being out here with all of the other people from different countries and meeting other people with similar interests," said Team Captain Amanda Semler. "I hope it will inspire other women to get into the industry and reach their dreams."

The International Rocketry Challenge is the culmination of three separate competitions held annually around the globe: the Team America Rocketry Challenge (TARC) sponsored by the Aerospace Industries Association of America (AIA); the United Kingdom Aerospace Youth Rocketry Challenge (UKAYRoC) sponsored by ADS, the UK Aerospace, Defense, Security and Space association; and the French Rocketry Challenge sponsored by Groupement des Industries FrancaisesAeronautiques et Spatiales, the French aerospace industries association. Each contest brings together teams of middle and high school students to design, build and launch model rockets with the goal of inspiring young minds to become engaged in science, technology, engineering and math.

Additionally, we have announced the rules for the Team America Rocketry Challenge 2015 ([www.rocketcontest.org](http://www.rocketcontest.org)), the thirteenth annual offering of this national rocketry competition for 7th through 12th grade students. The purpose of the Challenge is to teach students aerospace science and systems engineering by having them design and build a safe and stable model rocket that lifts a fragile payload to an exact altitude for a precise flight duration, at the end of which it must return this payload to earth safely and undamaged using a parachute as its recovery system. The Challenge is open to the first 1000 teams that submit a completed application, including payment, postmarked between September 2 and December 12, 2014.

TARC competition leads to a competitive face-to-face fly-off among the top 100 teams. The prizes are \$60,000 in cash among the top 10 places. First place receives \$11,000 plus a free trip to the international fly-off (at the Paris Air Show in 2015) against teams from the UK and France, with Japan likely to join in 2015.

Key elements of the challenge are:

- Altitude goal is 800 feet, duration goal is 46-48 seconds for all qualification flights and for the first flight at the Finals; but at the Finals (only) those teams that earn a second flight must aim for a different goal on the second flight: 775 feet and 45-47 seconds
- Weight and power limits, and altimeters, are the same, but there is a new limit -

- a minimum length requirement of 650 millimeters
- The part of the rocket containing the egg and altimeter must separate from the rest of the rocket and must return by parachute (any size), the rest of the rocket can use any safe recovery system
- There is no longer a limit on the number of teams that a school or youth group may enter, but only the three best-scoring teams from any single organization will be eligible to be invited to the Finals. Team supervisors can adjust membership of these three teams before the Finals (within the maximum limit of ten per team) to include students from other teams from their school that scored better than the national Finals cutoff score but were not in the top three from that school.
- Selection for the Finals will continue to be based on the sum of the best two of up to three qualification flight reports submitted by a team by March 30, but there will be no bonus point award for doing one early.

The results from at least two qualifying flights observed in person by an adult (senior) member of the NAR must be submitted between September 2, 2014 and 11:59 PM Eastern time on Monday, March 30, 2015. Based on these qualification scores 100 teams (with a limit of no more than the best three from any single school or sponsoring organization) will be selected on the basis of lowest combined scores for their best two flights. Teams will be notified no later than 5 PM on Friday April 3, 2015, and will be invited to participate in the final fly-off to be held on May 9, 2015 (alternate date in case of inclement weather will be May 10, 2015).

Trip Barber ([ahbarber@alum.mit.edu](mailto:ahbarber@alum.mit.edu))  
NAR TARC Manager



### **NAR Scholarship Program and Robert L. Cannon Award**

Did you know that if you are NAR member between the ages of 17 and 22 attending college or a vocational school that you may be eligible to receive a scholarship?

Are you a teacher or educator who uses model rocketry in the classroom? You are welcome to apply for a \$500 grant to use in your program.

In 2001, the NAR's scholarship and Robert L. Cannon educational awards were inaugurated. Three NAR members received scholarships and two educators received Cannon awards. Over the years the number of award winners have grown. This year we awarded ten \$1000 scholarships, and ten Cannon \$500 grants. Next year the total scholarship awards will double, to \$20,000.

At the NAR Association meeting Monday, July 28, the recipients of the NAR Cannon and Scholarship awards were announced.

