TOTAL IMPULSE

JACKSON MODEL ROCKET CLUB
JMRC
HUVARS
HURON VALLEY ROCKET SOCIETY
TRIPOLI ROCKETRY ASSOCIATION, INC.

TOTAL IMPULSE VOLUME 26, NO. 4
JULY - AUGUST 2026

NARAM 67

ROCKON! SOUNDING ROCKET LAUNCH
NIKE CAJUN PROJECT TRUMP
CRAFTING NIKE APACHE FINS
USSF HAWK SPORT PLAN



CLUB OFFICERS

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Vice President: Roger Sadowsky
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Secretary: Buzz Nau
Editor: Buzz Nau
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Board of Director: Dale Hodgson
Board of Director: Michael Lewandowski
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MEMBERSHIP

To be a part of the Jackson Model Rocketry Club and Huron Valley Rocket Society means joining our family. We have monthly launches and take part in various educational events. We encourage our members to actively participate in our club projects, run for office in our annual elections, contribute to our monthly newsletter with articles or tips, and offer their expertise to the club. Members also enjoy no launch fees!

Applications are available at a launch or request one from bod@jmrconline.com. Mail the completed form along with a check for the annual membership dues ($30.00 individual or $40.00 family) to our mailing address:

JMRC/HUVARS
C/O Tony Haga
711 Wilwood Rd
Rochester Hills, MI 48309

COMM CHANNELS

There are several ways to keep in touch with JMRC/HUVARS and its members.

Website: http://www.jmrconline.org. Information includes directions to launch sites, schedule, range procedures, and instructions on how to join the club.

Groups.io: The JMRC groups.io site is a place to share files and serves as our primary e-mail listserv. Follow this link to join, https://groups.io/g/jmrc

YouTube: Check out our launch videos on YouTube. Search for "JMRCtv" and don't forgot to Like the videos you watch and Subscribe to the channel.

Facebook: If you are on FaceBook, search for "Jackson Model Rocket Club JMRC" and request to be added.

Discord: Our new chat channel for broadcasting notifications and interacting with members instantly. Discord is an instant messaging social platform that also supports VoIP (voice over IP). It allows us an opportunity for members to socialize, meet virtually with voice and webcams, ask questions, and more. Click on the invite link to join the server, https://discord.gg/pq88zUKMF9

About Total Impulse

Total Impulse is the official newsletter of the Jackson Model Rocket Club (JMRC), Tripoli Prefecture 96, NAR Section 620 and Huron Valley Rocket Society (HUVARS), NAR Section 463. Published Bi-Monthly, ***Total Impulse*** is a space-modeling newsletter devoted to representing the diversity of interests in today's hobby of model rocketry.

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The editor of Total Impulse accepts material for inclusion from anyone.

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Launch/Event Calendar - 2025

- Holiday Party - Feb 7 (Manchester)
- vNARCON 2026 - Feb 21
- March TBA (Horning 1) - Cancelled
- April 11 (Horning 1)
- LDRS 44 - April 16 - 19 (Pence, IN)
- Crapshoot XI - April 25-26 (Muskegon)
- May 16 (Horning 1)
- May 30 (Horning 3)
- NARAM 66 - June 23 - 29 (Muncie, IN)
- July 5 (Horning 3)
- August 1 & 29 (Horning 3)
- September 26 (Horning 3)
- October TBA (Horning)
- November 8 (Horning)

NOTE: Launch dates are subject to change without notice. Be sure to check the website or Discord for the latest weather and field information.

OUR CONTRIBUTORS

The following members contributed articles or photos for this issue. Photos by Buzz Nau unless otherwise noted.

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Scott Miller
John Potts
Chris Timm
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Mark Chrumka
Dale Hodgson
Steve Kristal
Buzz Nau
Roger Sadowsky
Andy Tomasch



On the Cover:
Steve Kristal's Boyce Aerospace Hobbies 1:24 scale Nike Hercules lifts off on the NARAM 67 contest range. Read more about this kit in Vendor News on page 56.

EDITOR'S RANGE BOX

Welcome to the July August 2026 issue of Total Impulse. We have an action-packed issue for you complete with local, national, and international coverage. There are articles on two club launches, NARAM 67 in Muncie, Indiana, and the European Space-modeling Championships in Poland.

Coming up in a future launch, we are hosting a new club fun contest, Alpha Streamer Duration. Details are in Club News. This issue also contains a pair of how-to articles and scale data on a variant of a popular sounding rocket, the Nike Cajun.

Speaking of sounding rockets, one of own members, John Potts, recently led a team of students to build and fly experiments that flew aboard a NASA RockOn! Terrier Improved-Malemute sounding rocket. John contributes the story of how that happened and the results of the flight.

Steve Kristal collaborated with Boyce Aerospace on a clustered, gap-staged 1:24 scale 3D printed Nike Hercules that was just released as a kit. Check it out in Vendo News.

We say our farewells to Dave McVeigh of Red Arrow Hobbies who passed away recently. President Scott Miller remembers Dave and his impact on Scott and our hobby.

There is also a sport plan based on a Wayne Kellner catalog illustration. Wayne was one of the best designers at Estes who created some of the most iconic kits there.

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LAUNCH REPORT NARAM 67

Buzz Nau, Al de la Iglesia, Mark Chrumka, & Steve Kristal



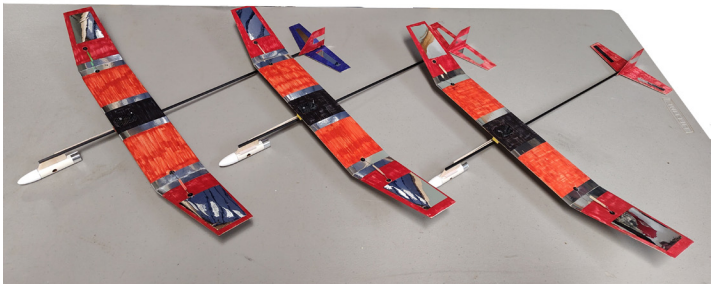
The National Association of Rocketry's annual meet, NARAM 67, was held at the Academy of Model Aeronautics (AMA) International Aeromodeling Center in Muncie, Indiana from June 29th to July 2nd. This was the second year in a row that the event was held at Muncie, which serves as the default location if the Contest Director is unable to acquire a suitable location. Last year's NARAM 66 was marred when thunderstorms cut the flying early on several days. There were no storms this year, but there was an intense heat wave that hit the Midwest this year with high temperatures and humidity. NARAM 67 was also unique as it served as the fly-off competition for the US FAI Team that will fly at the World Space Modeling Championships in Poland next year. That has happened before, but this year, rather than running a separate Cup event for the team selection, NARAM 67 included the FAI events merging three competitions together; NARAM 67, the NARAM 67 Cup, and the Team Fly-off.

Buzz Nau

Al de la Iglesia and I made the drive to Muncie on Sunday the 28th and were fortunate to get a room with working air conditioning. There was a power issue earlier in the week at Muncie which affected many of the rooms at the hotel. NARAM 67 Contest Director Matt Steele held the competitor's meeting that evening followed by model check-in for Monday's FAI events, A Rocket Glider Multi-Round (S4A) and 1/2A Helicopter Duration Multi-Round (S9A). I built three new scissor flop-wing gliders for NARAM based on my Osprey design. I checked in two and held off on the third which would have been used for a tie fly-off round. Mark Chrumka found out he was tagged with scale judging and would be spending his time at the hotel with that duty until craftsman events were flown on Thursday.

Monday

I got busy right away on Monday as A Rocket Glider was the first event of the meet. The first glider I prepped had developed an issue with one outer wing panel due probably to the high humidity. I spent some time making adjustments before prepping for flight and heading to our pad area. Al and Andy Tomasch were a huge help in picking air using Al's temperature monitoring system he highlighted in the January-February 2026 issue of Total Impulse. The boost and transition of the first flight went well, but it was apparent that the troublesome wing panel did not deploy to the proper angle as it was stuck in a tight turn. It scrubbed off half of its altitude when it finally settled into a proper glide for a score of 66 seconds, well below 90+ seconds it typically gets in dead air. I prepped the second model for the next round and this time nailed a thermal for 123 seconds. In the third round I had to re-fly the first model. I spent some time playing with that wing panel, but it flew the same as the first flight, tight turn initially and then smoothing out. This time the air was better, and it stayed up for 97 seconds. I didn't think the times were particularly good and was surprised we took first place in Team Division by over a minute. I was done flying for the moment and helped Al with his 1/2A Helicopter Duration flights when I could as I was also timing. Al had three qualified flights that pulled in 3rd place. Two medals already, we were rocking.



Buzz's Scissor Flop-Wing gliders

After 1/2A Helicopter Duration wrapped up, Al was tasked with Range Safety Officer duty, so I flew our last event for the day, C Egg Lofting Altitude. Both of us spent extra time on this event over the past year with Al making egg capsules and parachutes while I concentrated on the airframe. Our model uses carbon fiber laminate fins on a shroud-type design to keep the model relatively short and still have room for a 16" chute. We flew it off a naked piston using Al's fixed head design with a reusable nichrome igniter built into the piston head. We stuck with the Estes C6-7 as we have had inconsistent results with Q-jets. The launch had a slight tip-off from vertical but otherwise was a great boost. The chute fouled at ejection but was deployed enough for a soft landing. The egg was fine, and the altitude was 264 meters for second place. I'll be honest, I was happy just getting a qualified flight considering egg lofting has been a problem event for us in recent years.



One of our Egglofters and Altitude models

Monday night was the Manufacturer's Forum that was live-streamed and recorded for the NAR's YouTube channel. Click HERE to watch the video.

Tuesday
It was another busy day on Tuesday. I was timing for the first two events, 1/2A Parachute Duration and Streamer Duration multi-round. All of Al's flights in the two events were qualified with one MAX in 1/2A Parachute Duration. Andy also had a MAX in 1/2A PD for 7th place. Al's times were good enough for 3rd place in both events. Wow, two more medals! They say PD and SD are easy to fly, but hard to win, so placing in both events is huge.

That afternoon Al did the last shift of RSO duty and I flew A Altitude. Our models were pretty simple. Al polished a section of blackshaft tubing for the airframe. The rest of the model was a vacuformed nose cone and carbon laminate fins. Al made a special 10mm piston just for the event. The first flight wasn't quite straight up, and it took me a fair bit of time to find it for a recorded altitude of 403 meters. I was happy with that, but on the off chance we could get a few more meters, I prepped and flew the second model which went nearly vertical this time. I spent the rest of the day looking for it to no avail. The Bumblesaurus Rex team found their second flight and bested us by 12 meters for first place.

That night's activities included Vern Estes presenting his book, "Dear Mr. Estes". The talk also included a Q&A with Bill Stine. Afterward, there was a roundtable discussion, "From Hobby to High-Tech: Innovation and the Future of Sport Rocketry" that included Mallory Langford, Gary Rosenfield, and Bill Stine. You can watch the video HERE.

Wednesday
Matt had asked us to put the trophies together on Wednesday, so the plan was to work on that after Al flew S2P Precision Fragile Payload in the morning. He unfortunately DQ'd in round 1, so since we had the time, we did some sport flying. I put up my Super Screamer on a C11, the Upscale Vector V on a C11, and Centuri Orion clone on a D12. All were good flights and recovered easily.

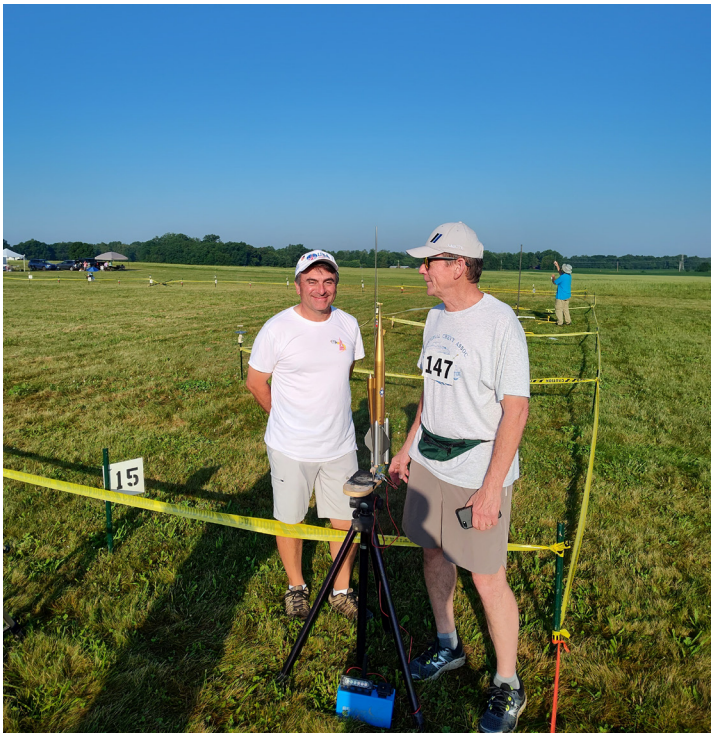


Al and the trophies that the three of us put together

After that we went back to the hotel only to find Mark had already done a lot of the trophy assembly, but there were obviously many parts missing. Eventually we found out there was another box of parts stored elsewhere, and we were able to wrap up the trophies later that night.

The night activity was the annual Cannon Auction that benefits the Robert Cannon Educator Grant. There wasn't a lot I was interested in, but I did win a propellant fill valve for the old Cold Power Convertible motors. Sounds kinda lame, but I was glad to get it.

Thursday
Concept Scale and Scale (S7) were the main events of the morning. Mark had his Supersonic Low Altitude Missile (SLAM) ready to go first thing in the morning, and we were one of the first flights of the day. In addition to the core motor, there are three strap-on boosters that fall away. Everything worked great and though it took a while to find one of the pod boosters, everything was recovered without damage for an eventual first place. There were many flights throughout the morning and not all went according to plan but were entertaining.



Al and Mark moments before Mark's SLAM flight

That evening was the banquet and awards ceremony. It's always a great time, but even better when you get to walk up for an award. Our goal is always to get qualified flights, and we pulled it off this year. We also placed in every event which I don't think we have ever done in the past which felt especially rewarding. Finally, thanks in no small part to all the membership in JMRC/HUVARS, our newsletter, Total Impulse won the LAC Trophy for the 6th time in a row and 8th overall. Thanks to all our contributors and readers for helping us reach that milestone.



LAC judge Ed Chess presenting the LAC Rockwell trophy for best newsletter - Al de la Iglesia photo

Mark Chrumka – Here Comes the Judge

Some of you may know that I compete in rocketry competition with Buzz Nau and Al de la Iglesia as part of the Escape Velocity team. We recently attended NARAM 67 in Muncie, IN which featured an incredible field and great hotel and convention facilities for a national event. Attendance this year was expected to be higher than normal, due to FAI participation. This became apparent once I entered the hotel and saw a significant number of attendees in the lobby area.

After checking in and unpacking, I attended a competitors' briefing where Matt Steele, the Contest Director (CD), outlined competition rules and guidelines and answered questions for the event. I found it odd that prior NARAMs required competitors to indicate range duty preferences when registering, but this NARAM did not have that requirement. Towards the end of the briefing Matt began to announce range duty assignments for various individuals. I was a bit surprised to hear that I was selected to be one of six scale judges.

With the exception of Range Safety Officer and Launch Control Officer, I had performed most other range duties, but this NARAM would be different. Instead of sweating in the oppressive heat and humidity like I expected, I would be judging impressive scale models in a comfortable air-conditioned environment. Hmm, I thought, I could get used to this. Building scale models is my specialty, but this was to be the first time I had judged models, so I expected it to be a useful learning experience.

On the first official day of competition, I got a cup of coffee and entered a large conference room filled with almost 80 scale models. My first thought was, 'Wow, there are a lot of models here.' The majority of models present were from the large contingent of FAI competitors attempting to qualify for the upcoming international competition in Poland. Shortly afterward, I met Guy Gehlhausen, another newbie who had been selected to judge scale. We decided to become a team to take on the large task ahead.



C Division Concept Scale models - Mark Chrumka photo

Scale events included Concept Sport (NAR) and S5 (Scale Altitude), and S7 (Scale), which were FAI events. Guy and I judged Concept scale for A, B, and C divisions. Guy had entered a model in S7 and I had entered one in Concept Sport, so we could not judge models in those respective categories.

We got down to business by evaluating A, then B, and finally C Division models. Each model and data packet was initially evaluated to ensure basic requirements were satisfied for continued judging. Assuming the model met the basic criteria, static judging was continued in the following categories:

- Similarity of Outline - How well does the model capture the overall shape and proportion of the concept prototype?

- Finish, Color and Markings – Realism of model paint, decal, textures and markings compared to the concept data provided.

- Craftsmanship – Evaluation of construction quality, fit and finish, attention to detail, (i.e. no glue blobs, smooth surfaces, etc.)

- Degree of Difficulty – Does the model have a complex design, include significant detail or have construction challenges such as unusual shapes and/or mechanisms.

Once Guy and I began judging we developed a method of assigning points where I would come up with a score in my head and wait for Guy to state what he thought was appropriate. We generally came within 5-10 points of each other and then decided on a final tally. In the majority of cases, we provided comments in the contestant judging sheet to explain the scores.

On the final day of NARAM, we left our comfortable and quiet surroundings for flight judging at the contest range. Each of us had a clipboard containing a pile of judging sheets used to score the flight performance of each model. Most models I judged did not include any mission elements, such as staging or motor clusters. If I recall correctly, the winning C Division model had a two-motor cluster, and three entries did not fly for various reasons.

Compared with judging static models, flight judging was a hectic period of time during which I crisscrossed the contest range multiple times to witness flights, all the while I was trying to keep judging sheets together, presenting completed forms to Data Entry, and trying not to trip over launch wire leads.

During my time judging scale, I was fortunate to have benefited from the expertise and experience of John Brohm, Jack Haggerty, and Patrick McCarthy, all of whom graciously answered my various questions. Judging with Guy was also an unexpected highlight of my time at NARAM.

In summary, my experience as a first-time scale judge was very gratifying and gave me a better appreciation of what the responsibility entails.

Steve Kristal - Life on the Edge

I only competed in 2 non-craftsmanship NARAM events this year. NRC A Altitude and FAI S1B Altitude. I skipped the other altitude event, C Egglofting because, well… I just hate flying eggs. To be fair to myself though, I DID initially try to practice for the egg event. I bought a bunch of C18 motors, failed to ignite a bunch of them, then got one to ignite which went funky and lost my altimeter. So, after that (not so) immense (mostly financial) effort I packed it in. That was enough for me, LOL. So instead, I concentrated on two eggless events I know well, have won in the past, and set records in.

The competition in both these altitude events is usually very tough. Lots of great competitors, multiple record setters and event winners in both. So, I am well aware that designing a "good enough, at least I got a qualified flight," model is usually not "good enough" to win. And boy, was I right.

For NRC A Altitude I spend a lot of time on RockSim repeatedly trying to make my models smaller, lighter, with the tiniest fins possible. I've competed with Bob Alway enough to learn that a winning model will probably be smaller than a Sharpie pen. The 1.6-gram weight of the altimeter in the tip of the 13mm vacuform nose cone will be crucial for stability. Hand-rolled vellum tubes are a must. Miniscule carbon fiber fins complete the picture. To be competitive I designed mine to the bleeding edge of stability, knowing full well a windy day would be a real problem. To be honest, mine are so precarious that a bee fart in the same county when I'm launching is likely to be a problem. And so it was this year. One DQ and another that just flew horribly.

The winners in this event were the "usual suspects." Canadians Fritz Gnass and Taras Tataryn as well as Chad Ring were the C-Division winners. B-Division winner Ethan Goldberg beat the old B-Division record by almost 100 meters. Team Division winner Bumblesaurus Rex had total U.S. record holder in this event, Bob Alway, demonstrating his dominance once again with a flight of 415 m. Overall, a really competitive, really fun, event.

FAI S1 Altitude went better for me. The event changed this year with FAI mandating second stage sustainers of at least 25mm in diameter, up from the 18mm used previously. The goal for FAI was to try to lessen altitudes to try to keep these



Steve & Emma prep one of their S1B model at NARAM 67 - Andy Tomasch photo

models in sight at apogee, and it pretty much worked with the heavier Estes motors we use here in the U.S. Overall length of 500 mm and boosters of at least 40 mm diameter for at least 250mm length stayed the same. But since 80% of the altitude on these models depends on sustainer design that's where I put my effort. All new fiberglass monocoque bodies, rear ejection, ultra-lightweight centering rings and fins. The photo shows the models Emma and I came up with. The very lightest was just 4.6 grams (less than the weight of a nickel) including everything but the motor and altimeter. They worked well for us, finishing 1st and 2nd in the event. 315m was the highest altitude this year compared to 373m two years ago. There were a lot of very competitive models including 8 great Junior models in the very difficult event. Overall, a really fun, well-flown competition. Most importantly, I think we assembled a great team to take us to Poland next year.



