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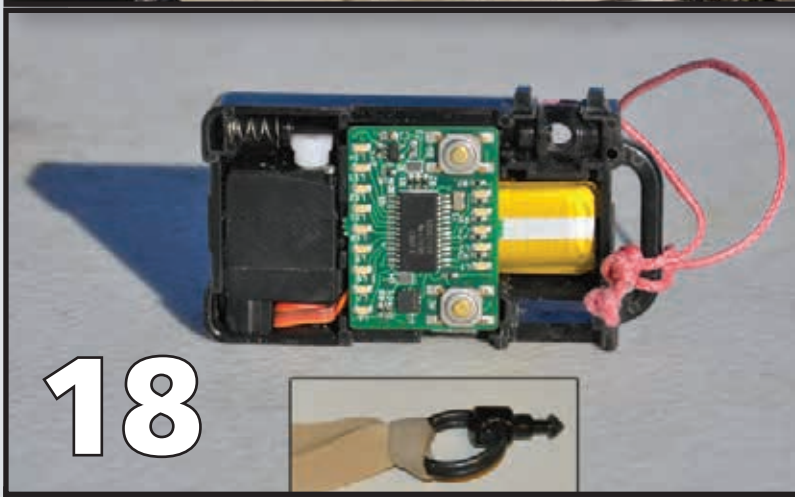
SPORT ROCKETRY
OFFICIAL JOURNAL OF THE NATIONAL ASSOCIATION OF ROCKETRY
JANUARY/FEBRUARY 2018 VOLUME 60, NUMBER 1

Feature Articles

On The Cover

Ashley Van Milligan ready to make a demo flight of the Dynastar Firefox SHX at NSL 2017.



EDITOR'S SPACE

Competition

This contest year, the NAR has changed to new rules. The events are still mainly the same, but the way competition is structured is different. Rather than flying in local/regional contests to gain points toward national championships, you now compete in six National Rocketry Competition (NRC) events and post your results to the online scoreboard to see how well you do against everyone else around the country.

It only takes two NAR members to hold a contest. You can fly just the NRC events, or also fly any other events you'd like to fly at your contest. Competitors placing well in the NRC events will receive recognition at the end of the contest year, and will also qualify to compete for Event Specialist Awards and National Championships at NARAM (where everyone starts with zero points).

Anyone who didn't qualify in the NRC can still fly the NARAM contest (which will include more events in addition to the six NRC events), but they are competing for NARAM trophies (not the national championships). It's easy to sanction an NRC contest and try out some events. You can learn all the details by reading the updated U.S. Model Rocketry Sporting code (you can find links at http://www.nar.org/contest-flying/).

My favorite change to the rules so far is that when flying the NRC events (not at NARAM), the Return Rule is not in effect for duration flights—you don't have to return either rocket from your two flights. So I was able to do well in 1/2A Parachute Duration (an NRC even this year) by putting two little rockets with 18" parachutes into a couple thermals. Both flights were still going up when the timers lost sight of them several minutes later. But I won't be able to do that at NARAM.

SPORT ROCKETRY

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Submission Guidelines

Deadlines for submission of material to *Sport Rocketry* magazine are as follows:

Issue Cover	Mailed	Deadline
Jan/Feb., 18	Jan. 8	Nov. 13, 2017
March/April	March 5	Jan. 8, 2018
May/June	May 7	March 12
July/Aug.	July 9	May 7
Sept./Oct.	Sept.3	July 9
Nov./Dec.	Nov. 5	Sept. 10

Submissions should be sent by mail to:

Thomas Beach
Editor, Sport Rocketry
432 Pruitt Avenue
Los Alamos, NM 87544
Phone: (505) 672-0249 evenings

Or, sent via electronic mail to:

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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 CD or DVD, 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. Images should be in separate files, not embedded in the article file.

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.

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.

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ANTARES

FLIGHT OA-5 IMPRESSIONS

by Alan Williams NAR 14137

Original version was published in ZOG-43 newsletter.

My Antares experiences were a mix of trepidation, nostalgia, and excitement. The shockingly violent 2014 demise of the ORB-3 mission caused $13 million in damage to the pad and blew out windows over five miles away, so things were a smidgen tense. The defective Soviet-era NK-33/AJ-26 engines were replaced with modern and more powerful Energomash RD-181 powerplants. But even with new engines it still felt like petting that pit bull that your neighbor swears never, never, ever bites anybody, mostly.

There was also a weather threat. A strong Category-4 hurricane was aiming at Bermuda. This threatened the major down-range tracking complex there, which would support the OA-5 mission, so the flight was held till the weekend of the 15th. The storm scored a direct strike on Bermuda midmorning Friday, but the dedicated workers made the installation mission-ready for Sunday.

Alex and I went down Saturday night for the anticipated Sunday night flight. (Craig was working the Maryland Renaissance Fair, but would join us if the flight slipped to Monday.) Next morning we reported for badging and immediately boarded the press Island photo tour. We were given about 20 minutes per location to get things done. First, we visited the cavernous Antares Horizontal Integration facility, which can handle two full sets

The rocket gods point and giggle...

of flight vehicle hardware at once. It looked empty(ish) with only the OA-7 first stage on the floor. There were gobs of handling jigs and such, all neatly stacked so we wouldn't trip over it (as one does). Also, there's a whole bunch of white in there!

Then down at Launch Area 2 we got our first look at Antares. At this point we were around one-half mile from the OA-5 vehicle. We had a good sweeping view of the complex in the distance. It was an impressive and inspiring sight, indeed. At almost 13 ft. wide and 140 ft. tall, Antares is actually much larger than the Gemini-Titan of old. It was hard to get a true vertical line while shooting the rocket, as all four lightning suppression towers were torn off or bent by the 2014 explosion and now lean slightly to the west. While most folks were facing south, I was also taking a little memory trip. Most of our popular scale modeling subjects flew out of this area. Because of turnover in NASA's sounding rocket fleet almost all the historic flight equipment here has vanished. The remaining large vehicle rail launchers are inside big rolling environmental shelters farther from the shore. The 1993 repair of the seawall has also swallowed up half of the apron areas.

