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National Association of Rocketry Educator's Newsletter

August 2015

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In This Issue

Aerospace Enthusiasts Welcome Here

On the long plane ride back from NARCON in Seattle, I reflected on the uplifting events of the weekend. I got to hear comments made by Vern and Gleeda Estes, Lee and Betty Piester, Bill Stine, Jay Apt and many others in the industry. One of the reoccurring points I heard was that in our current postmodern culture there is a lack of interest in science and the wonder of the universe. This decline of wonder underscores the urgency of continuing model rocketry to instruct and inspire students to explore science.

I connected those thoughts to the remarks made by Dan Hagedorn, Senior Curator and Director of Collections of the Museum of Flight at the highlight of NARCON, the dedicating of the model rocketry exhibit. He said to us, "aerospace enthusiasts are welcome here." This new display in the Space Gallery places the pioneers of model rocketry in the category of great aviators and astronauts. The common factor is they enabled us to move into the future and realize our dreams and theirs. With this permanent exhibit model rocketry is no longer, if it ever was, just a craftsmanship hobby. It is an art and a science that summons the imagination of its participants. Our 'toy' rockets are now enshrined in a case next to a Space Shuttle simulator and a Hubble telescope model and are recognized by curators and archivists to be part of that same exploration history line. Could these little cardboard tubes have really impacted aerospace events? Not the events exactly, but they definitely influenced the future aerospace scientists and engineers when they built rockets as kids.

As the creators of model rocketry hand off the artifacts of their vision to the next custodians it emphasizes the value of NAR's ongoing mission. Our organization has a higher responsibility than just safety, education and fun. NAR does all that and something more: we launch dreams.

Aim high!

Vince Huegele
NAR Education Chairman

PS...As part of the Rocketry Exhibit for the Museum Of Flight, NAR has a new website opening page with a wonderful introductory video. View it at http://www.nar.org/mof/

Team America Rocketry Challenge 2015 and 2016

Seven students from the Russellville City Schools of Russellville, Ala., won first place in the International Rocketry Challenge at the 2015 Paris Air Show on June 19. The U.S. team, sponsored by Raytheon (NYSE: RTN), beat teams from the United Kingdom, who came in second place, and France, who took home third.

Competing teams designed, built and launched rockets with a goal of reaching an altitude of exactly 800 feet within a 46- to 48-second flight window. This year's contest required rockets to separate into at least two sections during flight. The main section, containing a payload of one raw hen's egg and an altimeter, had to return to the ground safely with a single parachute as its sole recovery device. Scores were determined by how close the rockets approached the required height and time; cracked eggs would disqualify the flight.

The U.S. team consists of Cristian Ruiz, 16; Niles Butts, 17; Andrew Heath, 17; Katie Burns, 13; Evan Swinney, 18; Cady Studdard, 14; and Chelsea Suddith, 15. The team achieved a winning flight score of 49.53 and logged an altitude of 824 feet.

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 competition score. The U.S. took first place in this portion of the challenge as well.

"This was a wonderful competition, and after seeing our U.S. representatives and the teams from France and the U.K., I am truly impressed by the young talent that is here today," said AIA President and CEO Dave Melcher. "As they leave here with vivid memories of how exciting it was to compete at this level, I urge our outstanding rocket teams to use this experience as a springboard for their futures."

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 (AIA) and the National Association of Rocketry (NAR); 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 Francaises Aeronautiques et Spatiales (GIFAS), 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 2016 (www.rocketcontest.org), the fourteenth 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.

An extra-curricular hands-on project-based learning program, the TARC competition is modeled around the aerospace industry's design, fabrication and testing processes. All students participate in a team of 3-10 students to design, build, and fly a rocket. Like aerospace companies work within specific design parameters, every year the challenge requires teams to achieve the same basic mission-oriented goals of hitting a precise altitude, landing within a specific flight time window, and returning raw eggs ("the astronaut") without cracking. Each year a unique task is also included; this year we are challenging those students who win a spot at the National Finals to be able to fly their rockets to two separate altitudes. The target flight heights will differ between the first and second flight. Check out the rules.

The Challenge is open to the first 1000 teams that submit a completed application, including payment, postmarked between September 1 and December 4, 2015.

Key elements of the challenge are:

- Payload is two eggs (one oriented lengthways, one sideways - an interesting egg-protection challenge, particularly in combination with the higher descent rate)
- Altitude goal is 850 feet, duration goal is 44-46 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: 825 feet and 43-45 seconds
- Weight, length, and power limits are the same and we added one altimeter, the new Perfectflite Firefly, to the Pnut and APRA
- The rocket must return with all parts connected together; no specific requirement is stated for what recovery system may be used (as long as recovery is safe and autonomous), so anything goes; this could get interesting
- No limit on the number of teams that a school or youth group organization may enter, but only the three best-scoring teams whose members are from any single organization/school 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 April 4; no bonus point award for doing one early.

