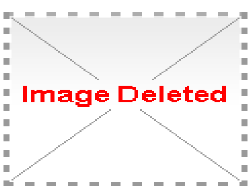
National Association of Rocketry Educator's Newsletter

October 2012

In this issue



Neil's Giant Step

We mourn the passing of Neil Armstrong and all that he represented. He was part of the generation that did the things "not because they are easy but because they are hard." Don't be ashamed to admit it if you are old enough to remember the first moon landing; I do. Can you believe you were a witness to one of humanity's' greatest accomplishments as Neil and Buzz stepped onto the lunar surface? And if you were too young, can you still believe it happened? The drama of exploring space can inspire your students if you can get them to imagine they are explorers too. They share the dream when they build a model rocket. The launch of their own model can be a defining moment for them as the announcement that 'the Eagle has landed' was for us. Just be sure they have something to launch their dreams. NAR can help.

Aim high!

Vince Huegele
NAR Education Chairman

2013 Team America Rocketry Challenge (TARC) Competition

Team America Rocketry Challenge (TARC) is an aerospace design and engineering event for teams of US secondary school students (7th through 12th grades) run by the NAR and the Aerospace Industries Association (AIA). Teams can be sponsored by schools or by non-profit youth organizations such as Scouts, 4-H, or Civil Air Patrol

(but not the NAR or other rocketry organizations). The goal of TARC is to motivate students to pursue aerospace as an exciting career field, and it is co-sponsored by the American Association of Physics Teachers, Estes Industries, the Department of Defense, and NASA.

The first ten Team America Rocketry Challenges, held in 2003 through 2012, were the largest model rocket contests ever held. The eight events together attracted about 6,816 high-school teams made up of a total of over 60,000 students from all 50 states. These students had a serious interest in learning about aerospace design and engineering through model rocketry.

The TARC 2013 registration process opens September 4 and closes on November 30, 2012. Our goals for TARC 2013 are to exceed the number of registered teams that we had in TARC 2012 with teams from every state, and to have at least two-thirds of all entered teams progress far enough into rocketry that they conduct a successful local "qualification flight". We had 675 teams last year and would like to get a lot more than that this year, with your local-area recruiting help. We do not have a "cap" of 750 teams; we'd love to have the problem of handling the 1000 teams that we are looking for!

All the rules, processes, and arrangements are in place to begin the eleventh year of a highly successful outreach program that is dedicated to building the next generation of U.S. aerospace professionals and NAR leaders -- and that is now firmly established in England, France, Japan, and Australia. I hope that you will read the article about the TARC 2012 Finals that will be appearing in the September-October issue of the NAR's "Sport Rocketry" magazine.

TARC is an event with massive US aerospace industry support that permits first-class operations such as our Finals and incredibly favorable publicity for the hobby, luxuries and impacts that the NAR has never previously known. We get this support for TARC because of two things: our tremendous co-sponsors and partners in the Aerospace Industries Association (AIA), the industry's trade association in DC; and the NAR's (that's your) demonstrated skill and dedication in helping young people nationwide and in running great, safe rocket launches such as the TARC Finals with the all-volunteer NAR range crew of 110.

There quite a few key differences from TARC 2012 in the TARC 2013 rules. As always we make some changes to do a "reset" putting long-time experienced TARC teams on an equal footing with newcomers -- everyone has to learn from scratch how to meet the new challenge. The major ones are as follows:

- Altitude goal is 750 feet rather than 800 feet
- Duration goal is a range of 48 to 50 seconds and the multiplier for time scores outside this window has been increased to 4, increasing the importance and difficulty of getting a perfect duration score.
- Payload is one egg rather than two, but the egg must fly "on its side" and the rocket body must be no less than 60 millimeters across at the point where the egg is located (this does not necessarily mean that the body must be cylindrical at that point, nor does it mean that the whole rocket body has to be 60mm)
- Recovery of the egg/altimeter section (or the whole rocket if the team prefers) must be done with a 15-inch parachute; the outer edge of the canopy skirt must all lie outside a circle of 14 inches diameter and inside a circle of 16 inches diameter
- Maximum liftoff mass of the rocket remains limited to 650 grams, and combined total impulse of the motors used to 80.0 N-sec
- Qualification flight deadline is 7 weeks before the May 11 Finals, not 6 weeks (the 6th weekend before the Finals is Easter).