While hunting down rusted footings I did manage to record King Zog (Alex) actually doing what we were there for: shooting the Antares. I also helped shout clueless video folks off the seawall. (The dune seagrass is a

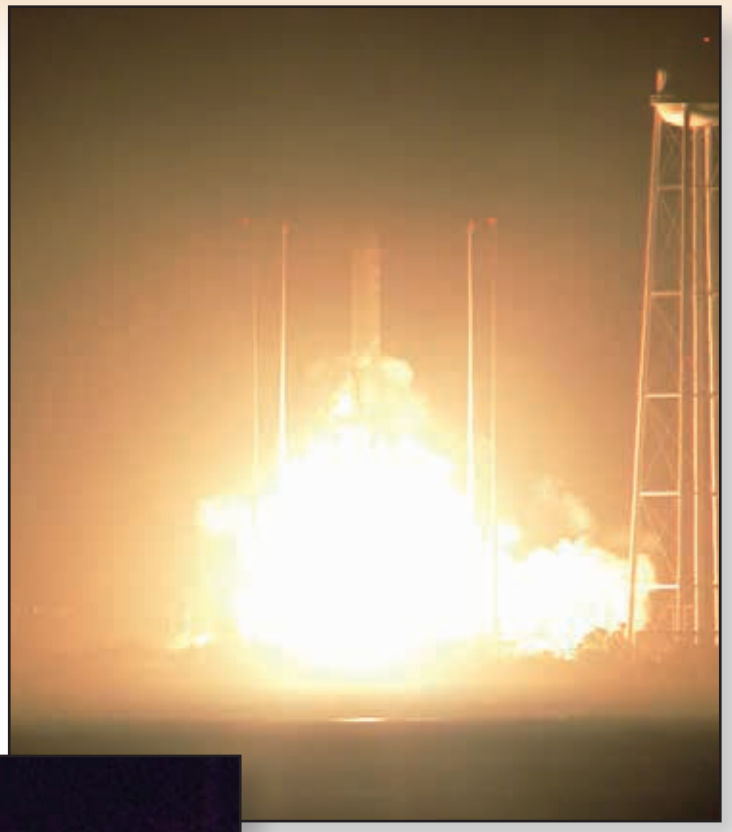
Antares OA-5 on the launch pad.
Photo by Alan Williams

very sensitive part of the shoreline stabilization project. If it fails, the island eventually disappears.)

We then moved down next to the old Area One Aerobee blockhouse, which put us roughly 850 feet from the rocket. I got some nice detail shots with my new Nikon Coolpix B 500, which has some surprisingly powerful optics and high resolution imaging chip.

We were then returned to the Visitor Center press site. Things among the NASA-Orbital info team went quiet for a while, then we heard that the flight would push to Monday evening because of a minor ground cabling problem. NARHAMS'ters DJ and Sally arrived and invited us to dinner. We scouted another shoot site on private property (actually closed because of behavior by previous tourist viewers), had a great meal, contacted Craig, then hit the sack. Six AM arrived on frenzied rooster calls from somewhere behind the motel. Thanks!

With no scheduled events at the press office till the move to the main view site, Alex got some time with Orbital ATK executive Barron Beneski. He gave us some really useful info. (By-the by, we could not have been better treated by NASA and Orbital information personnel throughout our trip. This, in spite of King Zog making me ask them if any Mars Bars were being shipped up for Halloween. His other burning question? "With launch failure-induced supply shortages aboard the ISS, how much replacement toilet paper was aboard Cygnus?" Official answer? "Enough!")



Antares OA-5 liftoff photos
Photos © C J Williams

Craig arrived around 2:00 and we reviewed our photo strategy. Alex would stay seven miles north at the Visitor Center and roll the dice on a single long time exposure from that view. DJ and Sally would be to the south, using his 600mm telephoto at the old NACA ferry dock. Craig and I would be just two miles across the marsh from the launch facility. We all had fine sightlines, great equipment, and years of experience on our side. What could go wrong?

At 5:30 we and some guests were bussed down to the media viewing site. On the way in we received a sobering and wholly appropriate set of emergency event

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Requirements	For motor-eject rockets 38mm and larger that fly at least 200 feet high.
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Antares OA-5 lifts off into the night sky an heads downrange.
Photos © C J Williams

instructions. It was interesting watching a few of the less serious participants realize that the lecture was for real. On arrival, Craig and I set up right in front of the U-80 NASA optical tracking installation. Most of our press brethren were established about 120 feet to our left. After emplacing and testing my two cameras I took some pleasant shots of Antares illuminated by the setting sun. Craig set up our complex of 500 and 800mm tele-lenses on high resolution still and video cameras, then started fighting mysterious power problems which kept him hopping almost till flight time. A large flight of geese arrived and began circling above us in the darkness. I worried about the consequences if they were still overhead when the rocket's sound hit. Then around T-10, we realized that an unexpected wash of cool marsh air had quietly painted our cameras with moisture. They were all dripping with condensation and I had not thought to bring wipes, since the weather had been very dry the past days. Since he had the big lenses I gave Craig the one paper towel I remembered in my pocket and said goodbye to any quality images from my fancy little camera.

7:45:46 PM was launch time, and Antares flooded the region with a gorgeous golden-orange glow as it rose. The moisture turned my flight shots into beautiful abstract-impressionist blobs. Then, the sound: a vast banging, crackling, hammering roar of power. Noisy, you might say. (Not Shuttle-loud, but close.) Craig's longest telephoto video brilliantly captured those geese blasting out of the marsh as Antares's sound ex-

ploded around them. Eventually I stopped shooting because of the lens fog and just watched as Antares left town. It had a high loft, and superb visibility. The rumbling took forever to fade. We were able to watch all the way to second stage shutdown and orbit at seven minutes and 113 miles high. I think that put it out near Bermuda. Astounding!

Within the hour we were beginning the trip back to D.C. It would take days to find out what we actually had. Bad Internet exposure advice dashed DJ's hopes, but the rest of the ZOG-43 crew did fine. And what do you know? The gosh-darn rocket really worked!

In mid-November Orbital-ATK announced that the February OA-7 flight had been cancelled. Instead, this Spring an expanded Cygnus cargo module will ride a ULA Atlas V vehicle out of Cape Canaveral. This will make up for recent mishaps in other ISS cargo missions and bring the delivered supply quantities closer to schedule. Assuming that other launch service suppliers come back in a timely manner, Antares Wallops missions are expected to resume in Summer-2017.

On November 27, Orbital also announced the successful end of the OA-5 Cygnus mission, with a controlled destructive return over the Pacific Ocean. All aspects of the delivery, exit from the Space Station, and subsequent free-flight operations, including deployment of four CubeSats and the operation of the SAFFIRE II space combustion experiment went as planned. All debris was safely destroyed by reentry forces.

Time exposure of the OA-5 Antares liftoff by Alex Mankevich.

Antares OA-5 on the pad.
Photo by Alan Williams.

The Antares at sunset.
Photo by Alan Williams.

Inside the Antares Horizontal Integration facility, with the OA-7 first stage.
Photo by Alan Williams.

Closeup of the Antares OA-5.
Photo by Alan Williams.

NARA

& Rock

Dear NAR Rocketeer—

It is hard to believe that the NAR is now 60 years old. We were founded on November 5, 1957. 60 years later, we are well past NAR number 100,000 and have nearly 7,000 current members, by far the greatest number in our history. It's time to have the 60th NARAM and to celebrate the NAR's success and remember its history. NARAM-60 will be held in Pueblo, Colorado, from August 4 to August 10, 2018, and on the evening of the opening day we are holding a "Rocketeer Reunion" as part of the celebration. I invite you to come to Colorado and join us for this special evening, and for as much of NARAM-60 as you can. Many of us were at the last reunion at NARAM-50 and know that an event like this and the opportunity to re-connect with old friends is a lot of fun. The Rocketeer Reunion 2018 is intended to bring together all generations of NAR members to share fellowship and memories. Vern and Gleda Estes will be there, as will Bill and Lisa Stine. It would be great if you could come as well.

