

# ZOG-43

In this ZOG:  
Sightings  
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Zog-43  
Volume 44 Number 3  
May/June 2022  
Official NARHAMS Newsletter  
Editor: Sarah Jackson

From the Editor- May/June 2022  
Sarah Jackson, NAR 101372

Hello NARHAMSters!

ZOG-43 is dedicated to model rocketeers of all ages, abilities, and interest. We are committed to providing the most current, up-to-date information on model and real world rocketry, and to provide educational material, as well as, entertaining information.

ZOG-43 is published bi-monthly and is available to all paid up members of NARHAMS. Club membership is open to all, dues are 10 cent per week.

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About NARHAMS

The National Association of Rocketry Headquarters Astro Modeling Section, or NARHAMS, serves Baltimore, the state of Maryland., Washington, DC and the surrounding Metropolitan areas. The club is a section (#139) of the National Association of Rocketry (NAR).

We are the oldest continuously active model rocket club in the United States, first established as a high school club in 1963, changing our name to NARHAMS when chartered as a NAR section in 1965. NARHAMS is the only seven time winner of the NAR "Section of the Year" award (1997, 1998, 1999, 2001, 2004, 2006, and 2007).

NARHAMS members regularly fly their model rockets at NASA's Goddard Space Flight Center in Greenbelt Md and at Old National Pike Regional park near Mt. Airy, Md.

NARHAMS welcomes all to our monthly meetings and launches.

For details, dates and directions to our club, meetings and launches, go to: <http://narhams.org>

I bring you the next edition of ZOG-43. NARHAMSters were a busy group of people this summer. You went to lots of launches and outreach activities. You volunteered and mentored. And boy, did you write a lot of articles about what you've done and know. I wasn't able to fit all of the articles on hand in this edition, but never fear, if you've submitted some words, they will get published.

The September meeting is coming up, which is when we hold our annual elections. Please join the meeting and nominate or volunteer to join the exclusive officer circle. The Secretary position is open!

In October we will be hosting a TARC outreach session at our monthly meeting. We hope to have some TARC teams ready to learn present.

Keep flying safe, folks!

For questions, answers, opinions, files, photos, and more NARHAMS, join the [NARHAMS Groups.io](http://narhams.org). Also checkout the [Facebook](#) group, and of course, the website at [narhams.org](http://narhams.org).

**Front:** Called the Cosmic Cliffs, the region is actually the edge of a gigantic, gaseous cavity within NGC 3324, roughly 7,600 light-years away. *Photo by James Webb Space Telescope.*

**Back:** Rockets fly again at the June Goddard launch. Folks were happy we were back. *Photo by TSgt Daniel Peterson.*

ZOG ROYAL COURT  
(NARHAMS OFFICERS)  
ZOG (President) Alex Mankevich

VICE ZOG (Vice-President) Alan Williams

COLLECTOR OF THE ROYAL TAXES  
(Treasurer) Ed Jackson

KEEPER OF THE HOLY WORDS (Secretary)  
Open

COURT JESTER (Section Advisor) Jim Miers

# Outreach Activities

## The Adventures of the NARHAMS Water Bottle

Reported by Jennifer Ash

Hi NARHAMSters!

I got the opportunity to visit Barringer Meteor Crater in Flagstaff earlier this year. This was so cool since the Apollo 11 astronauts actually came to Meteor Crater to train for their flight and walk on the Moon! There is even an Apollo Training Command Module at the Visitor Center. Lucky I had my Apollo 11 patch on me.

If you get a chance to go, look through one of the binoculars to the bottom. They have an Apollo Astronaut (6 feet tall) and a Flag (3' x 5'). You can barely see it without the binoculars because the crater is 550 feet deep (and a mile wide). The Washington Monument would fit inside the crater.



Meteorites found around the crater are known as Canyon Diablo, named for the nearby canyon, 3 to 4 miles west of the crater. Here is my picture with the Sun on the edge of the crater, just so you know I was really there!

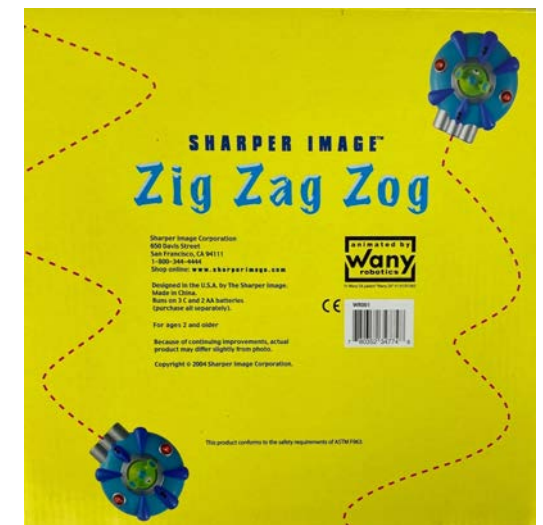
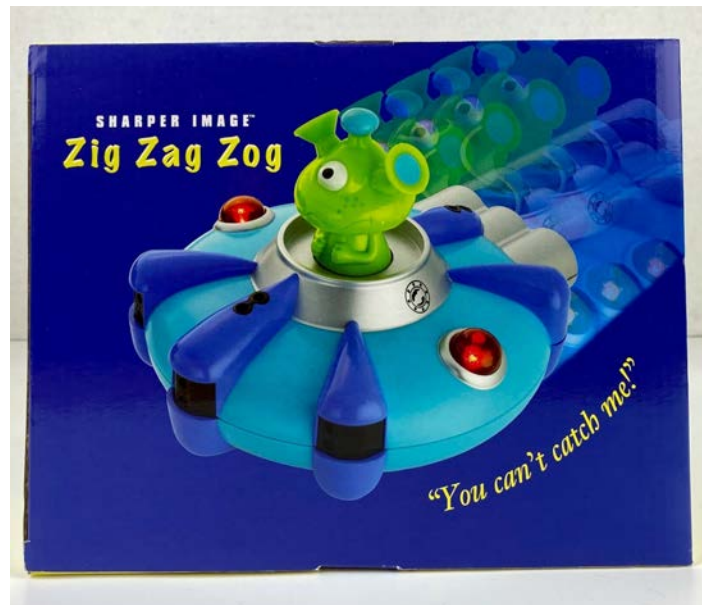
Where will you all take me next?

**Left:** Custom water bottles were given out at the Apollo Goddard Contest commemorating the 50th Anniversary of the Apollo 11 landing on the moon. Water bottles were an excellent idea since the Apollo Contest always falls on the hottest day of the year.  
*Photo by Jennifer Ash.*



# ZOG SIGHTING

Bruce Canino found the toy we ALL need in our lives. The Zig Zag Zog! Found at your local Sharper Image store.





## The Woodsboro/New Midway Elementary School Launch

By: Alex Mankevich

Libby Miller, Special Education Instructional Assistant, of the Woodsboro/New Midway Elementary School in Keymar, Maryland reached out to NARHAMS in mid-March 2022 about doing some sort of rocketry related event for the third through fifth grades of their elementary school. Libby had been to past Rockville Science Day events, and she remembered the NARHAMS build and fly sessions. She recommended that NARHAMS introduce their students to space exploration and model rocketry. The school is located on Woodsboro Pike (MD. Route 194) in north central Frederick County.

After a few emails back and forth, the date was set for May 3rd. Alex would do a Rocketry PowerPoint presentation followed by a demo launch of one rack of model rockets. Their school grounds fit into the category of a 1/2A launch range, so the plan was to demo launch model rockets primarily on streamers and around the A10 class of impulse power.

Sarah and Ed Jackson graciously donated their model rockets for this event, since most of Alex's fleet would likely produce flights that would drift into the neighboring farm field and private properties.

Ed Jackson had selected and test drove a few of his rockets at the April sport launch, thus giving Alex an idea of the maximum altitude and drift of the demo fleet.

Launch day was overcast, but without a threat of rain or high winds. The day was warm, but not hot or buggy. The grass was mowed neat. There were no low flying aircraft. There were some trees on the property of about 40 feet in height and a few scattered pole buildings. That meant there was just enough room for a few flights on conservative motors and streamers.

System 2 and its PA system were recruited to provide the launch thrill. It all performed quite well. Three of the Jacksons' rockets and

two of Alex's rockets did the demonstration honors. One rocket ended up low and recoverable in a tree and a second rocket ended up low and recoverable on a fence line. All the rockets returned in good condition.

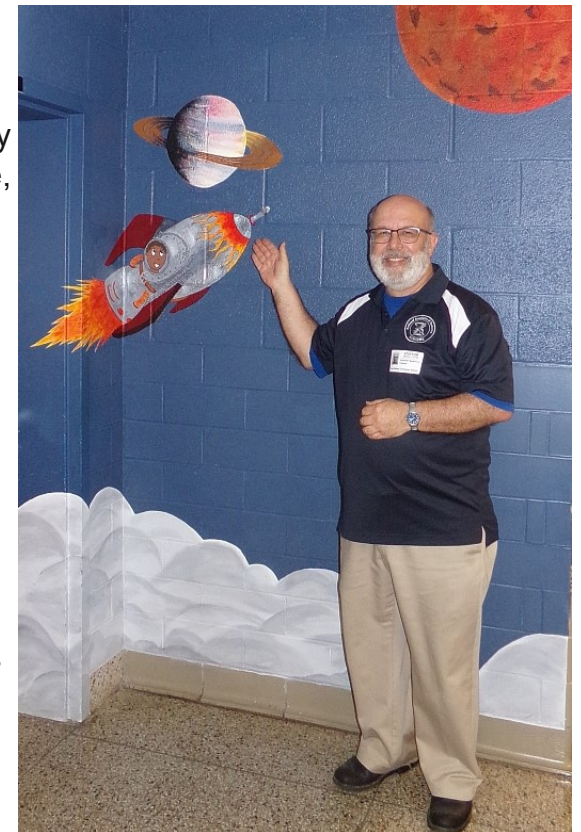
The entire school participated in this event. The head count was estimated at about 180 students and faculty. When asked how many students had previously flown model rockets, about 1/5th of them indicated that they had done model rocket launches. On a positive note, the teachers said they already knew of the Rocket Run we plan to conduct on May 21st.

