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SPORT ROCKETRY
OFFICIAL JOURNAL OF THE NATIONAL ASSOCIATION OF ROCKETRY
SEPTEMBER/OCTOBER 2006
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On The Cover

The student team from Coeur D'Alene (Idaho) High School pauses in prepping their model to watch another team's flight at TARC 2006. Photo by Glenn Feveryear.

SPORT ROCKETRY

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I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

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EDITOR'S SPACE

NAR Junior Science Fair Awards

The winners of the 2006 NAR Junior Science Fair awards are:

Daniel Flowers, NAR 83211
Braintree, Massachusetts
Testing the Efficiency of Model Rocket Ring Fins

David Canton, NAR 83858
Virginia Beach, Virginia
Are Two Streamers Better Than One?

Joe Bussenger, NAR 83689
Perkasie, Pennsylvania
The Effect of Multiple Engine Staging on the Altitude and Velocity of a Model Rocket

All three winners receive a one-year extension of their NAR membership and First Class delivery of *Sport Rocketry* magazine. Congratulations!

LAC Newsletter Award

The winner of the 2006 LAC newsletter award is *Team Pittsburgh* from the Pittsburgh Space Command section, edited by Art Nestor. Honorable mention goes to *MASA Planet* from the Minnesota Amateur Spacemodeler Association, edited by Ted Cochran. Congratulations!

All Sections wishing to submit newsletters for 2006-2007 judging can find the rules and judges' addresses at http://www.nar.org/lac2.html (they are the same as they were last year).

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May/Jun.	May 8	March 13
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Nov./Dec.	Nov. 6	Sept. 11

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Phone: (505) 672-0249 evenings

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Always include your name, address, phone number, and e-mail address with all submissions (and not just on the envelope). Including an email address allows us to acknowledge receipt of your submission and conduct correspondence faster. If you have questions about the current disposition of a submission, contact the editor via email, phone, or mail.

Content: We prefer articles that have at least one photo or diagram for every 720 words of text. Any type of rocketry related submission will be considered, including: plans, photos, launch reports, product reviews, articles, tips, techniques, historical, and club activities. Both model rocket and high-power rocket articles are accepted.

Articles may be submitted by email, on computer disk, or as hardcopy (even handwritten). Be aware that publication of hardcopy submissions may be delayed until it can be keyed in. Computer files may be submitted on 3.5" floppy disks, Zip disks, or CDs, in either Macintosh or PC formats; always enclose a hardcopy printout as well. ***Save the article as a plain ASCII text-only file***. You may also save it as a word processor file to preserve formatting (save using an older file format to make file conversion easier for us).

Photographs can be submitted as prints or 35 mm slides. Prints should be glossy, color or black & white, no larger than 8x10 and no smaller than 3x5. ***Always affix your name and a caption to the back of the photo.*** Do not write directly onto photos; use tape or post-notes. Ship photos with the faces protected.

Digital Images require at least 150 ppi at the final size and cropping used in the magazine. Higher resolutions are preferred. Minimal image compression is preferred.

Graphics may be submitted in computer form on disk, or as camera-ready hardcopy. Hand drawn sketches are accepted. Be aware that publication may be delayed if we must prepare publication quality drawings from hardcopy. Computer generated graphics are preferred in vector formats, such as EPS (encapsulated Postscript), rather than bitmapped formats. Contact the editor about file formats to use. Always submit hardcopy along with computer files.

Material submitted to *Sport Rocketry* must not be submitted to another publication, other than NAR section newsletters. You retain the copyright to your material. You grant the NAR the right to use your submission in Sport Rocketry magazine and in other NAR and NAR Section publications, unless you specify other restrictions. The physical media submitted becomes the property of the NAR and cannot be returned unless pre-arranged with the editor.

Team America

ROCKETRY CHALLENGE, 2006

by Trip Barber, NAR 4322
NAR Vice President and Team America Manager

A TARC model lifts off on a cluster of two D12 motors.
Photo by AIA.

The Foothills Colorado Civil Air Patrol team checks in their model.
Photo by AIA.

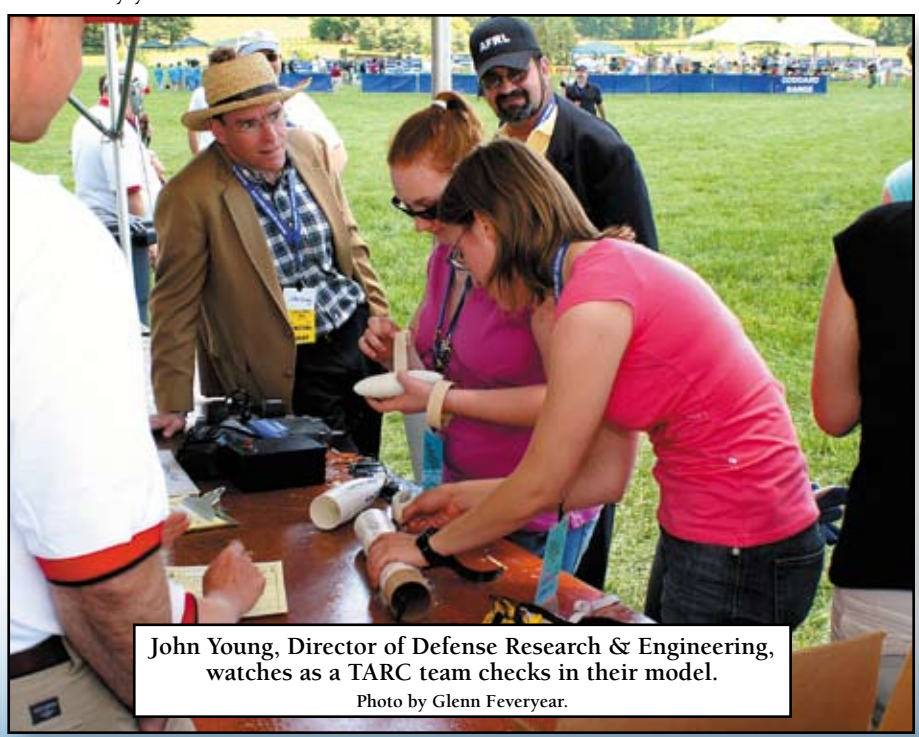
After four years of popularity and success, the annual Team America Rocketry Challenge (TARC) is now well established as a premier NAR national event. While it has become a tradition, it has not become routine; the rules change each year and there is a steady flow of new students on teams, as well as entries from many teams from schools or groups that have not entered before. Each year's event offers over 7000 students in 7th through 12th grades across the entire United States a chance to measure themselves against a flight-performance challenge that requires solid aerospace engineering and model rocketry skills to meet. This is exactly the teaching objective of TARC.

TARC began in 2003, co-sponsored and co-managed by the Aerospace Industries Association (AIA), which is the national trade association for the nation's aerospace companies, and the NAR. AIA brings the financial and publicity resources of their member corporations and a full-time staff to handle the administrative details of running TARC. NAR provides no financial support to TARC (and makes no money from it), but what we bring is irreplaceable—a nation-wide network of volunteer individuals and sections with rocketry experience, launch sites and equipment, and a passion for helping and teaching young rocketeers. Our efforts in TARC are making a major contribution to inspiring the next generation of U.S. aerospace professionals that our industry so desperately needs, and the next generation of "born again rocketeers" who will lead our hobby and the NAR twenty years from now.