- Who's invited: Rocketeers of all ages
- Where: The Pueblo Convention Center and adjacent Courtyard by Marriott Pueblo Downtown, Pueblo, Colorado
- When: Saturday, August 4, 2018, 5 p.m. to 10 p.m.

Registration is not yet open for the Rocketeer Reunion, or for NARAM-60, and it will not be for another couple of months, but I wanted to contact you early with this "hold the date" notice before you have made your personal plans for the coming August. The web address www.naram.org will point to the NARAM-60 website once it is up; it still points to last year's NARAM as of now. If you are considering attending the Reunion, even if you are not yet sure you can, please send me a note so I can put you on the distribution list for further information.

THANK YOU!

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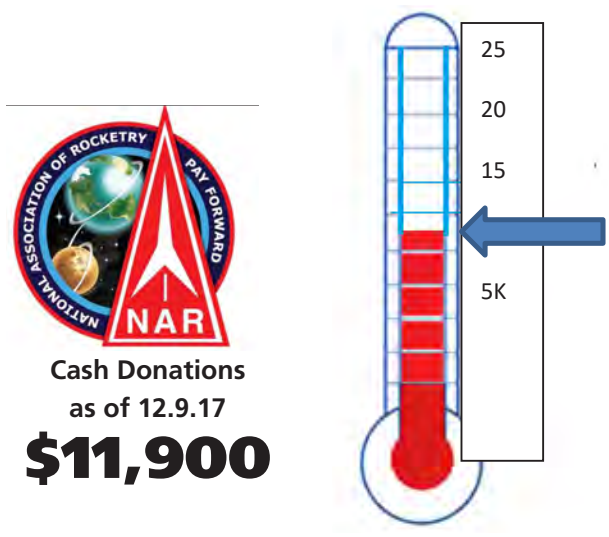

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M 60
keteers Reunion

As long as we are talking about sharing history and memories, I'd like to tell you about another way you can help pass along the legacy. The collections of G. Harry Stine, Vern Estes, and Lee Piester have all been donated to the Museum of Flight (MOF) in Seattle over the past few years, where they will form our hobby and our NAR's cornerstone historical collection. This is a massive amount of material. A few memorable items are on display there already in a great rocketry exhibit that opened in 2015 (seehttp://www.museumofflight.org/Exhibits/inspiring-rockets) but most of the material is still in storage, awaiting full cataloging and archiving. At the current rate, that work on Harry's collection alone won't complete for another 10 years. The NAR and MOF both want to make this incredible asset available to rocketry and space enthusiasts in a more timely manner. MOF has estimated a full time museum professional will require 2 years to complete the Stine work in compliance with Smithsonian Institution standards with an online finding aid to allow an overview of collection content and an ability to respond to reproduction requests.

MOF estimates the total cost of augmenting their capacity to get this work done in two years at $100,000, and has committed to raise $50,000 of this from their own donor base. The NAR Board of Trustees has committed $25,000 to a Historical Fund for the project. NAR members and supporters need to raise the final $25,000 by individual donations. This is where you come in. If you can help this important project preserve our hobby's legacy, please go to www.nar.org/donate to see more and to make a donation. A number of us have already made significant donations (8 people are at the $1000+ level), but we have a long way to go and need your help.

I hope to see you on August 4, 2018, in Pueblo, Colorado.

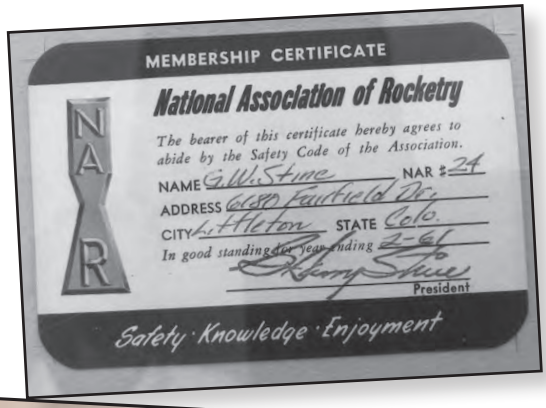
Trip Barber
NAR 4322

The Old Rocketeer II

by Bill Stine NAR #24—

Growing Up in the Stine Workshop

I've been an NAR member since the night I was born in 1960. Growing up as G. Harry's son was a very unique experience. Most of my earliest life memories are from our basement workshop at 127 Bickford Lane in New Canaan Connecticut.


MEMBERSHIP CERTIFICATE

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The bearer of this certificate hereby agrees to abide by the Safety Code of the Association.

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President

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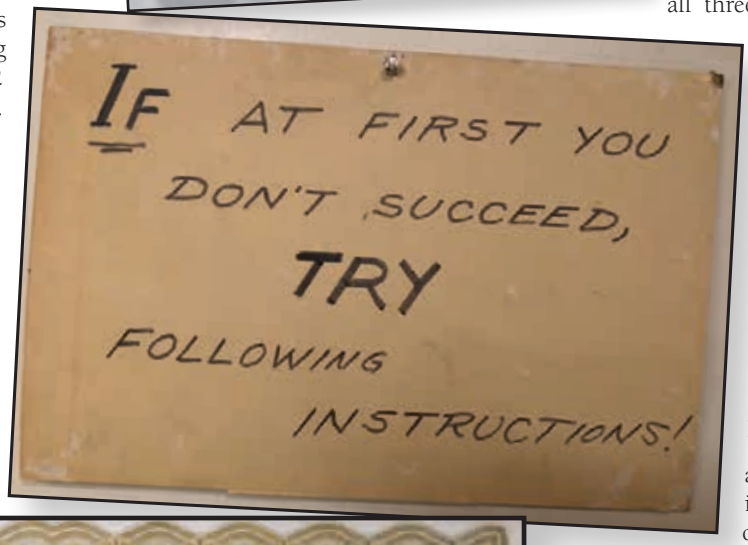
Before I was old enough to build models myself, there was always a stool next to my dad's workbench and I would sit there for hours just watching him model. Besides building model rockets, Dad enjoyed building 1/72 scale plastic aircraft models and HO trains. Too young to really build models myself, I was often in charge of balsa dust clean-up at the lathe with a vacuum cleaner. I loved that job! When I wasn't sitting next to him at the workbench I was sitting next to him at the drafting board. He was an excellent draftsman and was an absolute wizard with a Leroy Lettering set.