#### **2014 Scholarship Recipients are:**

- \* Amanda Boadway, Ferris State University, Diagnostic Medical Sonography
- \* Devin Draizin, U. Central Florida, Mechanical/Aerospace Engineering
- \* Calvin Earp, Boston U., Mechanical Engineering

- \* Alexandra Eicher, Stanford U., Aeronautics/Astronautics
- \* Matthew Janecka, Austin Community College/U. Texas, Aerospace Engineering
- \* Ryan Kinsler, Fort Hays State U., Agronomy/Animal Nutrition
- \* Kirsten Ma, U. Washington Seattle, Microbiology
- \* Magdalena Moses, Virginia Tech, Electrical Engineering/Mathematics
- \* Gavin Ragland, Northwest Missouri State U., Computer Science/Engineering
- \* Jeremy Simoes, Stevens Inst. of Technology, Mechanical/Electrical Engineering
- \* Catesby Wolski, Georgetown U., International Relations

**2014 Robert L. Cannon Education Award Winners are:**

- \* John Benvenuti, Dr. John C. Page Elementary, West Newbury, MA
- \* Kathy Griffis, Notre Dame Academy, Los Angeles, CA
- \* Virginia Knudsen, Parkway Middle School of the Arts, Fort Lauderdale, FL
- \* Daniel Maloney, LaSalle Institute, Troy, NY
- \* Michael O'Connell, Chester Area School, Chester, SD

**The deadline for applying for the Scholarships and the Cannon Award in 2015 will be June 1st.** Awards are announced at the annual meet (NARAM). You do not have to be present to receive an award.

Both of these programs are ongoing. See <http://www.nar.org/cannon.html> for details on how to apply. If you have questions concerning either program, please contact Joyce Guzik, via email: [jguzik@mindspring.com](mailto:jguzik@mindspring.com).

**Small Satellites for Secondary Students**

In partnership with [AeroPac](#) and the Endeavour Institute, the Education and Public Outreach group at Sonoma State University (SSU) has just finished a week-long training at NASA Dryden's Aero Institute. Fourteen middle and high school teachers and four Girl Scout leaders learned how to solder, build, test and program small experimental payloads that can be launched on high-power rockets (HPRs) or flown on tethered weather balloons. This program, "Small Satellites for Secondary Students" or "S4", fills an important "missing link" in NASA's educational pipeline between Team America Rocketry Challenge (TARC) and sounding rocket flights that are usually conducted by graduate students at research universities.

The S4 program participants have created an educator's guide and associated videos, as well as a hardware, software and server platform for secondary students to create their own experiments, analyze, and share the data. Training week concluded on July 13 with the launch of the teachers' payloads at the Lucerne dry lake bed, with help from the Rocketry Organization of California. Participants flew 19 payloads to as high as 4500', receiving live WiFi 802.11g telemetry with additional data backup on SD cards within the payload. SSU undergraduate student Kevin Zack and Santa Rosa Junior College student Aaron Pacheco were primarily responsible for the design and

manufacture of the S4 board, now commercially produced by Advanced Circuits. Students will be able to view many of the flights in real time, over the Internet, through the use of AeroPac's Virtual Classroom. They will then collect and analyze the resulting data.

During the 2013-2014 academic year, the teachers will help their students build their own experiments. Once completed, the payloads will be flown by partners including: AeroPac ([www.aeropac.org](http://www.aeropac.org)), the LUNAR chapter of the National Association of Rocketry (NAR) ([www.lunar.org](http://www.lunar.org)) and the Rocket Club of California (ROC), as well as through programs such as the Endeavour Institute's Balloon Fest (<http://endeavour.org/events/BF2013Championship/index.htm>). This program will provide unparalleled access to the design, development and flight process for hundreds of students involved in the pilot teams, while allowing thousands of additional students to participate online in the flight events and data collection and analysis.

For more information about S4, please see: <http://epo.sonoma.edu/s4>

## INSPIRING OTHERS



### **Wallops Rocket Academy for Teachers and Students (WRATS) and RockOn! Programs**

#### **WRATS**

The WRATS teacher work shop was held for the 4th year at Wallops Flight Facility. 20 teachers from near and far attended the week long educational experience.

WRATS combines hands-on activities such as building model rockets, parachutes and an electronic payload with theory on rocket propulsion, flight dynamics, and trajectory simulations.

Each teacher builds a model rocket and a payload and designs a recovery system during the week. The launch of the model rockets occurred on June 25 on airfield and all 20 rockets took off the pad. Flight data is recorded on board and analyzed post flight. The payload incorporates an Arduino Micro and three sensors; an accelerometer, a pressure transducer and a thermistor. All payloads recorded data and analysis showed that the rockets reached altitudes of between 400 - 600 feet.