Steve and Emma's S1 Altitude sustainers

Al de la Iglesia
Several JMRC/HUVARS competed at NARAM this past June at the International Aeromodeling Center (IAC) in Muncie, Indiana. Buzz Nau and I drove down on Sunday afternoon and met up with Steve Kristal and Andy Tomasch. Later that evening we all gathered at the hotel where we found Mark Chrumka checking in. The Courtyard by Marriott was having difficulties getting rooms ready in time for the NARAM crowd as well as issues with AC not working in some rooms and rooms with partial power outages from recent thunderstorms. Buzz and I lucked out with our room, but others had to wait for a room and/or switch rooms as the week was hot and muggy. That evening Mark turned in his concept scale entry, a beautiful supersonic low altitude missile (SLAM) that won at NARAM 59, but he refinished it to look even better than before. We hung around after dinner and socialized in the hotel lobby/restaurant area but had to turn in early as the flying rounds would start at 8am.

Four of this year's NARAM/NRC events were FAI events so that we could bring the FAI and NRC fliers together for a big NARAM which included tryouts for the US team to travel to Poland next year for the World Spacemodeling Championships. The events this year would be a little tougher as pistons are no longer allowed in FAI events, so it is harder to boost high enough to catch a thermal. Monday morning started with S4A (A Rocket Glider Duration) where Buzz put up three good flights for a total of 286 seconds, good enough to win the Teams division. Wow, what a way to start NARAM with a first place, great job Buzz! I used my new thermal detector to help improve our chances of picking thermals and Andy helped with his Bubble Gun and bag of Milkweed fluffies. With our combined experience and tools at hand, I think we improved our thermal picking to better than 67%. It wasn't easy as the thermals were small and moved through quickly. As an aside, I told Buzz that had he entered the US tryouts, he would have made the US team for S4A at third place.



Al prepping an S6 model

In the afternoon, we flew S9A (½ A Helicopter Duration) and I managed three decent flights but was bummed after our 3rd flight when I found out that the timers lost sight of it after 43s. Andy and I timed it for another minute or so easily and couldn't understand how they lost it. I guess that is part of the luck of the timers that you get from the pen at NARAM. Our score of 210 seconds was good enough for 3rd in the team division in the NARAM scores, but I was really let down when I saw that I was in 4th place for the US team tryouts. Only later did I get the good news from Steve Kristal that I made the team for S9, as one of the top 3 qualifiers was a female, so I made the team as the 4th flyer.

During the third flying session of the day, I RSO'd for C Eggloft Altitude and Buzz worked alone to prep and fly the event as Mark was conscripted to judge scale models all week. It was fun to be an RSO at NARAM, but I had a much easier session with only 25 entries across all the divisions compared to the 56 entries in the morning session for S4A that John Hochheimer had all 3 rounds to get through. Buzz did a great job and took second place in teams with a flight of 264 meters. As a team we did quite well on the first day of a busy NARAM with all qualified flights and placing in every event. Every year we set a goal of getting qualified flights in every event, so we were pleased to have things go smoothly. That evening we got together and went out to dinner. We were running a bit late after dinner and missed most of the manufacturer's forum, but they did make a video that can be found on the NAR YouTube channel that I watched later on.

Tuesday morning started early with S6A (½ A Parachute Duration) and low winds, but it was hard to pick thermals. The other issue that made it hard was the 70+ entries trying to get the attention of the RSO and queue assistant to get in the queue within the round and have a thermal present when your turn to fly came up. It became a game of getting in the queue and then pulling out if there was no thermal, then getting back in the queue. My first flight did not fully open the chute and resulted in a low time for the first round. I kicked myself for not double-checking the chute that I packed the night before, so I rechecked both chutes for the next two rounds and got full opening chutes for the next two flights. I missed the thermal on the second flight but got one on the 3rd flight for a max of 5 minutes. My total time was 447 seconds and was good for 3rd place in teams. Andy and I flew side by side, helping each other to pick thermals. Andy had the same fate as me on the first flight with a partial deployment. He rechecked his chutes and then got good flights for the next two rounds. We had almost identical flights and Andy had a total of 457 seconds and took 7th place in C division. Neither Andy nor I did well enough to place in the top 3 for the US team tryouts, but Andy took 9th, and I got 10th in the NARAM Cup. Emma Kristal managed to grab the female spot on the S3A team for next year with a time of 247 seconds.



On Wednesday we got in a little sport flying

Later that afternoon we flew S6A (½ A Streamer Duration) which had 71 entries across all divisions. Luckily, streamer flights are shorter, so the queue was moving quicker as we played the game of getting in the queue and pulling out as we often did not like the thermal conditions.

Andy and I tried our best to pick hat sucking thermals but eventually had to relent and fly in non-optimal conditions. Andy got 3 good flights for a total of 119 seconds and took 4th place in C division. I managed to eke out a little more for a total of 133 seconds which gave us 3rd place in teams. Looking at the US tryout scores, Andy took 8th and I got 6th place. I was again a little let down by my performance, but I got good news again from Steve Kristal that I made the team for S6A as the 1st place finisher, Herbie Vinyard, turned down his spot on the team since he doesn't want to travel overseas anymore and the 5th place flyer was from Croatia and thus did not qualify for US team spots, so I slid into the 4th place spot for the US team. To my surprise I saw that we had not only a few fliers at NARAM from Canada, but also a couple from Croatia. When was the last time that happened? I was glad to hear that the NARAM Cup event was able to attract fliers from elsewhere in the world.

In the third flying session, I also was RSO for A Altitude. There were 26 entries in the event and most of the models were tiny BT-5 models of minimum length. The true big-time competitors were flying off pistons and those little models were very hard to see at those high altitudes. Buzz again did an awesome job of flying alone and managed to get a returned flight at 403m and took second in teams. He managed to get in a second flight in the last few minutes before the range closed, but we could not find the model. That second flight just teleported straight up off the piston and I saw the ejection, but I had to move on to the next flier trying to get in before the range closed. Buzz scoured the field while driving the golf cart back and forth, but no luck. It was a double whammy, it would have been a much higher flight and the Adrel altimeter was gone. Steve Kristal had spent most of the first two days helping juniors get in their flights for the US team tryouts. He managed to get in an altitude flight, but was plagued by instability issues as he rode the ragged edge of trying to set a new record. It was another long day of tough competition, but we fared well with qualified flights and places in every event. We were again running late for dinner, but we did go to the Vern Estes interview first and listened to some great stories of the glory days at Estes. We missed out on the "Future of Sport Rocketry" panel discussion, but again a recording was uploaded to YouTube for all to enjoy.



Vern Estes with Scott Alexander on the contest range - Andy Tomasch photo

Wednesday came bright and early for the flying of S2P in the morning. This event is basically the FAI version of ARC with a twist. Fly a model with an egg and altimeter to 300m and land in 60 seconds but do it three times in one hour rounds. Oh, by the way, you can only remove the egg after the third flight. I used a model that flies on D12-5 motors and uses a clear egg capsule for the nose cone so that you can look at your egg between rounds to see if it survived. On my first flight I got a great boost straight up to 286m, but at ejection I saw the shock line break and my egg capsule came straight down, right next to the RSO tent. Well, I was out with a DQ, and we were done flying contest flights for the day. It was a bit of a relief as I only fly S2P for fun and don't really care how I place. As it turns out, it was not a NARAM scored event, so our team did not suffer a DQ, thus keeping our team "NO DQ" goal alive.

Later that afternoon was the S1B altitude event for the US team tryouts. I did not fly in that event, but Steve Kristal takes that event most seriously and is considered by many as the best in the US. S1B is probably the toughest event as your model must be staged to be competitive and deploy a recovery device with each stage. Steve managed an altitude of 315m on his first flight and then sat back to see if anyone could beat it. The closest was by Emma Kristal at 286m using similar models. The Kristal's easily took gold and silver and secured spots on the 2027 US S1B team.

Wednesday evening was topped off with the Cannon Auction. It was a smaller crowd and not as many items, but it was a fun time. I did manage to get a deal on a starter set, but I later donated it to a youth flier that was bidding against me in the auction.

Thursday was the day to fly Concept Scale, so Mark Chrumka was all business as he carefully prepped his model. You have to see his model up close to really get a feel for the quality of Mark's craftsmanship. Flawless is the word that comes to mind when looking at it in terms of build and finish quality. Mark was way ahead in the static judging points and hoped that all would go well and that he would only have to fly it once. Although we had to search around a bit for one of the pods in the thick clover and grass, his flight was perfect and Mark took an easy first place with 995 points out of 1000 possible and the next closest competitor was 950 points. Steve Kristal flew a Gauchito to 4th place in C division with a score of 654 points.

NARAM ended Thursday night with the awards ceremony and banquet. It was a great time to talk with modelers from across the country. It was also nice to see so many youth fliers that came to fly the FAI events. I counted over 110 people at the banquet, which seems to have been the largest that I have seen in quite a few years. Buzz, Mark and I sat at a table with David and Mak Cheung, so the table got quite full of medals and trophies since Mak won almost all of the B division awards and Escape Velocity won a medal in every team event as well, and we won the Team National Championship for the second year in a row. To top the night off, Buzz won the LAC newsletter award again, the 6th time in a row, for editing our awesome newsletter. We hung around afterward and shook some hands, took some photos and said our goodbyes then finally packed all the loot onto a baggage cart to take back to the car. Overall, it was the most attended and competitive NARAM that I have been to in a few years. I hope to see you all at NARAM next year.



Ed Chess' Klingon Battle Cruiser



Mark Chrumka's (Escape Velocity) SLAM



Marc McReynolds' Mercury Lab CATO



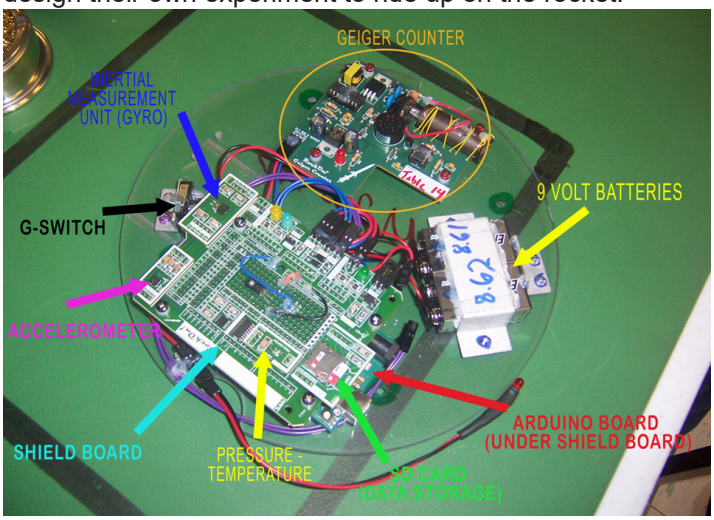
G-Force Tin Tin rocket

RockOn! Success: John Potts and SVSU Students Launch Payload on Terrier Improved - Malemute

John Potts

NASA has several STEM programs that are aimed at students from kindergarten through college level. Earlier this year, I learned of a program called RockOn! that tasks college students to build an experiment that would ride up on a sounding rocket into space. I applied for the workshop and a few weeks later, learned that my application for Saginaw Valley State University (SVSU) was one of 24 that were accepted! Each team consisted of two students, and an advisor. The team members from SVSU were Kayla Newson, a Physics major, Lucas Colpaert, a mechanical engineering major, with me as the team advisor.

The seven-day workshop was at Wallops Flight Facility in Virginia, the home of NASA's sounding rockets program. Our launch vehicle was a Terrier - Improved Malemute, a 44-foot-tall sounding rocket powered by a Terrier Mk 70 first stage and a surplus Patriot (improved Malemute) rocket motor for the second stage. Our rocket carried the experiments from two STEM programs; RockOn! and RockSat. Teams in the RockOn! workshop build their experiments from a provided kit. RockSat is phase two of the program, where the students design their own experiment to ride up on the rocket.



Experiment - J. Potts photo

Our experiment was constructed during the first four days of the workshop. The experiment was constructed of three modules. The first module was a Geiger counter, the second module was a Shield board which held several sensors, and the third module was an Arduino Uno microcontroller board. The Arduino board gathered the data from the Geiger counter and the sensors mounted on the Shield board and then recorded the data on a Micro SD card. Construction of each module consisted of soldering through hole components as well as surface mount components. I am familiar with soldering though hole components from assembling kits from Radio Shack and Heathkit. The surface mount components required me to learn a new skill. A surface mount part does not have wires that go through the circuit board, rather these tiny components have metal ends that are soldered on small pads on the circuit board. I am glad that we had magnifying lights to help soldering the tiny components to the circuit boards. After all the experiments were assembled and tested, they were mounted in flight canisters. Eight experiments each in three canisters.



Rocket team at Wallops - J. Potts photo



Canisters containing our experiments - J. Potts photo

The fifth day was integration day. This was where the experiments were mounted into the payload section of the rocket.

To ensure a successful flight each team member signs the payload skin. The experiments were then sent off to be mounted on the rocket.

On day six, the RockSat teams presented their experiments to the RockOn! and other RockSat teams. I was impressed with the experiments designed by the RockSat teams.

We traveled to the launch pad on day seven for a group photograph with the rocket on the launch rail.

The eighth day started at 4:00 am. After a quick breakfast, we drove an hour to the launch area and arrived at 5:00 am for the scheduled 5:30 am launch. The early launch time was to take advantage of calm air and low marine traffic. From our vantage point about half a mile away, we could see the rocket lit up by spotlights. As the sun rose out of the ocean, the rocket glowed in the early dawn. The countdown worked its way down - five, four, three, two, one, zero. There was a pause just long enough for doubt to creep in and then, a flash of light and a mighty roar as the rocket leapt off the launchpad. Six seconds into the flight, the first stage completed its burn and at T+ 15 seconds the second stage fired taking the experiment payloads into space. Two smoke trails marked the rocket's path to space.

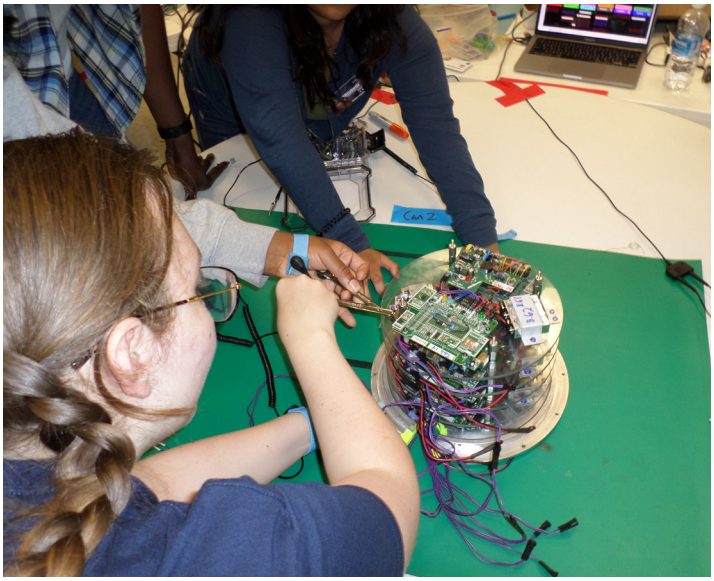
It took about two hours to learn about the fate of our flight. At the post flight briefing we heard that our rocket had splashed down, and the recovery boat had the payload section and was on its way back to Wallops Island. We returned to the assembly building and waited for the arrival of the experiment payload. The payload section was disassembled, and we returned to the workshop to download our data and start analysis.

Flight Data:

T 0.0 sec	Ignition
T + 6.2 sec	Terrier burnout (First stage)
T +15.0 sec	Malemute ignition (second stage)
T + 26.7 sec	Malemute burnout
T + 214.5 sec	Maximum altitude
T + 713.8 sec	Splashdown

Here are a few statistics of the rocket flight from our experiment:

- Maximum altitude 115.45 miles
- Splashdown 75.69 miles off the Virginia coast.
- Maximum acceleration: 18 g
- Maximum spin: 5.3 revolutions / second with a de-spin to 0.25 rev/s at 60 seconds into flight.

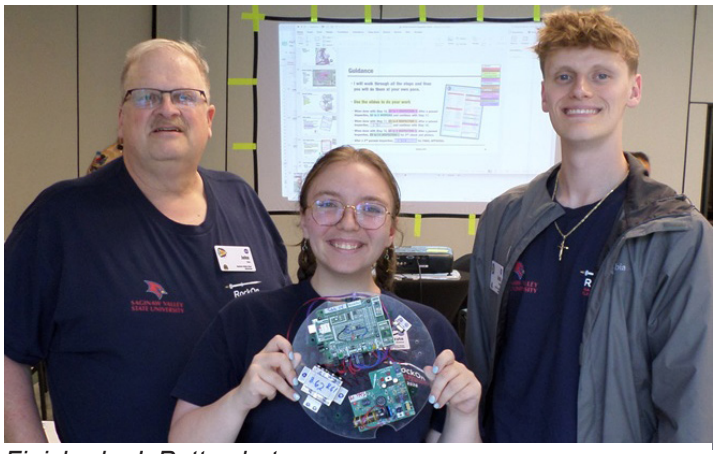


Mounting in a canister - J. Potts photo

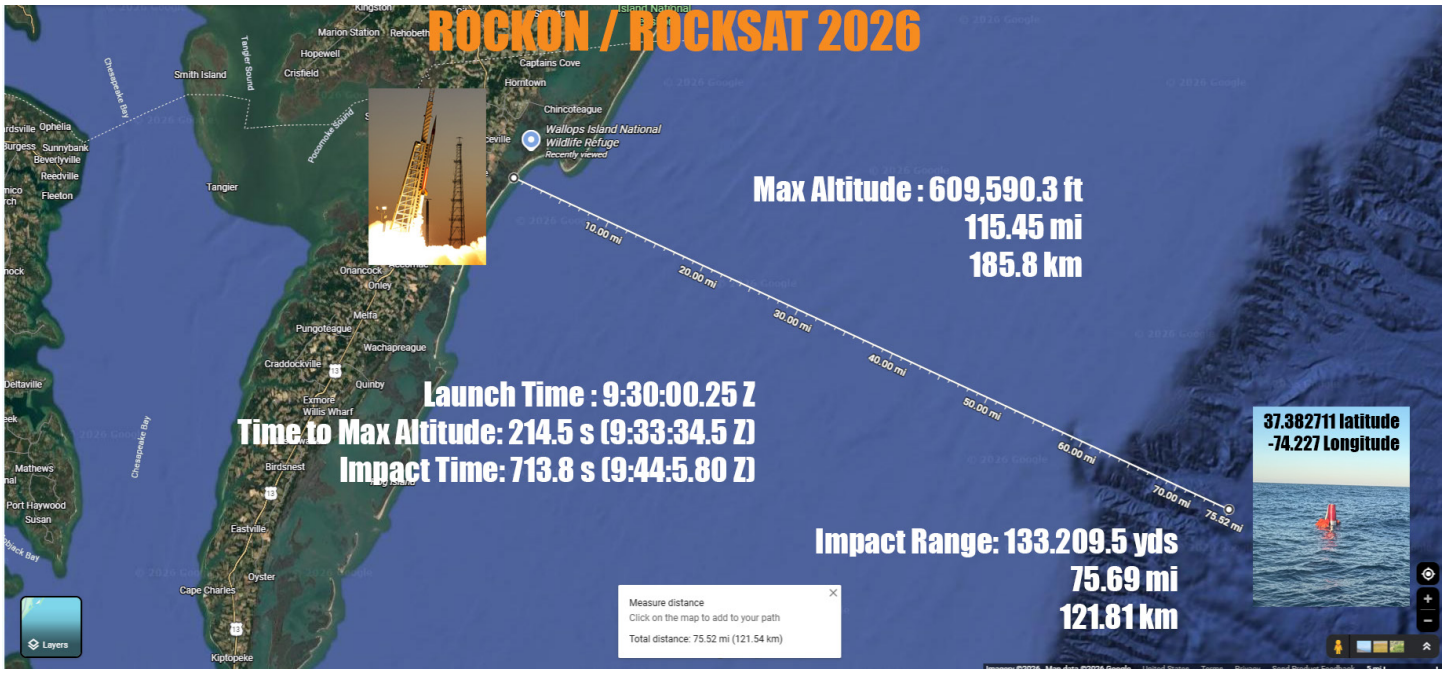
I am at a loss for words to describe the experience of leading a team to launch an experiment on a NASA rocket into space. Incredible, amazing, wonderful, and spectacular just do not describe my feelings. The team was able to attend the RockOn! workshop from a resource grant provided by the Saginaw Valley State University Foundation. I cannot thank them enough for providing the opportunity to energize two students with a learning experience that will stay with them for a lifetime. I too, have been energized by the RockOn program I am hoping to continue on to phase two with assembling a RockSat team to build a new experiment for next year's launch!