As I grew older both of my older sisters Connie (NAR#1300) and Ellie (NAR#1955) became active NAR competitors and evenings and weekends in the Stine workshop had four of us in there at one time. Nights and weekends before NAR contests were a busy time in the Stine workshop. NARAM was always our family summer vacation. Before I was old enough to compete, I would hang out with Rick Piester.



Dad taught us a myriad of building techniques and all three of the Stine kids learned to use the Unimat lathe and Badger airbrush (and especially how to clean it after use). Dad was big on using self-made fixtures like stands, paint wands, and rotating rocket holders.

G. Harry attended high school at New Mexico Military Institute and that upbringing resulted in a lot of rules for the Stine kids. Of course many were common sense safety rules like "Always wear eye protection—you only get one set of eyes—protect them!". My favorite was a written rule on the shop wall "IF AT FIRST YOU DON'T SUCCEED, TRY FOLLOWING INSTRUCTIONS!"

I have no idea how my father had so much energy. My bedroom was right above his basement office (right next to


NEW CANAAN YMCA SPACE PIONEERS SECTION

NATIONAL ASSOCIATION OF ROCKETRY

Certificate

TO ALL WHOM THESE PRESENTS MAY COME, GREETING:
BE IT KNOWN THAT:

BILL STINE

has heretofore exhibited his prowess as a Competent Model Rocketeer by virtue of enduring nine solid months of intensive and extensive training;

AND THEREFORE,

in recognition of his talents, some exhibited and some he would just as soon forget, he is therefore granted the full rights conferred by this Certificate, to pronounced capable of building all sorts of model rockets with a reasonable chance of success in flying them; is certified as an expert ride climber and long distance runner; is possessed of eagle-type colorblind eyeballs capable of tracking model rockets in flight;

AND FURTHERMORE:

is authorized to pass as an exacting expert on the strength of being able to turn out, with prolific fortitude, strings of incomprehensible formulae calculated with incremental precision from extremely vague assumptions based upon debateable figures obtained from inconclusive tests and quite incomplete experiments carried out with instruments of problematic accuracy and by persons of rather dubious mentality.

WITNESS our hands and Seals given this 5TH day of JUNE, in the year of our Lord 1972, at, by, and for the New Canaan Community YMCA Space Pioneers Section of the National Association of Rocketry, certifying that the aforementioned Expert is a member in full and complete standing.

Section Chairman

YMCA Youth Director

Top: Bill Stine's original NAR membership license, issued upon his birth.

Center: One of the common sense rules posted on the wall of the Stine workshop.

Bottom: The certificate Bill received for completing the YMCA Space Pioneers rocketry course.

the workshop) and most evenings I remember falling asleep to the sound of him typing below. Later in my teenage years when I began having less interest in rockets and more interest in girls, many nights I couldn't talk on the phone because Dad was already on it talking NAR business.

Harry being the Senior Advisor for a very active NAR club (YMCA Space Pioneers) in the late 1960s and early 1970s resulted in Space Pioneer club members working on many contest event development projects. Model rocketry was unfurling as a hobby. There was much to learn and experiment with. Boat tails, gliders, rocket gliders, plastic model conversion, and even drag race — G. Harry helped pioneer early designs in all these areas and the kids in that club all helped.

Test shots of the parts for the Pilgrim Observer plastic model kit.

As I became older, it seemed more and more of my life became about being in the workshop and helping Dad. In 1969 he started consulting for Model Products Corporation (MPC). Suddenly, boxes and boxes of model rocket parts would arrive at the house. Initially it was all balsa parts and so many came in MRI packaging (MPC bought MRI and changed it into MPC). Then came the plastic parts. 20mm and 25mm one-piece fin units, nose cones (20 years later I started Quest with those same molds). And then came the Titan, Vostok, and Pilgrim Observer kits. We test flew everything dozens of times and Dad always waited for me to get home from school and then we would go up to Waveny Park in New Canaan to test fly something.

In the Spring of 1972 I took my father's famous YMCA Space Pioneers "rocketry course." Texas Instruments had just released the famous SR-10 slide rule calculator. We immediately acquired one but I was not allowed to use it and had to use my slide rule throughout the whole course. Dad insisted that I wouldn't understand the math if the calculator did it for me (and he was right). Sometimes I did get to check my slide rule math with it. Every other Monday night the course was held at the local YMCA—and as son of the teacher, I never got to miss a class or skip doing my homework.

Despite being a very stern Range Safety Officer at NAR events, Dad often allowed me to experiment on my own when it was just the two of us flying. One of my funniest and memorable experiments was to fly a Centuri Orion with a MPC Mini-Jet B3-3 (we happened to be test flying B3-3 motors for MPC that day). It lumbered off the pad very slowly and once it cleared the top of the launch rod it just lay over on it side and fell to the ground with motor the delay smoking. It was always a good thing when Dad would laugh with me at one of my failed experiments.

I miss his laughter and mentorship. Now many years later, my grandson Oliver sits on the stool next to me in my workshop.

Best Rocket Gadget Ever!

Jolly Logic Chute Release

Review by Thomas Beach

I've had a lot of devices I thought were the "best rocket gadget ever" over the years, but I have a new favorite: The Chute Release from Jolly Logic. This incredibly handy and easy-to-use device can revolutionize your rocket flying, making it possible to recover your rockets in limited field space without a lot of hassle.

Good old electronic altimeter dual deployment has been in common use for a couple decades now, allowing us to recover our rockets gently closer to the launch pad by deploying a small drogue chute near apogee, and then waiting to deploy the large main parachute closer to the ground. But dual deployment it is often a hassle to implement—you have to modify your rocket design to include an avionics bay, include multiple parachute compartments, run wires, deal with deployment charges, etc.). The Jolly Logic Chute Release gives you a similar capability to recover your rocket with minimal wind drift, but with much less hassle to prep—and it works on unmodified rockets.

The Jolly Logic Chute Release is an electronic device in a 2.13" x 1.22" x 0.44" plastic case that you attach to your rocket's shock cord or parachute lines with a tether. The device incorporates a barometric altimeter to monitor the altitude of your rocket. The Chute Release has an elastic band attached to one side that has a release pin on the free end. You wrap the Chute Release's elastic band around your folded-up parachute and click its release pin into the release latch hole on the other side of the device. The elastic band holds your parachute snugly closed.

When ready to fly, you turn on the Chute Release and set the desired parachute deployment altitude using two buttons on the device. The parachute and Chute Release go into your rocket's parachute compartment. The bundled parachute and the attached Chute Release are ejected from your rocket near apogee by your rocket's normal deployment method (usually this would be ejected by the motor's ejection charge, but the parachute could be ejected by a deployment charge controlled by a separate altimeter system). The Chute Release stays clamped around your parachute and allows your rocket to descend quickly from apogee. When the rocket reaches your preset altitude, the

The Jolly Logic Chute Release with its rubber band snugly holding the rolled-up parachute closed, ready to be turned on and flown.