The 2006 Event

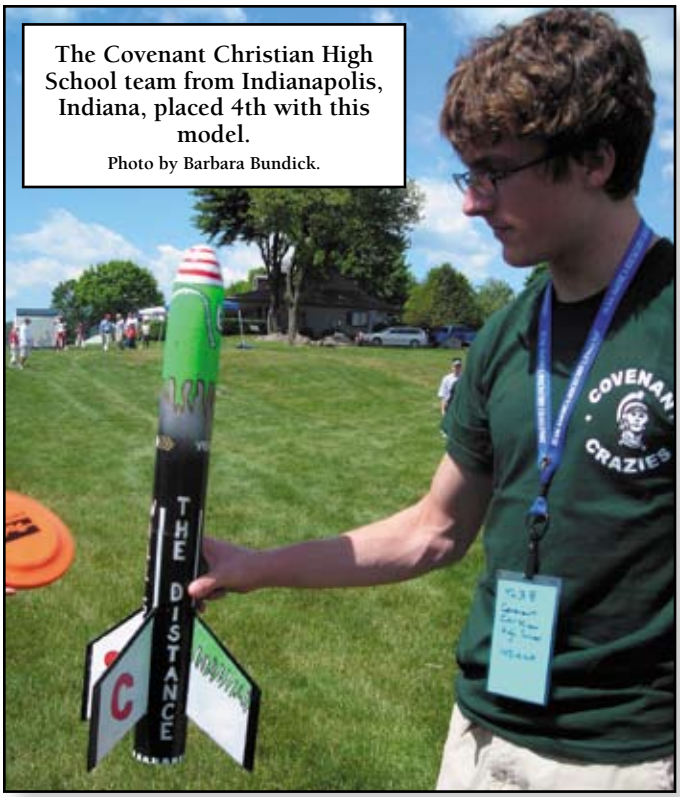
TARC 2006 attracted more aerospace corporate financial sponsors (39) than any previous year, and it also attracted the Department of Defense (DoD) to join NASA as a government co-sponsor. The Civil Air Patrol (CAP) was this year's educational co-sponsor. There were 678 team entries in TARC 2006, representing over 7000 students in 7th through 12th grades from 47 states plus the District of Columbia, an increase in the number of teams over TARC 2005. These teams were drawn from 465 public, private, and church schools (some with 6 to 10 teams each) plus numerous homeschool associations, Scout troops, CAP squadrons, 4-H chapters, and other non-profit youth groups. 35 percent of the teams were veterans of one or more previous TARCs. Teams had to have no fewer than 3 and no more than 15 student members plus an adult (teacher or youth group leader) from the organization that sponsored them.

The most vital ingredient in the ability of a team of young TARC rocketeers to succeed in qualifying—which means making a successful local flight of a rocket meeting the event's requirements in front of a local NAR Senior member observer—is having a rocketry-savvy "mentor" available to show them how to get started with designing, building, and flying a model rocket. Many of the students who enter TARC have never been to a hobby shop or built anything with their hands, and find basic



John Young, Director of Defense Research & Engineering, watches as a TARC team checks in their model.
Photo by Glenn Feveryear.

craftsmanship skills to be a challenge at first. While some teams were fortunate enough to have a teacher or member with rocketry experience, most needed external help, and this is where the NAR volunteers were so important. Over 260 NAR Senior (adult) members volunteered to serve as local mentors for TARC teams and many of them spent some very rewarding time with one or more student teams as rocketry instructors. The surveys we have TARC teams fill out on their experiences consistently yield extraordinary stories about dedicated and deeply appreciated support to these young rocketeers by NAR mentors throughout the nation.



The Covenant Christian High School team from Indianapolis, Indiana, placed 4th with this model.
Photo by Barbara Bundick.

Beyond the contributions of individual members, a large fraction of the NAR's sections also made TARC teams welcome on their flying ranges, with some even scheduling special launches to support local teams. This nationwide network of volunteer support—NAR members "paying forward" to the next generation—is our irreplaceable contribution to the success of TARC. This year, our support led to nearly 60 percent of all teams learning enough to make a successful local qualification flight, a huge increase in the success rate compared to the 35-40 percent in previous years.

The NAR needs even more of this kind of member support for TARC 2007. There are still regions that have no mentors nearby, particularly in those states where the NAR does not have large numbers of members or multiple sections. Any NAR member (age 21 or older) who would like to be a local volunteer mentor resource for a TARC team should contact the author at ahbarber@alum.mit.edu to sign up. The next generation of U.S. aerospace engineers and NAR rocketeers needs you, and you will enjoy the experience of working with the very bright young people who enter TARC.

The TARC "challenge" each year is for the student team members to design, build, and fly a model rocket that carries a raw egg payload and returns it unbroken while meeting a specific flight performance target. This performance target, either an onboard electronic altimeter-measured altitude or a flight duration

The Coeur D'Alene (Idaho) High School team loading their model on the pad.
Photo by Glenn Feveryear.

(or both), changes each year. In previous years, the target had been purely an altitude or a duration, and the rockets had been required to have the complexity of carrying two eggs and using two stages. This complexity had led to a low qualification success rate, a high expense for teams to purchase components and do multi-motor test flights, and too many hair-raising "prangs" by novice rocketeers trying to master clustered-motor ignition and staging. For TARC 2006 we improved safety and simplified the rocket requirement to single-stage/single-egg, but compensated by making the flight performance requirement harder to meet with goals of both altitude (800 feet) and duration (45 seconds from liftoff until egg land-

The Festus (Missouri) High School team's entry boosts on a composite moor.
Photo by Tom Pastrick.

NAR volunteers look on as the Whitefield School team from New Hampshire readies their model.
Photo by AIA.

ing). Score was the total number of feet by which the altitude target was missed plus the total number of seconds by which the duration target was missed; lowest score wins. TARC 2007 will use a nearly identical set of rules, with a slightly different altitude goal.

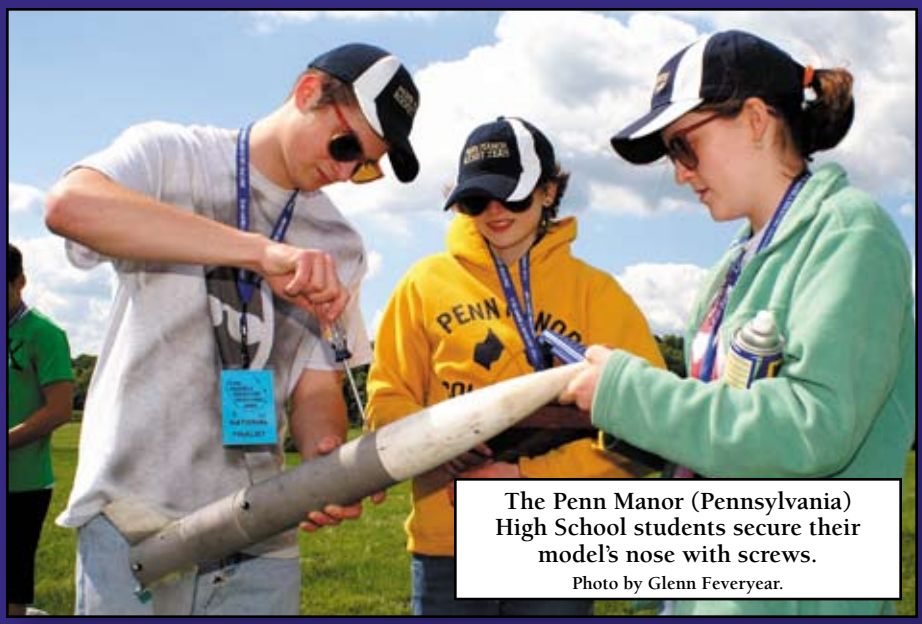
TARC 2006 was a tough challenge; the 100 teams who made it to the finals made a total score of 21 or lower in their local qualification flights, and the top 10 finishers at the finals had a score of 12 or lower. It took sustained effort, careful design optimization, and repeatable, controllable flight performance to succeed; the teams that made it to the finals reported having started early with their building and testing, and had made an average of 19 test flights. This year, for the first time, all 100 of the teams that were the top qualifiers for the finals actually were able to raise the funds to attend in the month between their notification and the finals date; none of the 20 alternates were used. 57 of the 100 teams had previously made it to a TARC finals, and 17 of these were from schools that have made every finals since TARC began. But the two teams that ended up finishing on top were attending their first finals! Some of the seniors on teams that attended actually skipped their high school graduations to come; we had a special ceremony to honor their dedication at the end of the day on the flying field.

The 2006 Finals

The TARC finals are the biggest, most complex event that the NAR runs each year. They involve large numbers of VIP guests, live national TV coverage, many exhibit booths run by government agencies and universities, and an opening flyover by U.S. Marine Corps aircraft, just to name a few of the features. Most importantly, they involve 100 teams of eager young rocketeers who worked the entire year to get a rocket flight good enough to qualify to get there, performed fund-raising miracles to afford the trip to Washington, D.C., and have only one chance in a single one-hour "flight window" to make the flight that might earn their team $9,000 for winning. This is pressure—both for the teams to perform, and for the NAR to deliver a smooth-running event that gives every team a full and equal chance to succeed. We have succeeded at delivering a great event each year for three reasons: the financial and staff resources of the AIA that permit first-class management support; the world-class public event venue provided by the Great Meadow Outdoor Center facility in The Plains, Virginia, that hosts the event; and the extraordinary talent and dedication of the 85 NAR volunteers who do much of the advance work and who attend the finals at their own expense to serve as full-time range crew and support staff. A handful of these volunteers, people such as John Hochheimer (awards and shirts manager), Jonathan Rains (range operations manager), and Mitch Guess (range equipment manager) to name but a few, put in long hours over many months prior to this date to ensure everything was ready for the big day.