This was Alex's first foray into an elementary school venue since the start of the pandemic. It was nice to get back into the groove after two years. As usual, there are always some eyeopeners when getting out in public. Alex was introduced to one student who shares a birthday with Alan Shepard (it is November 18, as if you didn't already know that).

Alex spent some time in a Q&A session with a 5th grade student who evidently designed the Orion capsule, since he probably knows more about that spacecraft than some people at NASA.

The school has a space travel themed mural in its hallway. Alex was quite pleased to strike a glamor photo pose.

**Right:** Alex is looking tan, rested and ready just prior to his rocketry presentation at the New Midway Elementary School near Keymar, Maryland. The school has a "space travel" mural in its hallway that is appropriate for Alex's rocketry theme. *Photo by Alex Mankevich.*



## Westchester Elementary School Launch: Day One

By: Alex Mankevich – Pad Assistant



It was the resumption of model rocket launches at the Westchester Elementary School following a COVID-imposed hiatus. It was the first use of launch system #3 since the pandemic. It was over 100 flights of model

rockets by 4th graders.

OK, enough of the “It was”. Tom and Johanna Bagg reprised their roles as coordinators for the elementary school launches in Catonsville, Maryland. This year they added the fifth-grade students in addition to the usual fourth-grade students.



They added a second day to the launch program in order to make this possible. The weather was nearly ideal for the fourth-grade launch. It was a warm,

sunny day without much humidity. There was no threat of rain and no low-flying airplanes overhead. A helicopter managed to make a nuisance of itself for about 15 minutes, but it stayed away from our airspace.

The primary model rocket for the 4th grade students was the Quest Astra III. It is pre-painted bright yellow having 15 inches in height and 1.18 inches in diameter. It is a skill level 1 rocket with a 14-inch parachute. Tom allows the students to press the launch button for their rocket’s flight, and he allows the students to chase after their descending rockets in an attempt to catch them in mid-air. The launch and chase are very much liked by the students. Since there was very little wind on launch day, most students managed to actually catch their rockets. Tom makes it a point to get the schoolmarms involved in the same manner as the students. Well, almost like the students. It seemed to me that the schoolmarms were somewhat less enthusiastic about chasing after their descending rockets at full speed. A lunch provided by the school divides the day in half and gives the launch team a chance to recuperate. The afternoon launch session had scores of students chanting “rockets, rockets, rockets” as their fellow students took their turns at their rocket flights. The launch program went rather smoothly as the wind did not carry the rockets too far, and we suffered relatively few igniter misfires. It is imperative at any school launch to



conclude by time the school busses arrive to carry the students home. We concluded around 2:45 p.m. so that “no students were left behind.” A few students even stayed to help us take down the launch range and to transport the equipment to our vehicles.



**Top Left:** Astras III at the Ready- The primary model rocket for the fourth-grade launch was the Quest Astra III. Each rocket had been previously prepped for flight by Tom Bagg.

**Bottom Left:** Catch a Falling Rocket- Tom allows the students to chase after their descending rockets in an attempt to catch them in mid-air. Since there was little wind, most students actually caught their rockets.

**Top Right:** Schoolmarms at the Launch Rack- Tom gets the schoolmarms involved just as much as the students.

**Bottom Right:** Tom Leading the Countdown- Tom keeps the level of launch enthusiasm running high as each rocket gets its countdown over the PA system. All Photos Alex Mankevich.



## Upcoming events

August 20th	12:00 - 4:00 PM	Sport Launch Theme: open Launch Manager: Alex	Mt. Airy, MD
September 4th	1:00 - 2:00 PM	Goddard Public Launch	Greenbelt, MD
September 10th	5:30 - 9:00 PM	Monthly Meeting Topic: elections Refreshments:	College Park, MD
September 17th	12:00 - 9:00 PM	Sport Launch Theme: John McCoy Night Launch	Mt. Airy, MD
October 1st	5:30 - 9:00 PM	Monthly Meeting Topic: TARC outreach	College Park, MD

## Meeting highlights

**June-** MOTION to spend \$140 to source fairy lights, garden lights, along with wires, connectors, and red film to prepare for September's John McCoy Night Launch.



## Launch reports

The May 21, 2022 sport launch was sort of a “three-fer” in that the 2022 Rocket Run was held at this launch. Andrew Perry also registered this launch so that he and his son could fly some NRC flights.

It was a hot day with temperatures insisting that they remain in the mid-90s. We set up a “full” range head of two racks and four away pads. We also set up the pop-up tents for shade and had a couple of coolers stocked with ice and cold water in our futile effort to ward off the heat. Since it was also the Rocket Run 2022, we also set up the launch range with some “extras”, which included the NAR banner, the NARHAMS banner and we proudly raised both the American and NAR flags.

We did not have to contend with any soccer activity (thanks to the heat), which meant that we were able to fly some mid-power flights. We had members volunteer for Range Duty Sign-Up. Ed Jackson did the morning Launch Control and Alex Mankevich took over for the afternoon. The Check-In duties were shared by Brett Jurd, John Junghans and Sarah Jackson.

We had several scouts on hand. We ran the launch so that the scouts were

## The May 2022 Sport Launch Report By: Alex Mankevich – Launch Manager

directed towards Rack #3 and the sport flyers were on Rack #1 and the away pads. Launching from Rack #3 were scout pack #465 from Bethesda, scout pack #169 from Monrovia and scout pack #1199 from Germantown.

We did have to deal with the tall grass to the East of the launch racks. Alan Williams’ timely article in the last ZOG-43 issue about the critters and creatures that make their home in the tall grass was something of a prophecy.

At 12:30 p.m. we shut down the launch range to sport flying so that we could have the Rocket Run 2022. We had allotted 30 minutes for the contest, but it took only ten minutes for the contestants to find all the Mosquitos. A separate report on all the details from the Rocket Run 2022 had been submitted to the ZOG-43 editor.

Despite the heat and the halt for the Rocket Run, we totaled 147 flights. Those are Goddard numbers, dude! Graphs and charts had been generated to illustrate the members who were “frequent flyers” and to depict the range and count of the motors that were launched.

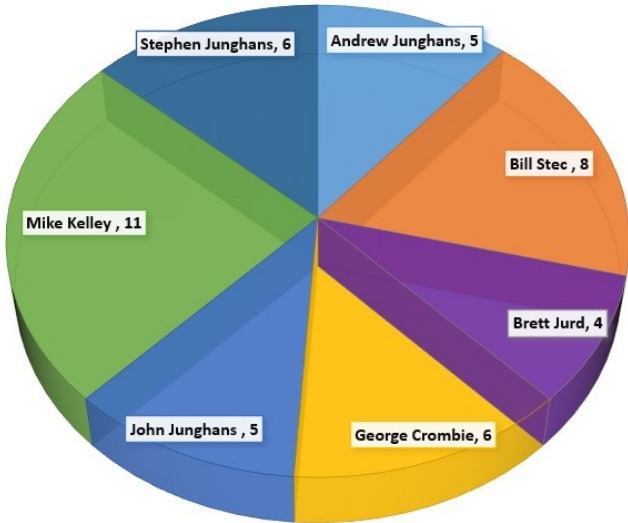
We wrapped up early due to the hot weather and the fact that many flyers had departed as the day moved towards mid-afternoon. We concluded at 2:40 p.m.