Chute Release mechanically releases the pin on the end of the elastic band, allowing the parachute to open fully for a gentle landing.

Limitations

The Jolly Logic Chute Release is a device to hold your rolled-up parachute closed as your rocket descends to the preset deployment altitude. The Chute Release is not a device for ejecting the parachute from the rocket—you rely on your normal motor ejection charge to deploy the bundled parachute from the rocket (or, if you don't want to use motor ejection, you can use a separate altimeter or timer based system to eject the bundled parachute from your rocket). What you do not need, however, is a separate deployment system for deploying a second parachute at low altitude, because the Chute Release is taking care of seeing that the main parachute is allowed to open at low altitude.


Photo 1.


Photo 2.

The size of the Chute Release limits the diameter of the rocket you can use it in. It fits into BT-60 (1.595" i.d.) or even 38mm motor tube with parachutes that can be packed small (such as plastic Estes chutes, or small thin-mil Nylon chutes), but it's important the the Chute Release and bundled parachute can easily slide in and out of the tube. Jolly Logic recommends that you use the "puff test" to see if you can easily blow the bundle out of your rocket by blowing into the rear of the model. Be careful that the shock cord mount or other obstructions inside the tube will not prevent

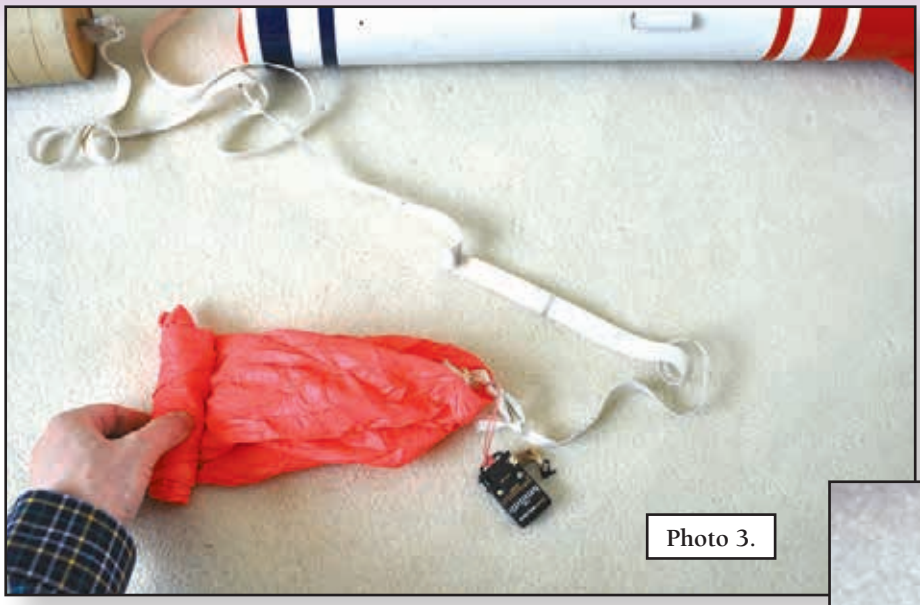


Photo 3.

ejection. The Chute Release is a wonderful device, but it isn't going to do you any good if you can't get it and the bundled parachute out of the rocket.

The Chute Release begins measuring the air pressure when you turn it on to determine the elevation of your launch site. It determines that your rocket has been launched when it senses a drop in air pressure indicating that it has gone up above 100 feet (for at least three seconds), so your rocket must fly a minimum of 100 feet above ground level for the Chute Release to work.

The mass of the Chute Release is just under 18 grams (with tether and small elastic band).

Operation

The Chute release has two recessed buttons to control the device. It might look like these buttons are difficult to push, but don't be tempted to poke them with a pointy object—your fingers will work (and if they don't, I suppose you could use the eraser end of a pencil to push the buttons). Pressing either button will turn on the device, and then it will flash its LEDs briefly to indicate the software version number and let you know it is reading the ground level air pressure. After that, the display settles down and shows you the battery charge (with a row of five LEDs), and the altitude that is set for parachute release (with a row of nine LEDs that indicate a release altitude setting of 100, 200, 300, 400, 500, 600, 700, 800, 900, or 1000 feet). Pressing the left or right buttons will decrease or increase the release altitude setting.

If you press the right button enough times to move the altitude setting beyond 1000 feet, the device turns off. If you press the left button enough times to move the altitude setting below 100 feet, the Chute Release will perform a ground test: The LEDs will illuminate in sequence from 1000 to 100 to give you a visual countdown, and then the internal servo will activate to release the latch pin. The Chute Release turns off automatically after a ground test (and after a normal deployment). You should perform a ground test before every flight to be sure that the Chute Release will properly release your bundled parachute (details on how to fold the parachute are given below).

Photo 4.

Prepping

The Chute Release comes with two different lengths of elastic bands. The short bands are for parachutes smaller than 36 inches in diameter, and the long bands (hidden under the foam insert inside the Chute Release box) are for larger parachutes. One end of the elastic band is attached to a bar on the side of the Chute Release case using a simple "cow hitch" and the other end is similarly attached to the

ring of a release pin.

You don't want to lose your Chute Release when it releases its grip on your parachute, so the Chute Release must be tethered to your rocket. Jolly Logic provides you with a tether loop that you attach to the plastic case and to your recovery system. I attach the tether to the place where the parachute is attached to the shock cord. It is important that you attach this tether in such a way that stretching the shock cord does not put any stress on the Chute Release (the Chute Release is only supposed to hold the parachute closed—it is *not* supposed to take any loads from the shock cord).

Remember to attach the tether to the recovery system before the steps below (it's much easier to do that before you wrap the Chute Release's elastic band around the parachute).

There are multiple ways that you can fold your parachute, but it's important to use one that will prevent getting the Chute Release tangled in your parachute's shroud lines after release. So, you have to use a folding method that keeps the shroud lines on the inside of the parachute bundle. The method recommended by Jolly Logic is shown in the accompanying photos. First, "spike" your parachute, then fold the lines back over the chute so that the parachute's attachment knot is just beyond the apex of