As a footnote, I want to list the similarities between the sounding rocket launch and our model rocket launches.

1.The fuel for both stages of the sounding rocket is Ammonium Perchlorate (APCP)
2.The rocket is spin stabilized
3.The rocket is initially guided by a launch rail
4.The rail is adjusted in elevation and azimuth to optimize the flight
5.The motors are started electrically (The second stage uses capacitive discharge)
6.The first stage is drag separated
7.An electronics package with GPS telemetry
8.Parachute recovery (Although the landing is out in the ocean, we do have the "big stinky" at MMAR)
9.And finally, both NASA and model rocketeers have a multi-year surplus of motors!

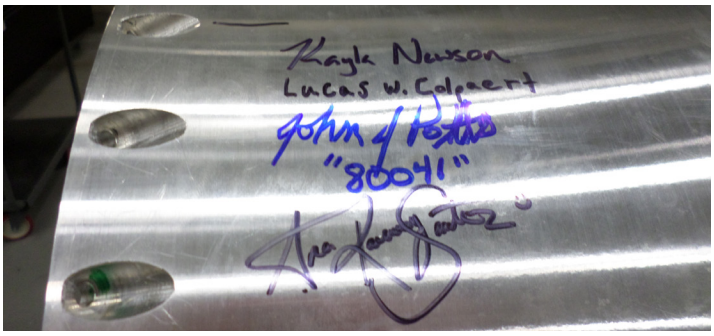


Finished - J. Potts photo





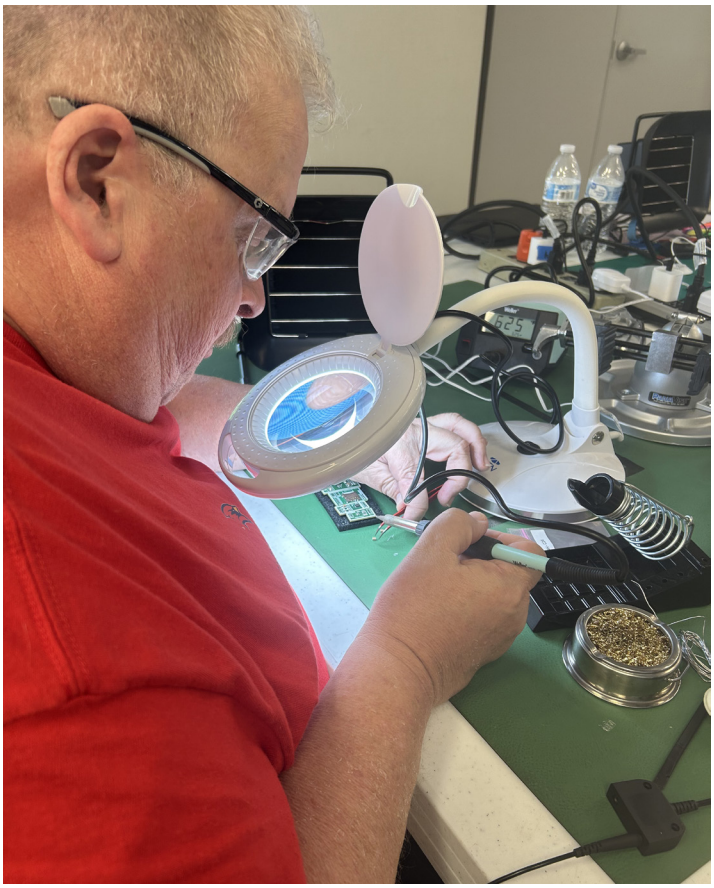
Group pic at launch pad - NASA WFF photo



Signatures - J. Potts photo



Double smoke trail – J. Potts photo



Tiny components - L. Colpeart photo



RockOn!/RockSat Terrier Improved-Malemute on the pad - NASA WFF photo



RockOn!/RockSat Terrier Improved-Malemute launch - NASA WFF photo

LAUNCH REPORT

AUGUST 1 SPORT LAUNCH

Horning 3 Field

Buzz Nau

The Horning 3 field continues to offer challenges in our range setup and model recoveries. Our launch on 1 August was another example where a north wind that shifted east during the day presented recovery issues. In total, we had three models go over the Consumers Energy Compressor Plant fence despite our efforts to keep models out. No one is at the plant on the weekends, and on Monday I reached out to my contact there. She informed me that she had moved on to another facility and cc'd my new contact who got back right away with two of the three models. The third was found the next day and all are safe waiting for their owners. Even though the plant personnel were helpful and friendly, it only takes one rocket to land in the wrong place over there and cause problems. Thankfully, the wind rarely moves in that direction and won't be a problem again until after we move to the Horning 2 Field.

The weather forecast for the launch was poor for the week leading up to the event, but as is usually the case, the rain held off for most of the day, and we got in a good launch. There were 54 flights put up by 11 fliers. My apologies to the competition fliers for not submitting a calendar event with the NAR for the launch.

Steve Lindeman led the pack with 10 launches. His Interceptor E and Cosmic Interceptor flew on E12-4s for nice flights, but tip-offs resulted in a walk for recovery. He also had nice flights with his Dyna-Star Snarky on a D12-5 and scratch built Snarky Jr on a C6-5.



Steve Lindeman's Cosmic Interceptor



Kinsley Wilson's Lil Spite

With 9 flights, Mark Chrumka had several of the day's best flights and probably the worst one as well. His Boyce Aerospace Apollo Abort Capsule had a great flight on a D12-3 as well as his Launch Pad AGM-12 Bullpup and 3D printed Bomb Rocket, both on D12-5s. Sadly, his recently repaired QModeling Nike X suffered a nasty CATO, again on an F44-4. His rebuild of the Nike X after the first CATO was the subject of his article in a previous issue of Total Impulse. This time it looks like the model is a total loss.

Jeff Jerzy had 6 flights of which 3 were his Estes Astrocam. He also flew Quint 5 twice on F-52's to test his Eggtimer Altimeter and "I Love Grapes" went up on a G80-5. Roger Wilfong also made 6 flights. His Estes Goddard rocket went up on an A3-2 for a nice flight. Roger also flew a nicely finished Estes Red Nova on a C11-3. His 2-stage Dual Spininator was entertaining on a D12-0 to a B6-0.

Kinsley Wilson and her dad made the trip from Charlotte to attend the launch. She had 5 successful flights including her Lil Spite twice on an F30 and E12. Kinsley also flew her Estes Vapor on a D12-7, Big Bertha on a C12-6, and Patriot on a C12-6. Also with 5 flights, Jon Demick sent up his scratch-built Carina on a B6-4 and Goblin on a B14-5. He also flew his Skittles twice on a D22-7 and E26-7.

Art Upton sent up 4 flights which included his Estes Ascender on an E20-7 and again on an F15-6 that CATO'd and blew the nozzle for a pad test. He also flew his Tigress on a C6-5 and Mano Magg on a D22-4. Dale Hodgson also made 4 flights. His Estes Red Flare flew twice on D12s, his Mini Bertha went up on a B6-2, and Hi Flyer XL on a D12-3.

Jay Calvert and Buzz Nau were going to make NRC competition flights, but as mentioned, I forgot to post the event. Jay went ahead and made a couple of A Helicopter Duration flights; the first one had a nice duration. Buzz made a Club Altitude Contest flight with his Estes Star Styker on a B14-7. He busted the 518 foot target with an altitude of 574 feet. He also flew his scratch built Little John on an F15-4.

Richard Buckley made a single flight, his Quest Big Betty on a C6-5. He lost track of it on descent, but was recovered after a couple of back and forth trips in the Mule.



Art Upton's Ascender



Steve Lindeman's Snarky Jr



Steve Lindeman's Expedition





Roger Wilfong's Dual Spininator



Mark Chrumka's QModeling Nike X CATO's yet again



Mark Chrumka's Apollo Pad Abort Test



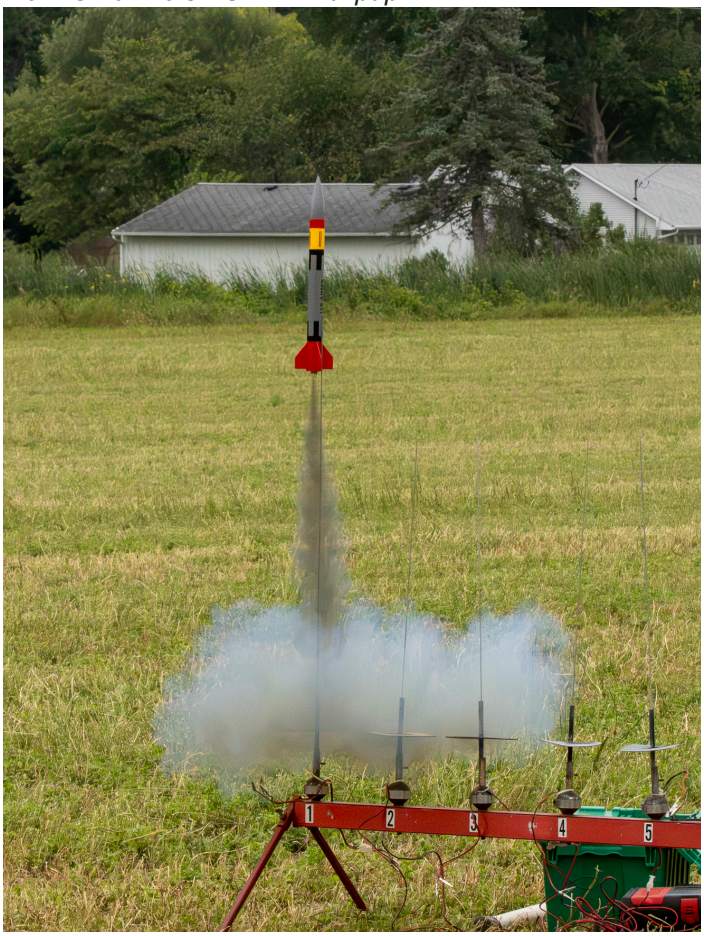
Dale Hodgson's Red Flare



Mark Chrumka's AGM-12 Bullpup



Buzz Nau's Little John



Kinsley Wilson's Patriot

VIEW FROM THE FLIGHT LINE

Funny How These Things Come Together

Dale Hodgson

As most members know, we haven't had the best flying season this year. Weather has caused the most issues, whether it's an actual storm, high winds, or weather induced delays in getting alfalfa cut which throws everything off by a few days. It's no one's fault really and we certainly can't blame the Horning's. They have been most gracious in letting us use their land; but they have a crop plan in place because farming is their livelihood. Their plans are affected by the weather just as much as ours is. It comes with the territory whether it's rocketry or agribusiness. Both activities are very much influenced by the environment.

For the rest of this year, or at least until fall when H1 and H2 are available again we are flying H3. It's a decent field but we are restricted a little by the power plant to the west and the lake to the east. If the winds are out of the south then Buzz' s home comes into play as well. So, to be as cautious as we can, we decided that no more than G impulse motors can be used and even that has some restrictions. A "G" in a light rocket will take it much too high so that makes getting it back problematic. "Fly the Field" has been our mantra for this year.



Mini motor adapter

The last article I wrote had to do with getting back to the basics. Well, thanks both to the field conditions and the foresight of Al, Buzz and Mark we have an event coming that will fill this particular niche perfectly. The final date is to be determined but what is planned is an Alpha contest. Not the great big, dual deployment versions with huge motors; the real Alpha. You know, the ones we all started with way back when. Sure, there are variants, but an Estes Alpha is one of the most basic "3 fins and a nose cone" kits out there. Also included in the contest will be Alpha III's; a plastic nose cone and fin unit version that's almost ready to fly. The other kit included in the contest is the Estes Make-It-Take It, another Alpha-like rocket that we have an abundance of. We are making them available to anyone for a small price ($5) if anyone wants to use one for the contest. The fin unit is the same as the Alpha III's, but Buzz mentioned the nose cone on these kits are a little long, so he made a bunch of 3D printed Alpha III replica cones to go along with the kits.



The rules are quite simple for this contest. Fly the rocket 4 times with streamer recovery. Each flight is timed from lift-off to ground contact. The person with the longest combined time wins. In the BOD discussion, we decided to keep the playing field as level as possible, so no pistons or launch towers are to be used, only the traditional rod or mini rail. We did this because some of us do have pistons and towers but a lot of folks that do not fly competition do not. We really didn't want some experienced competition flyer outdoing a young person simply based upon technology experience or monetary resources. We didn't put any parameters on streamer design; that's left up to the flyer. The only other variant in this is either an 18mm or 13mm A motor can be used; there will be motor adapters available for those that want to fly the 13's.

Frankly, I'm thrilled with this. A small group of friends and I did this exact same thing many, many years ago and it was a ball. Back then the original Alpha was the only one available; balsa cone and fins included. The A8-3 18mm motor was the motor of the day, we all flew off one launcher, and we all used crepe paper streamers that came off a roll used for party decorations.

We only did three flights, and we were fortunate that one of us had an old analog stopwatch. No digital anything. At first, we only did it for the glory of the win but at some point, we each threw in 50 cents; winner takes all. We did a lot of flights, had arguments about time accuracy and even a brew-haha or two at one point but in the end we all came away as still being friends and killing an entire day in our schoolyard ball field.

It's a great memory; one that still stands out. I think it's going to be the same this time around although the days of rolling around the grass to settle differences are pretty much done. I'm truly hoping that fliers of all ages get involved with this; it's meant to be an enjoyable time for everyone regardless of age or building skill level. It's going to be a ball.



13mm adapter

Now, I'll go ahead and outline my own game plan for the day. I built an original Alpha and one Alpha III. The original will be outfitted with an 18 to 13mm adapter to fly mini motors, the Alpha III will be flying on 18mm motors. Streamers will be mylar and very long to get as much drag out of them as possible to keep the birds in the air. I'll fly each off rods, just like in times long past. The only technological upgrade I'm doing is to use Kevlar as a shock cord rather than the elastic.



Alpha and streamer ready to go

For the Alpha I'm running a 13mm motor and rigged the shock cord to hold the rocket horizontally to get as much drag as I can. How I did this is fairly novel; I'm not sure it will even work. Rube Goldberg; eat your heart out. This is very new to me but sounds like it's going to be great fun. We'll see how all this goes. I have high hopes but I'm very much a rookie with this competition thing.

The Alpha III is absolutely assembled stock except for the streamer and shock cord. Again, a very long streamer on a Kevlar cord will be the order of the day. I think my biggest goal of the day will be to actually get 4 flights out of each rocket; everything else will be gravy. In reality, I expect I will get absolutely stomped by a young flier, but that's ok; I love to see kids flying and enjoying the heck out of it just like I did back in that schoolyard then and still do now.





LAUNCH REPORT

AUGUST 29 SPORT & NRC LAUNCH

Horning 3 Field

Buzz Nau

Our Sport & NRC launch on 29 August was nothing short of amazing. We had 30 fliers send up 140 sport flights and 2 NRC flights. It has been many years since we had a turnout and launch total anywhere close to this. The weather was perfect with a light SSW wind giving us plenty of room down range for recovery. We have gotten used to putting out a smaller number of pads than we used to, but it looks like we need to change that. Many thanks to all our volunteers that helped set up and tear down the range, also Al de la Iglesia and Roger Sadowsky for taking care of LCO duty for the day. Let's hope we continue to see this kind of turn out in the future.

Sport Flights

Mark Chrumka made good use of the conditions and made 15 flights for the day. Most of the flights went well like his Centuri Orion on a D12-3, 3D printed Maxi Saros on a B6-4, and Rocketarium Mega Rebel on a D12-3. He wasn't without some motor problems suffering a CATO on his Estes Big Daddy, Estes New Shepherd, and on a different flight of his Maxi Saros.

Close behind Mark was Andy Tomasch 13 flights. A couple of his models made multiple flights; the Custom Black Max Q on D12s and his scratch built sCRAPion on A8s. He also got in good flights with his Estes Show Stopper on a C11-5, CHAD Dart on a C6-5, and Not So Long Ranger on an A8-3.



John Potts' Thunderbird Interceptor



Roger Wilfong's Laser 2X

Coming in with 11 was Steve Lindeman flying several of his favorites. His Estes Big Red Max flew well on an F23-4, the Estes Star Orbiter made another great flight on an E12-6, and he had a successful dual deployment flight with his scratch built Slip Stream on a D12-3. Unfortunately, his scratch built Tinkerbell had a recovery system separation and the model suffered a lawn dart. It looks like the damage wasn't too bad, and hopefully he can get it back in the air.

It was good to see Mike Rangitsch at a launch as it has been a while. He made 10 flights with motors between 1/8A Micromax in an Estes Mosquito to a D22 in his Super Big Bertha. Mike also flew his Estes Dark Energy on a C6-3 and scratch built Scout on a C11-5.

Roger Wilfong had 6 flights including a test flight of his streamer recovery Estes Alpha on an A3-4. We have a club Alpha streamer duration contest coming up at the September launch. Check out the Club News page for details. I'm not sure if anyone timed Roger's flight, but he got a much better time than I thought an Alpha was capable of. Roger also flew his Estes Laser 2X on a B6-4 and his scratch built Maze & Blue on a C5-3.



Jeff Jerzy's Thomas the Rocket

Also with 6 flights was Steve Kristal. One flight was another test for the recently released Boyce Aerospace 3D printed Nike Hercules. Steve has been helping Alex Boyce for months in developing this kit using gap-staging for two-stage flights. This test was to see how it would do with a cluster of four A8 motors for the booster. While it flew successfully and staged, there are concerns about the booster recovery working at such a low staging altitude. It was still a great flight.

Art Upton came in with 6 flights including his Vaporous ASP in a D12-5, LOC Nano Magg on a D22-4, and E Sounder on a D12-5. All were good flights and it's great to have Art back on the field with us. Patrick Lester is a brand-new member and had 6 good flights throughout the day. Patrick sent up his Estes Der Red Max and Estes Patriot three times each and all on C6-5's.

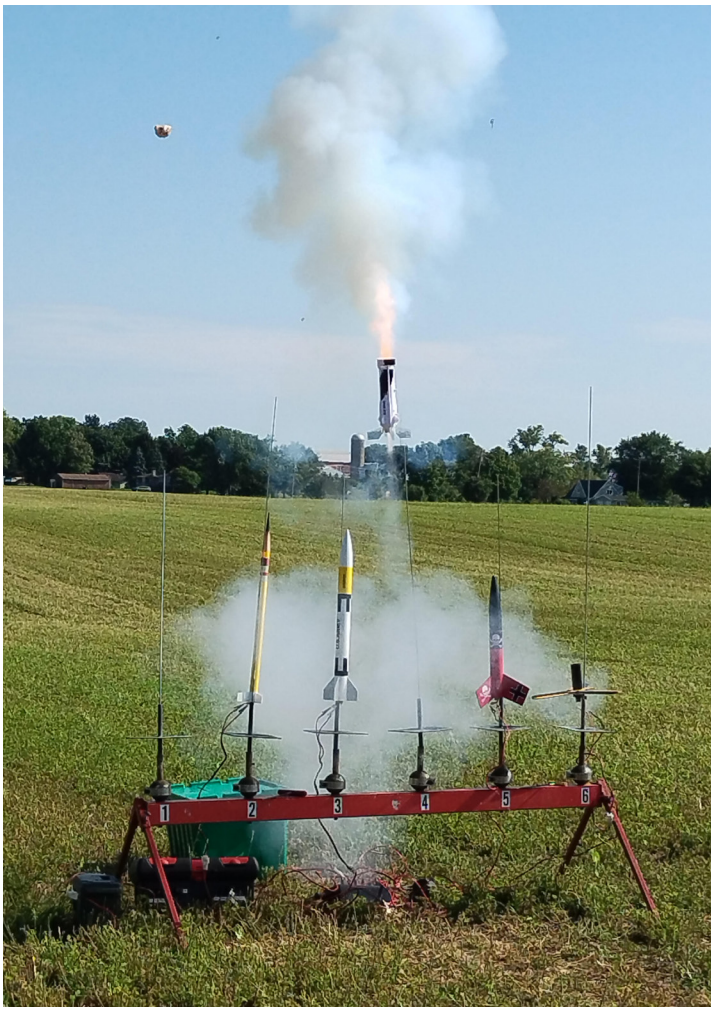
Jeff Jerzy made several entertaining flights throughout the day. He flew his eRockets Belly Flopper twice on D12s. It is a large, tall rocket that at apogee flops on its belly for a slow and safe recovery. It flies well and is certainly unique. Jeff also flew his Thomas the Rocket, based on Thomas the Tank Engine. It's boosted great on an F20, but the delay was too long causing a lawn dart downfield. Jeff's Apogee Heavy Lift rocket has three drop off pods with A8-0 motors and a core stage with a D12-3. It flew as advertised with all parts recovered.