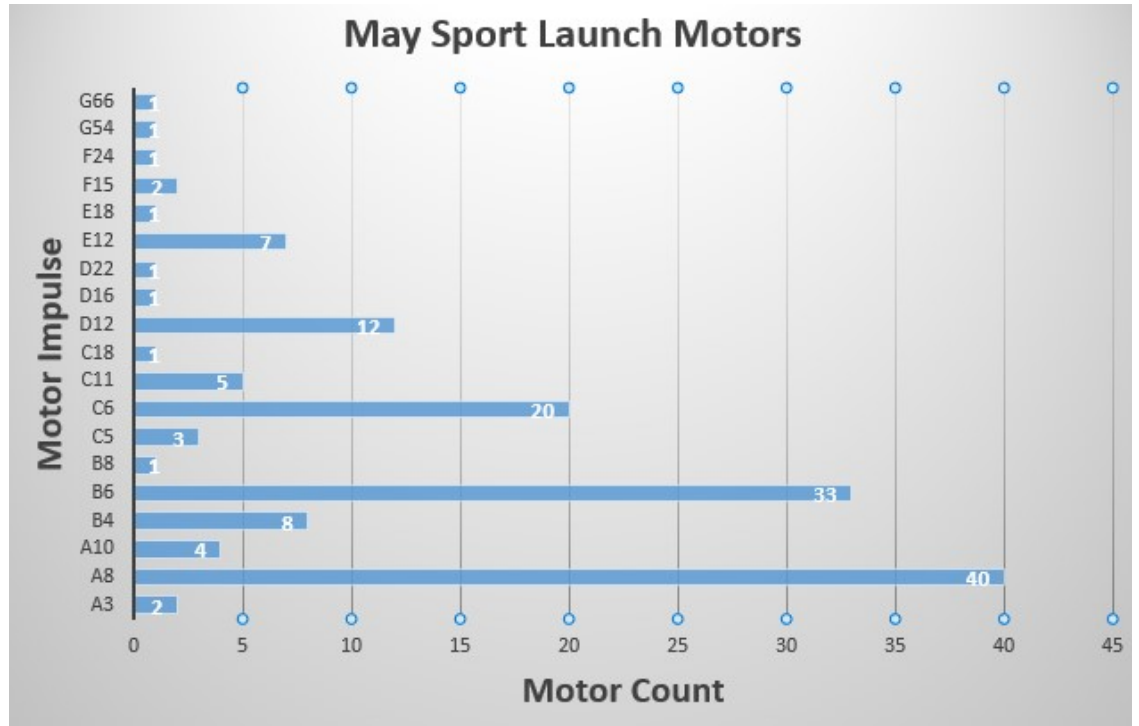
**Above:** Dr. George Crombie is pictured here in the midst of multi-tasking. He’s taking a photo, holding a rocket, cradling a nose cone and planning which rocket to prep for his next flight (and ignoring the ZOG-43 photographer). *Photo by Alex Mankevich.*



MAY SPORT LAUNCH FREQUENT FLYERS



May Sport Launch Motors



**Top Left:** Seven members had four or more launches during the hot and humid launch day. It took perseverance to carry on under the hot and humid conditions of launch day.

**Top Right:** We had 147 flights during the May Sport Launch (exclusive of the dozen Mosquito launches for the Rocket Run). Since there was no soccer activity on the nearby fields, we were able to get in some “F” and “G” motor impulse flights.

**Bottom Left:** Brett Jurd got in six flights after he had completed his launch range check-in duties.

**Bottom Right:** Bill Stec was another of our frequent flyers for this month. Bill is seen connecting the micro clips to his Estes Vesta Intruder rocket.



*All photos/graphics by Alex Mankevich.*



## Rocket Run 2022 Report By: Alex Mankevich

Ask any champion and they will tell you that the hardest thing to do is to repeat your success in the following year. NARHAMS faced this daunting reality as we tried to build on the success of our inaugural Rocket Run from 2021. Last year we flew 12 Mosquito rockets during our July sport launch to a crowd of about twenty participants. Eleven of the dozen Mosquitos were returned, along with the “debris” of the twelfth Mosquito. We handed out twelve swag bags of space related goodies.

A postmortem of the Rocket Run 2021 indicated that we should not host this event during a sizzling summer month when the temperature could climb into the mid-90s. A second consensus was to strengthen the means of identifying the participants who recovered and returned the Mosquitos, so that we would repatriate the correct Mosquitos to the participants and to not award the swag bag prize to contestants falsely claiming to have recovered a Mosquito.

The build up to this year’s Rocket Run began like last year in that NARHAMS members built the Mosquitos and then had them judged for craftsmanship by Ole Ed Pearson. The build and judging were recounted in the “Rocket Run Static



**Left:** Alan Williams registered the returns of the recovered Mosquito rockets during the Rocket Run 2022. We recorded the names of the contestants, and we gave them lanyards by which to identify which Mosquito they had returned. *Photo by Alex Mankevich.*

Judging” article by Ole Ed in the March-April 2022 issue of the ZOG-43. In the end we had the twelve cool-looking Mosquitos that were primed, painted, and primped for this year’s Rocket Run.

The wind down of COVID-19 allowed us to attend several outreach events prior to the Rocket Run, so that we had more opportunity to advertise this event. Rocket Run 2022 flyers were distributed at the 2022 Rockville Science Day, the 2022 Space Night at the Wood Acres Elementary School, the Woodsboro/New Midway Elementary School launch, and at the Westchester Elementary School launch. We had the confidence going into the May sport launch that we would not be hosting a party just to have no one show up.

We choose to host this year’s Rocket Run during the May sport launch at Old National Pike Park so that we could reduce the risk that this event would end up being conducted under the uncomfortable hot and humid conditions for which the Mid-Atlantic summers are famous. Well, that was the plan at least. Wouldn’t you know that Mother Nature decided to get back at NARHAMS for some perceived slight from the past? Whereas we were anticipating a mild 75 degrees day that was partially cloudy with a refreshing westerly breeze, Mother Nature was busy cooking up (and I do mean “cooking up” quite literally) a hot, steamy scorcher of a mid-90s day. It was the hottest day of 2022 so far.

Rules? Did somebody say rules? Well, since you are asking ... the contest was



restricted to students. It was to begin at 12:30 pm and it would run for 30 minutes. All 12 Mosquitos were to be launched in rapid succession and we enforced a “anti-hogging” rule.

We deliberately set the launch rails at varying angles and directions as to spread out the tumble recovery of the Mosquitos. We tried to avoid any Mosquitos tumbling into the tall grass to the East of the launch range. We set up a “Rocket Run Headquarters” pop-up tent at which were flew the American and NAR flags. We also displayed the NARHAMS banner at this

station. On a table at the front of the tent was the display rack of the 12 Mosquitos that we would be flying. Vice President Alan Williams served as the cordial host to welcome the contestants.

My non-scientific head count was that we had around 30 young boys and girls aged about four to ten years eager to engage as contestants. Cub Scout Pack 465 helped to swell the number a little bit, but I noticed that there were some young girls queued up at the starting line.

We were able to launch ten of the Mosquitos in rapid succession. One took two tries to launch and one took three tries to launch. Once the last uncooperative Mosquito flew, Alex yelled out “go git ‘em” and it was off to the races.

There are now only a handful of NARHAMSters who can remember their Pioneer Days out on the Great Plains when the bison roamed freely. Native American elders recite their ancestors’ stories of the earth-shaking thundering of millions of hooves whenever the bison stampeded across the prairie lands. For those of you who are too young to recall the 1880s, the Rocket Run is a fair facsimile. The young contestants streamed out from both sides of the roped perimeter as they speeded toward the fallen Mosquitos.

The first Mosquito was returned quite quickly. In fact, I had barely pulled the safety pin out from the control panel when I heard New Ed announce that the first recovered Mosquito was inbound. As it turned out, all twelve Mosquitos were returned by the time ten minutes had elapsed. All twelve were returned in good condition and unlike last year, no Mosquito



**Left:** Some of the early returns of the Mosquito rockets. All of the Mosquitos were returned intact and in fine condition. *Photo by Alex Mankevich.*



“debris” was collected.

As often happens during a well-attended event, some ironies come to light. Alan Williams was receiving the recovered Mosquitos and he noted something quite peculiar. The green Slytherin Mosquito was recovered by a contestant wearing a green colored shirt, the red Gryffindor Mosquito was recovered by a contestant wearing a red colored shirt, and blue Ravenclaw Mosquito was recovered by a contestant wearing a blue colored shirt. Quite odd, you say? Perhaps we can conduct a future Rocket Run at which the contestant must recover a Mosquito having the same color as their clothing? Just throwing that idea out there for now.

Michael Cochran prepared a Vulcan tribute Mosquito for this event. He was able to meet up with the young boy who recovered the Vulcan. The boy’s parents were invited over to hear Michael explain the 61 year old inspiration behind his Vulcan build. The young boy was happy to be able to keep the model.

As is always the case, the quality of this year’s Rocket Run was due to the quality of the people that made it happen. Thanks to all the members who built the twelve Mosquitos. Thanks to DJ Emmanuel who graciously provided most of the space related goodies in the swag bag prizes. Thanks to Ole Ed for performing the static

## Rocket Run 2022 - Matching Mosquito and Shirt Colors



**Blue Ravenclaw Mosquito  
Blue Shirt**



**Green Slytherin Mosquito  
Green Shirt**



**Red Gryffindor Mosquito  
Red Shirt**

judging of the Mosquitos. Thanks to Ed Jackson who did a fantastic job of advising the participants on how the contest would be conducted. Thanks to Mike Cochran

who did the pad assistant duties during the contest and provided the event photos that he posted to

**Top Left:** Coincidence, or not? The Jacksons prepared their Mosquitos in the signature color themes for the four Houses of Hogwarts Academy. Red for Gryffindor, Blue for Ravenclaw, Green for Slytherin and yellow for Hufflepuff. Three of the Rocket Run contestants returned their Hogwarts Mosquitos wearing shirts of the same color as the Hogwarts Houses. Something magical, perhaps? *Photo by Michael Cochran.*



**Bottom Left:** The contestants recovering the Mosquitos for the Rocket Run 2022 were very efficient in that they recovered all twelve Mosquitos within ten minutes. *Photo by Ed Jackson.*

our Facebook page. Thanks to Alan Williams who transported the Mosquitos, motors, and igniters to the field, and later did the flight preparation of the Mosquitos.