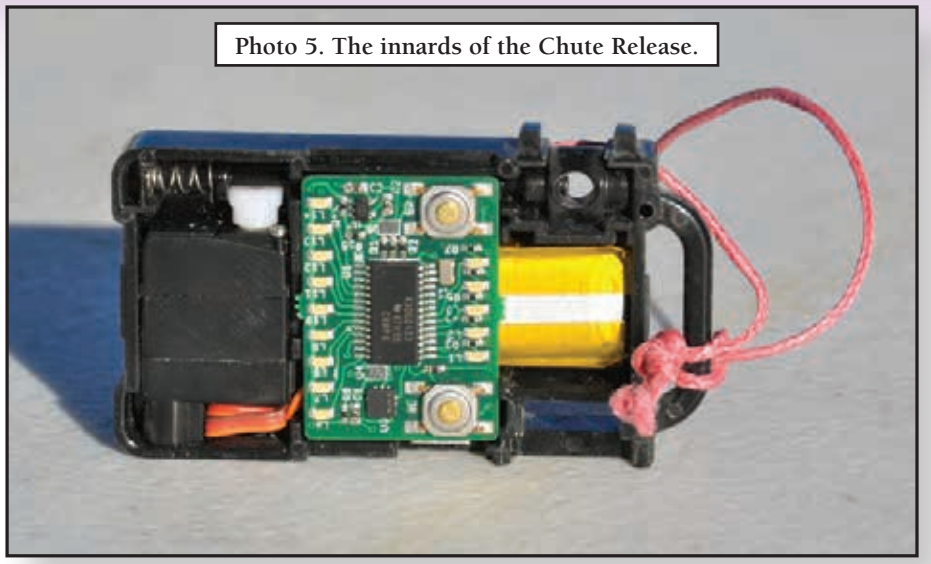
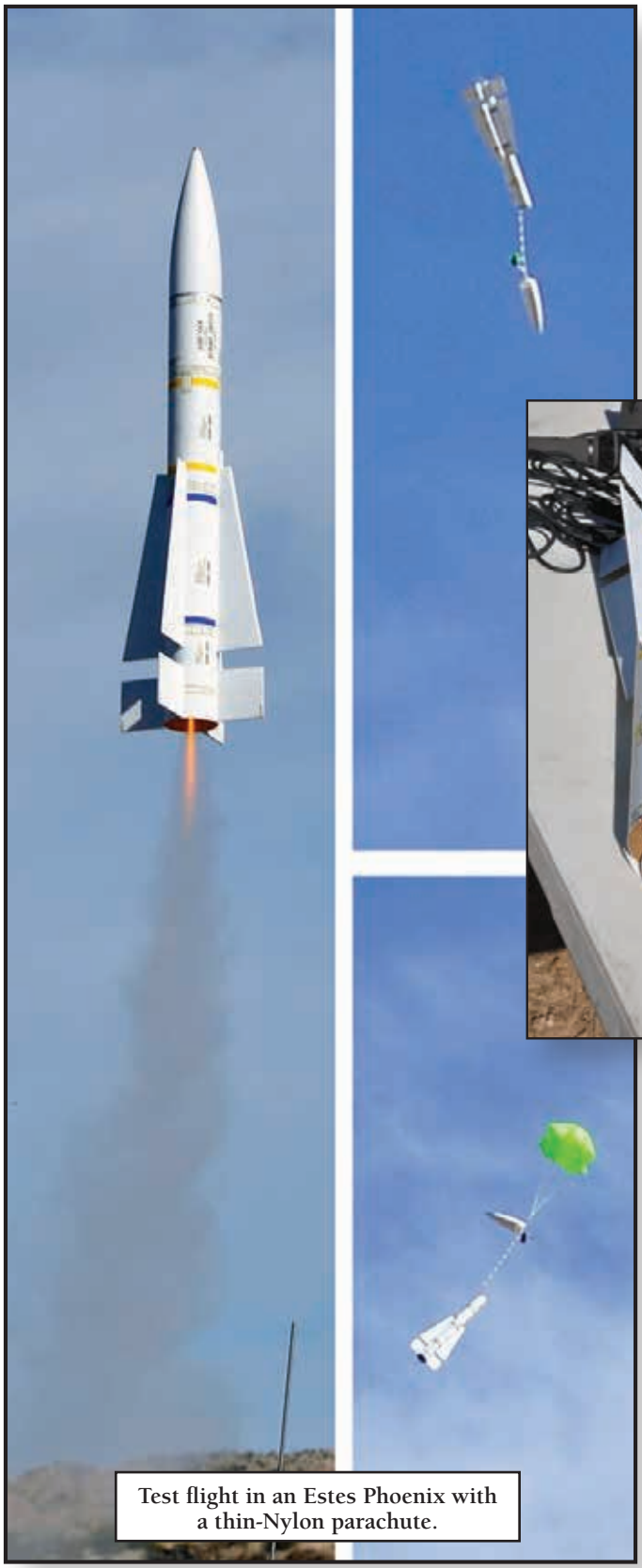


Photo 5. The innards of the Chute Release.

View of the Chute Release showing the latch pin and attachment tether.

the parachute (see Photo 1). Then fold in the parachute from the sides as needed to cover the shroud lines and get the width of the bundle to something that will fit nicely into your rocket (see Photo 2). Then roll up the parachute from the skirt end (where the shroud lines are attached), toward the apex (see Photo 3). Roll



Test flight in an Estes Phoenix with a thin-Nylon parachute.

it tightly! You want this bundle to be compact and to spring open when released.

Once the parachute is rolled up, place the Chute Release on the side of the bundle and stretch the elastic band around the bundle and click the release pin into the latch hole (see Photo 4). Note that the barrel with the latch hole through it can rotate (I rotate it around to the angle that will allow easy insertion of the pin before I wrap the band around the parachute).

At this point you should do a shake test—shake the bundle around and tug on the shock cord as needed to assure yourself that the Chute Release will stay snugly in place. Jolly Logic also recommends that you perform a ground test at this time to be sure the Chute Release will properly release your parachute (and then you get to re-prep it again).

Be sure the parachute/Chute Release bundle slides easily in and out of your rocket's tube.

Flying

When you are ready to fly, remember to turn on the Chute Release! I suspect that a large percentage of failures when using the Chute Release system are the result of people forgetting to turn on the Chute Release. The battery will keep the Chute Release on for a long time, so don't be afraid to turn it on early. Jolly Logic sells a nice "ARM ELECTRONICS" warning banner that attaches to your rocket with Velcro...but a piece of bright streamer material stuck onto the side of your rocket with a piece of tape can serve the same purpose.

Double-check that your release altitude is set to the correct height before stuffing the parachute bundle into the rocket. Be aware that your rocket may fall some distance after release before the parachute opens fully and the rocket slows down (Jolly Logic says this typically takes 50 to 125 feet). This distance will depend on the specifics of the rocket and parachute and your folding method, but it is a good idea to give yourself a little leeway.

It isn't necessary to put vent holes in the parachute compartment for the Chute Release sense atmospheric pressure (although a small vent hole is a good idea on high-flying rockets to prevent pressure inside the parachute compartment from pushing off the rocket's nose as it ascends to altitudes with lower pressure). The Chute Release is clever enough to figure out that it has been blown out at altitude (as long as it's above 100 feet for 3 seconds), and the pressure spike inside the parachute compartment during ejection doesn't seem to bother it. Jolly Logic does sell little pouches to pro-

tect your Chute Release from stray ejection gunk...but I fly mine nekkid.

You don't have to worry about what happens if your rocket never goes higher than the release altitude you set—the Chute Release is clever enough to release your chute immediately if that happens.