Phil Eberspacher/Chief Sounding Rocket Program Office was the main presenter and provided the teachers with interactive demonstrations as well as theory of rocket flight. Educators learned about various types of rocket propulsion, forces of flight, rocket stability and recovery system shock absorption.

The WRATS teachers attended the early morning launch of RockOn! and viewed the payload de-integration and experiment return.

#### **RockOn!**

For the seventh consecutive year students from around the country participated in the RockOn! sounding rocket mission. They came from as far away as Hawaii for this one of a kind experience.

The mission is setup to launch both RockOn! workshop experiments and more advanced RockSat-C experiments. More than 65 students attended this year's workshop which started on Sunday, June 22 and culminated with the launch of 41.110 on Thursday, June 26. The participants were divided into teams of 3 or 4 and built, programmed and tested their experiments during the workshop. All

workshop payloads include a microprocessor and a suite of sensors; accelerometers, pressure transducers and thermistors. The experiments are completed during the student's stay at Wallops. Chris Koehler from the Colorado Space Grant Consortium leads the instruction with help from University of Colorado students.

The RockSat-C experiments are built by students during the school year and arrive at Wallops ready for vibration testing, integration and launch.

More than 100 students attended the launch of the Terrier-Improved Orion, two stage rocket, on June 26, 2014.

For more information about RockOn!, visit <http://spacegrant.colorado.edu/national-programs/>.

### **Museum of Flight-Seattle, Washington**

3, 2, 1, Blast-Off! The Museum of Flight in Seattle, Washington is launching STEM with Model Rocketry

Energize your math and science curriculum! This workshop introduces how model rocketry can be used to teach STEM concepts in the classroom.

Participants will learn about the history of model rocketry and the National Association of Rocketry's role in establishing it as a safe and educational hobby. Each participant will build a basic model rocket kit and learn how to successfully lead a class in a model rocket build and launch. Other activities include samples of STEM lessons that use model rockets and how to begin a model rocketry program at their school. There will be a special presentation on starting a model rocketry club and participating in the Team America Rocketry Challenge. We then travel to a nearby launch area to fly the rockets and learn how to collect data to use in STEM lessons. (WA State clock hours available at no charge).

Date: **Saturday, August 9, 2014**  
Time: 8:00 am - 4:00 pm  
Audience: Educators teaching students in grades 6 - 12  
Location: Museum of Flight, Seattle  
Fee: **Free**  
Clock Hours: Seven for free

Registration: [dsmith@museumofflight.org](mailto:dsmith@museumofflight.org) or 206-764-1384  
Questions: [mkwong@museumofflight.org](mailto:mkwong@museumofflight.org) or 206-768-7216



### **Civil Air Patrol**

Collectively, we can have a remarkable impact on a partnering national organization. Take the time to contact a [local Civil Air Patrol squadron](#) near you and Pay Forward! You can find a local squadron by entering your zip code or city and state in the online unit locator found on the [home page](#). Each of these squadrons would welcome your insights and camaraderie! Additionally, the

Civil Air Patrol has an Advanced Rocketry Program (and Guide) for those folks who enjoy High Power Rocketry as well as Mid and Low Power...It's a great opportunity to share experiences and Pay Forward!

**4-H Uses Model Rocketry for Science, Technology, Engineering and Math** Rocketry School Enrichment and After School Enrichment Programs help students meet Pennsylvania Academic Standards in science. 4-H project books are available for Delaware County, Pennsylvania classroom teachers, home school

families, and after school clubs to use with students.

## **Estes**

**Student STEM Competition Offers \$100,000 Awards** The Siemens Foundation has opened its annual [Competition in Math, Science & Technology](#), with this year's program offering scholarships ranging from \$1,000 to \$100,000. Administered by the [College Board](#), the competition calls on high school students to submit original research in technology, science, or math, either as individuals or in teams. Regional competitions will be held at six United States universities in November, with finalists competing in Washington, DC, in December.

The application period for the awards is open now. Applications are due Sept. 30. Additional details can be found on the [Siemens Competition in Math, Science & Technology site](#).

## **Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring**

Established by the White House in 1995, this Presidential award recognizes U.S. citizens, permanent residents and organizations that have demonstrated excellence in mentoring individuals from groups that are underrepresented in science, technology, engineering, and mathematics (STEM) education and workforce. These STEM groups include women, people with disabilities, underrepresented racial and ethnic minorities, individuals from low socio-economic backgrounds and geographic regions like urban and rural areas. The [PAESMEM program](#) is administered by the [National Science Foundation \(NSF\)](#) on behalf of the [White House Office of Science and Technology Policy](#).