Kinsley Wilson and her Dad were back again with 6 great flights. Her flights included her Estes Vapor on an E12-8, Estes Lil Spite on an F30-8, and Mercury Redstone on a C6-5. She also flew her scratch built Lawn Dart on an E24-4 and F-27-8. Despite for fate testing name, it flew and recovered just fine.

Randy Gilbert had 5 flights, many were 3D printed or scratch built. He put up a Boyce Aerospace Mercury Redstone on a G64-4 and a scratch 3D printed Mercury Atlas on a D22-4. Randy also flew a huge 3D printed scratch Moon Go X on an F15-4 and scratch Centuri Vulcan on a B6-4. I also made 5 flights with maiden flights of my U of M themed Fliskits FriknFrak on a pair of B6-0s and USSF Hawk on an A8-3. See the article in this issue on the origin of the USSF Hawk. I also flew my Estes Interceptor E on an F39-6.

The following fliers all came in with 4 flights each. Dan Wiemer flew his 50 year old scratch built Discovery on a C6-3 and scratch Arcturus II rear ejection model. The rear eject pod separated, but the model should be repairable. Dan also made two Club Altitude Contest flights of 551 and 528 feet. Jon Demick flew a couple of new scratch builds, Septafin on a B6-4 and Not Easy Being Green on a C6-5. He made 2 flights with Skittles and the E20-7 might have finally been too much for it as it is missing. Dale Hodgson had a couple of flights with his Hi Flyer XL on D12-3s. Liberty flew on a D12-5 and his Baby Bertha went up on a C6-7. All were successful flights. Ramon Robles flew his Quest Totally Tubular on an A8-3, a Launch Labs Bullet Bobby on a B6-4, and also an Alpha III on an A8-3.

The following fliers made 3 flights for the day. It was great to see Dave Glover at the launch. His notable flights included an Apogee X-15 on an F25-6 (great flight!) and Quest Quad Runner on four C6-5s (also a great flight!). John Potts was fresh from his trip to Wallops Island where he and a couple of students built and flew experiments on a Terrier Improved Malemute sounding rocket (see his article in this issue). John flew a couple of 3D printed rockets as well as his Estes Inter-



Mark Chrumka's New Shepherd CATO - Andy Tomasch

ceptor in USAF Thunderbird markings, on a C6-5. Dan Pendell made a couple of flights with his Blue Streak with F15-6. A shorter delay might be a better option in the future. Tony Haga flew his Interceptor E a couple of times on E20-4s and also did a test flight for the Alpha contest. Jay Calvert made a couple of test flights with his A Helicopter Duration model and then made a test flight with his A Rocket Glide Duration slide wing model. Rick Buckley flew his LOC Blaster twice on D12-5s and then his DynaStar Flamethrower on 2 D12-5s. Great flight!

Lastly, here are fliers that put up 2 or 1 flights. Jim Dulbs is also a new member who had a flight with his Apogee Blue Streak on a 1/2A3-2. Family members Jeff and Liam made single flights with an Estes Mercury Redstone on a C6-3 and Estes Rascal on a B4-4 respectively. Al de la Iglesia made 2 Alpha test flights with an ultralight Alpha that he says he can make even lighter. Braedon Briggs had a couple of flights flying his Estes Rascal on a B4-4 and Estes Hi jinks on a B4-4. Bob Alway flew an Estes kit bash Rabbit Rocket on a B6-2, Robert Henline flew a scratch built Blue Joule on a G80-7, and finally, Quint Okon flew an Alpha III on a B6-4.

Competition Flights
Jay Calvert of the Bumblesaurus Rex team made the only NRC flights for the day. He flew a pair of A Helicopter Duration flights for a total of 126 seconds.

It was certainly one of the better launches we have held in quite some time and in the smallest field we have available. We will be transitioning to the Horning 2 in the near future and should have access to it for several years before crop change. Here's hoping to continue with well attended launches!

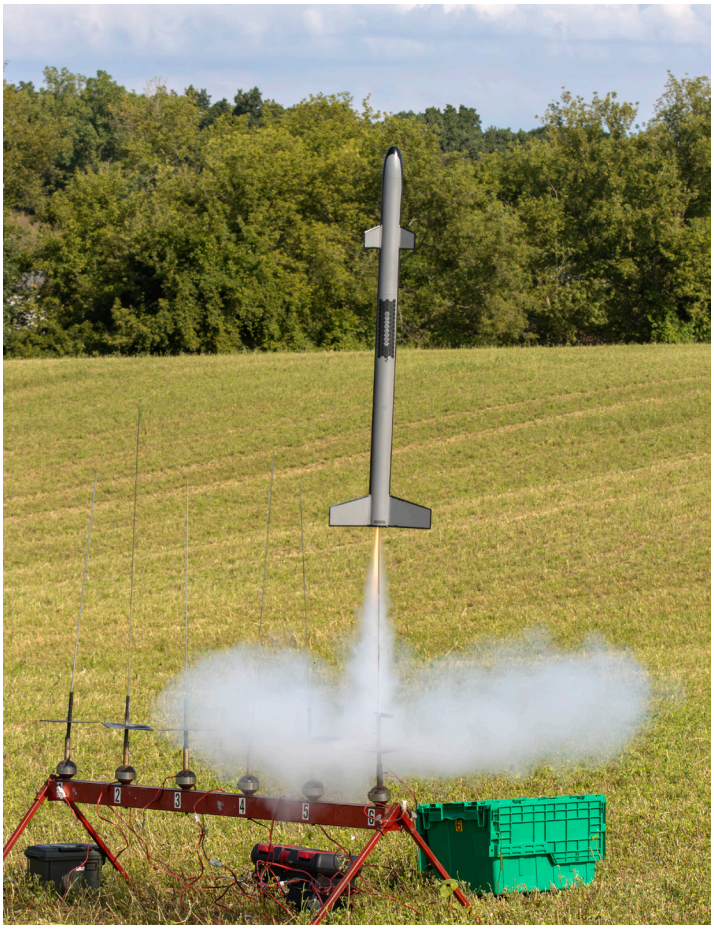


Dan Wiemer's Proteus





Buzz Nau's Wolverine Frik n Frak



Jeff Jerzy's Belly Flopper



Mike Rangitisch's Star Orbiter





Steve Kristal's Boyce Aerospace Nike Hercules



Art Upton's Nano Magg



Randy Gilbert's Moon Go X



Rick Buckley's DynaStar Flamethrower



Kinsley Wilson's Lawn Dart

USAF TARGET RADIATION MEASUREMENT PROGRAM

NIKE CAJUN - PROJECT TRUMP

Chris Timm & Buzz Nau

Introduction

Project TRUMP (Target Radiation Measurement Program) was a U.S. Air Force research effort conducted by the Air Proving Ground Center (APGC) at Eglin Air Force Base, Florida. The program's interim phase operated primarily between late 1961 and 1963, with launches from the Eglin Gulf Test Range and Cape Canaveral Launch Complex 43, Pad D.

The core objectives were to obtain radiation and upper-atmospheric measurements while simultaneously collecting high-fidelity trajectory, spin, attitude, and post-burnout dynamic data. These results supported validation of tracking systems and flight-prediction models for larger ballistic missiles and re-entry vehicles during a period of intensive Cold War ballistic missile development.

Although Project TRUMP employed several sounding-rocket configurations, this article focuses on the Nike-Cajun vehicles used as instrumented vertical probes.

The Project TRUMP Nike-Cajun

The Nike-Cajun was a two-stage solid-propellant sounding rocket consisting of a Nike M5-E1 booster and a Thiokol TE-82 Cajun upper stage. The Nike Cajun M5-E1 booster typically used a four fin configuration for improved aerodynamic stability. Project TRUMP vehicles, however, retained the original three-fin arrangement derived from the Nike-Ajax surface-to-air missile.



Project TRUMP Nike Cajun 5/18/63 - USAF Photo



Project TRUMP Nike Cajun 5/18/63 - USAF Photo

The booster fins were modified Nike-Ajax M-12 units, (canted approximately 0.40° to 0.48°) to impart a controlled spin rate. Appendix I of the contemporary APGC reports illustrates these fins with a root chord of 37.0 in, span of 25.7 in, and tip chord of 17.5 in. This three-fin geometry is confirmed both by dimensional drawings and by contemporary photographs of vehicles on LC-43 Pad D.

The nose package carried instrumentation to measure vehicle velocities, accelerations, spin rate, and attitude. Data were transmitted by a 4-watt FM/FM telemetry transmitter operating on 231.4 Mc. An AGA C/T-CV C-band radar beacon assisted radar tracking.

Measuring the target vehicles

Project TRUMP Nike-Cajuns served as a high-altitude instrumented probe launched in close coordination with the target missiles (Titan I, Titan II, Atlas, Minuteman, Polaris, etc.). The primary scientific purpose of the payload was to measure radiation signatures associated with those targets from a vertical-probe trajectory that placed the sensors at useful altitudes and aspect angles relative to the ascending or coasting missile.



Nike Cajun awaiting TRUMP payload - USAF Photo

Payload instrumentation

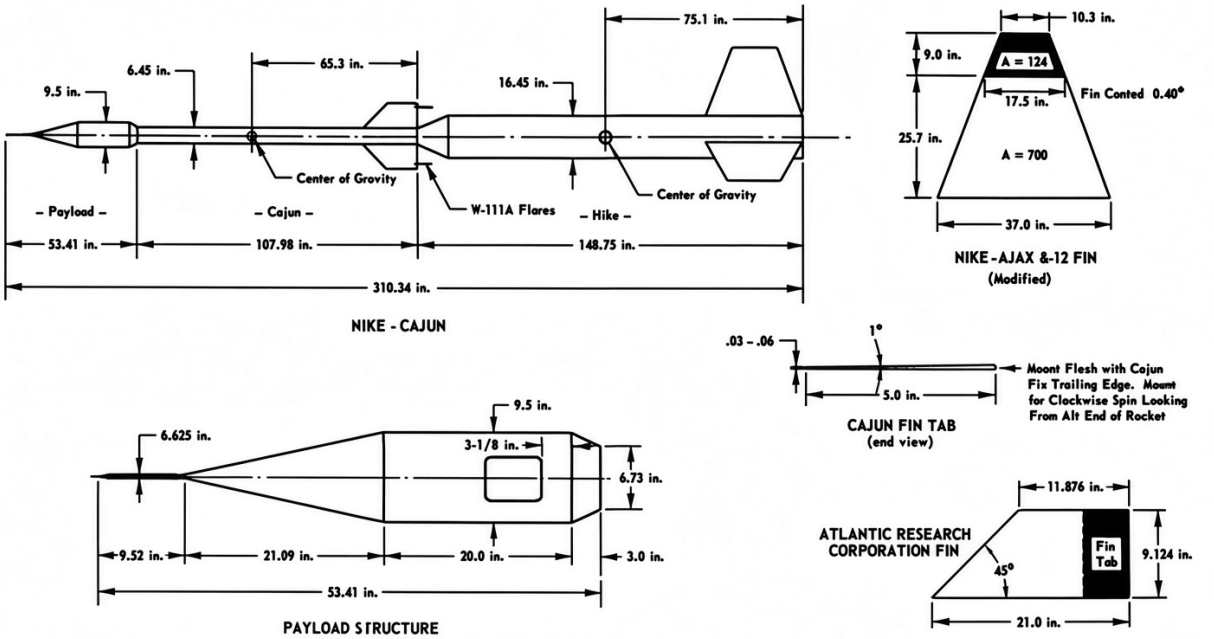
The nose package contained:

- Sensors for the Nike-Cajun's own flight dynamics (velocities, accelerations, spin rate, and attitude).
- Radiation-measurement instrumentation (the core of the "Target Radiation Measurement" objective).
- A 4-watt FM/FM telemetry transmitter (231.4 Mc) that sent the data to ground stations.
- An AGA C/T-CV C-band radar beacon to aid tracking of the probe itself.

Attitude knowledge was critical so that the radiation sensors could be properly oriented or their data corrected for vehicle motion. The earlier "Sun Slit" diagram (Fig. 5) is consistent with this: optical slits or sensors that used solar position to help determine payload attitude and spin.

Operational Measurement Sequence

1. The Nike-Cajun was launched on a near-vertical trajectory timed to the target missile's lift-off (delays of roughly 20–80 seconds appear in the launch tables).
2. While the target accelerated or coasted, the probe's radiation sensors recorded the relevant emissions (the exact spectral bands—optical, infrared, or other—are not specified in the publicly available report sections, but the program name and context make clear that radiation from the target was the measurement of interest).
3. Simultaneous ground-based radar (AN/FPS-16), telemetry, and optical (Contraves phototheodolites) tracking provided precise time-space-position data for both vehicles, allowing the probe's radiation readings to be correlated with the target's trajectory and aspect.
4. Meteorological data (winds, density) were also collected so that atmospheric effects on the measurements could be accounted for.



	Designation	Serial Number Launch No. 1	Serial Number Launch No. 2	Serial Number Launch No. 3	Weight (lb)	Fin Type and Alignment
Stage 1	Nike M5-E1	36619	36612	36629	1321.0*	M-12 - 0.40*
Stage 2	Cajun TE-82	PV-16-6-14	PV-16-6-16	Not Available	191.3**	ARC - Fin Tab
Payload Weight (lb)		67.7	65.3	66.2		

Project TRUMP Nike Cajun Dimension Drawing - Cape Canaveral Space Force Museum

In short, the Nike-Cajun did not “track” the target in the radar sense; rather, it acted as a high-altitude radiation-sensing platform whose own attitude and trajectory were carefully measured so that the radiation data collected from the target missile could be properly interpreted. The combination of onboard radiation sensors + vehicle dynamics instrumentation + ground tracking formed the complete measurement system.

Research Results

Comparison of predicted versus actual performance showed generally good first-stage agreement but larger dispersions after second-stage ignition and during coast. Launch 3 of the 1961–1962 series exhibited the greatest deviation, with a substantially lower apogee and shorter range. The 29 May 1963 flight similarly under-performed relative to theoretical apogee while exceeding predicted impact range. These discrepancies provided valuable empirical corrections to the trajectory models then in use.

Radiation, attitude, and spin data were successfully recovered on the majority of flights, confirming the utility of the Nike-Cajun as a stable, rapidly available “flying laboratory.”

Conclusion

Project TRUMP’s Nike-Cajun campaigns succeeded in generating usable radiation and atmospheric measurements while delivering concrete trajectory validation data for Air Force missile systems. The decision to retain the modified three-fin Nike-Ajax booster proved operationally satisfactory and highlighted the flexibility of surplus military hardware in sounding-rocket applications.

Key takeaways include the importance of real-world spin and post-burnout dynamics data, the adequacy of existing range instrumentation for precise reconstruction, and the value of modest, iterative vertical-probe programs in refining larger weapon-system models.

The surviving APGC reports (AIDR 63-26 and TDR-64-38) and associated configuration drawings remain the primary technical record of this interim phase. They illustrate how a mature, low-cost sounding rocket contributed quietly but effectively to the broader U.S. aerospace effort of the early 1960s.

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Project TRUMP Nike Cajun Payload Inspection 5/18/63 - USAF Photo



Project TRUMP Nike Cajun 5/18/63 - USAF Photo



Project TRUMP Nike Cajun 5/18/63 - USAF Photo

Nike-Cajun

Project TRUMP Interim

Project 4479W2

1/40 scale

Dimensions in inches

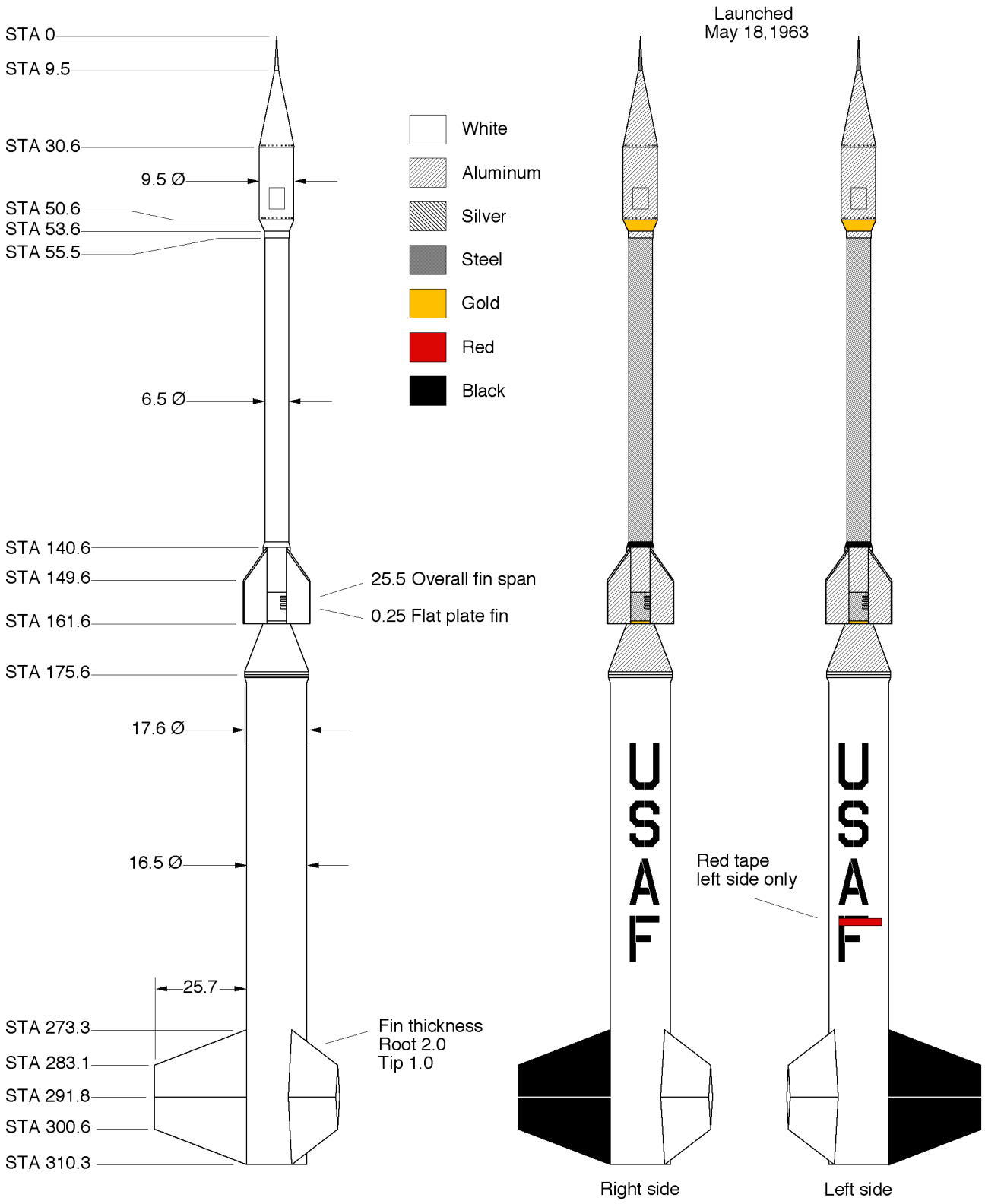
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Sources:

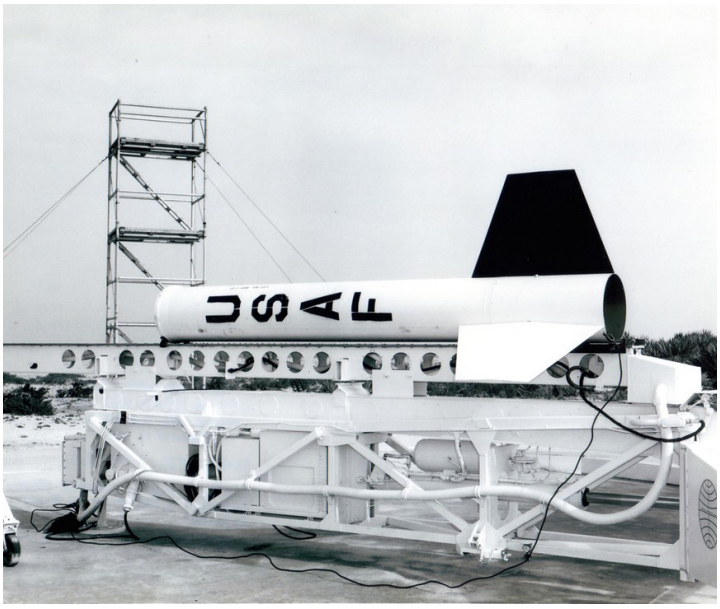
Nike-Cajun Vertical Probe Launching Report, Donald R. Puddy, 1st Lt, USAF and Marshall F Cartledge, APGC-AIDR-63-26, April 1963.