If you ever want redundancy when releasing a big parachute on an important rocket, Jolly Logic will happily sell you *two* Chute Releases so that you can connect them in series around the parachute bundle (the pin of one device plugs into the other device)—that way, if either device releases, your parachute is released.

Charging

The Chute Release comes with a cable that allows you to charge your Chute Release from any standard USB port. The battery should last for several flights before needing a charge—and it always shows you the charge level when you turn it on.

The small LiPo battery inside the Chute Release is apparently the same one that Jolly Logic uses in their Altimeters, and it can be replace by the user if it ever goes bad (no soldering required).

Test Flights

When I got my Chute Release back in March 2016, I brought it to our Zia Spacemodelers club launch and let anybody who wanted to give it a test flight have a go. From our experience that day (and subsequent launches), the Chute Release works well with large and small chutes, and with cloth and plastic chutes.

In fact, we gave it more of a test than I bargained for when one of the rockets failed to eject before impact. Ouch! My pretty new Chute Release! But when the remains of the rocket were retrieved, the Chute Release looked fine, and had apparently let go of the parachute as it was supposed to. So the Chute Release is one tough beastie.

Innards

After its crash, I decided to open up the Chute Release to see if it looked like anything had shifted around or broken inside—so you get to see a picture of the innards! (See Photo 5.) Everything looked fine. In the center is the circuit board. On the right (in the picture) and behind the circuit board, is the battery. On the left is a servo. Along the top is the rod that protrudes into the latching hole, you can see the bit sticking in that engages the pin. The spring on the top left pushes the rod to the right, and a cam on the servo pushes the rod left against the spring for release. Compact, clever, and well designed. I love nifty rocket toys.

Summary

The Chute Release is available for $129.95 from www.jollylogic.com and its suppliers. It's easy to adapt to existing rockets, and simple to fly. It could save your precious rockets from drifting away, never to be seen again—not to mention saving you time from having to do long recovery walks when you could be flying more rockets instead.

Cadet Tim Dye checks the igniter on this model prior to launch.
Photo by Frank Panek.

NAR Section Assists Civil Air Patrol Cadets Earn Rocketry Badge

by Frank M. Panek NAR 89806 L2
and Vince B. Huegele NAR 37520

The Blue Ridge Rocketeers (BRR) is a new NAR Section (#759) located in the eastern panhandle of West Virginia. In addition to providing support for local TARC teams, the section recently assisted the Martinsburg Composite Squadron of the Civil Air Patrol (CAP) with their Rocketry Program and provided the launch opportunities for several cadets to complete the requirements for their Rocketry Badge. This joint activity was particularly timely because a new Memorandum of Understanding had been recently adopted by the NAR and CAP Headquarters at Maxwell Air Force Base, Alabama. The MOU fosters greater cooperation among NAR Sections and CAP Squadrons and encourages both organizations to explore joint opportunities. The CAP Rocketry Program and the enhancement of CAP involvement in TARC have obvious benefits to both organizations. In the case of the BRR, this cooperation was made simply by the fact that both the Commander of the Squadron and the Deputy Commander for Cadets were the founding members of the BRR.

The Civil Air Patrol's Rocketry Program is one of many programs in aerospace education (AE) that are available to cadets. Aerospace Dimensions is the primary program tool for delivering aerospace education to cadets. It includes six modules: Introduction to Flight, Aircraft Systems and Airports, Air Environments, Rockets, Space Environment, and Spacecraft. Each of these modules is supported by a manual that is available in print or on-line, by classroom instruction provided by an Aerospace Education Officer during cadet meetings and by on-line testing to assess cadet learning and comprehension. For an overview of many components of CAP's AE Program, go to http://www.capmembers.com/aerospace_education/.

CAP's Model Rocketry Program is a phased achievement program for cadets interested in STEM careers. It builds upon the cadet program in Aerospace Dimensions to teach rocket history and the basics of rocket science, model rocket building, and the safe launch and recovery of a model rocket. There are three stages in the program, each of which includes classroom instruction, hands-on activities and proficiency testing. The **Redstone Stage** reviews the history of rocketry and its great pioneers; the **Titan Stage** details the physical laws which govern objects on the Earth, in the air, and in space; and the **Saturn Stage** presents information on trigonometry for altitude tracking and the physics of impulse and thrust associated with solid rocket engines. A cadet must complete all the activities and pass the three tests to be awarded their Rocketry Badge. It is a significant cadet accomplishment and one that more than adequately prepares them for another STEM activity: the Team America Rocketry Challenge.

In BRR's efforts with the Martinsburg Composite Squadron, we examined all of the rockets built by the cadets for craftsmanship and safety and organized a launch on our local field in which the cadets flew their single stage Estes Patriot and their two-stage Estes Long Tom. The former model was to satisfy the requirements for Titan Stage and the later for the Saturn Stage. NAR members assisted the cadets with altitude tracking on all their flights. It was a long day, but a fun day for both the CAP cadets and the BRR members.

There is a great need and many opportunities for collaboratively "paying forward." CAP has about 1,500 squadrons and 25,000 cadets with squadrons in every state. In 2014, only three of these squadrons supported a TARC Team—Polaris Squadron (Alaska), Monticello Composite Squadron (Virginia), and Martinsburg Composite Squadron (West Virginia). BRR assisted the Martinsburg team by providing launch opportunities with NAR observers on hand for their qualifying flight attempts. The team's qualifying flight scores earned them a place in the National Fly-off at Great Meadow.

How can NAR Sections assist CAP with the Rocketry Program or help mentor a TARC Team? The answer is quite simple...get to know your local CAP Squadron, meet the Squadron Commander or the Aerospace Education Officer, and see how you might work together to promote model rocketry. How do you find your local squadron? Again, this is an easy task. Go to CAP's website at http://www.gocivilairpatrol.com and enter your postal ZIP Code. The search engine will generate a map and contact information

Civil Air Patrol, Martinsburg Composite Squadron participates in the 2014 National TARC Fly-off at Great Meadows, Virginia.
Photo by Frank Panek.

for the squadrons nearest to you. Make the telephone call or go down and visit with the squadron on one of its meeting nights.

Redstone Learning Objectives

- Identify historical facts about the development of rockets.
- Describe the major contributions of the four great rocket pioneers.
- Recall facts about the rocket pioneers' lives and accomplishments.
- Design, build and launch two non-solid fuel hands-on rocket options.

Titan Learning Objectives

- Explain Newton's three Laws of Motion.
- Describe the aerodynamics of a rocket flight and recovery.
- Build and launch a single stage scale model rocket.
- Demonstrate knowledge of the NAR Model Rocket Safety Code

Saturn Learning Objectives

- Determine a model rocket's altitude.
- Describe the structure of a model rocket motor (black powder and composite).
- Understand motor coding
- Build and launch a two-stage model rocket.

Cadets Nikki Orr and Tyler Mason prep their rocket for launch.
Photo by C/MSgt Jake Kemman.