## **Siemens Foundation Student Competition**

The Siemens Foundation Student Competition is the nation's premiere science research competition for high school students and seeks to promote excellence by encouraging students to undertake individual or team research projects. It fosters intensive research that improves students' understanding of the value of scientific study and informs their consideration of future careers in these disciplines.

- [Registering is easy!](#) Simply indicate if you are registering as an Individual or a Team, provide your name, email address, and the area(s) of your scientific research. NOTE: If you are registering as a Team, you will be required to provide the names and emails of all team members.
- Once the Registration is complete, a link will be emailed to you to activate your Project Profile and complete the registration process.
- Your Project Profile is your online dashboard that will provide student profile(s), real-time status of your project and the information you will need to submit your Research Project.
- Submission deadline for Research Projects and additional required materials is **Tuesday, September 30, 2014 at 11:59 pm**.

Questions? **Contact them at 800-222-6098**, or email at [siemenscompetition@discovery.com](mailto:siemenscompetition@discovery.com).

## **National Coalition for Aviation and Space Education**

Check out the [AIAA Educator Academy](#) pages on the AIAA website to learn more about the curriculum and the instructors. Workshops are being set up around the country in local AIAA sections, so check the website to see where the next one will be located. Interested now? Why wait! We have webinars scheduled for educators to learn more about each program.

## RESOURCES



### Adventures in Rocket Science Educator Guide

The "Adventures in Rocket Science Educator Guide" is available for download from the [NASA website](#).

Education specialists from the Marshall Space Flight Center created this curriculum with members of the NAR. The material was tested in a workshop pairing NAR members in the MSFC area with informal educators from science centers, 4-H clubs, Girl Scout troops and after-school programs to introduce the groups to how to use the guidebook with students in informal settings. The Guide has activities for grades K-12 and serves as a program to progressively prepare students for participating in TARC.

**NOTE:** The "Adventures in Rocket Science" guide is recommended over the NASA Educator Guide entitled simply "Rockets". Recently, an air pressurized paper rocket launcher being used by an educator accidentally failed. This launcher is described in NASA's Rockets Educator Guide, publications EG-2011-11-223-KSC, pp. 86-90 and EG-2008-05-060-KSC, pp. 86-90. NASA completed an engineering investigation into the failure and determined that the air pressure launcher should not be used. NASA has removed the launcher design from its website and its education curriculum. Individuals and organizations should immediately discontinue use of the air pressure launcher published in the referenced NASA publications.

### Estes

Estes has an internationally recognized curriculum for educators at <http://www2.estesrockets.com/cgi-bin/WEDU100P.pgm>. Additionally, they offer a newsletter <http://www2.estesrockets.com/cgi-bin/wedu001P.pgm?p=newsletter>.

### Quest

Quest Aerospace has a great resource center for educators! You can sign for special discounts and information at [http://www.questaerospace.com/q\\_rcentral.asp](http://www.questaerospace.com/q_rcentral.asp). Be sure to take a look at all their multimedia and graphics section for some inspiring ideas!

### Apogee

Apogee Components has an extensive educator's page and a remarkable newsletter archive <http://www.apogeerockets.com/Education>. If you want to subscribe to their newsletter try [http://www.apogeerockets.com/newsletter\\_signup.asp](http://www.apogeerockets.com/newsletter_signup.asp) or just look at the right hand column of the Educator's page and you will see the sign-up section.



### NAR Offers Teachers and Youth Group Leaders Resources

Are you starting your rocketry program and aren't sure what rockets are right for your kids? Contact your **local NAR Section** (<http://www.nar.org/NARseclist.php>) to help with your program. Having worked with teachers, Section members can provide valuable advice about planning the time you have scheduled and purchasing rocket products tailored to your needs and launch site. For instance, did you know it takes a typical 8th grade class about two days to build a rocket with balsa fins? As you might



expect, the age of your students and the size of your class are also factors in determining the right type of kit and the amount of time to complete it. Indeed, based on the size of your launch site, a streamer recovery rocket (as opposed to a parachute recovery) might be a better option for your students as the chances for a successful return (and a chance for additional flights) would be greater.

In addition, The NAR offers Free Resource downloads (<http://www.nar.org/teacher.html>) produced by members who have helped teachers and youth group leaders like yourself all over the United States.