The Riverview High School team from Florida had unique team uniforms.
Photo by Tom Pastrick.

The TARC 2006 finals began on Friday, May 19, with a full day of work for 25 NAR volunteers out on the Great Meadow flying field in setting up the two precisely laid-out 18-pad competition ranges, a high-power demonstration range, and all the supporting range facilities and publicity banners. It continued that evening at Battlefield High School in Haymarket, Virginia, where the NAR range crew volunteers gathered for an hour of training, followed by a gathering of all 100 student teams (about 600 people) for registration and a pre-flight procedures briefing plus a remarkable talk on Mars exploration results by Dr. Curt Niebur of the NASA Mars Rover Project. The excitement of this auditorium full of enthusiastic student rocketeers the night before their big day of rocketry competition is always one of the high spots of the TARC finals for the NAR volunteers; it is tangible proof that the hobby that excited our imaginations at a young age still has this power with bright young people. Each of the 100 teams had their own story of determination and achievement that got them to that auditorium; this year's article on TARC devotes more space to telling their extraordinary stories (based on team surveys and on-the-field interviews by Barbara Bundick), and less to the usual description of the overall events of the flyoff.



The Penn Manor (Pennsylvania) High School students secure their model's nose with screws.
Photo by Glenn Feveryear.

The Geekette Team from Lake Braddock Secondary School (Virginia).
Photo by AIA.

Right: A Dakota County (Minnesota) 4H student sports a Rocket Scientist coat.
Photo by Barbara Bundick.

The moment of truth at the returns table; did the egg survive?
Photo by Glenn Feveryear.

The Maranatha Christian Academy students from Minnesota concentrate as they prep their rocket.
Photo by AIA.

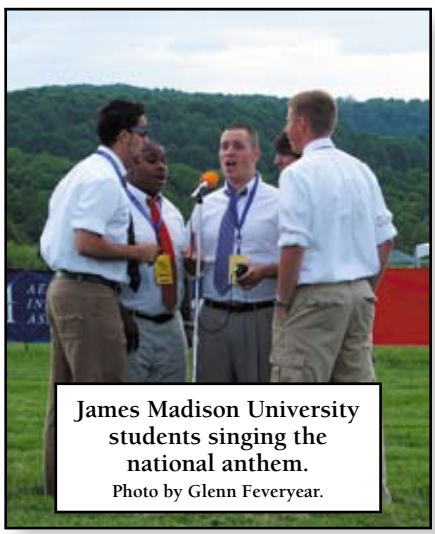
2006 TARC Final Standings

Place	Team	City, State	Weight (grams)	Length (cm)	Motors	Time (sec)	Altimeter (feet)	Score
1	Statesville Christian School	Statesville, NC	748	168	F40-7	43.21	800	1.79
2	Notre Dame Academy	Toledo, OH	752	131	F52-5	44.07	799	1.93
3	West Point/Beemer Jr./Sr. High School	West Point, NE	1235	126	G79-10	44.09	802	2.91
4	Covenant Christian High School	Indianapolis, IN	550	64	F42-8	42.15	794	8.85
5	Riverview High School	Sarasota, FL	320	63	2xD12-5	48.08	794	9.08
6	Venture Scout Crew 146	Oregon, IL	560	121	F42-8	51.78	803	9.78
7	Madison High School	Madison, OH	412	59	E18-7	44.13	810	10.87
8	Butler County High School (Team 2)	Morgantown, KY	507	73	2xE9-6	38.45	795	11.55
9	Penn Manor High School (Team 3)	Millersville, PA	1280	95	G64-4	41.25	808	11.75
10	Lloyd C. Bird High School (Team 1)	Chesterfield, VA	297	50	2xD12-7	46.86	810	11.86

Flyoff day, Saturday May 20, dawned with perfect Northern Virginia spring weather: no rain, no extreme temperatures, and only a moderate amount of wind. The NAR range crew was on the field by 6:30 AM to do final set-ups, and the student contestants began arriving shortly thereafter to begin the check-in process for the first round of flying that was to begin at 9:00 AM. The day's first big event was live national TV coverage on the CBS Morning Show, a 7:00 AM interview with legendary Apollo 11 astronaut Buzz Aldrin and two student contestants. The official opening ceremony began at 8:45 and went like clockwork: a march-on of the colors by a Civil Air Patrol color guard from the Langley Composite Squadron from Langley Air Force Base; the National Anthem sung by a group of talented student vocalists from James Madison University of Virginia, and as the last note of the anthem was completed, a thunderous flyover by a pair of U.S. Marine Corps AV-8B Harrier jump-jets followed by a "fire and smoke" four-rocket salvo of high-power rockets by a NAR flight demonstration team led by Jerry O'Sullivan. With that, the day's competition began.

The TARC flyoffs were run in six one-hour "launch windows." Each of the 100 finalist teams was assigned one of these windows several weeks in advance of the flyoffs, and had to make their single allowed flight during it, which they all did. 18 teams were assigned to each window (10 to the final one), and there were two 18-pad flying ranges in operation, each with a large dedicated NAR range crew—one run by NAR Trustee (Carnegie-Mellon University professor and former astronaut) Dr. Jay Apt and the other run by NAR International Spacemodeling Team manager (and founder/CEO of Aurora Flight Sciences Corporation) Dr. John Langford. While one range was open for loading the pads, the other was flying, with the duties alternating between ranges each hour. To get to the point of flying, each team had to go through a thorough check-in inspection by the NAR range crew. No adults were allowed to assist or accompany any team at any time during the preparation, loading, and flight phases at the flyoffs. The TARC finals are run very strictly and precisely, since there are $60,000 in prizes on the line for the top 10 teams—and this year the first place team also got a free trip to attend the famous Farnborough (England) Air Show in July as VIP guests of the Raytheon Corporation. The top 25 teams also receive invitations from NASA to submit bids for grants to build large payload-carrying high-power rockets as part of their Student Launch Initiative program for the next academic year. Talk about pressure! And yet despite this, the young fliers were calm and clearly enjoying their experience. The parents and teachers watching from outside the flying field were a lot more anxious than the kids.

USMC Harrier jets making a flyover during the opening ceremonies.
Photo by Craig Beyers.



James Madison University students singing the national anthem.
Photo by Glenn Feveryear.

The 2006 Results

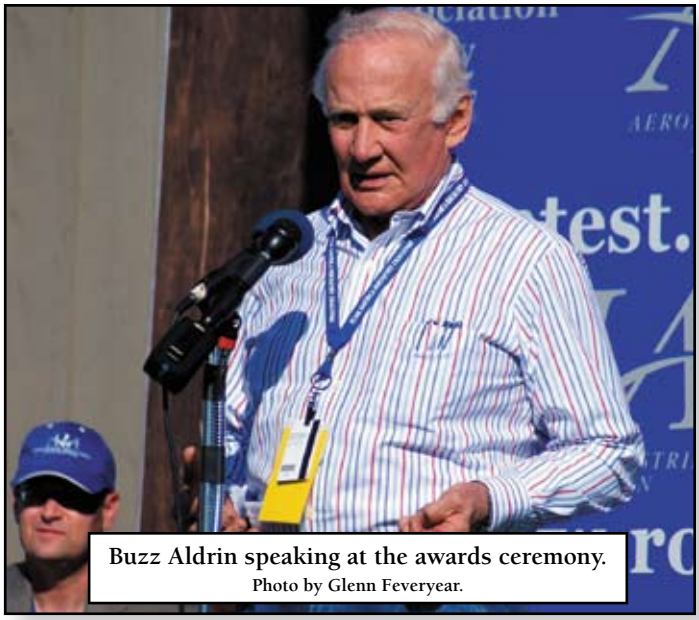
The TARC 2006 finals were marked with a lower flight failure rate than in previous years, largely due to the elimination of the multi-stage requirement. There were only two crashes, both due to incomplete cluster ignitions, five broken eggs, and one non-returned rocket; there were 92 fully nominal flights. When the smoke had cleared and the results were tabulated, a team of first-time competitors from the Statesville (North Carolina) Christian School had edged out the competition with a flight altitude of exactly 800 feet and a duration of 43.21 seconds, for a total

score of 1.79. Just behind them was another team making its first trip to the finals, from Notre Dame Academy of Toledo, Ohio, with a score of 1.93.