# ECRM

## By Jim Filler

Thank you again for attending ECRM 48. Conditions were no ideal but it tends to be that way every couple years for this event. Some years its heat, some its cold, some its rain, and some its wind. All can be four letter words to rocketeers. So I ask you to continue to fly contest rocketry because someone once said "rocketry is fun damn it ! "

I certainly could not do this without all of you. A special thank you to Ed and Sarah Jackson. They are always helping to make sure the launches "Go" by bringing the equipment. I also want to thank Jennifer Ash for doing data. She was nice enough to track everything in separate files for maximum transparency. I found out that this was not necessary. I uploaded the ECRM file without the FAI flights. I sent that file to Steve Kristal who can upload it. There was another strange reporting that

## ECRM-48 Meet Champions

Place	Contestant	Number	Total Points
<b>A Division</b>			
1	Stokker, Maddie	103403	75
<b>B Division</b>			
1	Mosby, Randall	113404	50
2	Solomon, Daniel	pending	25
3	Anderson, Zuri	114035	0
<b>C Division</b>			
1	Stokker, Alan	100432	96
2	Feveryear, Glenn	24931	60
3	Carson, Don	11069	45
4	Canino, Bruce	39989	43
5	Williams, Alan	14137	25
6	Houston, Robin	108400	21
7	Avramov, Stoil	92988	20
8	Miers, James	60876	17
9	Jackson, Ed	99776	12
10	Alexander, Scott	84112	8
11	Gbologun, Ike	113405	4
11	Ha, Tom	76754	4
<b>D Division</b>			
1	Them Filler Boys	T-043	120
2	The Flying I-Beam Kids	T-473	45
3	Murphy's Lawyers	T-788	17

## ECRM-48 Results

Contestant	Number	B ELA	1/2A RG	SPSC	1/2A HD	OSL
<b>A Division</b>						
Stokker, Maddie	103403	35		685 / 123		28.9
<b>B Division</b>						
Anderson, Zuri	114035					
Mosby, Randall	113404	EGG		640 / 115	23 / 11	
Solomon, Daniel	pending					5.42
<b>C Division</b>						
Alexander, Scott	84112					13.5
Avramov, Stoil	92988		NG / 29			
Canino, Bruce	39989	46	NG	700 / 113	SEP	16.8
Carson, Don	11069		48 / 7			4.49
Feveryear, Glenn	24931	96	NG	770	41 / 28	13.44
Gbologun, Ike	113405					50.0
Ha, Tom	76754					50.0
Houston, Robin	108400	EGG		655 / 105		50.0
Jackson, Ed	99776					9.5
Miers, James	60876					4.81
Stokker, Alan	100432	77	26	755 / 116	13	8.64
Williams, Alan	14137					3.81
<b>D Division</b>						
Murphy's Lawyers	T-788					34.85
The Flying I-Beam Kids	T-473		9 / 52			29.1
Them Filler Boys	T-043	52	16	740 / 132	37	23.36

showed some ECRM flyers as having a sport scale entry which I didn't find upon review. So maybe I broke the enhancement to the contest manager new version ?



**Above:** Steve Foster waits patiently holding his ECRM rocket glider from falling over in the wind, while Bruce Camino checks the wind speed. This tableau lasted a few minutes only to become a cato. *Photo by Sarah Jackson.*



## Returning to Goddard- June 2022



**Clockwise from Top Left:** The first rocketeer, after a two-year hiatus, was a young man named Alex. He's showing off a commemorative quarter he was awarded for being the first launcher. Gathering of the LeGivind family picnic? No, it's the launch's check-in-inspection line. The crowd gathers to watch the launch. Tom Bagg on hand to support. Ed Jackson (foreground) gives everyone a briefing, prior to the launches. Ted Cochran, with pole, did tree-model retrieval. Foreground L-R: Brian Beard and Sarah Jackson did pre-launch safety inspections of all flown models. Background L-R: An Air Force photographer from Ft. Meade came out to document/advertise the launch for base personnel interest. Jessica Evans, a GSFC public affairs officer covered the launches for NASA social media. DJ Emmanuel (L) and Zog Alex Mankevich coordinate activities prior to the launch. *All photos by Ed Pearson.*

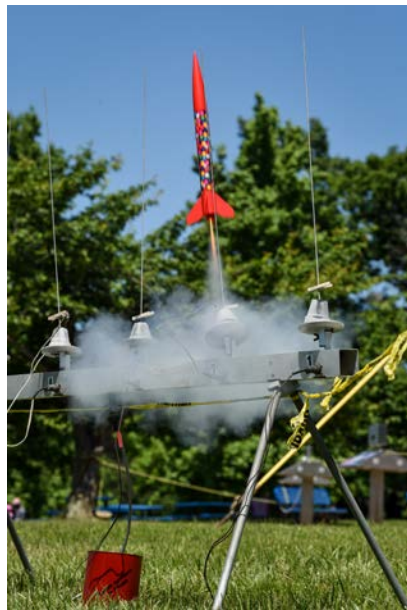




# Goddard Launch Guest Photographer TSgt Daniel Peterson



All Photos TSgt  
Daniel Peterson.





# NARHAMSters at TARC 2022

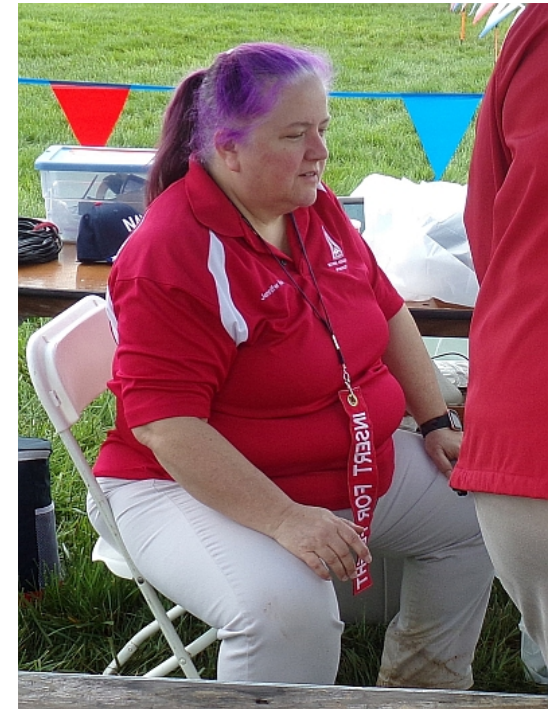
TARC 2022 NARHAMSters On Duty: Not all the NARHAMSters at the 2022 TARC were near Alex to be photographed. Those that were posed for their glamor photos. *All photos by Alex unless otherwise noted.*

**Left Top:** Ted Cochran- Ted was the Range Safety Officer for the Goddard launch range.

**Left Bottom:** Jim Miers- Jim was a Pad Manager at the Stine launch Range.

**Top Right:** Jennifer Ash- Jennifer was the Launch Control Officer for the Goddard launch range.

**Bottom Right:** Mark Wise- Mark was involved with Awards and Logistics.







**Top Left:** Alan Williams- Alan was involved as a Special Events Judge.

**Top Right:** Alex Mankevich- Alex was a Pad Manager at the Goddard launch Range. *Photo by Tom Ha.*

**Center:** NARHAMS again proudly provided the flagpole to host the American and NAR flags. It is after all The **American Rocketry Challenge**.



**Left:** Jim Filler- Jim was the Launch Control Flight Card Manager on the Stine launch range.

**Right:** Tom Ha- Tom was a Pad Manager at the Goddard launch Range.





## Further Vacations with Don Carson

### Vacation 6

Jim and I had a great day launching yesterday. I had mowed the field on Saturday, which brought out our RC brethren. We had a total of 7 folks flying rockets, planes (electric, gas and jets!), and drones. Quite a nice variety.

Much to our surprise and everyone's delight we had a little sport plane buzz the field, circle around, and LAND!

It turned out to be one of the neighbors of one of the RC guys. What a cool little plane. It only needed about half the runway length. He parked it on the side and spent a couple of hours chatting and watching rockets and planes fly. Nice guy, used to fly Estes rockets as a kid and was



a former Marine Harrier pilot. That was a first for me.

As to flying, we spent the first part of the day flying S2/P. Jim flew a new model and a variety of F engines to try and "dial in" his model. As a result, his scores were quite varied, but he qualified and is now on the (US Team Tryouts) scoreboard in the top ten. I did a checkout flight on my lighter S2/P model (like the one hanging over in the trees). I was hitting pretty close to the target altitude of 300m and got some really good times near the 60 target, but like before, one flight caught some "good" air and took an extra 25 seconds to come down. That messed up my overall core and did not improve on the score I already have posted on the scoreboard. We got a lot of data points on our models' performance, though, so that is good.

After that, Jim flew some S3 (parachute) flights but had trouble getting good chute deployments. I started flying S4 (Glider) but the tail broke on my first launch and I decided to pack it in.

Field update: We do keep the airstrip mowed but the surrounding grass is getting quite tall. Someone mysteriously

mows it from time to time, but I don't know when it will occur again. The





adjoining crop field to the west was winter wheat, it has been harvested, and something has sprouted (soybeans maybe). For now, it is easy to find models and walk to retrieve them. The field to the east was fallow (I think) but has now been tilled and furrowed for tobacco. It is super easy to see models land, but is surprisingly strenuous to walk on to recover models.