Of particular note is the NAR CD Version 3.0 update of the Education Resources CD-ROM. This disc is a library of classroom ideas, lesson plans, and rocket activities. It's been totally reformatted to be more convenient to find your most interesting topics with lots of new material. There are video clips, software samples, and internet links to the best sites in rocketry education. Most importantly, this disc is free from NAR for the asking, to you, our honored teachers.

Just go to <http://www.nar.org/teachercd.html>, answer a few questions about your class, give us your address and we'll mail it right to you.



### **Space History**

#### **54 Years Ago**

**August 12, 1960:** NASA launched its first communications satellite, Echo 1. Echo 1 rode to space on a Thor-Delta rocket from Vandenberg Air Force base, California. The satellite transmitted a signal from President Dwight D. Eisenhower across the nation, demonstrating the feasibility of global communications via satellites. Echo 1 was the largest and most visible satellite for its time; however, it was quickly superseded by active-repeater communication satellites such as Telstar.

#### **49 Years Ago**

**August 21-29, 1965:** NASA launched Gemini V on a Titan II rocket. Several records were set during this eight day orbital flight: the longest manned flight; largest amount of time in space; and a new altitude record for an American spacecraft. Astronaut Gordon Cooper was the first man to make a second orbital flight and, consequently, accumulated a record amount of spaceflight for one individual.

#### **29 Years Ago**

**August 27, 1985:** NASA launched space shuttle Discovery (STS-51I) from NASA's Kennedy Space Center, Fla. The shuttle deployed three communications satellites and retrieved, repaired and re-launched the TELSAT-1 Communications Satellite, Syncom IV-3.

#### **14 Years Ago**

**August 9, 2000:** The European Space Agency launched the second pair of Cluster II mission satellites, named Rumba and Tango, aboard a Soyuz-Fregat rocket from Russia's Baikonur Cosmodrome. The Cluster mission used simultaneous measurements from four satellites to provide detailed analysis of the effects of solar wind on Earth's magnetic field. The mission is still in effect today and has resulted in around 1000 scientific publications in peer-reviewed journals.

## 9 Years Ago

**August 12, 2005:** NASA launched the Mars Reconnaissance Orbiter (MRO) from NASA's Kennedy Space Center, Fla. aboard the first Atlas V rocket used for an interplanetary mission. The ongoing mission was to map the physical features of Mars, including its atmosphere and its subterranean layering

## Manufacturers News

### Estes

New to model rocketry and don't know how to get started? The BEST way is with a launch set. With many to choose from, surely we have one just for you!

<http://www.estesrockets.com/rockets/launch-sets>

The **Comet Chaser Bulk Pack** is now available for your summer programs. With laser-cut wood fins, waterslide decals and parachute recovery, this payload rocket is perfect for students that need more of a building challenge. Learn more about the new [Comet Chaser Bulk Pack](#).

Have you noticed a new color at the tip of the igniter wires sold in engine bulk packs, engine packs and igniter packages. This is a result of a recent manufacturing process improvement. In order to better reflect what this product does, we have changed its name from Solar Igniter to Solar Starter. We conducted extensive testing on the **Solar Starter** and are pleased to report that Estes educators and rocketeers will continue to enjoy the same great launch experience. And, good news: There are no hazardous materials labels on Solar Starter boxes when shipped without engines. That means Starters can now be shipped via regular carriers with no extra fees or handling required. Look for this new name appearing on product instructions and packaging this summer.

### Fliskits

Coming soon! **FlisKits Starter Sets!** Materials have been ordered and Jim is finalizing the documentation now. Micro to the MAXX starter sets coming also! A first in micro rocketry makes for a wonderful way to get introduced to this exciting aspect of model rocketry. Exciting things are happening at [FlisKits!](#)

### Quest and AeroTech

Quest is widely known as a leader in the beginner and education markets for model rockets. Its kit designs and rocket motors are geared for the entry-level rocketeer. The RCS Rocket Motor Components/AeroTech line of mid to highpower products starts right where the Quest line leaves off. "We will be the only hobby rocket company in existence that can bring a fourth grader into the hobby and carry him all the way through to an 'M'-powered Level 3 certified flight and beyond with our own products" said RCS President Gary C. Rosenfield.

For further information, please contact [customerservice@aerotechrocketry.com](mailto:customerservice@aerotechrocketry.com) or [service@questaerospace.com](mailto:service@questaerospace.com).



### Quick Links...

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[Our Website](#)

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[Find a Local Club](#)  
[Model Rocket Safety Code](#)

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