The end of the contest flying brought the customary NAR high-power rocketry demonstration launch, a carefully-scripted series of a dozen flights of various types of high-power rockets designed to impress the many government and aerospace industry VIP's who came for the awards ceremony, and to demonstrate sport rocketry's other dimension of technology to the students. Every rocket flown at this annual event is a proven reliable performer, and the fliers, organized this year by Jerry O'Sullivan, are among the most experienced in the NAR. Jerry and his team dazzled the crowd with a flawless display of hybrid rockets, dual-deploy recovery systems, scale models, and even one monster powered by a K motor.

An open-air award ceremony with notable speakers such as astronaut Buzz Aldrin and Mr. John Young, the Director of Defense Research & Engineering (and former model rocketeer), and the follow-on free BBQ dinner (courtesy of Northrop Grumman) brought TARC 2006 to a close. Ten teams walked away richer by a total of $60,000 in prizes, 39 teams received special corporate partner awards for "best team uniform," "best teamwork," "best ground control equipment," and similar achievements, and all the teams were awarded medals and certificates that signified the success represented by qualifying to attend the finals. Both the aerospace corporate sponsors and the NAR volunteers felt at the end of the day that they had made a significant contribution to inspiring the next generation of U.S. aerospace professionals and model rocketeers. TARC is about "paying forward" to our future.

Next time, be part of the TARC experience. Spread the word to local schools and non-profit youth groups and encourage them to enter teams; volunteer as an NAR mentor. Registration opens in September; check the website www.rocketcontest.org



Buzz Aldrin speaking at the awards ceremony.
Photo by Glenn Feveryear.

The high-power rocketry displays attracted student interest.
Photo by AIA.

Plantation High School, Plantation, Florida (6 teams in finals). Returning finalists.
Our seniors are missing graduation for this, and one of them is the valedictorian. They are flying in their third TARC finals. Four of the six seniors are going to be studying engineering in college. Our advice to new rocketeers is to stay dedicated to the project. We worked on our rocket every day for two months.

for details. See you in TARC 2007!

In their own words . . .

Mulberry Grove High School, Mulberry Grove, Illinois. First-time finalists.

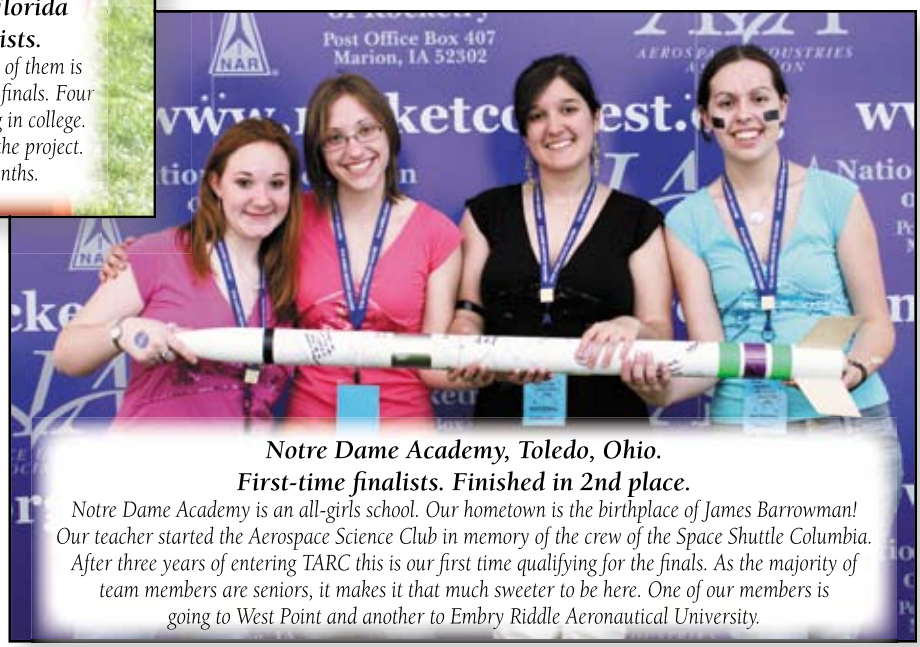
The Mulberry Grove High School Rocket Team is from a high school that has less than 140 students. Memory foam, duct tape, hard work, and a common dream helped this first-year team to be able to compete at a national level. The students raised money running concession stands at ballgames to get money for the registration and initial parts and motors. Only one (of eight) team members had built and flown rockets before.

Harlingen High School, Harlingen, Texas. First-time finalists.

This is the first time the Harlingen High School Engineering and Tech Club has qualified for the TARC finals. For every successful launch we had at least two failures but we learned from our mistakes and kept trying. The team worked well together, each member had an assignment and we had a good project manager. The team is all seniors, and five of the six members will be pursuing engineering degrees in college.

Clayton High School, Clayton, Missouri. Returning finalists.

Oh rocketry, I envy thee, your beauty and your grace
Your fins catch air, your engine flares, you fly up into space
Up and down trajectory, resemblant of an arc
But nothing would you be, alas, without our friends at TARC.



Notre Dame Academy, Toledo, Ohio. First-time finalists. Finished in 2nd place.
Notre Dame Academy is an all-girls school. Our hometown is the birthplace of James Barrowman! Our teacher started the Aerospace Science Club in memory of the crew of the Space Shuttle Columbia. After three years of entering TARC this is our first time qualifying for the finals. As the majority of team members are seniors, it makes it that much sweeter to be here. One of our members is going to West Point and another to Embry Riddle Aeronautical University.

Statesville Christian School, Statesville, NC. First-time finalists. Won TARC 2006.
We had little to no experience with rocketry before this year. This year has been a tough one, the team has been through a lot. Two of the five original members died in car accidents. This is our first TARC competition, and it is in honor of William Nathanial Parker and John E. Nichols.

Fairfield High School, Fairfield, Ohio. Returning finalists.

Our egg capsule used expanding foam around a hollowed-out egg that we put our egg payload inside. One of our test flights had the egg and the altimeter survive a 900-foot free-fall drop. Another flight had the altimeter section get hung up in a tree just as a heavy rain and hailstorm approached. It got wet but survived. We modeled our rocket's paint job from a McLaren Formula 1 race car.

Monadnock Regional High School, Swanzey, New Hampshire. First-time finalists.

Our team had no prior experience with rocketry before this year. Now they have experienced: a rocket bursting into flames; landing one in a tree; catching one in high-voltage power lines; and retrieving one from under a 50-foot propane tank. They are grateful for launches in wide-open places. Our most memorable moment was when our rocket went 801 feet high during the qualifying flight. Our advice would be to start your rockets early and get a mentor because they are very helpful.

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NSL 2006

NATIONAL SPORT LAUNCH

McGregor, Texas, May 27-28

by James Gartrell

My grandson Blake Gartrell and I went to NSL 2006 with my buddy Royce Frankum and his son Jarrod. The boys are near to the same age, so they have a lot of fun together, and Royce and I share a common love for old rockets, so we always enjoy one another's company. With all of the burn bans in Texas lately, we were all ready for a fun weekend of rocketry. Not just flying rockets, but meeting and talking with others who share our interest. Royce was pulling the DARS trailer that contained all of the equipment for the launch, so he stopped by on Friday to pick me and Blake up and we headed to the field to meet Don and Terri Magness. Several other DARS members and Lee James from the Austin club, AARG, also arrived at the field around noon to start getting things set up. Thankfully, there were enough volunteers on hand that set-up went pretty quickly.

A very proud Teresa Ballard, just after completing her Level 1 certification flight. Fantastic!
Photo by James Gartrell

The Field

The field was somewhat overgrown, as the cows normally sharing the field had moved to a different field—well, that and the fact that we had been getting some welcome rainfall. As a result, a good portion of time was spent clearing the areas around the pads. By early afternoon, the field was staked out, pads were set up, power cords were laid out, the PA was in place, and the safety check-in and registration tents and tables were up. Everything was pretty much ready to go. All we had to do in the morning was set out the event materials, controllers, and relayers, and then connect and test the pads.

Only one thing was missing: lighter winds. The wind was steady at about 15mph, not the best conditions for a launch. We hoped for lighter winds fore-

casted for the next day, but they didn't ease much. With all the high grass, the high wind was going to make for some challenging recoveries.

The Vendors

Kudos! Kudos! Kudos! The vendors really came out in force for NSL 2006, and even if they couldn't make it to the launch they provided a lot of really nice prizes. I think sometimes our vendors get overlooked, so I intended this article to be primarily for them. After all, we wouldn't have much of a hobby without them.