Navigating the Team America Rocketry Challenge Presentation Competition

by Christopher Stone NAR 100891

While many teams prepare to compete for the Team America Rocektry Challenge National Finals in the spring, most are focused on the main event—the design, building, and flying of their team rocket. However, there is another competition that provides beneficial experience for rocket teams that could serve you well in life, especially in the aerospace industry. This is the presentation competition, where teams choose to compete using their professional skills of communication.

As a judge in 2016, I want to be sure everyone knows that while the main challenge of design and engineering is huge and is indeed a tough nut to crack given the restraints and constraints for the design of your rockets, it is by no means easy to prepare a professional presentation for a wide audience—especially when discussing rocket design and flight testing. This article will provide one judge's thoughts about the presentation that could help those teams considering entering this additional competition, one that has benefits of its own. Last year's team for instance received autographed copies of *The Martian* by Andy Weir! The biggest benefit will be the experience you gain of presenting a complex topic under time constraints.

Last year, the judges utilized five criteria for judging presentations:

Delivery – Do the speakers have a smooth and clear delivery? Do their voices, poise, and eye contact make a favorable impression? Notes may be used, but should not be just read aloud.

Organization – Does the presentation have a logical organization? Do the speakers make clear what was done and how it was done?

Visual Aids – Do the speakers use visual aids appropriately? Were the slides helpful or distracting? Did

the speakers use any other aids such as models, sub-assemblies, etc.

Familiarity with the Subject – Do the presenters demonstrate adequate knowledge of the subject? Did they answer questions fully and clearly?

Time – Speakers may use six minutes for the presentation (plus two minutes for questions). Did they adhere to the six-minute limit and finish their presentation within it?

As you can see, with time constraints, this is not just you standing up and talking about how cool your rocket is and how great the team worked together—although that could certainly be part of it. As someone who has given presentations to space program managers and industrial team leads regarding space and missile programs in the Pentagon and elsewhere, below are some tips for each area for you to consider:

Delivery:

a. *Choose your presenters:* One thing that I noticed from the teams that did well in the rankings is that they didn't bring their entire team with them and force each to speak a portion of the presentation. That sucks up time and not everyone on the team wants to stand up in front of people and talk about their stuff. You want the best three or four members of your team to be your sales people. Why? If you are selling a product or a project to a senior leader in Government or the space industry, you are dealing with people with a lot on their plate and not a lot of time to do extra work of researching your team. Confidence will take you along way. So choose those that are the most comfortable with talking in front of people and *very* importantly, understand and can speak to each part of your project that is relevant to your rocket. More on that later.

b. *Professional image:* Realizing that it's spring in Virginia and it can be hot, you will want to think about what your presenters wear to the presentation. It doesn't have to be a suit, and I wouldn't recommend that given the setting, but khakis and polos look good or at least a nice shirt and pants would go a long way toward showing not only you are serious about the rocket project competition but your presentation as well. Some teams from private schools have more funding than smaller school teams, but you can find innovative ways to dress for success.

Organization:

a. Organizing your material in a coherent, smooth flowing fashion: This is a big deal. Some teams that didn't do as well tended to put *way* too much information into each slide and not follow a consistent pathway of how their proj-

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ect was created, how the design process went, etc. It also didn't look rehearsed.

Visual Aids:

a. *Don't overdo it:* Be sure that you can present your information in sequential order, with just enough information on the screen to provide backdrop, but, in the end, your knowledge coming out in your presentation is where the money is made. If we are reading everything on the screen that you are saying, it's too scripted and wont look as professional.
b. *Readable charts and graphs are outstanding:* Some of the best presentations had great images that we could read from our seats. Those that weren't easy to read were useless to judges to gather the information from your presentation. A few groups that were in the top three or four, if they had images that could be hard to read, provided *color* printouts of the briefings for each judge. That is a great thing that shows professionalism and sets you apart from other teams.

Familiarity with subject:

a. *Choose only the most important information to demonstrate knowledge:* Fully and clear answers do not mean we need every bit of data you extracted from test flights or computer simulations. It does mean that you can present what your testing and design process showed you, what you learned and how you adjusted your design to compensate for challenges.
b. *Positive attitude and Confidence:* Keeping a positive attitude during this part is key. Confidence will take you along way provided you have knowledge behind it. Those teams that looked like they didn't know what they were doing or were pushed into the competition did less well. Those who knew their stuff and got into the meat of the project were able to answer questions from some of our more technically inclined judges and were very impressive to all.
c. This also does not mean you have to use words that are not within your normal vocabulary. Using terms that you wouldn't normally use sounds fake and doesn't add to your presentation. If you need to use tech terms however to explain the design and test processes, that is fine and encouraged. Be sure to explain any acronyms or what you mean by things that you develop internally as the judges and others watching won't have that inside knowledge.

Time:

a. *Use time wisely:* Six minutes isn't a lot of time, but it's enough if you use all that has been discussed earlier in this article to save time.
b. *Practice, Practice:* Make sure you practice beforehand and if you are going to tag team, be sure that each person is able to speak to the project equally. It's not always best to let one person be the only person to answer questions. Show how strong you are as a team by having the best, most knowledgeable people promoting your project. It will improve your presentation and will make it more enjoyable for your teammates as well.

Conclusion

This is still a fairly new competition, but it's a skill that is a very big part of the space industry and government space agencies. Briefing your idea for a major space program is what either gets the vehicle off the drawing board and into a fully funded mission on the launch pad or becomes another could have been space effort. It can be fun or it can be tedious. It's all in your attitude and what you make of it. If you haven't participated in this competition I would encourage you to add it to your mix of events for the next TARC. It's well worth the time and will serve you well in life even if you don't pursue a career in space and rocket technologies. Best of luck and happy flying!

Christopher Stone, a 2016 Presentation Competition Judge, has served as a launch officer for the U.S. Air Force's Minuteman III ICBM, a Mission Director with the NRO, a space policy analyst on the staffs of the National Security Space Office, Principal DoD Space Advisor Staff, and has worked several industrial councils with NASA. He can be reached with questions at stonechr99@gmail.com.

WRITE IT...

and Get Paid!

Sport Rocketry is looking for full length feature articles with high quality photos/illustrations. Articles such as building projects, technical topics, and "how to" subjects are needed. *Sport Rocketry* is also looking for additional, shorter, perhaps less technical, but still substantive articles. Examples of shorter articles that have been published include: outreach events, local or regional launches, and simpler builds.

Feature article authors will receive $350 after publication of their article. Authors of shorter articles will receive a free year's NAR membership. Decision on payment is based on the quality and subject matter of the article and is at the discretion of the Periodicals Committee Chair, Mark Bundick.

Do you know someone in your club or a NAR member attending your launch who has an interesting project or model you think would make a good article? Please send those suggestions, along with any contact information on the project owner, to Periodicals Committee Chair, Mark Bundick for follow up.