The official altimeters for TARC 2013 are the Perfectflite APRA and Pnut. These use identical sensors and software, one records full flight data for later download and the other just records apogee. These are available to registered TARC teams (only) from Perfectflite for a special discount price. The Perfectflite ALT15K/WD has been out of production for several years and is no longer permitted for use on qualification flights or at the Finals (any leftovers a team has are good for doing test flights). RockSim from Apogee Components and SpaceCAD are flight-simulation software options, and we have a deal for teams to get these from their vendors at a reduced price. The "freeware" Open Rocket program is also an option; we do not dictate what (if any) software teams may use. Teams have to buy their own altimeters and their choice of software separately from their $125 entry fee. We estimate the average successsful team accomplishes at least ten practice and qualification flights and will spend about $500 for TARC; clearly some are lower and many are higher.

The top 100 teams from among all those who have entered will meet in a final fly-off competition on May 11, 2013 at Great Meadow, The Plains, VA. These top 100 teams will be selected based on the duration and altitude scores reported from local qualification flights that they conduct in front of an NAR Senior (adult) member observer at their choice of time up until the flight deadline of April 7, 2013.

The entry forms, contestant handbook, and other details about TARC 2013 will be posted on the AIA's website in early September 2012. Registration is open from September 4 until November 30, 2012. The rules for TARC 2013 were released in July 2012.

Trip Barber
NAR 4322
NAR TARC Manager

NAR Instructional Video

Several years ago the NAR and Aerospace Industries Association produced a one-hour instructional video "How to Build and Fly a Model Rocket" in support of student teams in the Team America Rocketry Challenge student rocket contest. Originally only available in DVD format, this useful resource is now available on YouTube at http://www.youtube.com/watch?v=gYh1pWHoQXE&feature=related.

TIP: Planning considerations

While model rocketry offers a rich set of learning experiences, teachers should keep a few items in mind as they plan and conduct lessons.

Construction Safety

Be aware that many children have never used an X-acto knife or equivalent. It is best to hold a separate learning session on knife safety rather than during a model building session. Another alternative for untrained youth is to completely eliminate the need for a hobby knife during the build or have an adult pre-cut parts needing a hobby knife before the session begins. If you do choose to have students use hobby knives, limit the number being used at any given time and closely supervise their use.

Launch Safety

Model rocketry was created in the late 1950's as a means by which non-professional individuals could build and fly their own rocket powered models. The hobby was structured to safely pursue an activity that has a potential for personal injury and property damage. The use of manufactured motors to minimize the mixing and handling of propellants was a major factor in model rocketry's safety success. Safety procedures for the construction and operation of the models, based on aerospace industry practices, were another factor in this excellent safety record.

The primary safety officers are the Range Safety Officer (RSO) and the safety check-in officer. The RSO is responsible for safe operation of the rocketry range. The safety check-in officer is responsible for verification of the vehicle flightworthiness. He will inspect the vehicles for structural integrity, systems condition (e.g. recovery system, motor restraint), motor certification, and dynamic properties (e.g. center of gravity, center of pressure).

NAR Sections all over the country hold numerous sport launches each year, at which you are welcome to come fly. The Section takes care of providing the permits, field, launch equipment, and range organization and safety; just bring your rockets, motors, and flight supplies and join in the fun! With sport launches accounting for over twelve million rocket flights every year nationwide, the NAR offers a number of services for the sport modeler.