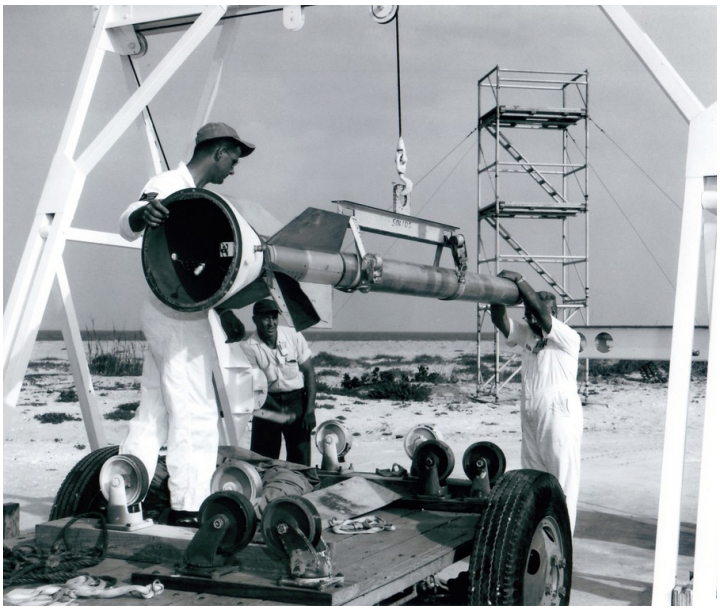
TRUMP (Interim Phase) Nike-Cajun Vertical Probe (TRUMP Vehicle) Trajectories, Ernest T. Scambos, Capt., USAF, APGC-TDR-64-38, June 1964.

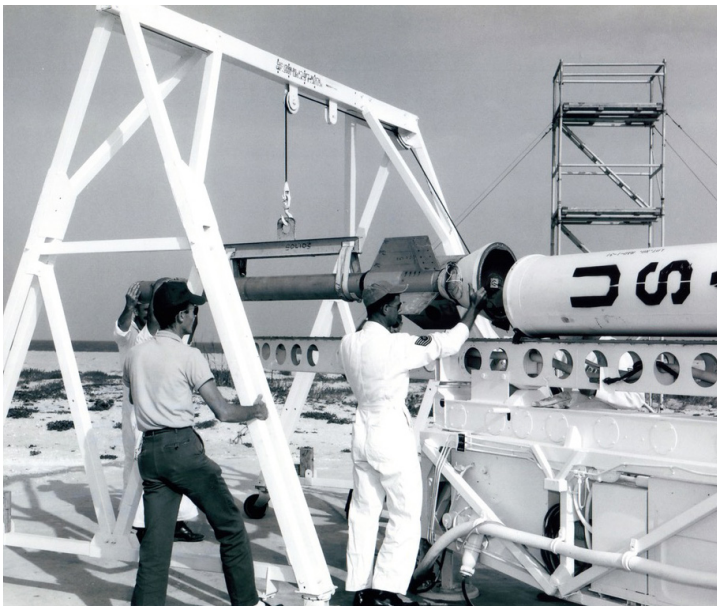
Various U.S.A.F. photographs provided by Roger McCormick, Cape Canaveral Space Force Museum, Florida.















Project TRUMP Nike Cajun Assembly 5/18/63 - USAF Photos courtesy of Cape Canaveral Space Force Museum

Yet Another Suggestion For Mounting Paper Skins on Balsa Fins

Dan Weimer

You have likely seen suggestions posted online for gluing paper skins onto balsa fins to improve their strength. For example, on the Apogee Components website Tim Van Milligan has posted at least three videos about this technique. After having so many fins broken on rough landings (and an engine CATO), I thought I would give it a try. Somewhere I had seen a suggestion to try peel-and-stick adhesive paper, such as that used for printing mail labels, to cover the fins. I tried this with a small piece of scrap balsa material, and I was not impressed with the result. In an earlier tip at https://www.apogeerockets.com/Advanced_Construction_Videos/Rocketry_Video_16, Tim uses ordinary wood glue to adhere the paper, then follows by sealing the edges with CA "superglue." In another video tip, 14 years from the first, Tim suggests applying a thin CA adhesive to the entire fin surface before applying the paper skin (.../Rocketry_Video_381). Considering the fumes from the CA, I didn't want to try that. Later on (at .../Rocketry_Video_450), Tim suggests using wood glue thinned with water. I was left wondering exactly which mixture proportions would work best and whether or not it would waste a lot of glue.

Then it occurred to me that the sanding sealer that I had using (obtained from eRockets) might work as a suitable adhesive, since I had found that it was quite sticky when applied to balsa, as well as on the paint brushes. So I gave this a try on another scrap piece of balsa, and found the result to be surprisingly strong. The pore-filling properties of the sealer likely helped. So I went ahead and used this method on my latest rocket. On this rocket I decided to try reinforcements on the root edge of the fin, as shown in Photo 1, for attachment directly to the D and E sized engine tube rather than using thru-body fin slots. I used 28 pound laser printer paper for these skins. Two coats of sealer are suggested before applying the pre-cut paper skins. Extra paper margins were trimmed with combinations of knife, file, and sandpaper. Then I followed the suggestion to seal the edges with CA adhesive. But I found the resulting edges rough and bumpy, requiring extra sanding on all three finished fins. I went back to my trial scrap sample and sealed the edges with plain white wood glue, and found that to be easier to finish. So I recommend just white glue rather than superglue for finishing the fin edges. If you want to try this yourself, then I suggest that you still watch the Apogee videos mentioned earlier for tips.



My final rocket, named Procyon (after the brightest star in the constellation of Canis Minor), is shown in Photo 2. This rocket has a size 60 body so that could accommodate a Jolly Logic Chute Release, for use at the smaller Horning 3 field with E sized engines. (Who wants to end up in the lake or the Consumers Power facility on a windy day?) But for the first flight on May 30 I had used a C11 engine, and it only went up to just a little over 220 feet. As a result this rocket also had a rough landing, as the Chute Release mechanism was set to open at 300 feet. But all fins remained intact, so the extra layering on the fins seemed to work. So Procyon was ready for another go, reaching over 500 feet on a D12-5 engine (it seems to be a heavy rocket for its size). This time the Chute Release worked as expected.



Musings From The Shop:
Crafting Scale Apache Fin Leading Edge Extensions

John Brohm

Introduction

Sometimes the scale modeler is confronted with the challenge of reproducing very thin fins. Depending on the prototype and scale factor, the required model fins may push the limits of available materials.

That's exactly the situation with the sustainer fins on the Nike Apache I'm currently building. The prototype Apache fins were 0.26" thick[1] ; at our scale factor (1/5.489), they shrink to a width of just 0.047" - little more than 1mm. This raises two key questions: how to produce a fin at true scale thickness that's still robust enough for flight, and how to replicate the Apache's distinctive leading edge bevel on such thin material?

In this article, I'll share with you the approach I've taken to address both challenges.

The Prototype Apache Fin

The Apache fin was an aluminum extrusion that included the mounting flanges and was cut to the planform illustrated in Figure 1.

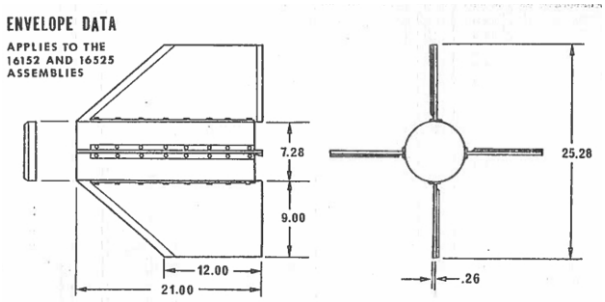


Figure 1: Nike Apache Fin

Standard Fins – Cajun-Apache Rocket Motors

Each Apache fin featured an Inconel leading-edge cuff for thermal protection and was fitted with a field-machined trailing edge spin tab to induce a specific roll rate. Each fin assembly was screwed to an extruded aluminum shroud that was, itself, screwed to the nozzle section of the Apache motor.

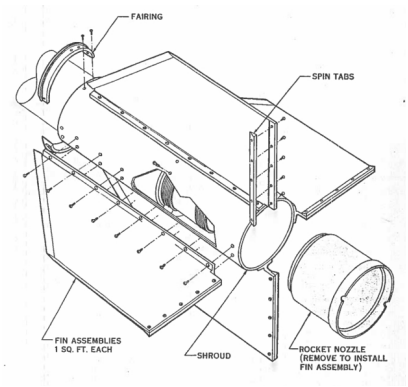


Figure 2: Apache Fin Can Assembly

1 "Standard Fins – Cajun-Apache Rocket Motors", Atlantic Research Corporation

Apache and Cajun fin can assemblies were interchangeable; as described by Buzz Nau[2], "Cajun and Apache are so similar that they are often regarded in NASA reports as "Capache", signifying the material is relevant for both rockets". We'll take advantage of this interchangeability by borrowing photos of both prototypes so that we might more clearly visualize the key features.

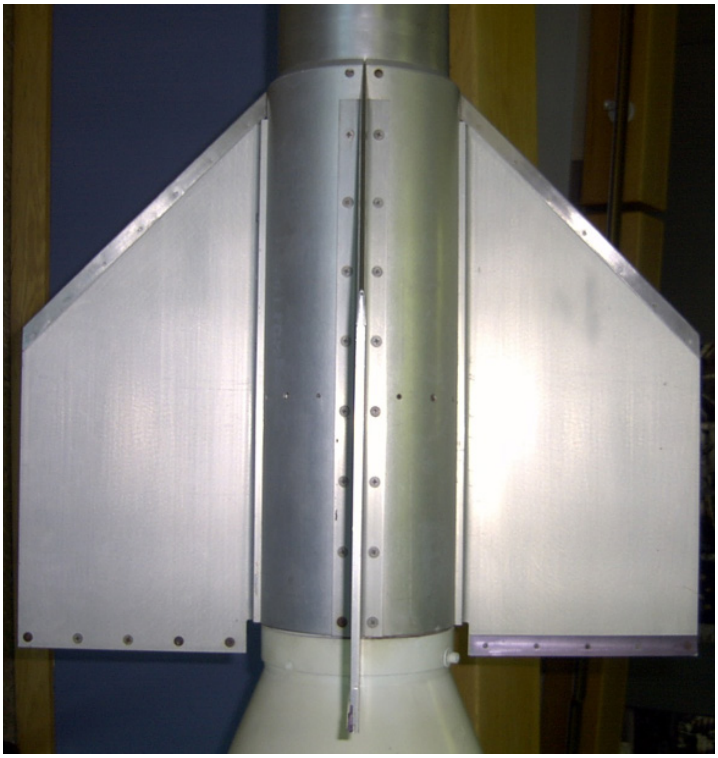


Photo 1: Apache Fin Can
Photo Courtesy of Buzz Nau

Photo 1 highlights the leading-edge Inconel cuff and the trailing edge spin tab. Of note is the way the leading-edge cuff lands flush at the shroud; because the fin extrusion is cut short of the shroud's forward edge, a small gap is created between the forward edge of the fin extrusion and the aft edge of the Inconel cuff. This is a detail that we'll want to capture on the model fins.

At the aft end of the fin assembly, one can see how the fin trailing edges have been notched to provide clearance for the motor nozzle – that's the white ring just behind the fin can. Often this ring is confused as a part of the Interstage Adapter; Photo 1 makes it clear this ring is the rocket nozzle as depicted in our earlier Figure 2.

Photo 2 provides an oblique view of the fin assembly, and highlights the motor nozzle.

2 "Nike Cajun and Apache Sounding Rockets", Total Impulse, Vol 18/No. 1

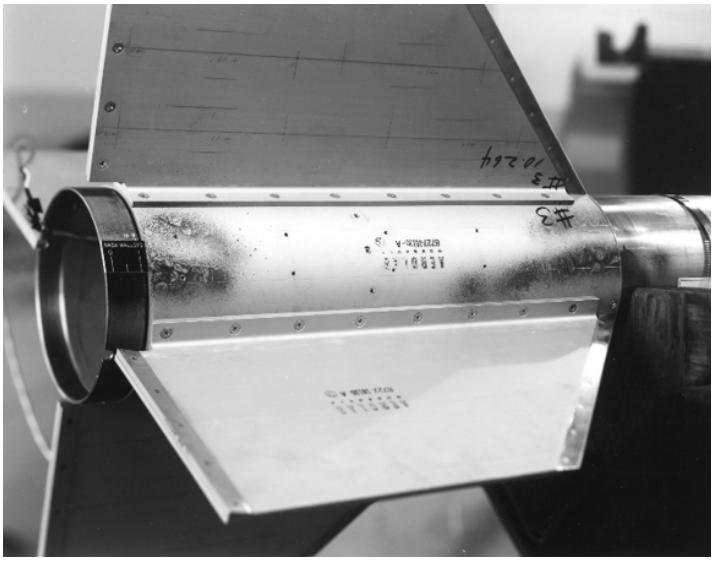


Photo 2: Cajun Fin Can
Photo Courtesy of Chris Timm



Photo 3: Cajun Fin Can
Photo Courtesy of Chris Timm

Zooming in on Photo 3, one can clearly see the gap between the Inconel cuff and the forward edge of the fin root.

Finally, Photo 4 – it provides a close-up detail of the Inconel cuff itself.

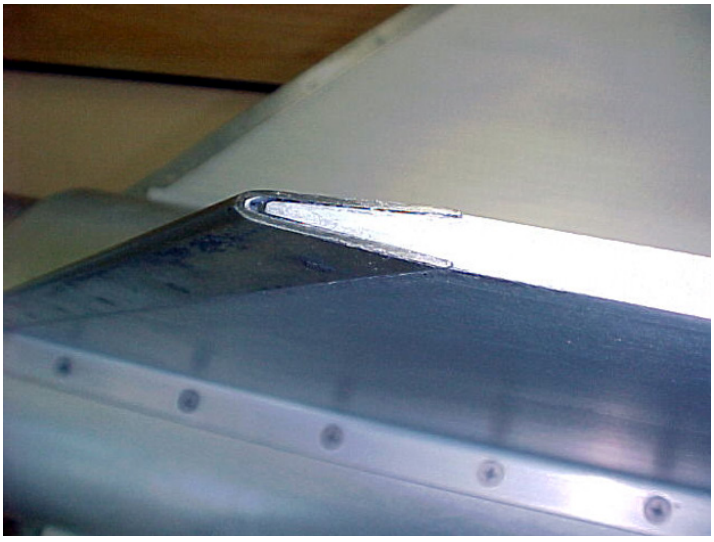


Photo 4: Leading Edge Inconel Cuff
Photo Courtesy of Buzz Nau

As Photo 4 shows, the fin's leading-edge was milled to seat the one-piece cuff. The photo also shows how the fin's leading-edge/cuff is aerodynamically beveled, and how the Inconel cuff sits slightly proud of the fin at the mating edge. The beveled leading-edge is a feature that we'd like to capture on our model, however, with fins of a thickness just barely more than 1mm, creating a consistent leading-edge bevel will be a challenge indeed.

Considerations for Crafting Scale Apache Fins

The fins for our model's Sustainer will be quite thin – 0.047" thick; there are no traditional modeling materials (balsa, plywood) available in this thickness. One option would be to craft a composite material fin by sheeting 1/32" (typically 0.035", or 0.8mm) thick balsa with a lightweight fiberglass cloth and epoxy resin. The resulting composite fin would likely be stiff enough for flight, but controlling the thickness of the layup would be challenging.

The scenario calls for a stiff material with precise dimensional characteristics, such as G10 fiberglass. Here, we can find sheets of 1mm and 1.2mm thickness, with the 1.2mm thick material being almost exact scale. However, while G10 offers the qualities we seek (stiffness, robustness), those very same qualities present serious obstacles when we consider how best to replicate the leading-edge bevel, especially on such a thin fin.

As a practical matter, in the absence of a reasonably precise milling set up there is no easy way to achieve a consistent ~0.5mm half bevel on 1mm G10 – certainly not by hand. So, our strategy will be to prepare the beveled leading-edge as a separate part, and then glue it to the G10 fin. But first a decision must be taken as to which material – 1mm or 1.2 mm – will be used for the fins.

Normally our preference is to use exact scale materials whenever possible. The problem here is the math - 1.2mm is 0.047". Since the bevel occurs on both sides of the leading edge, that means the half bevel is 0.0235". There is no convenient material set that can be adapted to create such a bevel.

However, 1mm is 0.0394", very nearly 0.040". A half bevel with this material would be 0.020", a standard size in sheet Styrene. So, a leading-edge cuff mold could easily be crafted for 1mm G10 material. The downside is the 1mm-based fin would be slightly undersize, thin by 0.0035" on each fin side. But that's the unfinished fin – primer and paint will help the finished fin land close to scale thickness.

So, with these considerations in mind we'll select 1mm G10 as the fin material, and we'll craft a separate beveled leading-edge extension which will be added to the fin.

Sizing the Leading-Edge Extension (LEX) & Inconel Cuff

The November 1969 issue of Model Rocketry magazine, pages 5-9, contains a scale article and drawing of Nike Apache FLT 14.04UE. The drawing (page 6) provides a stock width for the Inconel cuff of 0.75". Unfortunately, we can't be sure of the accuracy of this dimension, as other dimensions in the drawing are known to be at variance with actual source material[3]. We are therefore disinclined to rely on this drawing.

3 "Standard Fins – Nike Rocket Motor", Atlantic Research Corporation
"Standard Fins – Cajun-Apache Rocket Motors", Atlantic Research Corporation
"Nike M5 Rocket Motor", Biedron/Tschirhart, 1996/2012

However, we do have actual prototype photos of the Apache/Cajun fins (e.g.: Photos 1-4, herein), and from these we can approximate the cuff width by scaling from these photos. Admittedly, this process introduces some error, due to parallax issues with the photos. Nevertheless, by taking measurements from several different photos, we arrive at a likely stock dimension for the cuff in the range of 0.625" (5/8") to 0.71".

For the model, I decided to go with the 0.71" dimension, only because this returns a prototype chord length of 1" (i.e.: 0.71*√2=1), a conveniently round number[4]. But it could just as easily be 0.884" if the 5/8" prototype stock width is correct (or perhaps it's actually some other measurement, maybe even 0.75"). Until a confirmed prototype measurement or engineering drawing is found, we'll go with our scaled interpretation.

Taking these considerations into the fin's design, we arrive at the planform shown in Figure 3, based on our scale factor of 1/5.489.

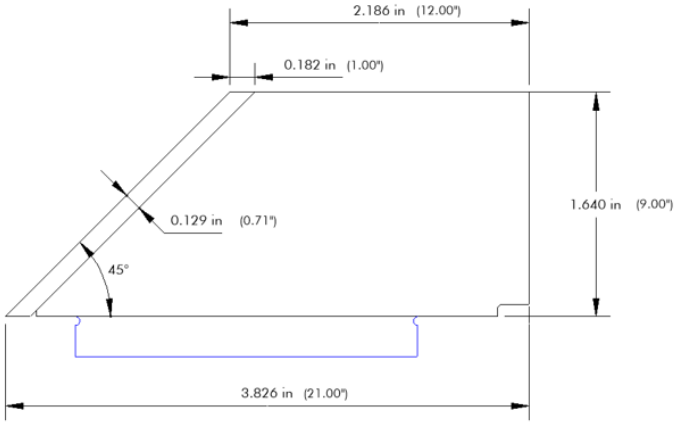


Figure 3: Scale Model Apache Fin
Prototype Dimensions shown in Parentheses

The diagram shows that the beveled leading-edge stock width is 0.129", and its chord length is 0.182". We'll base our LEX on these dimensions.