TARC gives students opportunities to apply their math and science skills to a real world project outside of the classroom. For many students, this experience yields their first significant personal realization of how what they are learning in school is relevant to endeavors that are fun, challenging, and represent potential future career pathways. Through TARC, students have discovered that they enjoy solving math and science problems in the context of resolving difficult and complex design issues. Often TARC is also their first exposure to the aerospace industry. They learn what aerospace engineers and skilled technical workers do and what it takes to become one of those professionals.

A recent survey of TARC alumni showed that exposure to aerospace through TARC is having a positive impact on students' career choices, as 81% of past participants plan to pursue careers in science, technology, engineering, and/or math. Seven out of ten past participants said that they are a least somewhat likely to pursue a career in aeronautic or aerospace engineering. 2012 TARC finalist Tashi Atruktsang recently put

into words the impact the TARC program can have saying, "This is life changing. I think this has significantly changed my career choice. Before I wanted to be a doctor, but for sure now I want to be an aeronautic engineer."

Trip Barber (ahbarber@alum.mit.edu)
NAR TARC Manager

NAR Scholarship Program, Robert L. Cannon Award, and Extracurricular Activity Grant Awards

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. In 2015, a new program, the NAR Extracurricular Activity Grant (EAG) is being initiated to provide up to ten $500 grants for after-school activities, such as rocket clubs, scout, Civil Air Patrol, 4-H, or NAR section programs involving model rocketry. TARC teams are not eligible for these awards. This year we awarded ten $2000 scholarships, six $1000 scholarships, six Cannon $500 grants, and one Extracurricular Activity Grant (EAG).

NAR Scholarship Winners 2015 ($2000)
*Michala Alexander, Penn State U., Aerospace Engineering
*Russell Barie, Cal. State, Long Beach, Aerospace Engineering
*Adam Gearhart, James Madison U., Chemistry and Secondary Education
*Silas Graff, Embry Riddle Aeronautical U., Aerospace Engineering
*Daniel Kelton, Texas A&M, Aerospace Engineering
*Kirsten Ma, U. Washington, Microbiology
*Karen Maurer, Embry Riddle Aeronautical U., Aerospace Engineering
*Magdalina Moses, Virgina Tech, Electrical Engineering and Mathematics
*Phillip Rangitsch, Missouri U. of Science and Technology, Mining Engineering
*Jacob Staab, Washington U., Mechanical Engineering

NAR Scholarship Winners 2015 ($1000)
*Ishan Arora, Virginia Tech, Aerospace Engineering
*Jacob Berger, Arizona State U., Mechanical or Aerospace Engineering
*Ryan Kinsler, Fort Hays State U., Agronomy
*Nathan Putira, Embry Riddle Aeronautical U., Aerospace Engineering
*Matthew Rangitsch, U. Oklahoma, Mechanical Engineering
*Cassidy Steele, Brigham Young U., Social Work

Robert Cannon Educator Grants 2015 ($500)
*Ralph Rise, Lake Roosevelt Jr./Sr. High School, Coulee Dam, WA
*John Benvenuti, Dr. John C. Page Elementary, West Newbury, MA
*Marci Farmer, Sanborn Central Middle School, Letcher , SD
*Jerry Iacona, William Robinson School, Hamilton Township, NJ
*Daniel Maloney, LaSalle Institute, Troy, NY
*Mark Nowotny, Wyoming Starbase Academy, Cheyenne, WY

NAR Extracurricular Activity Grant 2015 ($500)
*Alan Pritchard, Waccamaw High School, Pawleys Island, SC

The deadline for applying for scholarships, the Cannon award, and the EAG award is June 1st of each year. Awards are presented at the NAR annual meet (NARAM) held in late July/early August. You do not need to be present to receive an award.

These programs are ongoing. The NAR Board of Trustees funds these awards at the Winter board meeting. If you have questions concerning either program, please contact Joyce Guzik, via email: jguzik@mindspring.com.

Small Satellites for Secondary Students

NAR sponsored TARC finalist entries in the Small Satellite for Secondary Schools program (S4), and offered prizes for the best entries. S4 helps fill an important link in NASA's educational pipeline between Team America Rocketry Challenge (TARC) and sounding rocket flights conducted by graduate students at research institutes. Through the S4 program, students and educators gain experience soldering and assembling payloads, building rockets, recording and analyzing scientific data.