### Vacation 8

We held a rare mid-week NRC/US Team tryout/Sport launch June 13-14. Over the 2 days, we had a variety of folks launching lots of rockets. The heat was brutal on Monday, and Tuesday turned blustery and



was much cooler.

Barb and Tom Tobin came over from the Charlotte area to fly NRC and Sport models. Eric Noguchi and his wife came up from the Triangle area to fly boost gliders, yay! Will Gilley and his Grandmother came up from Chapel Hill to fly US Team tryout and sport models. Jay Marsh came over from High Point to help mentor Will. That's a pretty widespread group.

Eric got us going with a nice upscaled CMR Manta. I was sure I took a picture but it is no where to be found. He followed that up with a nice bright orange fixed pod glider. The heat took its toll and the Noguchis packed up and headed home. Hope to see them return another time.

Barb and Will were super busy testing models and getting flights in to go on the Scoreboards. Will test flew his boilerplate S5 Scale Altitude model, S9 Gyrocopter models and S4 Rocket Glider model. He now has qualified to try out for the US Team in three events plus Scale Altitude (which doesn't require getting a qualified flight). Well done, Will!

Barb flew NRC streamers, egglofters, 2-stage altitude models, helicopters and giant flying Easter eggs! In all, she got on the National Scoreboard in four events.

I flew a number FAI Gyrocopter models but had some serious charring from the Estes ejection charges. None of my models could be flown a second time. The good news is the rotors/hubs/nosecone were all fine.

Tuesday's flying was challenging with much higher winds and the threat of rain. We finished up earlier than we expected. All in all, I think it was a great launch, thanks for coming out.



*All photos by Don Carson.*

## NARHAMS LIBRARY EXPLAINED

By Jennifer Ash

*Editor's Note: In the June meeting, Jennifer informed us that she will no longer be able to store the NARHAMS library. As a club, we need to decide how to handle the items currently in the library. Please send suggestions and comments to the zog editor as to the placement/continuation of the NARHAMS library.*

From the 1968 NARHAMS Constitution:

Article 8, Committees

Section 2, The Contest and Records Committee

The contest and records committee makes all arrangements for NARHAMS launches and contests, including the appointment of all range officials maintains legible and complete records of contests performance monitors all records attempts and maintains a section library.

I started in the NARHAMS club in 1996. Tom Lyon was the president then and had the NARHAMS library (He was also the NAR Contest Board Chair). When Tom moved to Richmond, the library had to come somewhere, so it came to me.

Most of what the library has is newsletter exchanges, old Zog-43 newsletters (multiple copies for some), old minutes (including the one where Don Carson, then secretary, recorded when NARHAMS became a NAR section in March 1965). There are also contest plans, results, but

some boxes I have never gotten a chance to go through them.

Some of the items that are in there are of interest to the NAR historian (me), and there are scans when NARHAMS ran NARAM 50. I compiled a CD that was given out at that NARAM, which included scans of old Zogs, and other fun things the NARAM committee thought would be cool.

Here is a pic of what I have on shelving in my basement, There are a few things not shown, but the majority of it is here.



Here is a list that I compiled:

- 1 Bruce Blackistone 23B Disaster Glider
- 10 signs from NARAM 50 from the ORR (showing restroom, reserved parking, etc)
- 3 boxes of Zog-43 Newsletters
- Zog-43 in binders, protected with archival sleeves (~15)
- 1 metal box of various papers, NAR, NARAM
- 1 Box from Paul Croakin (various things, some NARHAMS, some NAR)
- 1 box from Burce Blackistone (Same thing as above)
- 1 box of Zog-43, Newspaper clippings, etc
- 1 plastic box of newsletter exchanges
- 1 box of newsletter exchanges

NOTE: I do not think the club should make this a grab all at the December meeting. There are important historical things, and I don't want them to get lost (which is why I became the NAR Historian after Art Nestor).

The best thing may be for one or two people to help me go through things (over several days/nights/weekends) and determine if NARHAMS wants to continue to have a library.

And FYI, a lot of stuff has been scanned and is on the NARHAMS website, but you should ALWAYS have a paper backup copy.



## Changes Noticed at Goddard Visitor Center

By Ed Pearson

Wow in the two years since the club held public model rocket launches at NASA Goddard, several changes have occurred there. Here are five I noticed—four affect the rocket launches.

1. The addition of a modern sculpture in the rocket garden. The last known remaining IRIS sounding rocket has been removed and in its place (and then some) is a sculpture reminding one of Alexander Calder's mobiles. It certainly is modern and eats up a lot of real estate formally we used for our launches and the Apollo contest.



2. The addition of a lower parking lot. The visitor center had parking for 94 vehicles and on model rocket Sundays there were often overflows—sometimes quite substantial. The new lot feeds off

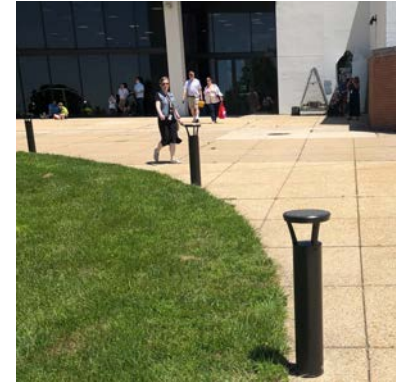
the entrance road (abutting but separate from the east of Bldg. 17) and is going to help on large-attended model rocket days.

3. The addition of fencing around the sounding rockets. The pole fences are low (allowing unobstructed views), clearly signal don't climb on or touch the rockets. (Small unattended tots are bound to climb on the fences though upkeep/repainting the sounding rockets is noticeable). The fencing seems to be a smart move and the boundaries can be used for crowd control and wait-area lines prior to loading racks.



4. The addition of solar cell lights around the Delta. This will add a nice decorative glow in evening hours when the visitor center is unavailable to the public...I don't

know how the lights will affect Star Parties when telescopes are set up there for viewing special events.



5. The addition of a periodically-placed road sign (intersection of Greenbelt Road and Cipriano Road on NASA's fence line). Previously this

sign was intended to tell Goddard employees inside the center of the monthly launches. Permission has been to made to display the sign to the public—a savvy move.



Photo by DJ Emmanuel

In addition the gift shop is nominally closed on Sundays. But it was open for June's launch and the manager says she'll reopen it for each model rocket Sunday (first Sunday monthly). The shop has RTF models, wadding, engines and some pretty neat NASA and Goddard-specific (think James Webb Telescope) stuff!

## **BOLT-2 Hypersonic Research Flight Zooms Out of Wallops Island**

**By Vice Zog Alan Williams**

On March 21, an Air Force Research Laboratory high speed flight experiment took the Wallops flight range back to its roots. The BOundary Layer Turbulence-2 hypersonic research program was precisely the type of cutting edge investigation that had brought the range into being over 75 years ago. A Terrier-Improved Malamute rocket accelerated the “BOLT 2” investigational shape out to the hairy edge of high speed aero-physics knowledge. The test object investigated laminar and turbulent airflow characteristics at many points along its heavily instrumented surface as it rode in the superheated air rushing past.

The experiment might best be described as a large flat-ish pointy door-wedge shape about two feet across, almost five feet long, with pronounced concave side channels. It was supported by a stout conical-to-rectangular shaped adapter shaft forward of the ten foot long mission payload canister. The BOLT model flew aboard a standard NASA two stage sounding rocket. The first stage was a Mk -70 Terrier /Standard ER motor which produces 50,000lbs. thrust for five seconds. The second stage was an “Improved Malamute”, which burns for something like eight seconds. This motor is a civilian evolution of Patriot missile hardware and propellant technology specific data is somewhat hard to obtain

Launch occurred at 7:12 Monday evening, shortly after sunset. Launch angle was 78.8 degrees, on an azimuth of 100 degrees. Wallops spokesman Keith Koehler said that total powered flight phase was 26 seconds, with a built in coast time between stage firings. The BOLT reportedly achieved a velocity of over Mach 6, or about 4,700 mph. The package impacted downrange at over six minute’s flight time, with no attempt to recover any experiment hardware. When I talked to Koehler later, altitude and downrange distance were not available. However, Air Force lab personnel were quite happy with first-look performance figures.

Keith stated that good sighting reports came in from across the Eastern Shore, down to Norfolk and eastern North Carolina. There was even one from Lancaster, Pennsylvania. However, viewing these things is often a very individual experience.

A number of NARHAMS members tried to view the event, since NASA had released a promising view prediction map. I was at my house in Bowie, DJ and Sally were at Centerville, Va. Ed and Sarah Jackson were at their shiny new home in Catonsville. The “Commitment Award” winner was our own King Zog Alex who went all the way from Baltimore to a marina on Kent Island.

Sally, DJ and I were linked by phone so I could hear the Mission Control count. At T+30 I was scanning the distant sky and scanned, and scanned with my trusty binoculars. The sky was extremely clear. While looking, I was surprised to see an airliner way, way off in the distance over Wallops, traveling north. But rockets saw I none. At T+4:30, I declared that we had achieved “Squatsky” status. Sally, DJ, Sarah, and Ed all eventually reported the same.