We will also add a cuff to the LEX to complete the fin assembly, just like the prototype. This separate part will be a one-piece wrap, fashioned from 0.005" thick Styrene sheet and will be sized to match the LEX as shown in Figure 3. Making the cuff a separate Styrene part also affords the opportunity to detail the part with the rivet pattern we see in our earlier Photos 1-3. The photos also make plain that the Inconel cuff had a brighter sheen than the dull aluminum fin extrusion, so we'll address that issue during the finishing stage.

But first, let's cut those G10 fins.

The Scale Model Apache Fin

Using the planform in Figure 3 (minus the LEX), a set of four 1mm thick G10 fin blanks was cut.

One may have noticed the five counterbored holes on the right-facing side of the fins. Those are there to accept the Phillips head screw details we'll add later to represent the spin tab fasteners (see Photo 1).

4 The Apache/Cajun fin leading edge was swept 45 degrees

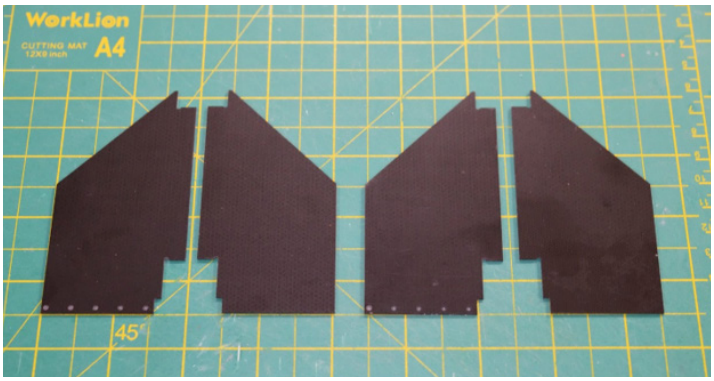


Photo 5: G10 Fin Blanks

The next challenge is producing a consistent, repeatable leading edge bevel. As mentioned earlier, given the hardness of the G10 material and the dimensions involved (a half bevel of 0.5mm over a 0.129" stock width on each fin face), filing/grinding this feature directly into the G10, either by hand or by machine, would be extremely difficult. Instead, our strategy here will be to replicate this feature with a separate part, which will be glued to the leading edge of the fin.

The leading-Edge Extension (LEX)

Since we've decided to craft the LEX as a separate part, let's consider our fabrication options.

One consideration would be to have the part 3D-printed. However, while 3D printing might seem like an option, the part's dimensional requirements — a 1mm base tapering to a knife's edge over a 0.182" chord — might exceed the practical resolution of most hobbyist FDM printers.

Another option might be to attempt to handcraft the part from a soft, workable material like balsa or basswood. But again, given the part's dimensions, the part would be extremely fragile to handle while shaping, and it would be very difficult to achieve a consistent bevel along its length, if at all.

That leaves a third option, which is to resin-cast the part from a silicone mold – that's the approach we'll take here. Using standard materials, we'll craft an accurate geometric mold that will produce a precise LEX part.

To create the silicone mold, we first need to prepare a molding buck, which itself will be resin-cast from a built-up Styrene mold. The buck mold begins with two pairs of 0.020" Styrene strips; the base piece was cut to a 0.25" width, and a wider strip was cut to include the added LEX stock width (0.25" + 0.129" = 0.379" wide).



Photo 6: Mold Preparation

With a pair of strips stacked and glued together, a 0.020” step is created at the edge of the narrower strip. That step is the form for the half bevel. The step is then filled with an epoxy clay (in this case, Milliput), and is feathered out to the front edge of the wider strip to make the half bevel shape. Once the clay cures, the half bevel is sanded smooth, with any divots filled with modeling putty and then sanded again. The process is repeated for the other pair of strips.

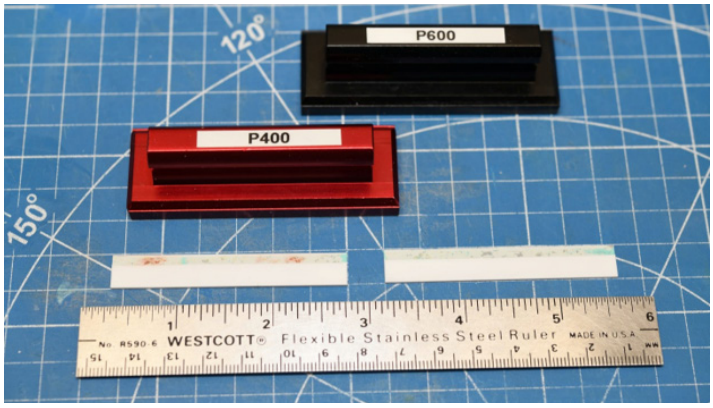


Photo 7: Mold Preparation

Satisfied with the shape and smoothness of each half bevel face, the two mold sides are glued together at the 0.25” base strip to form the completed bevel mold. The resulting bevel mold forms an inverted isosceles triangle, with a width of 1mm (0.040”) and a height equal to the stock width of the LEX (0.129” at our scale factor).

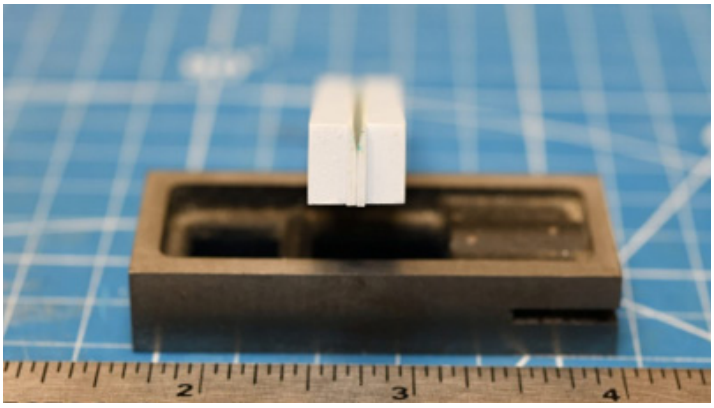


Photo 8: Bevel Mold - End View

A length of 0.25” x 0.375” Styrene strip is added to each side of the mold to keep the thing straight and rigid. Small cap pieces are added to cover the open ends. After spraying the mold with mold release, the mold is chucked in a vise, and resin is poured.



Photo 9: Resin Poured

Once the resin has cured the mold is broken apart, and our mold buck is revealed. Let’s take a look at its fit on one of the fin blanks cut earlier.

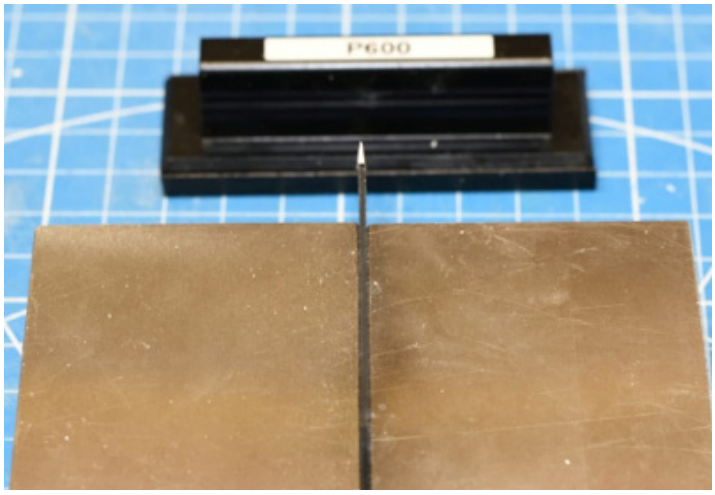


Photo 10: LEX Test Fit

It’s rather tiny, but Photo 10 provides an end view of the LEX sitting on the leading-edge of the fin blank. It’s the tiny white triangle perched up on the edge there. This initial cast is used as the buck for a silicone mold from which we’ll cast the LEX parts for the fin set.

The mold box is crafted from pieces of 0.030” Styrene, starting with the base. The buck is glued to the base with some thin Styrene cement. The box sides are added, and we’re ready to pour the silicone rubber.

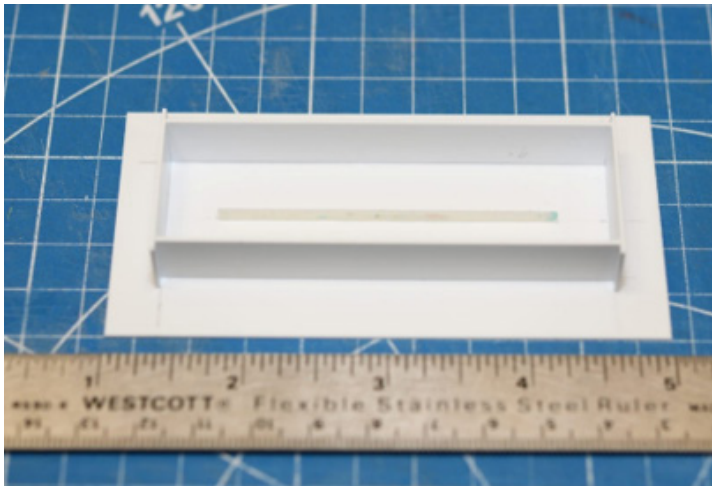


Photo 11: Preparing the Silicone Mold Box

Once the rubber has cured, the mold is popped, and we’re now ready to resin-cast some leading-edge extensions. With a squirt of resin from a Monoject 412 syringe and some appropriate curing time, we arrive at a LEX, ready for application.

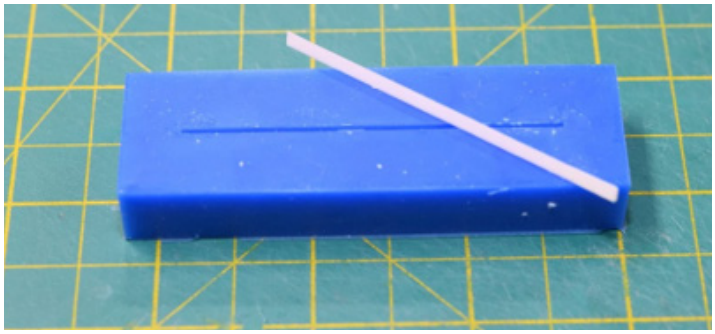


Photo 12: Molded LEX

This process is repeated until we have the complete set of LEX parts we need.

With the extensions molded, the next step is integrating them cleanly onto the G10 fins; this step will require careful alignment but will deliver the beveled edge appearance we're seeking.

Mounting the LEX

Aligning a LEX on a G10 fin is a little like walking a balance beam; a misplaced step can lead to tragedy. In this case, our beam is only 1mm wide, so we'll prepare an alignment fixture to help us stay on beam. As for the extensions themselves, we'll apply them in their over-long state, and trim them flush once the glue cures.

The alignment fixture is a simple affair – a "V" trough that the LEX is placed in, and then with the aid of some alignment blocks, the fin is held in place until the glue sets. The V trough ensures the extension sits perfectly centered, preventing roll or tilt during glue up — alignment issues that would be difficult to correct once the glue cures.

The fixture begins with a base of 0.100" thick Styrene. A 'V" trough is created from a pair of 0.020" x 0.100" Styrene strips, glued against 0.100" thick Styrene support bars located on each side of the trough. The width and shape of the trough is controlled during fabrication by inserting one of the LE extensions as a spacer.

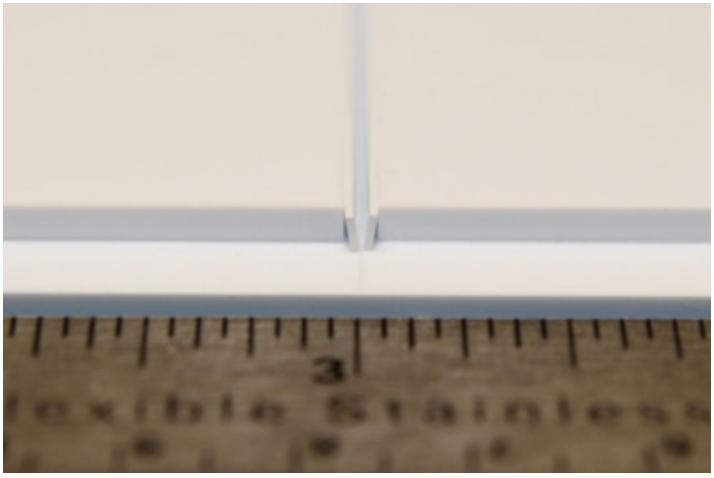


Photo 13: LEX Alignment Fixture

The 0.100" thick Styrene support bars ensure the trough stays straight and rigid.

A LEX is placed inverted in the trough, and then a very thin film of epoxy is judiciously applied along the LEX with a toothpick. Epoxy is the adhesive of choice here, as it provides the necessary working time to check, double-check and correct any alignment issues that may arise during the gluing process.

A G10 fin is then mated to the extension in the inverted position with Gravity doing all the work. The fin is set against a vertical support block that sits carefully aligned with the trough. Any excess glue is easily wiped away, and a second block is carefully placed to maintain the assembly's vertical alignment.



Photo 14: LEX Glued

Once the epoxy cures the fin assembly is removed from the fixture and the ends of the extension are carefully trimmed with a fine-toothed razor saw.

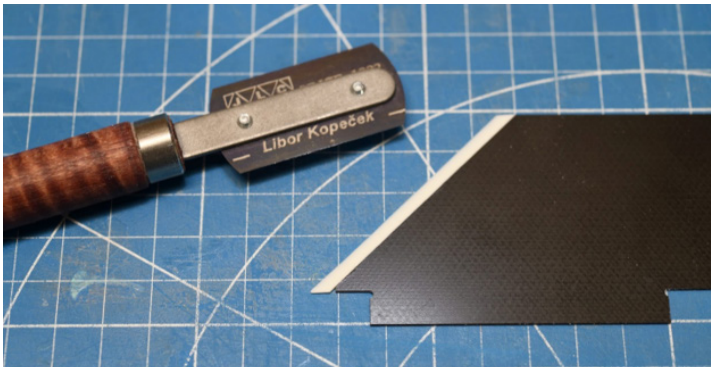


Photo 15: LEX Trimmed

Looking closely, we can see that our fin assembly has a little gap between the aft edge of the LEX and the forward root face of the fin, just as we saw with the prototype in our earlier Photo 3.

We'll repeat this process for four more fins so that we end up with a total of five assemblies. We'll use one of the fin assemblies as a painting and finishing mule to confirm the techniques we'll use to finish the four fins for the model. But before we move on to finishing, let's first fabricate and test our Inconel cuff wrap.

The Inconel Wrap

Several photos were scaled to arrive at the cuff's rivet spacing. Using this and the dimensions for the LEX, a cuff wrap pattern was drawn in CAD which was then used to craft a cuff and rivet template from a piece of 0.020" Styrene.

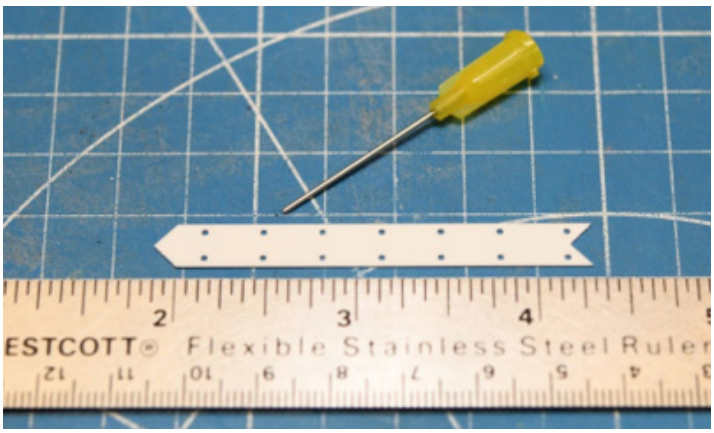


Photo 16: Inconel Cuff Template

The template holes were sized to accept a 20ga glue syringe needle; this needle produces a rivet impression with a 0.036" diameter. With the template securely taped in place over a sheet of 0.005" Styrene, its outline was carefully drawn with a fine point Sharpie and the rivets were lightly pressed, hole by hole, with the rivet tool.

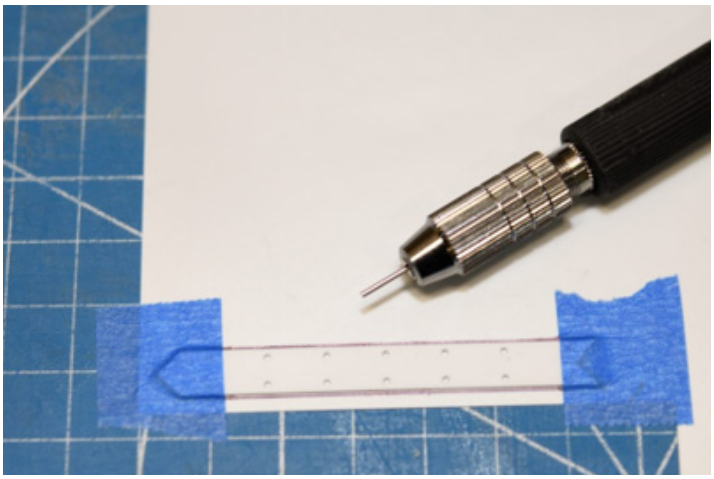


Photo 17: Riviting Underway

Once all the rivets are pressed, the template is removed and the cuff is cut from the sheet with a fresh, sharp, #11 blade. Since the cuff pattern was drawn along the outside edge of the template, it's important to carefully cut the pattern along the inside edge of the Sharpie lines. Doing so preserves the accurate size of the part.

We now need to precisely bend this very thin, somewhat springy, plastic cuff along its center line so that it will tightly drape over the LEX when applied. Attempting this bend by hand is likely to annoy the Fabrication Gods and will seriously aggravate the Builder. So, we'll not do that; instead, we'll use a tool that will deliver the precise tight bend we need.

Over in the Plastic Model world, often times kits can be detailed with photo etch parts that must be precisely bent to a required shape. This is accomplished with a Photo Etch Bender, of the type shown in the following photo. That same tool (available in various sizes) will work perfectly for our purposes here.



Photo 18: PE Bender

Before making the bend we'll first lightly score the backside of the cuff, center to center, with the backside (the blunt side) of a hobby knife blade. This must be a light scoring, as the Styrene is virtually paper thin.

The cuff is then carefully positioned under the bender fingers and clamped in place. The long bending blade seen to the right of the Bender will be used to make the bend.



Photo 19: Cuff Clamped

The long bending blade is slid underneath the cuff up to the score line we made earlier, and then with gentle even pressure, the free side of the cuff is bent up and over the bender fingers. With some patience and practice we get a precisely sized, sharp edged beveled cuff, ready for the fin assembly.



Photo 20: Completed Beveled Cuff

Let's give the cuff a dry fit. The following photo, somewhat underexposed to highlight the rivet detail, gives us a glimpse of how the part will look once it's glued in place. It seems the cuff might need a hair or two trimmed for a proper fit.

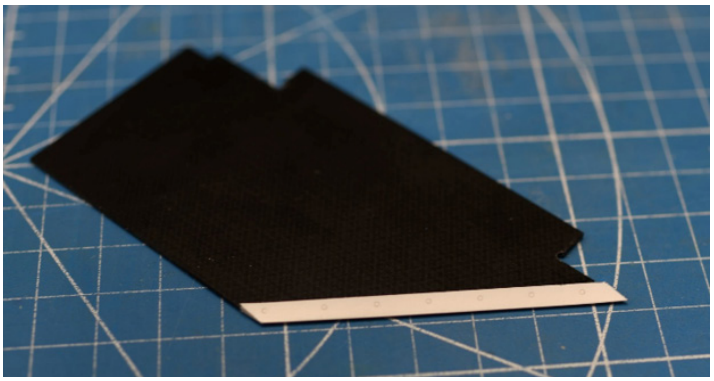


Photo 21: Inconel Cuff Dry Fit

Once satisfied with its fit and position, the cuff is glued in place with very light dashes of extra thin Styrene cement, placed carefully underneath the cuff's edge. "Carefully placed light dashes" are the watchwords here, as any excess cement risks damaging the very thin Styrene cuff.

I had considered finishing the cuff separately and then gluing it on once the fin was painted, but experimentation with this

method failed to produce a reliable bond with any non-marring adhesive one might use. So, with the cuff now an integral part of the fin, we'll need to consider how best to realize the cuff's bright metal sheen once we get to the later finishing stages.

It will be apparent that the cuff wrap presents a very slight raised edge at the cuff's transition. This is both unavoidable and prototypical — the real Inconel cuff also sat slightly proud of the aluminum fin extrusion, as we saw in our earlier Photo 4. So, we're on reasonably solid scale ground here, and we can move forward with some confidence in our build. Let's now turn our attention to the finishing process.