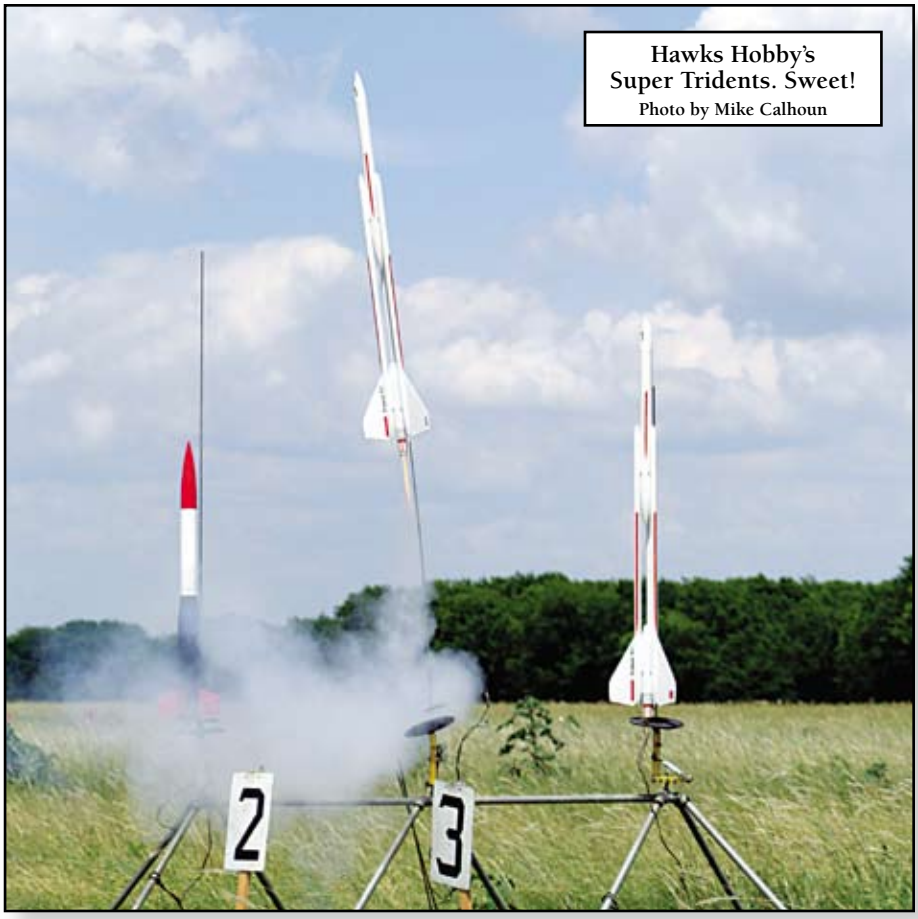
Don Magness, the owner of one of our premier Texas model rocket vendors, Squirrel Works Model Rocketry, was also the event Director for NSL 2006. He and his wife Terri not only worked tirelessly to provide one of the best-attended NSL events, but with the help of Quest and Red River Rocketry they also provided 30 kits for the build-and-take Iron Rocketeer event. Personally, I think that was the best prize available, and nearly every boy or girl that came to the event received one. There were plenty of kid-designed rockets flying that weekend, and there aren't any better looking rockets around than those. I think the Iron Rocketeer event contributed to the fact that over 1 out of every 3 of the fliers over the two days was under 18.

While all of the kids' rockets were fantastic, I have to admit that my favorite was Jarrod Frankum's High Five rocket. The hand-shaped fins were cut out on the field and painted with a Sharpie, and the body and nose cone were covered with about 50 stickers he just happened to have (?) in his pocket. He also deserves recognition for having the most flights with a single rocket in one day. He flew the High Five 18 times on Sunday! Each flight was arrow straight and reached serious altitude, even on an A motor. As a matter of fact, he depleted both his

Jonathan Robinson, a very nice young man, was first in line to get his Iron Rocketeer kit and then waited patiently for me to get this photo.

A couple of Iron Rocketeers, ready to fly!
Photos by James Gartrell

Jarrod Frankum, off to the pad for another flight.



Hawks Hobby's Super Tridents. Sweet!
Photo by Mike Calhoun

dad's supply of A8 motors and my supply and then started work on his dad's B and C motors. He even burned a ½A6-2 motor in a drag race with Blake who flew his Silver Bullet, also on a ½A6-2. I knew I shouldn't have brought my contest motors to the event! The only thing more impressive than his rocket and the number of times he flew it was the "sayings" he included on most of his flight cards. My favorite was, "One small step for hand, one giant leap for handkind." "Three thumbs way up!" was pretty good, too. Very funny, Jarrod! Oh, and Jarrod wanted to thank AeroTech for the Initiator kit and PML for the $25 gift certificate he won as door prizes.

John Dyer of Red River Rocketry also assisted Don in planning and preparation for the Iron Rocketeer event. He was also the primary vendor contact. Anybody that got a prize needs to thank John for all of his efforts assisting Don in securing vendor prizes. And to top it off, he even provided Red River Rocketry kits as door prizes. John introduced his newest addition, the Stratos, to an expanding line of very cool rockets. If you haven't gotten one of his kits yet, you're missing out. I'm not sure why Nina didn't attend the event, but his son Michael did come along. They shared a room at the event hotel with Chas Russell. Now that's a roomful of old rocketeers! Yep, Michael qualifies as an old rocketeer, even though he's probably only in his late twenties. He's been flying rockets long enough, at least based on a photo John took in 1988 showing Michael as a young boy holding one of his dad's models.

I also want to express a sincere thanks to one of our newest Texas vendors, Hawks Hobby. Considering their business is just starting up, they provided some really spectacular prizes. The demonstration launches of their products were also spectacular. Loretta Hawkins, owner of Hawks Hobby, and John Dyer of Red River Rocketry flew the Super Trident several times. It is a very impressive model at over 52" tall and a fin span of 11 inches. Considering the nine cones and all the tubes that come with it, the price is very reasonable. Loretta came out with her husband and family expecting all of them to get Level 1 certification. Time constraints and other problems worked against them, and only Mark Hawkins, Loretta's husband, certified. I think he flew a beefed up version of one of their newest releases, the Super Javelin, for his certifying flight. Congratulations, Mark!

A representative from AeroTech, Craig Christiansen, was also there with six high-power 38mm reloads available to anyone who would fly them at the event, including two of the new H669 Warp 9 propellant reloads. Believe it or not, he was having a hard time giving away the motors as many of the high-power fliers were laying low because of the high winds. I'm sure he finally got folks to take them, though. I watched DARS member Dave Schultz's rocket on one of the H669 reloads. Wow! That's one fast motor! The other four motors were two I225 and two I364 fast Black Max reloads. They also provided kits, reload cases, and some smaller motors.

Bill Stine and Nettie Hunsicker were there to represent Quest who also provided numerous kits for door prizes. While I didn't get a chance to talk with Bill (darn it!), I did get to visit some with Scott, Nettie, and Kim Hunsicker. It has been a good while since I last got to visit with them. It was comforting to find out she is recovering very nicely from her recent medical problem. My grandson Blake was more interested in all of the Quest kits, especially the Aries. It's always amazing to me what the kids find interesting. While the Aries is a very nice looking model, either the Quest Force 5 or Shuttle Intrepid would be my favorite. Wow! Both are very nice kits! And

of course, the Quest Flat Cat boost glider is a nice kit, too. I am especially partial to that kit as it was one of the models I flew away at NARAM-44. A "DQ," because the pod separated from the glider before ejection, kept me from putting in a very good time for that event. I'll pay a little more attention to how well that's glued next time.

James Duffy, www.rocket.aero, was also on site, partly because of the FAI practice that was going on adjacent to the NSL field. He provided some of his latest DVD's, including his newest *Wings of Fire Messerschmitt ME-163,* as door prizes. I have his Little Joe DVD. Besides being an excellent reference work, I enjoy playing it on occasion for inspiration when building a rocket. James also gave me a copy of his *Wings of Fire* DVD to review. The film and photos are superb. I'm always amazed at the quality of his DVDs. The format is very similar to the Little Joe DVD, with alternative audio choices for the historian or modeler, the modeler's aids sections containing notes, and a still photos gallery. There is a lot of info on the DVD, and not all just about the ME-163. Lots of photos and video taken from test flights and propaganda films are included along with some very cool films of the RAK series of rocket cars. Way cool stuff! In addition, a variety of very interesting related tidbits on historical rocket glider research are included. The menu is organized very well, allowing easy access to just that portion of the video one wants to review, or you can just hit play and relax to watch the whole thing. As usual, the price is very reasonable. By the way, did you know the Komet was a glider and was capable of rocket powered take-off? Hmm, rocket glider candidate, maybe?