Estes Educator Newsletter

Have you subscribed to Estes' educator newsletter? If not, you're missing out on some fascinating opportunities:

Senstional **STEM Summer Camps**...This summer a huge number of kids across America were fortunate to be able to participate in STEM Summer Camps, and I'm amazed and blown away by all the STEM Summer Camp programs out there! You know, of course, that Estes model rocketry is the perfect hands-on STEM activity to motivate kids in STEM subjects. There's no better place to do model rocketry and STEM than at day-long and week-long summer residence camps!

Reach for the Stars Goes to College... Colleges and Universities across the US Gear Up for RFTS Rocket Competition An impressive list of colleges and universities is forming for the first Reach for the Stars -- National Rocket Competition / Collegiate Challenge. Teams from the University of Florida (Gators), Florida State University (Seminoles), the University of Miami -- Florida (Hurricanes), Bridgewater State University -- Massachusetts (Bears), Framingham State University--Massachusetts (Rams), University of Central Florida (Knights) and Embry Riddle Aeronautical University -- Arizona (Eagles) are preparing for launch. Many other schools are expected to enter before the September 30th deadline.

And the AIAA Classroom Foundation Grant Program...Take a more detailed look at Estes Educator and subscribe to their Newsletter!

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 will award ten $1000 scholarships, and ten Cannon $500 grants.

The deadline for applying for the Scholarships and the Cannon Award in 2013 will June 1st.

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. Awards are announced at the annual meet (NARAM). You do not have to be present to receive an award.

Air Force Association's Educator Grant 2013

The Air Force Association (AFA) mission is "to promote a dominant United States Air Force and a strong national defense, and to honor Airmen and our Air Force Heritage." To do this the association educates the public on the importance of superior aerospace power and technical workforce to ensure U.S. national security. It also advocates aerospace power, promotes aerospace education and STEM education and supports the total Air Force family.

The AFA believes "one of the most effective ways to affect student learning is to fund grants to meet the unmet and unfunded educational needs of students." Every school year the AFA awards grants up to $250 to "worthy projects that significantly influence student learning." The Educator Grant program promotes classroom aerospace education activities for grades K-12, supporting innovative aerospace activities, such as model rocketry, within the required curriculum.

The Educator Grant is a competitive grant judged by a committee of outside experts in aerospace education that reviews the applications and makes recommendations on funding. Based on the available funding, the AFA will choose projects that best serve the students and support their mission.
The AFA is accepting grant applications online from July 1 - October 18, 2012 at 4:00 p.m. Pacific Time. Winners will be notified by January 9, 2013. To register and complete the application, go to www.afa.org/aef/aid/educator.asp. If you need funds for your students' model rocket studies, this is a convenient way to acquire $250 to purchase them.

NAR offers Teachers and Youth Group Leaders resources

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.

Manufacturers

Looking for a special rocket to highlight a particular aspect of your lesson plan? Take a look at the following companies for some unusual ideas:

SpaceX offers their Falcon 9 and Dragon capsule through Amazon! What a great way to integrate history into your curriculum! Fliskits offers a wide variety of kits and services...From science fiction topics to a scale model of the worlds first successful liquid fueled

rocket was designed, built and flown by Robert H. Goddard Fliskits has you covered...To include an educational sections where you will find opportunities for lesson plans and discounts to educators.

Whether you are just beginning to integrate rocketry into your curriculum or have been utilizing it for years, Semroc offers something new for everyone. From their latest scale renditions of the Aerobee 150 and ARCAS to their Retro-Repro™ kits of the Moon Glo and Shrike, you are sure to find something to stimulate learning.

If you are looking for a special sport flier, military scale replicas, scale sounding rockets or even multi-stage and cluster rockets, Rocketarium is the place. You'll find a wide selection of model rockets, parts, and supplies; there's something for every lesson and every budget!