But, what of Alex? He called me later and shared his tale. He had tried to guess a good look angle between the marina and Wallops, some 80 mile southeast. But when the rocket popped up above trees and such, his aim was off. Fast as he could, he re-pointed his gear and tried to shoot. Unfortunately, Alex was schooled on the majestic soaring of orbital missions, not the mucho zippy dragster flights of sounding birds. By the time he was ready to fire again, it was all over.

However, since Alex was the only one of us to actually see anything, it is my honor to officially declare that at 7:13 pm on March 21, 2022, our beloved leader Alex Mankevich did, before the sight of man and God on high, achieve “Bupkis”.



## **Building a Representative TARC Model** **By Jim Miers**

A Representative TARC Rocket cannot fly in the contest, being neither designed nor built by a student team, but were it otherwise, and presented as a flying rocket to the check-in team at the TARC finals, it might pass muster, depending on current year's exact criteria, but whether it would earn altitude and duration scores sufficient to make it a serious contender is anybody's guess.

In outward appearance, most TARC models are unexceptional 3FN mid-power models, but internally are more sophisticated, needing among other qualities, adequate containment for an egg (or two), above average shock absorption, and a properly vented altimeter bay. Also, additional space set aside for a bit of ballast to control altitude, should you choose to control altitude that way - not all teams do. Generally, TARC design parameters require an airframe length of at least 65 centimeters and a lift off mass not greater than 650 grams. Beyond that, each contest year carries its own specific conditions. This design covers only the general parameters. In some years, it would meet all contest requirements, in others it would not. Regardless of that, as a representative model, it is about the same size, same capacity, same motors the students build when participating in the actual contest.

Overall construction is straight forward, technique should be familiar to most builders, although some may have no experience with cutting slots for through-the-wall fin mounting. All non-custom parts are available online, the nose and egg containment are unique Apogee Rockets parts, the rest can be obtained from most online rocketry sites, and a few sourced from local stores. You'll find most sites will sell you pre-slotted tubing for the through-the-wall fin mounts, however be aware that some pre-cut slots may be too long for the fins on this design. If you need to cut your own slots, a six-to-twelve inch length of 1" angle aluminum (available at hardware stores) makes a useful marking and cutting guide. Also, temporarily inserting a spare coupler inside the end of the tube will provide support during cutting.

The altimeter bay is too long for any of the PerfectFlite altimeters allowed by the contest, so you will probably want to include some internal support for the lower end of the altimeter to rest on, either a BT-20 motor block or a balsa or Styrofoam bulkhead will work. When the upper stage is assembled, drill four 1/16" holes around the base, close to the separation line to vent the altimeter bay to the outside. One accessory, often neglected (until after field testing begins at any rate), is the payload extractor to assist in pulling the

foam container out of the upper stage. This can be as simple as a turn of ribbon around the base of the egg container, but I added a 6.5cm plywood disk for additional support.

You will also want a small hook (wire with a short "L" bend works well) will be needed to install and remove the altimeter, which needs to be placed in the bay at the bottom of eight inches of BT-80 tubing.

Rail guides should be as far apart as is practical with the mass center located somewhere in between. If guides are held in place with a blind nut installed through the inside of the recovery chamber, be sure and cover the exposed base of the nut with a circle of stiff paper glued over it to ensure the recovery harness cannot become fouled with the nut (and yes, that can and has happened).

And paint it. It does not have to be fancy, but teams will lose points at the finals if they fly an unpainted model.

TARC typically flies at altitudes in the 800 to 850 foot range, for which the required delay will likely be in the five to six second range, accordingly, the delays given on commercially available motors will usually be either a bit too short or a bit too long. Most teams aim for a bit too long, since the rocket needs to clear apogee to record its optimal attitude.



## Parts List:

- Nose (TARC foam rocket nose Apogee Components part # 14812)
- Upper Body (BT-80 - 26.8cm long)
- Main Body (BT-80 - 52.5cm long)
- Fins (3x 1/8" aircraft plywood per the pattern follows)
- Egg Container (TARC vertical two-egg container Apogee Components part # 14817)
- Coupler (BT-80 coupler - 15.2cm long)
- Upper Coupler Bulkhead (custom from 1/4" foam-core board)
- Lower Coupler Bulkhead (1/4" plywood bulkhead to fit inside the BT-80 coupler)
- Altimeter Bay (BT-20 - 14.2cm, but measure to fit)
- Altimeter Bay Lower Support (centering ring 24m to 18m)
- Screw Eye (common hardware store # 8-32 x 1/2" stainless, with nut and washers)
- Upper Shock Cord Leader (200 to 400lb Kevlar braid - ~25cm long)
- Shock Cord (1/2" elastic band - ~200cm)
- Lower Shock Cord Leader (200 to 400lb Kevlar braid - ~100 cm long)
- Centering Rings (3x 1/8" plywood, matches BT80 to BT50 (66 mm to 24 mm))
- Motor Mount (BT-50 – 13cm long)
- Motor Retainer (common Estes grey plastic 24 mm screw on retainer)
- Parachute (24" nylon)
- Parachute Protector (12" square Nomex)
- Launch lugs – whatever rail buttons or guides work for you

Some suggested motors: (and you can use the shorter delays if preferred, but will likely find you are deploying below maximum altitude)

- E28-7 (or 4)
  - E30-7 (or 4)
  - F39-6
  - F44-4
  - F30-6
  - F32-6 (or 4)
  - F35-5
- Next Pages:** File 2021-03 design – The plan. All necessary dimensions are in the parts list.
- File 2021-03 fin template – The fin template. Note the dimension gauge will let you know how much correction to allow if your printer or conversion programs have distorted the exact dimensions.

*Designs by Jim Miers.*

**Below:** All the parts laid out. A few things to note:

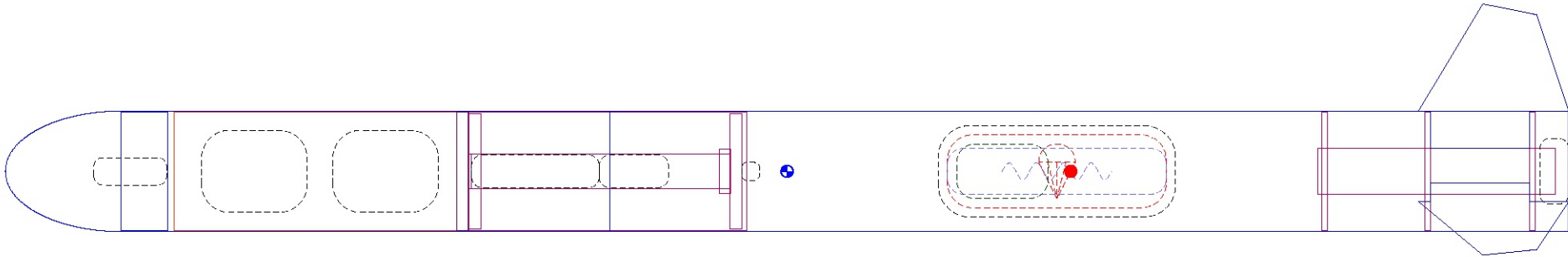
- Upper right, the foam egg container (two parts), and the extractor disk, which sits immediately underneath the container and is used to pull it out of the upper body.
- Immediately beneath the green upper body is the PerfectFlite altimeter at approximately its correct location when installed. The red wire hook is needed to install in properly in the altimeter bay. The small hole immediately above the coupler is for venting the altimeter to the outside.
- Also, note the overly-elaborate shock cord connections, useful for providing connecting points for the parachute and protector, but most builders will find this level of construction a bit excessive.
- The static CP is on the lower body, about halfway up from the base. You can see it marked in line with the two rail guides.

*Photo by Jim Miers.*



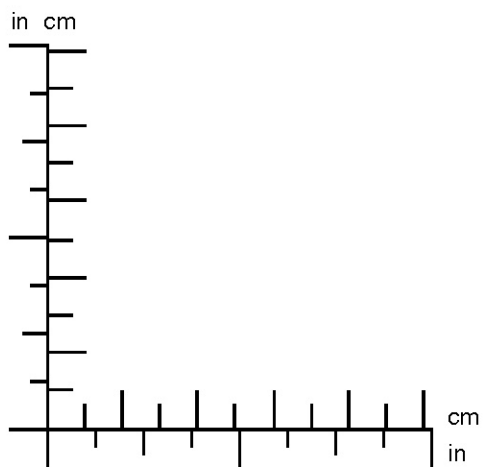
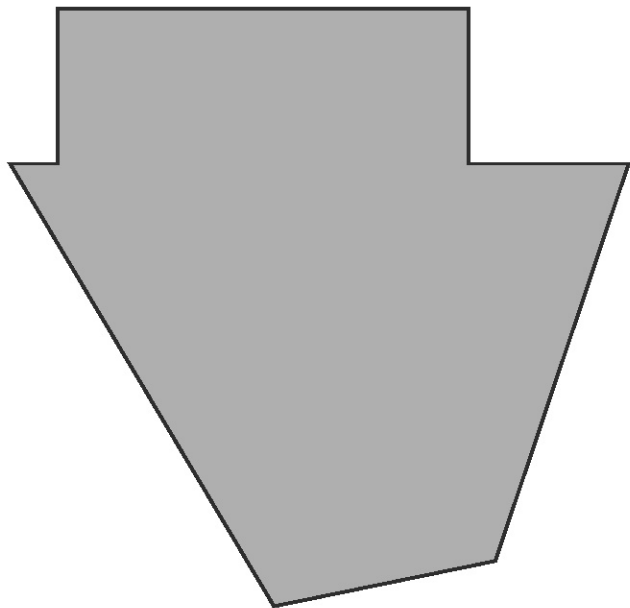


# Rocket Design



Rocket  
Stages: 2  
Mass (Empty): 441 g  
Stability: 2.36 cal  
CG: 42.9 cm  
CP: 58.4 cm







## Modeling a BBVIII Igniter Housing By John Brohm, NAR #78048

All photos John Brohm, unless otherwise noted.