Morgan Terry, another satisfied HobbyTown customer. The Estes X-15 RTF flew very nicely, even with all the wind.
Photo by Randy McDonald

Our local Hobbytown USA vendor was on site, too. They provided numerous gift certificates with values up to $100! Wow! With all the children in attendance for the Iron Rocketeer event, they seemed to be doing pretty well. There always seemed to be someone at their tent. I saw at least three of the Estes X-15 RTF rockets flying that I believe were purchased from them. I think they were the kids' favorite vendor!

The high power fliers had plenty of available vendors, too, with Quickburst, motorman Chad Ellis of CLE Enterprises, and Kyniska Rocket Supply. Each of the vendors provided some very nice door prizes and stayed plenty busy. Somebody was carrying motors from another new

Texas motor manufacturer, Road Runner Rocketry—at least I saw a couple of flights that were using these newly certified motors. Bob Korman is the owner and the motors are single-use F and G impulse. According to folks I chatted with, they are more powerful and lower price than similar AeroTech motors. Check 'em out and see what you think. You can contact Bob at: www.roadrunnerrocketry.com.

Blake won a 29mm saucer, one of many door prizes from Art Applewhite Rockets. As Blake was receiving his prize, Art hollered out that he would be glad to sign it, too. You should have seen the smile on Blake's face. That's the first signed kit he's ever gotten. Art really made his day! You never know how much impact you can have with one really small gesture. Nice timing. Thanks, Art!

Other vendors not able to attend provided a whole host of prizes. These were: Apogee Rockets, Aerospace Speciality Products, BRS Hobbies, Dr. Zooch Rockets, Excelsior Rocketry, FlisKits (whose Decaffeinator was given out in the first round of drawings), Pemberton Technologies, Public Missiles Ltd., Qmodeling, Semroc Astronautics, Sunward Aerospace Group, and Thrustline Aerospace.

Qmodeling and Hawks Hobby kits were awarded as prizes for first place winners in the Classic Models contest. I sadly regretted not seeing the Semroc folks at the event, but Blake won a couple of nice Semroc kits in the Classic Models contest, which were second place prizes. Chas Russell put up one of their SLS Hustler kits on an F motor for a very impressive flight. I just love those Semroc kits!

The vendors were so generous that Don Magness, NSL 2006 Director, was able to announce several prizewinners every hour on the hour for the entire event!

Sirius Rocketry sponsored the prize, a Refit U.S.S. Atlantis kit, for the Cochran Challenge contest. If you haven't visited their website lately, you need to. I'm not sure who won the Pemberton Technologies Space Ark kit, but I was sure hoping that would have been Blake or me. However, Blake did win one of the Thrustline Aerospace Black Shadow kits as a door prize. Nice kit—it certainly impressed Blake. I was fortunate to win a Dr. Zooch Saturn 1B kit, a 24mm x 4" BT-60 motor mount kit from BRS Hobbies, and a Sunward Galactic Wave kit. Woohoo! All were very nice door prizes.

I'm not sure if the Hobbytown folks brought any Baby Berthas, but it was a mistake if they didn't because there were

Ed Boyle gets a very nice door prize, the FlisKits Decaffeinator.
Photo by James Gartrell

a lot of folks running around with Excelsior Rocketry's "Goony" kits. I didn't see anyone hysterically running around and jumping up and down with joy, so Apogee must not have donated one of their Saturn kits. There were a bunch of folks with squinted eyes, though. I wasn't sure if that was because of the sun, or if it was from trying to put together one of FlisKits new micro line of kits that were donated for door prizes. Rumor has it that someone was "supercharged" on coffee after opening that Decaffinator kit. Hmm.

Oh, I must not forget our food vendor, the McGregor Volunteer Fire Department. Their chopped beef barbeque sandwiches came piled high with Texas hospitality, and their drinks were colder than an astronaut's boot on the dark side of the moon. Seriously, the folks with the McGregor Fire Department are a great bunch of folks and are always a welcome sight at our regular DARS launches in McGregor. We appreciate them very much, even though they aren't known for flying a lot of rockets!

The vendors were so generous that Don Magness, NSL 2006 Director, was able to announce several prizewinners every hour on the hour for the entire event! So even though winners of the various contest events took away some spectacular prizes, many of the door prizes were really nice, too. I'm sure there were a lot of happy folks leaving the event whether they stayed one day or both days, and I'm not just talking about fliers, but vendors too. As usual, the best way to thank our generous vendors is to buy some of their products. Given the list, that shouldn't be a difficult task. Thanks again to all of our vendors for their generosity!

The Events

Dr. Pepper Lofting – I'm not sure what happened, but only two fliers entered the event. Bob Wilson, coordinator for the event, and Jack Sprague were the only ones brave enough to take the challenge, I guess. With a case of "real" Dr. Pepper (made with real pure cane sugar) at stake, I thought more would come forward for the two-day event. Jack Sprague won the event.

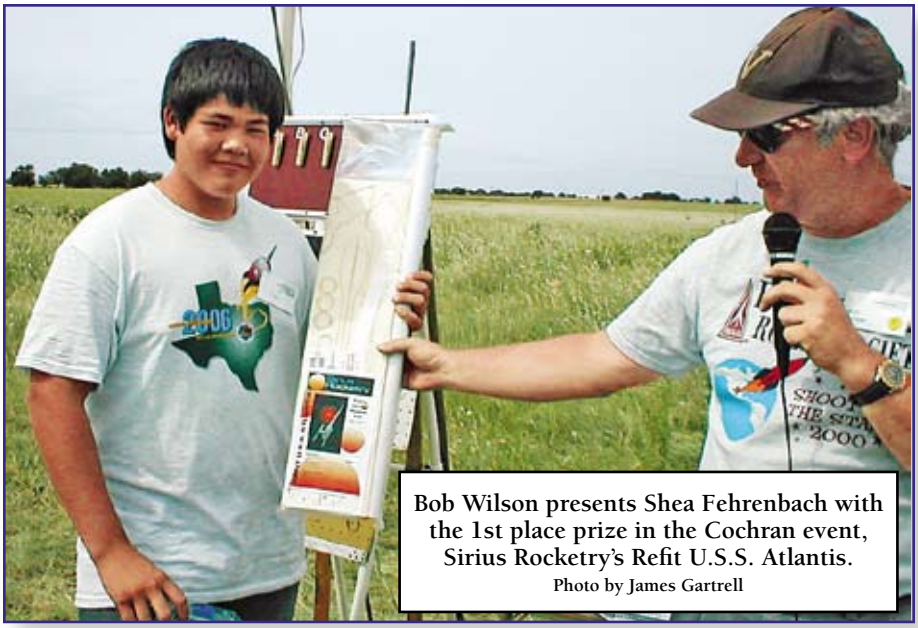
Cochran Challenge – Bob Wilson also coordinated for this event, which had plenty of challengers available. Be sure to check out his separate article.

Classic Model Rocket Display and Launch – Gary Briggs has written a separate article for this event, so I won't steal his thunder. I will say that I found it very interesting that my 15-year old grandson Blake took 2nd place in the 60's and 80's categories. He wasn't even born until after the 80's! To top it off, I really had to eat crow after the launch, since my Estes-signed OT placed behind Blake's rocket. Sheesh! Furthermore, with Josh Briggs 2nd place win in the 70's category, someone born after the 80's held three of the top twelve places in the event. I think classic rockets will be around for a long time to come.

Some famous guys.
Photo by James Gartrell

Iron Rocketeer Challenge – Every boy or girl under 12 was a winner in this two-day event. I think this was probably the main reason for the large number of children attending the launch. The concept was the brainchild of Don Magness and was intended to help kids develop the

Continued on page 22.



Bob Wilson presents Shea Fehrenbach with the 1st place prize in the Cochran event, Sirius Rocketry's Refit U.S.S. Atlantis.
Photo by James Gartrell

The Cochran Challenge at NSL 2006

by Bob Wilson

There were 21 Cochran flights in total.

Flights like these have been around ever since there were motors more powerful than what the manufacturer recommended for a kit. Then there were obvious envelope-pushing opportunities, like the Estes Comanche-3 with a recommended D12-0 to C6-0 to C6-7. But in 1997, it came to a head when Estes introduced the Fat Boy with an 18mm motor mount. All the other BT-80 based kits of the era were flying on D12 motors. This one was obviously "underpowered." Sure you could boost it to respectable altitudes in a stock engine mount with an AeroTech D21 or E25. If you left out the forward engine block you had the AeroTech E45 and F55 as options. But beyond that, you had to resort to some serious engineering of the warp drive system. Geordi could do it. Scotty could do it. Zefram Cochran taught them how. So in the DARS high power launches of 1997 the Cochran events were born. Sometimes it was a contest. Sometimes it was a certification. But it was always fun.