Fin Finishing

Given that the upper stage Apache fin can and fin set all present a common aluminum finish, it won't be necessary to finish the fins separately before they are installed on the model. The fin mounting flanges, part of the fin extrusion on the prototype, will be added to the model as separate pieces after the fins are installed, and once blended and primed, the entire fin can package can be finished and painted as one integrated assembly.

But before we do all that, let's take the opportunity to choose the metal paint we'll use, and as well, decide how we'll represent the brighter metal finish of the Inconel cuffs. For this experimentation, we'll use one of the fin assemblies as a painting mule to nail down the fin finishing process.

To start, the mule is inspected for surface defects - surface preparation is paramount here, as the thin metal paint will be viciously unforgiving of any overlooked defect. Particular attention must be paid to the seam/joint between the LEX and the fin blank, with any gaps or divots filled and sanded. Once satisfied with the assembly's surface finish, the mule is then wet-sanded with a good #400 grit followed by a wet-sanding with #600. The mule is then wiped down with IPA (Isopropyl Alcohol), the fin mounting tab masked, and the assembly is then sprayed with a quality primer – in this case, I'm using Tamiya #87042 Surface Primer.

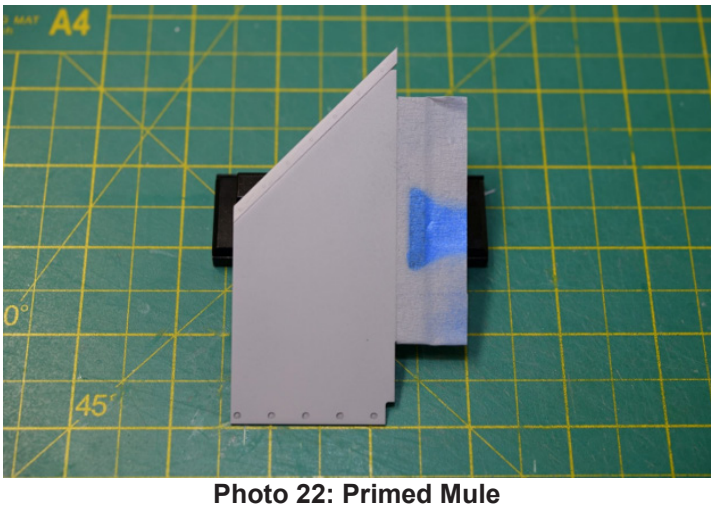


Photo 22: Primed Mule

Provided our pre-primer surface prep efforts were suitably fastidious, one even primer coat should be sufficient; paint management is important here to protect the cuff rivet detail. Once the primer has cured, the mule is then carefully wiped down with a micro-fiber cloth, of the kind one would use to wipe a pair of glasses. This action removes any surface dust that may have accrued without scratching the primed surface. This done, our attention now turns to paint.

I'm partial to AK Interactive's Xtreme Metal finishes, although Alclad metal lacquers work just as well; Xtreme Metal is just my preference, and that's what we'll use here. AK's Xtreme Metal is an enamel-based paint, airbrush ready right out of the bottle. For the Apache's dull, somewhat oxidized, fins we'll go with AK's #488 Matte Aluminum. And like a James Bond martini, this paint is best prepared when shaken, not stirred.



Photo 23: AK Interactive #488 Matte Aluminum

Metal paints look best when sprayed over a black base, and generally, the glossier and more polished the underlying black paint is, the brighter the over-sprayed metal paint will appear. But glossy and bright isn't what we're going for here, so we'll stay with the grey Tamiya primer and airbrush the matte aluminum paint directly over it. For this paint application I'll use an airbrush fitted with a 0.35mm nozzle and 15psi air pressure.

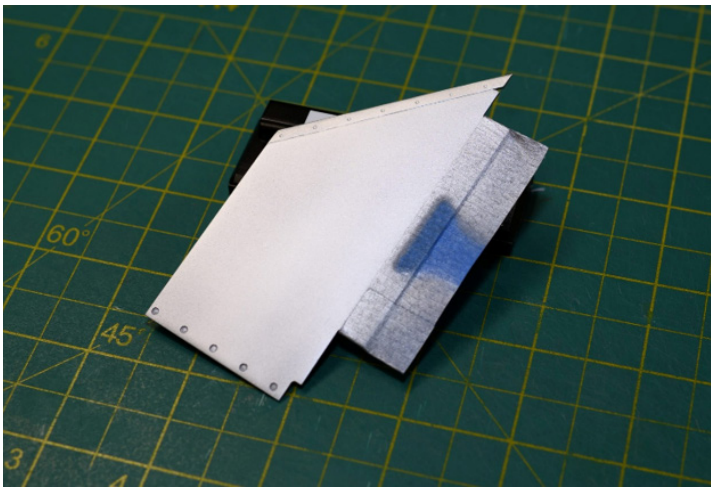


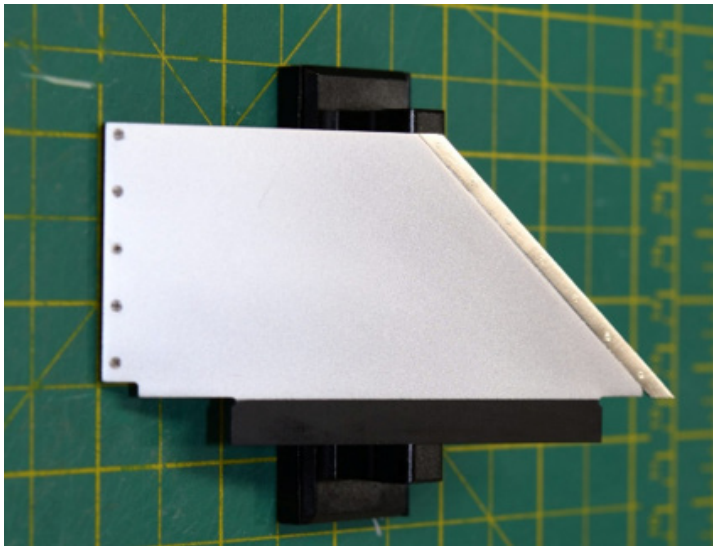
Photo 24: Metalized Fin

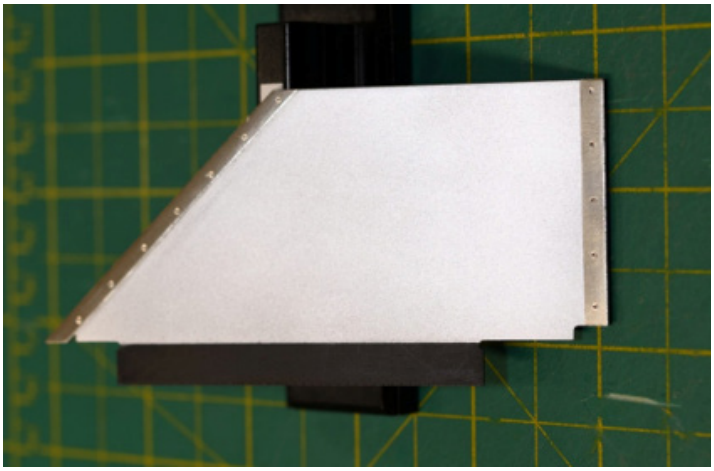
Once the paint has cured, the LEX is rubbed down with a micro-fiber cloth. We'll finish the Inconel cuff with strips of Bare Metal Foil, in this case BMF-001 Chrome. Using BMF precludes the need to mask and paint the cuff.

The BMF is cut into oversize strips with a single-edge razor blade. Several passes with a light touch are needed here to avoid tearing the foil. Once placed over the LEX and aligned with its aft edge, the foil is burnished along the LEX with a cotton swab; this is followed by carefully burnishing the rivet impressions with the tip of a toothpick to help them stand out. Again, the lightest of pressure should be used here to avoid tearing the foil. Satisfied with the fit, the foil strip is trimmed and the process repeated for the other side of the LEX.

Even though the focus of this article is the fabrication of the beveled leading edge, I thought it would be interesting to add

the remaining Apache fin details – the Phillips head screws on the right-facing trailing edge, and the spin tab/wedge on the left-facing trailing edge. Doing so would give us a view of a fully completed Apache fin. The next photo gives us that view.



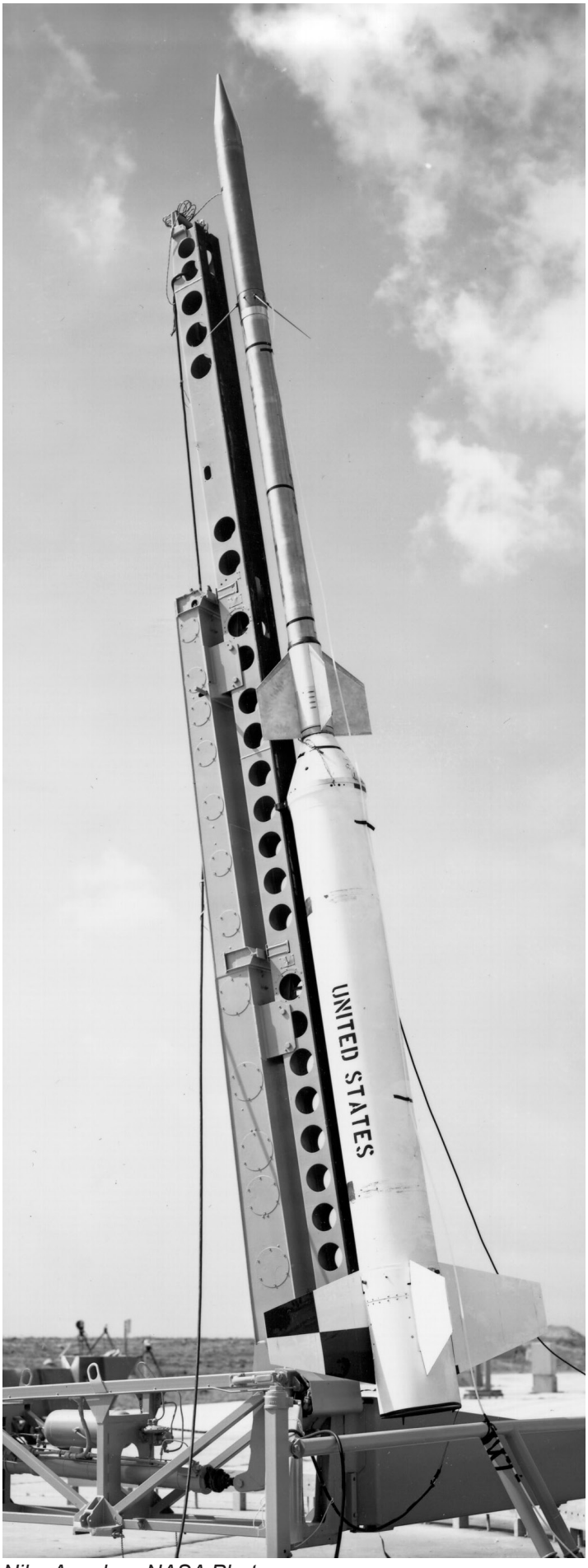


Photos 25&26: Detailed Apache Fin

Regarding the final details, the spin tab is another resin casting, created much the same way as the LEX, and drilled at the appropriate locations with a #67 bit to represent the through holes for the tab mounting screws. Once primed the spin tab was foiled with BMF Chrome to match the LEX, and then set in place with MIG's Ultra Glue Matt. The Phillips head screws are just 1.6mm diameter disks, punched from 0.010" thick Styrene with an RP Toolz Punch & Die set. The disks were then pressed with a small jeweler's screwdriver to make the head impression. These were painted with GSI's Mr. Metal Color #213 Stainless and were likewise placed with MIG's Ultra Glue Matt.

And there you have it, a very thin but finished, detailed scale Apache fin. Having finalized our fin construction and finishing methods, we can look forward to applying these techniques to the actual scale model.

While the Apache's thin fins and features present an unusual set of challenges, the methods described here — resin casting, controlled alignment fixtures, and careful metal finishing — are applicable to many scale projects where geometry and material limits collide. I hope these techniques prove useful in your own work, and as always, I wish you every success with your scale modeling projects.



Nike Apache - NASA Photo



Background

In 1974 Estes Industries published the Model Rocketry Custom Parts Catalog, touting 100's of parts and accessories for every imaginable design. The front cover was adorned with six model rocket illustrations providing excellent examples of using your imagination for your own designs.

The three on the right are well known Estes Design of the Month winners, the Starship Excalibur (Plan No. 55 designer unknown), Ganymede 274 (Plan No. 59 designer unknown), and Little Beth X-2 (Plan No. 57 designed by Hal Kurtzman). These plans showed up in issues of Estes Model Rocket News and were sometimes included in postal orders.

The designs on the left side of the cover were a mystery. No plans were ever published nor were there any photos of built models. Only the top illustration has a probable name, "Invader" as the other two lack markings that include a possible name. I had posted a thread on Ye Olde Rocket Forum in an effort to uncover the origins of these mystery designs, but it failed to generate useful information. In 2008, I reached out to Mike Dorffler, who was a great friend and remarkable designer at Estes asking if he knew anything about those designs.

Mike, in fact, did know the origins, *"Those designs were examples from Wayne Kellner's creative mind - they were never free plans that I am aware of or can remember. Wayne was a prolific sketcher of hypothetical futuristic designs. He built and flew many of his ideas that would unfortunately end up on top of his file cabinets to collect dust. Many of them really should have become kits.*

I will always maintain Wayne Kellner was the greatest model rocket kit designer of all time. No one, and I mean no one, comes close. As hard as I tried, I couldn't match his creative skills. I eventually resigned myself to handling the technical end such as cameras and scale projects and left the futuristic and out of the box stuff to Wayne. In the end I think the modelers got a much better mix of neat stuff with our joint sharing of product ideas, and how they were executed."

I have always wanted to build all three of these designs, but to do so, I would need to make plans on my own.

USSF Hawk

I decided to start with the bottom left design which is the smallest and easiest of the three. Lacking a name, I came up with "USSF (United States Space Force) Hawk". Visually, it appears to be a BT-20 or BT-50 based design using a BNC-20N or BNC-50Y nose cone. I opted to build a BT-50 version but later on realized the original design was likely BT-20 based. RockSim made it easy to mock up and a nice attribute of the program that helped simplify the process was using the 3D view and adjusting to the same ¾ perspective view that is shown on the catalog. This helped detirmine fin shape and the body tube length. I used card stock cutouts for testing as I dialed in all the dimensions. What I came up with is as close an approximation to the original drawing as I think I'm going to get. I did add a single ventral fin underneath between wings. just because.

As for parts, I decided to cheat with the nose cone. The drawing shows a cockpit canopy which I could have done



with a decal or made a paper version like the Estes Star Blazer kit, but I decided to take the Centuri PNC-165 3D print recreation file by Doug Holverson and modify it. The PNC-165 has a molded canopy and was used in the Centuri Quasar kit. I stretched the length out a bit and then scaled the part down to fit a BT-50 body tube. It came out reasonably well! I went with 3/32" thick blasa for the fins as many BT-50 kits use that stock. The only parts left were the launch lug, recovery harness, and an 18mm motor mount.

Construction

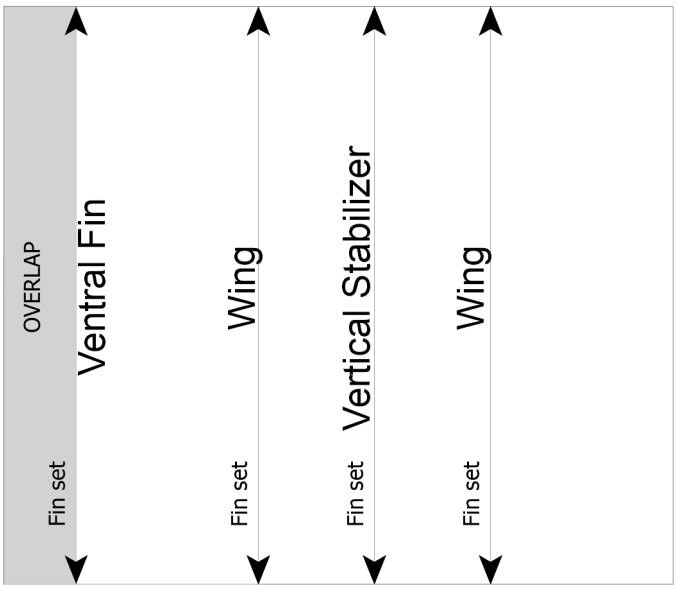
The body tube seam was filled with Bondo glazing putty and sanded smooth. The balsa fins were filled with thinned Elmer's FillnFinish and sanded smooth. The vertical stabilizer is mounted 0.25" from the end of the body tube. The wings are mounted 110 degrees from the vertical stabilizer and even with the end of the body tube. The ventral fin is 180 degrees from the vertical stab and 0.25" from the end of the body tube. The stabilator halves are glued together and mounted on the top of the vertical stabilizer forming a "T" tail.

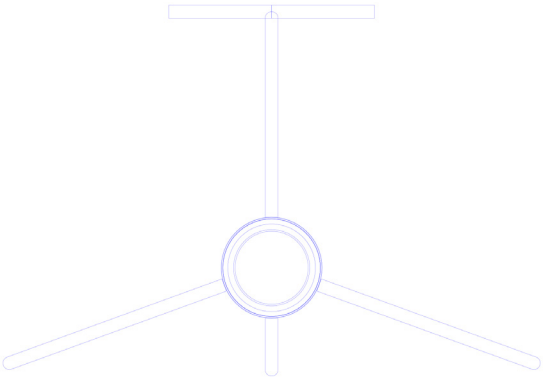
I created decals using Photoshop and printed them on laser decal paper. For the article photos I stuck with the default markings on the catalog illustration, but I created more markings that will be applied later. Look for the new markings in a future issue.

First Flight

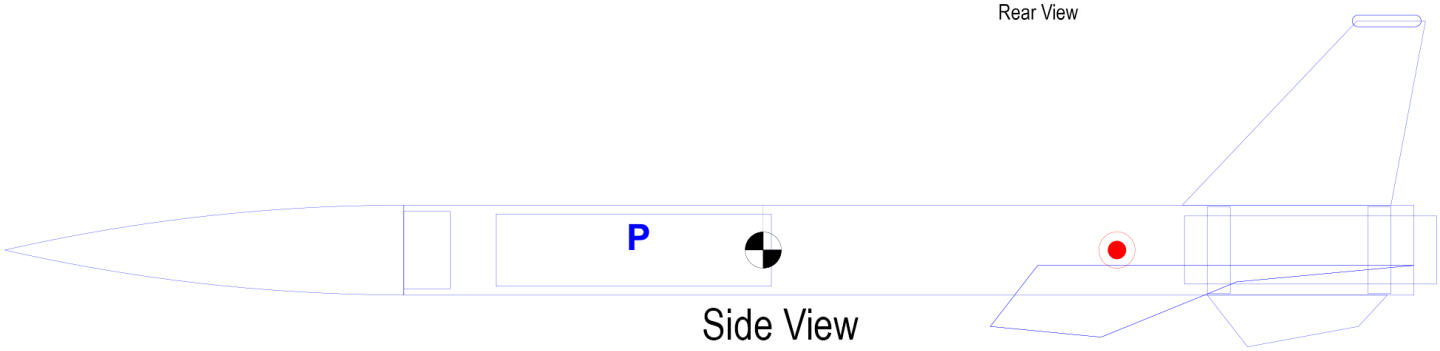
The maiden flight was at our 29 August monthly launch using an A8-3. Liftoff was a little off vertical without any roll. After burnout the USSF Hawk began a slow pitch over before ejection. The nose cone attachment failed at ejection, but it was easily recovered and the model landed safely on a 14" parachute.

This was a fun project and I am looking forward to reverse engineering the other two designs which will no doubt be more challenging.