From a distance, the St. Louis Science Center Black Brant VIII Sustainer appears to be not much more than a long, four-fins-and-a-nose cone rocket. Closer examination, though, reveals a prototype rich in detail, detail that we'll want to capture on our model. Over the course of this article and the next, I'd like to focus on the payload section, and share with you how I tackled the features found on this part of the round. Let's start with a reminder of what the BBVIII upper stage looks like.



Left: BBVIII Upper Stage  
Photo by Tim Harincar

The next photo highlights the payload section, where we find it comprised of an Igniter Housing (the red part above the white stripe), and an Instrumentation Section (the white part). Our interest here is with the red part, the Igniter Housing.

Right: BBVIII Payload Section

Photo by Paul Lubertowicz

Note that the joint between the two sections is obscured by the bracing clamp that secures the round to the building we'll deal with that obscured joint in the next article when we model the Instrumentation Section.

The following photo provides a clearer view of the Igniter Housing.



Above: Igniter Housing/Motor Case Joint

Photo by Paul Lubertowicz

In this photo, one can see a small access panel on the far left, fastened in place with four round head screws. In the middle is the umbilical port. Prominent in that port is a



Cannon DD50S 50 pin D-Type connector. And then further right is the forward launch rail lug.

Looking more closely, one can just make out the large diameter flat head socket screws used to join the Igniter Housing to the motor. Those screws are UNBRAKO 3/8"-24UNF countersunk socket head screws, and there are sixteen of them spaced about the circumference of the joint. Armed with this, we have the reference data we need to model the Igniter Housing. Off to the Shop.

### Igniter Housing

We'll base the entire Payload Section on a JT-70C coupler, as this section must mate with the BT-70 based Sustainer portion of our model. We'll begin with the Igniter Housing, cutting out the port for the umbilical connector.



Above: Umbilical Port

To this we'll add a wrap of 0.010" thick sheet Styrene, scaled to length, and cutting out the port area once the glue has set. As

seen in our earlier photo, the umbilical connector is inset at an angle, and so we'll craft the port accordingly from pieces of 0.010" thick sheet Styrene.

To represent the DD50S Cannon connector, we'll cut the end off of a micro-USB cable at our scale factor, a micro-USB connector is very close to the required shape and size, and makes for a good facsimile.



Above: "Cannon" Connector

The port assembly follows:



Above: Umbilical Port Assembly

Before we mount the port assembly, we

need to add the outer skin so that the outer diameter of the Igniter Housing matches the outer diameter of the airframe. We also need to allow for our representation of the UNBRAKO socket head fasteners, and so to prepare for this, the outer skin is punched along its lower edge.



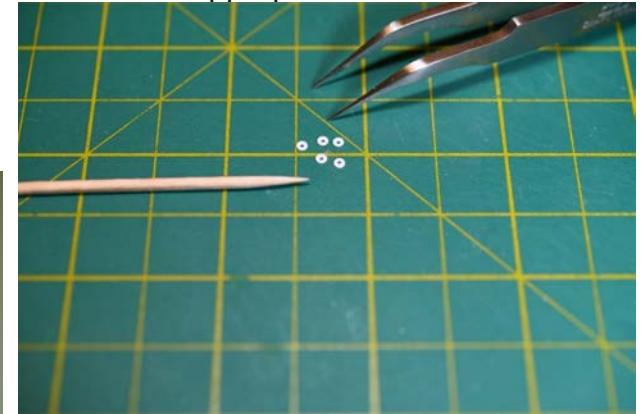
Above: Igniter Housing Outer Skin

With some glue the outer skin is applied, the umbilical port area opened, and the connector port assembly installed and trimmed.



Left: Umbilical Port Installed

To represent the UNBRAKO socket head screws, we'll double-punch some Styrene disks of the appropriate diameter.



Above: Socket Head Screws

These are installed with careful dashes of Tamiya Extra Thin Cement.

Next, we'll craft up the forward launch rail lug using pieces of Styrene sheet.



Above: Forward Launch Rail Lug

This puts us in position to attempt a trial fit before priming the assembly:





Above: Igniter Housing Trial Fit

With this, it's off to the Paint Shop for some primer and paint.

### Igniter Housing Paint

The Igniter Housing was primed with Tamiya Fine Gray Surface Primer, with defects fixed with Tamiya Basic Modeling Putty. The section was then shot with Tamiya TS-26 Pure White, and once cured, sprayed with Dupli-color Perfect Match Flash Red. The faux Cannon connector was hand-painted with Vallejo Model Color Black, and once dry, a narrow piece of Bare Metal Foil Gold was placed over the shell. The bare metal area of the port was covered with pieces of Bare Metal Foil Aluminum.

The forward launch lug was primed with GSI's Mr. Finishing Surfacer 1500 Black Primer, and then over-sprayed with Tamiya AS-12 Bare Metal Silver. Once dry, the lug was installed, completing the

Igniter Housing assembly. In our next article, we'll tackle the Instrumentation Section – see you next time!

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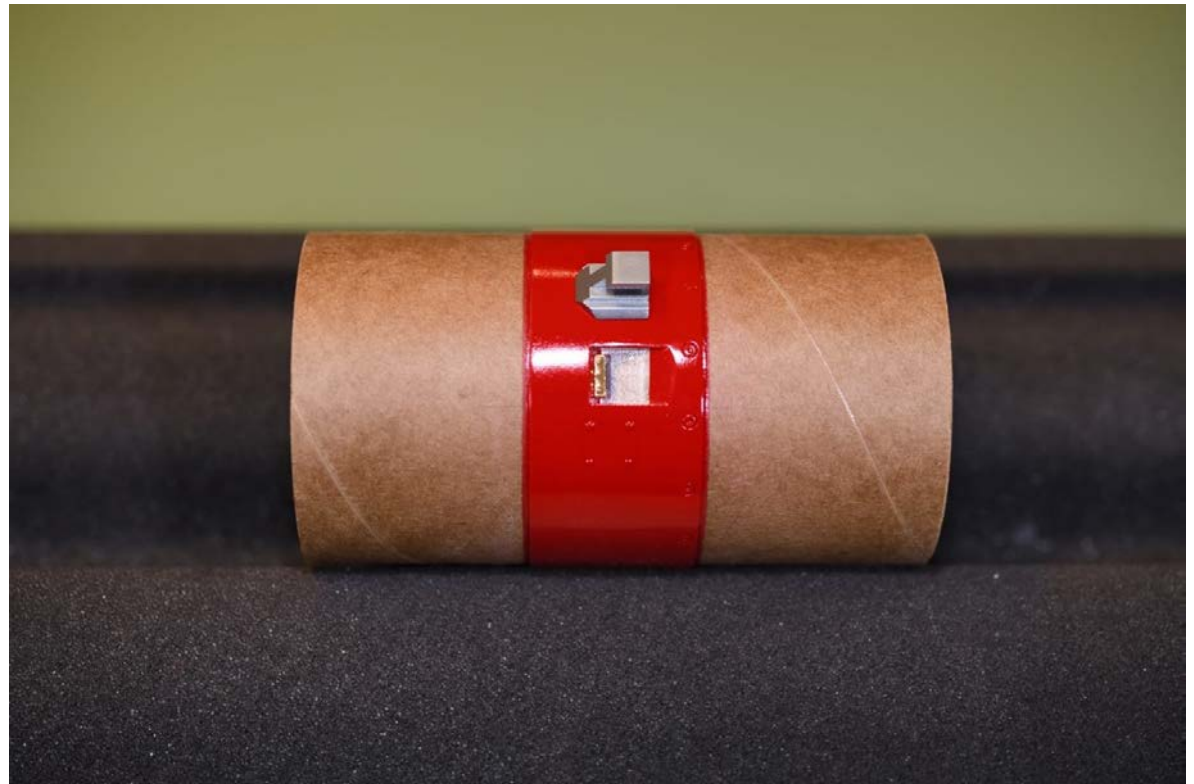
Evergreen Scale Models – sheet Styrene [Evergreen Scale Models](#)

Bare Metal Foil – self-adhesive metal foil

[Evergreen Scale](#)

[Bare-Metal Foil](#)

Below: Finished Igniter Housing



## Painting Your Rocket By Steve Lloyd



Left: Steve Lloyd has contributed a number of articles for the ZOG-43. He usually writes about backyard science and nature or just a philosophical slant on science/nature which you can read in the Frederick News-Post. Steve often gets creative with the themes of his model rocket design such as his "Spirit of Candy Corn" rocket.