*First: Newark Memorial High School team #1
*Second: Northview High School
*Best Flight: Newark Memorial High School team #3

INSPIRING OTHERS

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

WRATS

The WRATS workshop is intended for High School STEM teachers and familiarizes the participants with the physics of rocketry through interactive lectures and hands-on activities.

During the five day workshop teachers construct a model rocket and a payload and conduct a flight test of their system collecting data on pressure, acceleration and temperature during the flight.

Additional activities include tours of Wallops Flight Facility and viewing of the RockOn sounding rocket launch on Wallops Island. More about WRATS.

RockOn!

Another successful student mission, RockOn/RockSat-C was flown from Wallops Island, VA on June 25, 2015. This was the eight flight of RockOn experiments and the seventh for RockSat-C.

A record number of RockOn participants from around the country built their experiments during the one week workshop held at NASA GSFC Wallops Flight Facility. The RockOn/RockSat-C programs are a cooperative effort between the Colorado and Virginia Space Grant Consortia and NASA. The programs are designed for College level students and faculty.

The RockOn participants arrive at Wallops on Saturday before the launch and build experiments from kits provided by the Colorado Space Grant Consortium. The kits include sensors, such as accelerometers, thermistors, and geiger counters, which are integrated with a datalogger to collect data during the flight.

RockSat-C experiments are the second level of student experiments, more advanced than the kit based RockOn experiments and are completely designed by

student teams sharing space in payload canisters. Twelve teams built RockSat-C experiments for this flight.

In addition to the RockOn and RockSatC experiments this year's mission included 80 Cubes in Space experiments. Cubes in Space facilitates experiments built by students ages 11 - 14.

The Terrier-Improved Orion rocket carrying the RockOn/RockSat-C experiments flew to an altitude of 115 km and was recovered off the coast of Virginia.

Interested? Check out RockOn!

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!

New Jersey Wing, Joint Base McGuire-Dix-Lakehurst

The NJ Wing of Civil Air Patrol is enjoying a "re-birth" in rocketry and Colonel Steven Tracy is leading the front! Work with base partners at Lakehurst Naval Air Station, the New Jersey Wing has gained permission to launch once again lauch rockets near the area where the Hindenburg crashed. No one has launched there since 1996!

Missouri Wing, Whiteman AFB

Lt Col Bill Sander is President of NAR section 770 and the Director for Aerospace Education for the Missouri Wing of the Civil Air Patrol. They will be hosting their Annual Conference on 15-16 October in Kansas City, MO. They have 30 Aerospace Educators signed up so far as well as 40+ cadets from CAP units all across Missouri and Kansas. Some of which are members of NAR! They launch their rockets at Fort Leonard Wood-Gammon Field. For future high power launches, they will be working with the St. Louis Rocketry Association (SLRA), section 551.

4-H

Olympic Peninsula Rocketry

Join area 4-H members for Pasture Blaster 2015! Hosted by Olympic Peninsula Rocketry 4-H, it is scheduled for August 21, 22 ,23 2015 at 922 W. Uncas Rd, Discovery Bay ,WA, 98368.

Entry Fee: Adults $3.00, KIDS FREE. Entry Fees are good for all three day's (when wearing the wrist band). This launch is open to the Public on our 84 acre launch site.

Three National Association of Rocketry Competition Events will be held on August 21 and 22:
Spot Landing
1/2A Parachute Duration
A Streamer Duration

For more information, check out their web site.

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 22, 2015 at 11:59 pm**.

Questions? **Contact them at 800-222-6098**, or email at 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. 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 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 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 produced by members who have helped teachers and youth group leaders like yourself all over the United States.

Would you like to have a rocketry program at your school or know more about how to use rockets to teach math and science? Please take advantage of our field experience in educational rocketry by completing our survey. That signs you up for both our Email Educator Newsletter, and our free Rocketry Resource Portal You and your students will be "go for launch."

Space History: 55 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 it's time; however, it was quickly superseded by active-repeater communication satellites such as Telstar.

50 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 fort 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.

30 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.

15 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.

10 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

Fliskits
Micro to the MAXX starter sets are available! 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!

eRockets
Starter Kits contain the primary elements to get a new rocketeer started in the hobby. All kits include a rocket, Launch Pad, and launch Controller. Some kits may even include rocket engines. This is the place to start when you are new to the hobby!

Quick Links...

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Our Website
NAR Teacher Resources
Find a Local Club
Model Rocket Safety Code

Join Our Mailing List!

National Association of Rocketry | P. O. Box 407 | Marion | IA | 52302
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