Visit the NAR booth at the NSTA Conference

The NAR will have an exhibit at the regional NSTA conference in Phoenix, Arizona December 6-8, 2012. Come by to hear about the latest plans NAR has for education and see what TARC rockets look like. We'll have other cool rockets on display to show you how to launch your students experiments. Tell your colleagues who may be attending to check us out!

Space History

October 3, 1962--Mercury-Atlas 8 (MA-8) was the fifth United States manned space mission, part of NASA's Mercury program. Astronaut Walter M. Schirra, Jr., orbited the Earth six times in the Sigma 7 spacecraft in a nine-hour flight focused mainly on technical evaluation rather than on scientific experimentation. This was the longest U.S. manned orbital flight yet achieved in the Space Race, though well behind the several-day record set by the SovietVostok 3 earlier in the year. It confirmed the Mercury spacecraft's durability ahead of the one-day Mercury-Atlas 9 mission that followed in 1963.

Planning began for the third U.S. orbital mission in February 1962, aiming for a six-or-seven-orbit flight to build on the previous three-orbit missions. NASA officially announced the mission on June 27, and the flight plan was finalized in late July. The mission focused on engineering tests rather than on scientific experimentation. The mission finally launched on the morning of October 3, having been delayed two weeks because of problems with the Atlas booster. A series of minor booster problems during launch and a faulty temperature controller in Schirra's pressure suit were the only technical problems noted during the flight. The spacecraft orbited in both automated and passive flight modes for prolonged periods while the pilot monitored it and carried out some minor scientific experiments. After six orbits, the capsule landed in the Pacific Ocean half a mile from the recovery carrier, and was hoisted aboard for Schirra to disembark.

The scientific results of the mission were mixed. The astronaut returned healthy after nine hours of confinement in a low-gravity environment. Observation of the Earth's surface proved unproductive, however, because of heavy cloud cover and bad photographic exposures. The public and political reaction was muted compared with that of earlier missions, as the Cuban Missile Crisis quickly eclipsed the Space Race in the news. The mission was a technical success: all the engineering objectives were completed without significant malfunctions, and the spacecraft used even less fuel than expected. This confirmed the capabilities of the Mercury spacecraft and allowed NASA to plan with confidence for a day-long flight, MA-9, which had been an early goal of the Mercury program.

November 7, 1967--Surveyor 6 was the sixth lunar lander of the American unmanned Surveyor program that reached the surface of the Moon.

- Launched November 7, 1967; landed November 10, 1967
- Mass on landing: 299.6 kg (660.5 lb)

Surveyor 6 landed on the Sinus Medii. A total of 30,027 images were transmitted to Earth.

This spacecraft was the fourth of the Surveyor series to successfully achieve a soft landing on the moon, obtain post landing television pictures, determine the abundance of the chemical elements in the lunar soil, obtain touchdown dynamics data, obtain thermal and radar reflectivity data, and conduct a Vernier engine erosion experiment. Virtually identical to Surveyor 5, this spacecraft carried a television camera, a small bar magnet attached to one footpad, and an alpha-scattering instrument as well as the necessary engineering equipment. It landed on November 10, 1967, in Sinus Medii, 0.49 deg in latitude and 1.40 deg w longitude (selenographic coordinates) - the center of the moon's visible hemisphere. This spacecraft accomplished all planned objectives. The successful completion of this mission satisfied the Surveyor program's obligation to the Apollo project. On November 24, 1967, the spacecraft was shut down for the 2 week lunar night. Contact was made on December 14, 1967, but no useful data were obtained.

Lunar soil surveys were completed using photographic and alpha particle backscattering methods. A similar instruments, the APXS, was used onboard several Mars missions.
In a further test of space technology Surveyor 6's engines were restarted and burned for 2.5 seconds in the first Lunar liftoff on November 17 at 10:32 UTC. This created 150 lbf (700 N) of thrust and lifted the vehicle 12 feet (4 m) from the Lunar surface. After moving west 8 ft (2.5 m) the spacecraft was once again successfully soft landed. The spacecraft continued functioning as designed.

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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