When I got back into this hobby I was building scale models with their typically black and white paint jobs. Painting a Saturn V in something bright and colorful just isn't right. Before long I switched to kit-bashing and/or styling my rockets to suit my taste or needs. Certain factors influenced my rocket coloration. First, smaller rockets, even when powered by "A" motors, seemed not to fly so much as disappear from the launch area. They are hard to see! Secondly, darker colored rockets can be hard to find regardless of their size. Finally, I always thought the 1950's Air Force fighter aircraft looked very cool in their fluorescent orange or red "high-viz" color trim. Thus, my penchant for LOUD or unusual paint schemes and markings began. A number of people have asked me about the paint schemes and markings on my rockets, so here's a little info about them I'd

like to share. Let me give a brief disclaimer before I begin: I know most of my rockets aren't built for official competition. For example, I don't usually spend the time to fill in the seams on the standard cardboard tubes nor do I lavish hours on the fillets where fins join the body. This isn't a criticism of those who do I admire and respect that craftsmanship and understand the incremental improvement in aerodynamics such efforts promise. I will lavish that care and effort for another hobby of mine: plastic static models. It was working in that hobby that I first became familiar with the fluorescent paints.

Florescent, or "Day-Glo" paints are more difficult than regular paints, whether they are solvent-based (like the traditional oil-based enamels like Testors) or acrylic.

Fluorescents reflect light differently than conventional paints, providing the viewer with somewhat dazzling effect.

After trying several bottled and spray-can florescent paints, both solvent-based and acrylic, I found a favorite. I was looking for the brightest and most electric-appearing yellow I could find — largely for visibility and ease. That favorite is Testor's .25 ounce bottles of their #1177 Florescent Yellow. Locally, I've seen it in the crafts sections of stores I usually purchase several bottles at one time online. If you are thinking of trying this paint, keep in mind that Rustoleum recently bought out Testors and have dropped Testor's ModelMaster and other popular scale model paints. Rustoleum

appears to retain the .25oz. bottles in a variety of popular colors for now, but there appears to be a shift away from the solvent-based paints generally, most likely because of health and environmental issues beyond the scope of this article. Don't wait too long. Florescent work best against a bright, clean, white background. I always spray my rockets with Tamiya's White Primer before painting them with colors even when I use a black paint. Primers slightly fill in crevices and reveal where the original surface may be rough or need additional finishing. Another significant advantage of using a primer is that it gives the color coating some "bite." The color paints adhere much better with primer to the rocket's surface, regardless of the material. By the way, Tamiya's spray primer can be covered with just about any type of paint. You do not need a heavy coat of primer.

While the Testors #1177 can be airbrushed, I opt for painting it on by hand with a good quality, soft sable brush. I load the brush fairly heavily, not so much that it drips, but with a generous supply of paint. I paint in long, overlapping strokes, and never try to "stretch" the paint. This paint dries quickly for a brush application and it's best to slightly overlap the strokes before the paint begins to dry. You may find it necessary to stroke back and forth to fill in gaps, etc., but do so before the paint begins to set. It will take some practice, but ultimately you will have a smooth, even application that leaves no brushstrokes. An additional advantage to





**Left:** A selection of Steve's rockets.  
*Photo by Steve Lloyd.*

this Testors #1177 is that it's absorbed somewhat into the cardboard tubes and balsa or basswood fins so popular with smaller rockets. You will almost immediately

ly recognize one of the challenges of all florescent paints: they almost always need more than one coat. Most of my rockets have two coats. Be sure to allow several hours between coats for each application to dry completely. If you don't, the paint will be a sticky mess that will set hard, requiring extensive sanding to smooth it. Testors does offer several other florescent colors. I have found their florescent green and florescent blue to be most frustrating to work with, requiring as many as five coats

before a satisfactory, brush-stroke free finish is possible. The other colors are florescent orange or a deep florescent pink. It is possible to mix other normal Testors' paint to get to a florescent red. I start with the Testors florescent pink and add their standard red paint until I like the resulting color. I would estimate the ratio to be 2/3 florescent pink to 1/3 standard red. It's important to get a feel for how much of this Testors #1177 paint you may require. Here's one yardstick I can offer: an Estes Big Bertha, completely painted in Testors #1177 would take three .25oz bottles! Plan ahead. The florescent paints I've referred to above can best be cleaned off your brush, etc. with Lacquer Thinner or Acetone (nail polish remover is typically a form of Acetone). Lacquer Thinner and Acetone can be found in the paint section of Home Depot or Lowe's. For the life of your good quality craft paintbrush, I would give it a gentle final bath with hand soap and water, followed by a gentle drying with a paper towel or Turkish towel. I have craft brushes over ten years old with this kind of care. Estes and other manufacturers usually provide either stick-on markers or

**Right:** As beautiful as they are, Steve's rockets don't always enjoy smooth flights. *Photo by Sarah Jackson.*

waterslide decals with their kits. Stick-ons work as the name implies, but they don't fill in gaps well and are three dimensional, possibly affecting the aerodynamics of the rocket. The waterslide decals are more effort to apply, but they can be made to snuggle down into nearly all areas with a little care in their application. Additionally, the decals can be cut up or combined to provide a customized look. Estes and others provide instructions for applying them. Maybe the decals that come with your kit aren't too exciting. This led me to creating my own. You will need a computer and a



color ink-jet printer as well as software for the creation of the design. There is also purpose-made decal paper available from several sources. Decal paper can be purchased at Amazon.com and online hobby suppliers. It usually comes in standard letter 8.5" x 11" size. The final requirement is a clear spray paint. I have found Krylon's Crystal-Clear Acrylic spray paint quite good and easy to use. This is available at just about any crafting or home improvement store. The spray paint is applied after you've printed your design. The clear spray paint is what "carries" the design and gets applied to your rocket

It makes no difference what kind of computer you use. I have a PC-based system, so my favorite designing software is Microsoft Publisher, although if you're skillful with Microsoft Word, it works in a pinch. Clearly there isn't time or space here to explain how to actually use the software to design within these or similar programs, but ultimately, you prepare the design as if you were going to print it on regular paper. If you have access to a scanner, an existing design can be copy and pasted or scanned into your computer for later use in your design. This is how I got the NARHAMS logo for my rockets. Copied or scanned images can be resized to fit your needs. Most decal paper comes in a few varieties: matte or gloss finish for the decal itself, and the background in either clear or white. I generally use clear background with a glossy finish. In so doing, I do not need to

trim significantly the design I will use on the rocket. But there is a price to pay with the clear background: visually, let's say you want to make a design with the "43" from our Zog newsletter, and you make the "43" in red. With clear background paper you get ONLY the "43". With a white background paper, you still get your red "43," but on a solid white

**Below:** Steve shows off a brightly colored rocket with a very familiar logo. *Photo by Sarah Jackson*



background. The red on white of the "43" will be a richer shade of red, but it will still have the white background. With the clear background you get only the red "43," but upon application, its color will be weaker. If the white background is easily trimmed away after printing, you will get better results. On the other hand, if your design is intricate say, a gothic-print "43," the trimming around that number to get rid of the white background is difficult, at best. It will take practice.

Another thing to keep in mind is that, to your computer software, white is the same as transparent. If something within your design MUST be white, be sure to use the white background decal paper.

As you get the hang of printing your design to the paper in your ink-jet, keep in mind that your printer is applying ink only where you have your design (with the exception, of course of the solid white paper background). If you used one sheet of 8.5 x 11 paper to print one two-inch tall "43," then the same sheet can be inserted into your printer and reused, assuming you don't overlap the old "43" with the new one. Moreover, as long as the paper you're printing on is not spray painted with the clear spray paint, you can keep printing on the same sheet. You will waste less paper this way as you become familiar with the results. I mentioned spraying the clear paint



on the finished/printed design. Do this spraying evenly and gently. It's better to do two light coats than one heavy one. You want to see that the spray covers the entire design with an even coat. If it appears rough, let it dry and re-spray later typically, three hours later. Again, you will learn the correct layer of spray paint as you try your designs. Once your design is fully dry, it's ready to be cut out, soaked and applied. ALL decals work best on non-porous surfaces. Usually, glossy surfaces help the decals adhere best. Don't apply



decals to unpainted balsa fins or unpainted cardboard tubes. With most rocket modelers, after you've applied the decals normally, you're done. But let's say your design must cover a launch lug or fin fillet. Without special treatment, the decal may not "snuggle down" adequately. When the decals are applied, there are solutions you can use that assure the decals will soften and fit flush into nearly any nook or cranny. The two big products are known as "Solvaset" and "MicroSet"/"MicroSol." There are others. These are liquids that are brushed on the decals while they're still wet. They soften the decal film as if they were paint on instead of decals. I've found Solvaset to be the stronger of the two and its can even be applied on decals that have completely dried, although that's not the recommended method. A brushed coat of MicroSol makes the area to which the decal is to be applied somewhat slippery, so it can be quickly wiggled into place. Once in place, you brush on the MicroSet to finish the job. Whether you use Solvaset or the "Micro" products, do not touch the decal until it dries! Once the decal begins to soften, any touch can destroy the decal. These solutions are available at [Megahobby.com](http://Megahobby.com) and other  
**Left:** A brightly colored rocket will cheer up the gloomiest and darkest of days! *Photo by Sarah Jackson*

modeling suppliers.

There is a learning curve both with fluorescent paint and decaling your rocket. I cannot stress enough that it will take practice, and if you have an old rocket you can experiment with, that will flatten your learning curve. Different brands of paper work differently, hence the learning curve you face. Before long you will be having great fun making your own designs and showing off your highly personalized rocket.



*Photo by Sarah Jackson*