For NSL 2006 it was primarily certification levels where a warp factor was awarded for each impulse class above the kit manufacturer's recommendation. But since there was an event sponsor donating prizes there had to be a winner. The flier of a returned model that achieved the highest warp factor was the winner. In the case of ties other factors came into play. Was the model damaged? Did the engine come back with the model? Was there something special about the model (payload, scale, cluster, etc.)? Did the rocketeer recover his own model? How young was the contestant (a BAR should have experience doing this compared to a junior rocketeer still learning and enjoying rocketry)?

This was one of the closest Cochran contests in a quite a while. Three fliers really pushed the envelope by making Warp 5 attempts.

Note: As in Star Trek, Warp 5 doesn't really sound that impressive until you realize that these people are flying rockets with motors *Thirty-Two* times more powerful than the manufacturer ever envisioned! In some ways it's like building your Level 1 certification rocket so that you could be flying M motors in it.

Shea Fehrenbach, Ed Boyle, and James Brazell had come ready to "duke it out" with Warp 5 models available. Shea flew scale with his Estes Patriot, first to Warp 4 and then Warp 5 on an AeroTech H165R (or is that ARrrrr...). Ed came prepared with two Cochran models. First, a Quest Courier that he flew with an egg payload on an AeroTech G80 and recovered. Well, the rocket was recovered. The egg? Well... Then Ed came back with an Estes Fat Boy that he also flew on a G80. Finally, when Shea upped the stakes by achieving Warp 5, Ed put the Quest Courier back up on an Ellis Mountain H101. The final Warp 5 attempt was actually the first Cochran entry. This was by James Brazell who flew his Quest Falcon on an Ellis Mountain H50. The boost was straight with a good deployment, but recovery was not successful.

After the smoke cleared, and long recoveries, the winners were:

First place: Shea Fehrenbach.

Second place: Ed Boyle.

Third place: Jim Jarvis flying his Estes Big Daddy to Warp 3 on an H128. It was a well-finished carbon fiber model that looked so good it shouldn't be painted.

A number of fliers didn't make the trophy cut but they still put on a great show and should be commended. Mike Abbot flew "his" Warp 4 Quest Bright Hawk on an AeroTech G38 but did not recover it. At the time the model was checked in, a nearby spectator who frequently flies Quest Bright Hawks in a Cochran manner strongly recommended against flying such a configuration on a G80. There was some comment that empirical evidence had shown a G80 was not a good idea.

Scott Hunsicker also pushed the limits of his spouse's employer's model by flying a Quest Apollo on an Ellis Mountain G37. Boost was straight and true but the flight ended up becoming a sacrifice to the rocket gods. Once the tracking smoke became invisible, the rocket disappeared due to the higher cloud cover and was never seen again.

Both Mike Lemke and Dave Babyak flew Estes Gauchitos to Warp 2, but they got there in two radically different ways. David went the traditional "Throw a C motor in it" way. Mike went the "Burn a pack o' motors" way by clustering four Estes A10T motors. Both got points for starting with the rocket kit with the smallest maximum recommended motor and going up from there. I'm sure there will be some contest in the future where the starting point is a MicroMaxx. Then, watch out!

Nostalgia points went to David Chapa for flying his Centuri Quasar to Warp 1 on an Estes D12. Tim Reidy got scale points for sending his Estes Saturn V moon rocket "to the Moon" on an AeroTech F24. Dave Schaefer entered a very Cochran-friendly Quest Lightning on a G40, but then decided flying rockets he could R/C back to the pad was a better idea than chasing a tiny rocket to the north side of town. He's flown that motor combination before in a Cochran drag race with Brian Nelson. When he's not flying fast Cochran models he's been known to go the slow lazy route by putting Apogee F10s into a Quest Icarus.

The most frequently "Cochraned" model was the Estes Big Daddy, flown by Jim Jarvis, Jack Sprague, and Shea's dad, Rags Fehrenbach. There was no clear winner in the Cochran motor of choice. AeroTech G80s and G64s, and Ellis G37s all had two flyers each choose them for their Cochran flights. I imagine Roadrunner Rocketry G80s will start showing up in future Cochran contests.

Iron Rocketeer Contest

by Jarrod Frankum

One of the extra activities this year at NSL was the Iron Rocketeer contest sponsored by Don and Terri Magness; the event was mainly available to the younger fliers. Each contestant was given a bag of parts to build a rocket—items such as body tubes, motor mounts, nose cones, streamers, balsa fin stock, etc. You entered the contest by building a rocket; it could be of any design you liked, but you only had a certain amount of time to accomplish this task. There were quite a few young fliers who participated in this event. When the time was up we all brought the completed flyable rocket to the pads and flew our birds.

My particular rocket was a custom built design, which I called High Five. It was a unique design that was about 14" tall and had a unusual fin pattern. I used the outline of a hand "palm print" for the fin shape. Once it was flown at NSL 2006 it was widely accepted as the outstanding Iron Rocketeer model. It was flown well over 30 times at the event. Every time I headed to the pad with it I filled out the flight card and included a unique comment for the LCO to read out. Such comments as "One small step for hand, one giant leap for handkind," and "look ma—no hands."

This was my second time participating in this event. My first time was at my club's local "Shoot for the Stars" launch last year. It was there that Don and Terri Magness first made this program available to the younger fliers who wanted to participate. From what I've seen, it is great program for younger rocketeers!

Robert and Bill Parks show off their gliders. Very cool!
Photo by James Gartrell

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skills needed to advance in the hobby. The kits contained everything needed to design and build a model rocket, including an idea book to jump-start the process. Registration for the event started at noon on Saturday, and all of the entrants that stayed until 3 PM on Sunday could present their rocket to receive a beautiful Certificate of Engineering Excellence in Rocketry. It was something they all could be proud of and that parents would love to hang on the wall. Frankly, I'd like to see this event at every NSL in the future. Anyone that saw the smiles on those kids' faces when they received their kit would want that to happen as well.

FAI Practice – This was a neat distraction from the norm that lasted both Saturday and Sunday. After watching several gliders hang in the wind for several minutes, I wandered over to talk to some of the folks and get some pictures. I was sure glad I did. One of the guys I talked to right away steered me over to talk with Bill Parks, the son of Robert Parks (NAR 7871). Bill was eating lunch after having just sent up his R/C glider and kept it up for over 6 minutes of flight. Way cool! He was nice enough to stop eating lunch and talk with me. He's only been doing this for a little over a year. His dad got him involved. Imagine that. I asked Bill if competing interfered with his schoolwork. He said it took a lot of effort to get to the level that he's at in such a short time, but it wasn't interfering with school. As a matter of fact, he said he was doing pretty well at school. Awesome! He's looking forward to going over to Kazahkstan with his dad to participate in the competition. A very pleasurable young man to talk with. Hey, like father, like son. I was glad I got to talk with both of them.

I also talked with Kevin Johnson, another really nice guy. He's participating in the S3A, S4A, and S6A teams. He was sporting one of the very nice Quest flop-wing gliders. He also showed me another one of his models, a neat flop/swing-wing glider, The Giblet, from Venus Rocketry. Kevin flew away one just like it at a NARAM after a flight of over 9 minutes before the trackers lost sight of it.

I didn't get a chance to talk with many of the others, but hey, if the rest of the team is as good as Bill and Kevin are, I'm thinking the U.S. Internats team may be bringing some gold medals back again. Regardless, they are really nice people and are top-notch folks to represent the U.S. Good luck to you all, and bring home the gold guys!

The Texas Contest Consortium's NSL 2006 Duration Record Trial – I'm not sure this event finished, as Lee James, coordinator for the event, had to leave due to a family emergency. Hope all is well, Lee.

The Fliers

Given the number of flights over both days, there were a lot of folks who weren't about to give in to either the wind or the tall grass, although the wind did seem to limit the number of upper-end high-power flights. Flying wasn't impossible, just a challenge, as evidenced by the quantity of motors flown. Over 400 motors were flown with a cumulative impulse that exceeded that of an O motor. That's a lot of flying! There were some brave souls that took the challenge and flew high power, with 41 flights over the two days. One of those was Jim Jarvis who launched a two-stage I-to-I that went more horizontal than vertical when the sustainer ignited. Deployment was fine, though, and Jim returned with his rocket in perfect condition. Of course, that tracking device helped a lot!

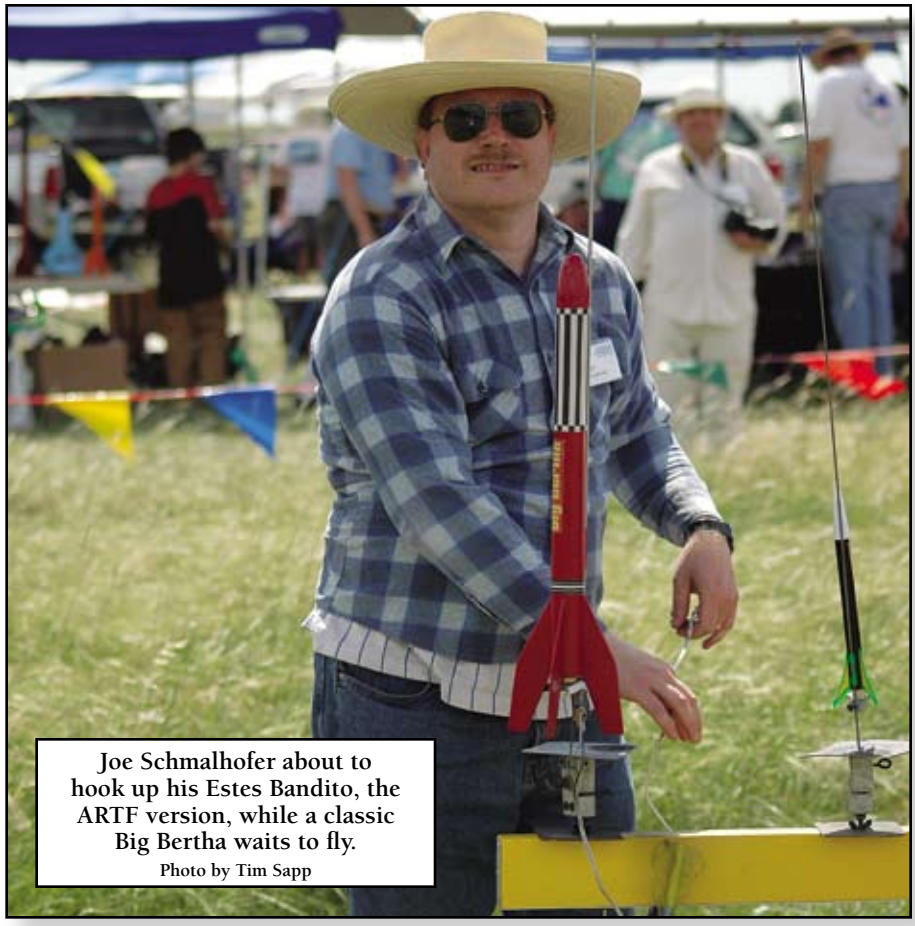
There were a number of certification flights attempted, seven on Saturday and a few more on Sunday. Jarrod Frankum

Chase Hrncir readies his crayon rocket.
Photo by Tim Sapp.

and Cory Suddeth certified L1 with nice flights under the NAR junior certification program. Congrats, guys! Ben Jackson also certified L1 and Joe Cook certified L2. Teresa Ballard completed her L1 cert flight on Sunday with a rocket called Blue Thunder. She was ecstatic! I didn't get the names of everyone, but congrats to all!

That tall grass *did* receive a few cuss words for swallowing up rockets, which it unfortunately did quite often, mostly the smaller models but also some of the mid/high-power rockets. It was certainly evident, though, that those who came, came to fly! Joe Schmalhofer certainly was an example of one of those folks. He flew 30 rockets over the two days, with numerous Estes Skywinder and Wizard flights, and two or three flights with the newer Estes Bandito in the Cochran Challenge. Needless to say, he was pretty bushed by the time the range closed Sunday afternoon. A true rocketeer, though, Joe still assisted with takedown of the range on Sunday. Good job, Joe! It was a pleasure to meet you.

Tim Reidy, an Alamo Rocketeer from San Antonio, also wasn't going to let conditions keep him from flying despite hav-



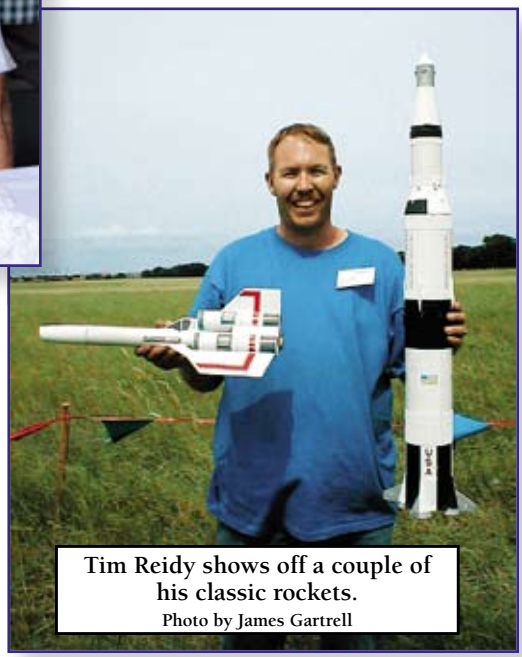
Joe Schmalhofer about to hook up his Estes Bandito, the ARTF version, while a classic Big Bertha waits to fly.
Photo by Tim Sapp

Stuart the "Crusty Rocketeer," and Laurie Powley relax after the NSL Saturday night dinner at Johnnie's Place. Wake up, Stuart! No more cobbler and ice cream for you.
Photo by Tim Sapp

ing hung his Estes Colonial Viper over the power lines on Saturday. Thankfully, it slipped off over night, but the next day he hung his Estes Der Red Max on them. I don't think he got that one back. Boo! Bad power lines! Nevertheless, he flew 23 different rockets over the two days and flew his Estes Andromeda, Cherokee-D, and Saturn V twice. He provided me with a list of his rockets and it looked like an old rocketeer's dream. His lineup of rockets included the Mars Snooper, Torrelian Invader, Starblazer X-20, Aries SST, Orion Starfighter, and many others. It was hard to get that list, too, as he hardly stopped except long enough to prep the next rocket. Tim also stayed to assist with range takedown on Sunday. Great guy! I hope to fly rockets with Tim again someday—he's not too far from us by Texas standards.

Dave Schaefer, pilot of the famous high-power X-30 R/C glider, was at NSL 2006 to fly a little smaller glider, one of Squirrel Works newest releases, the Mega Baron. Don's 24mm Mega Baron kit looks more like a lumberyard than a kit. It is huge! Of course, this was a natural challenge for R/C conversion by Dave. He flew the rocket twice and both flights were picture perfect. Each flight the boost was slow and graceful and then Dave slowly turned the rocket to bring it back in for a gentle landing right by the rangehead—simply beautiful. Watching Dave fly one of his gliders is always fantastic, but the bi-plane design of the Mega Baron looks awesome in flight.

There was another flier of note. Not that he flew a lot of rockets. Oh, he flew some nice rockets, that's for sure. He's one of those "old rocketeers" that always has a nice rocket to fly. However, Stuart Powley had one very special rocket to fly. It was called Bad Kitty. Now, I don't know where that name came from. I didn't ask him. I was almost afraid to ask. Anyway, Bad Kitty was special because it was built and flown at NSL 2006 to commemorate Stuart's one-week anniversary to his new wife, Laurie. Yep, he was married one week earlier, and the lucky guy convinced his wife to come fly rockets with him at NSL 2006. She's a super person, though, and I don't think he had to do a lot of convincing. Fittingly, the flight of Bad Kitty was just as spectacular as Laurie. With an unusual degree of old rocketeer karma, the rocket launched beautifully and landed in the field with the "dedication" fin showing their names facing up. Very cool! Congratulations, Stu and Laurie!



Tim Reidy shows off a couple of his classic rockets.
Photo by James Gartrell

Dave Schaefer's R/C converted Squirrel Works Mega Baron lifts off the pad.
Photo by Tim Sapp

All in all, NSL 2006 was a wonderful event, and Don Magness certainly deserved the NAR recognition plaque presented to him by Trip Barber at the Saturday evening dinner. Someone also noted that his wife Terri deserved a lot of credit, too. In their usual humble style, though, they both noted that it couldn't have been done without the help of all the volunteers. Uh, and that would include Squirrel Works mascot, Shelby the squirrel, who certainly did her part to entertain the children. She says, "Thank you!" and "See you next time!" in her best squirrel voice.

Royce, Jarrod, Blake, and I left Sunday evening, tired but satisfied. It was an event we will remember for the rest of our lives.