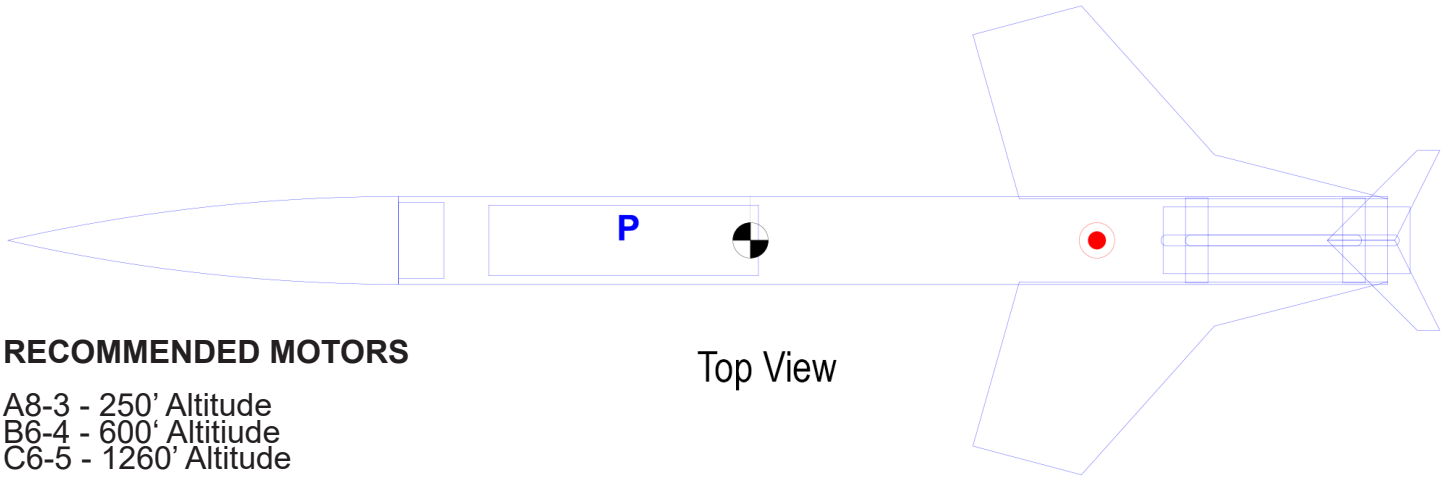




Rear View



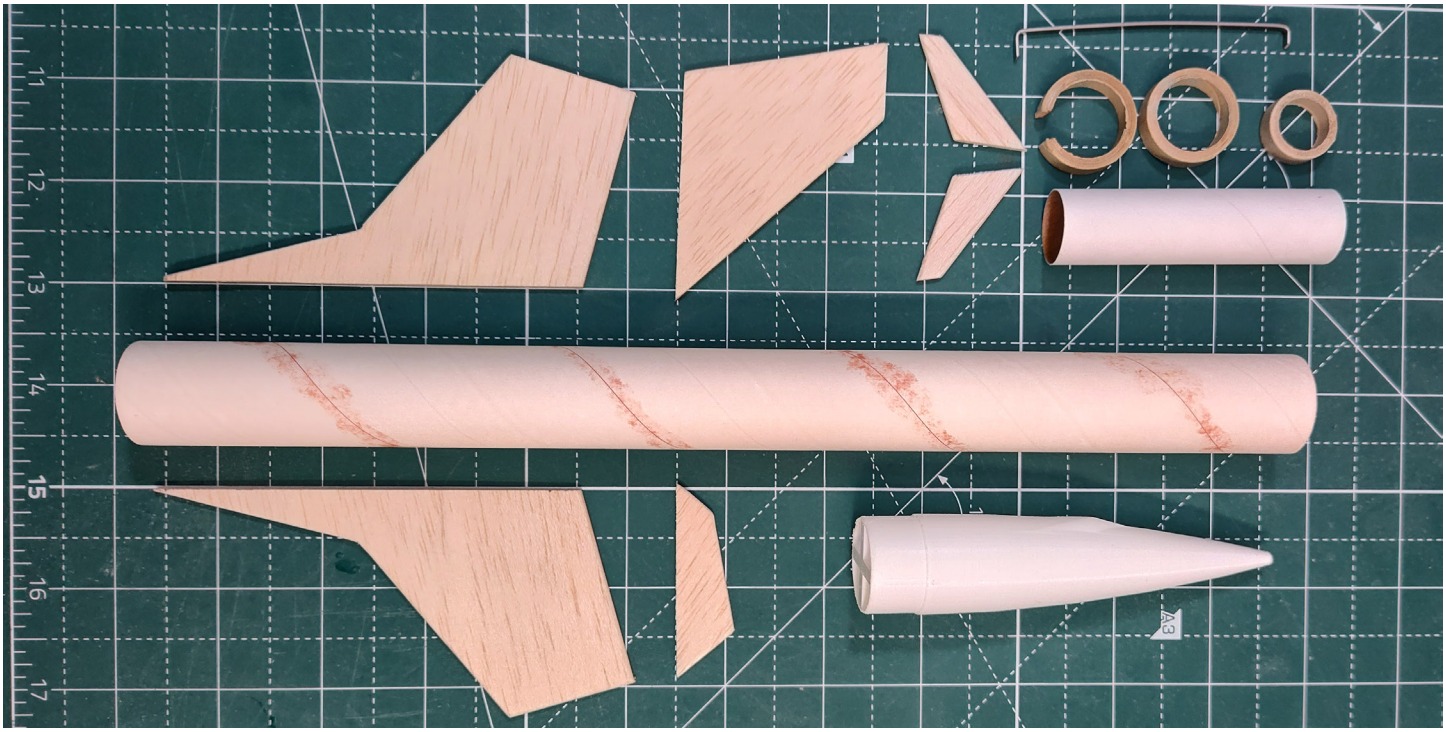
Side View



Top View

RECOMMENDED MOTORS

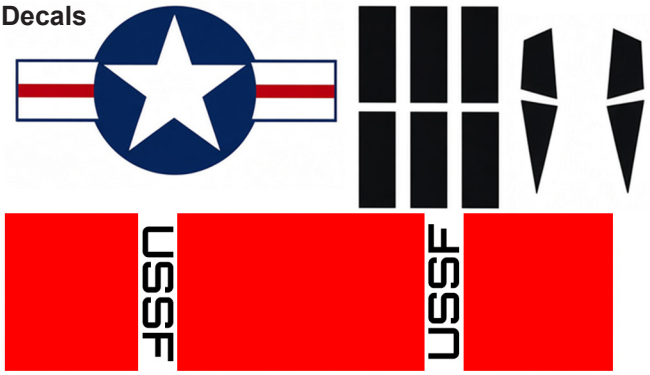
A8-3 - 250' Altitude
B6-4 - 600' Altitiude
C6-5 - 1260' Altitude



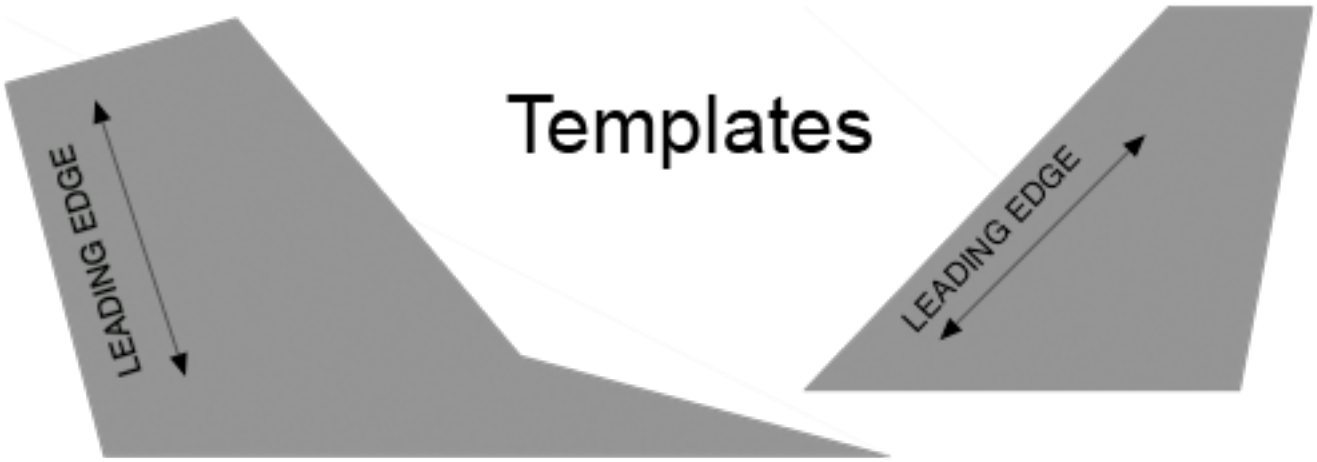
PARTS LIST

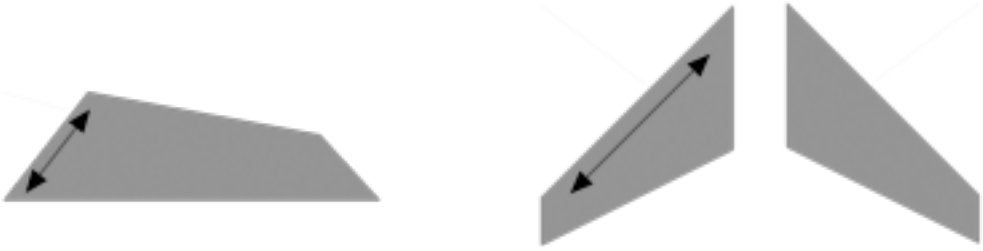
1 Nose Cone - BNC-50Y
1 Body Tube - BT-50 (11”)
1 Balsa Sheet for Fins - BFS-30 (3/32”)
1 Motor Mount Tube - BT-20 (2.75”)
2 Centering Rings - CR-2050
1 Engine Block - EB-20
1 Engine Hook - EH-2
1 110# Kevlar Shock Line (30”)
1 Parachute (14”)
1 Launch Lug (1/8” x 2”)

Decals



Templates











COMPETITION CORNER

2026 European Spacemodeling Championships

Al de la Iglesia

Every other year, opposite of the World Spacemodeling Championships, the WSMC host country holds a European Championships. Although the US is not a European country, we were allowed to bring a team to fly as guests but not be eligible for awards. Steve and Emma Kristal, my daughter Mia and I joined with Matt Steele and daughter Cassidy Stewart, Chris Flanigan, Sean Guzik, Dave O'Bryan and James Duffy to all make the trek out to Wloclawek, Poland to have fun and scout out the competition in advance of next year's WSMC held at the same location.

Steve, Mia and I took the 7hr flight from Detroit to Amsterdam on August 12th where we had about a 1.5 hour layover before our 2.5 hour flight to Warsaw, Poland. In Warsaw we stayed a night at the Courtyard by Marriott which is literally across the street from the airport. We needed the break as it was tough to sleep on the plane with all the excitement of travel and the 6 time zone difference from Michigan. That evening we met up with all the other weary US team members as their flights arrived and we had a nice meal before heading to bed early so that we could adjust to the new time zone.

On Friday morning I walked across the street back to the airport to rent a car for the next week as we had about a 2hr drive to Wloclawek where the contest hotel was located. It was interesting driving on the highway there with a speed limit of 140 km/hr (87mph) and many cars passing you at higher speeds while avoiding getting stuck behind trucks that only went about 90km/hr (56 mph). I was glad to have DaveO as my navigator as he has tons of experience driving in Europe and helped me to learn to drive like the locals. We arrived safely at the hotel, which is also a health spa, that was crowded with older people. It seems that the hotel is a summer hotspot for elderly vacationers in the area. We got there a bit earlier than the others, so we checked out the hotel grounds and the few surrounding shops. We found a small convenience store that sold beverages, ice cream novelties and all sorts of deli foods and deserts. A 500ml polish beer in the can was just over a dollar and later Mia and I got some ice cream, sodas and snacks for less than $5. It was warm, around 80F, that first day but tomorrow was forecast to be a scorcher for the opening ceremonies.



Kruszyn Airfield

Saturday morning, we headed out to Kruszyn Airfield, the home field for the Aero Club of Poland. The aero club is used for small aircraft and sailplane flying as well as spacemodeling, R/C and control-line airplane flying. They also have a few hangars and an office building along with a small restaurant and bar. Outside the club they have a couple of old military aircraft and seating areas.

Around noon, they started the opening ceremonies with a procession of teams just as the temperature ballooned into the low 90's, which is rare in this part of Poland. The usual ceremony included long speeches by old dudes and national anthems with young people in military fatigues standing at attention while holding flags and country name plates. Did I mention that it was hot? So hot that 3 of the military flag holders had to be relieved of duty during the speeches due to heat exhaustion. After that the contest was finally opened, and we all made our way to the tents and flying field to watch as they started the first event; S8/P.



US Team during the opening ceremony

DaveO was our only entry in the event in which an R/C rocket glider is flown in rounds with a 6-minute flight time and a precision landing task. He had one decent flight, then had a D3 motor CATO which destroyed his pod above the wing. Luckily, he had a spare pod that he swapped out but didn't realize there was internal damage to the wing. He promptly found out on his next launch as the wing folded on boost and thus wrecked his model. It is always fun to watch R/C RG models fly, especially in the wind that picked up as the day went on. The heat advisory ended that evening and the forecast for Monday was back to normal with a forecast of cloudy skies and cooler temps.

On Sunday Steve, Matt, Emma and I flew S6A (A streamer duration) in the morning. It was overcast and about 65F, and the thermals were few and far between. We all got 3 qualified flights each, but Emma managed to pick a couple nice thermals for what would have been 4th place and highest female

score. It seemed odd that on some of our flights, it looked like we had models that flew past apogee and ejected on the way down after a second or so, it wasn't until later that we came to the realization that our motors had longer than advertised delays. We did the best that we could, but we had no control over the motors that we got.



Dave O'Bryan's with his S8/P RC glider

In the afternoon DaveO flew S4A (A Rocket Glider duration) with some new models he designed and was still working out some of the bugs. His first flight boosted well in the wind, but the wing did not rotate and he DQ'd. His next flight flew better and transitioned fine resulting in a qualified flight.

On Monday morning we flew S3A (A parachute duration) in similar conditions to the day before but a few degrees warmer and less wind. James and I each got qualified flights, but no maxes while Steve and Emma each got two maxes, but unfortunately each got a DQ in the second round when their chutes didn't open. In the duration events, it is a good team goal for every flier to get 3 qualified flights, and at this level of competition, you also need at least two maxes to be competitive. Typically, three maxes are needed to make the top ten and/or the medal round. It was more obvious in this event that a large percentage of our motors that had delays that were too long. Chris Flanigan made it a point to test some of these motors later in the week with his portable test stand to see what was going on with the delays. It turned out that he saw the A1-4 motor was more like an A1-5.5. Yikes, no wonder our models were going down for 1 to 2s past apogee. I hope that this issue gets resolved before next year's WSMC.



Cassidy Stewart and Emma Kristal



Al de la Iglesia ready on the pad

Steve, Emma, Cassidy and Sean flew S1B after lunch in windy conditions with overcast skies that threatened rain until late in the day. Cassidy led the team with 456m and 3rd among female fliers. Sean got a qualified flight at 322m using a new design and was pleased that it worked given the short amount of time he had to design and build the model before the event. Steve had a DQ for unstable flight and then got off a solid flight in the third round to 429m. Emma had stability issues and got DQ'd on both her flight attempts. This event is so tough given that you must prep your 2-stage model in the lane during the 1hr round and then have everything work perfectly to get a qualified flight. The Serbian telemetry-based altimeter system left a lot to be desired in terms of the actual flight data and working time window. If you want to get an earful on the details, you will need to discuss it with Steve when his blood pressure isn't sky-high from the shenanigans that went on during this event.

Tuesday was scale altitude (S5C) and helicopter day (S9A). It was cooler with stronger winds, overcast skies and rain predicted for the afternoon. Our S5C team of Matt, Cassidy, Chris and James decided to just fly for qualification by entering single stage models. Even with the lower flying models, Matt and Cassidy's models tipped off downwind and made recovery difficult for our small crew. We found Matt's model on the same line as Cassidy's, but hers went a bit further downrange. After searching awhile, a member of the Turkish team saw me looking near where they were and waved me down to come get a model. It was Cassidy's Black Brant IV, but it was missing a fin and the upper half was torn apart, and the altimeter was missing. After a bit of translating with Google, it became clear that some local kids were picking up models and wrecking them. Luckily the Turkish team saw what was happening and got some models from the kids. It was obvious from the damage that someone broke it on

purpose and took the altimeter so that she could not get a score for the event. What was really strange was that her altimeter somehow got turned back into the data tent about half an hour after the range had closed, and the altimeter was broken also. So, Cassidy did not get a qualified flight, and I am not sure if the US team had to pay the 100€ for the broken altimeter.

Later that afternoon we flew S9A and I flew with DaveO and Sean. The day before I had checked the weather forecast and saw the high chance of rain, so I checked in models that had a layer of Mylar. Yes, they are about a half gram heavier, but I couldn't take the chance of my paper models folding when wet. Sure enough, the wind picked up, and the skies darkened as the first round opened. I flew my first model early in the round hoping to just get a decent qualified flight in the windy conditions, but I got a motor with a very long delay which resulted in my model coming down for almost 2 seconds before ejecting which promptly ripped off 2 of my rotor blades. I got DQ'd in that round for separation, so I headed back to the car to stay dry as the rain started and prepped my other model. Furthermore, I strengthened the rotors by adding a bit of Kapton tape, got my model on the pad for the next round, and just flew without looking for decent air as the rain and wind was picking up. I did get my next two flights to qualify even though they were screaming down with the extra-long delay. Sean had a tangle on his first flight and got 2 qualified flights with long delays just like I did. DaveO had a great boost on his first flight with a good delay and qualified but had bad luck on his second flight as his nose cone separated for a DQ. I didn't get good times, but I learned a lot about flying the event in crummy weather.

On Tuesday evening, the Latvian team hosted a BBQ at their Airbnb. A couple of the Brits came to the party as well. DaveO, Mia and I brought some real steaks, well at least the closest thing we could find to real steaks as there is not much in terms of beef availability in this area of Poland compared to what we are used to in the US. It was a lot of fun talking about spacemodels, food, work, and other things that we all have in common. I found it most interesting that the young Latvians were working for companies that made drones for the Ukraine side of the war using their modelling skills rather than just using their educational backgrounds for their jobs. Several more people wanted to attend the party, but it was bad timing given that most modelers stayed home to prep their scale models for the next day.



Matt Steele launches an S6A model

Wednesday was the crowning event as S7 (scale) was flown in cold (60's F) overcast skies with mild wind. The US team of Chris, Sean, James and Cassidy brought some nice, large models to fly and see how judging would look for next year. Chris flew his battle-worn Long March which used about 12 motors and placed 6th. James flew a staged Bumper WAC to 12th place. Sean flew a Trailblazer II to 15th place and Cassidy flew her Artemis SLS to 19th place. Sean was the only member that had a DQ and reflew in the second round with a successful staging. Several questions were raised by the team members about certain judge scoring anomalies. I hope that those issues get fixed next year.



Chris Flanigan and his Long March scale model



A S5B model lifts off

The Friday night banquet was held in a hotel restaurant that had about 100 people in attendance. The food was quite good and came in several rounds of different meats, fish, dumplings, and all sorts of other good items. I tried my best to sample every single dish, but I think I missed one that didn't make it to our end of the big table. We had a few shots of premium Polish Vodka as well, while others got drinks at their sections of the tables. There was a lot of good conversation, music and dancing as well. We got some deserts to sample at the end and finally made our way back to the hotel as the night was getting late.



US Team at the banquet

Thursday was the closing ceremony as no events had to be postponed, so we packed up all our gear and loaded the car before heading back to Warsaw after the final awards were given for S7. Other than a 40-minute traffic jam on the highway, there was nothing exciting about the trip back to Warsaw. We then stayed in Warsaw for an extra day to do a little sightseeing in the old part of town that had been rebuilt after WWII. We did some tourist shopping and spent an hour in the Madam Curie Museum. Next year I want to check out the science and technology museums that have some rockets and aircraft.

We had our final meal together as a group on Friday night as our flights went out at 6am Saturday morning. Connecting to the Detroit flight in Amsterdam was a bit close as our flight was almost 15 min late getting in and resulted in Steve, Mia and I briskly walking for 25 minutes through the airport to get to our gate with only half an hour before departure. It was a tiring flight back home as the excitement wore off, but I can't wait to do it again next year when the US team returns to Poland with a full contingent of about 100 team members and supporters.



Line up of scale models



Sightseeing in Warsaw

JMRC HUVARS Club News

Members Attend Euro Championships

Al de la Iglesia, Steve, and Emma Kristal recently attended the 2026 FAI European Championships for Space Models held in Włocławek Poland on August 15 - 20. This is a precursor to the World Spacemodeling Championships that will be held in Poland next year.

NEW CONTEST! Alpha Streamer Duration

This was announced through the club email and Discord channel.

Goal:
Using an Estes Alpha or Alpha III (Including replica clones or scratchbuilds), make up to four flights using A impulse motors, and attain the highest score which will be the duration sum of all flights using a streamer for recovery.

Allowable changes:
The Alpha or Alpha III must be identical to a stock kit except for;
- The recovery device must be a streamer
- The shock line may be swapped out for Kevlar
- Launch lugs may be swapped out for rail buttons
- It may have a 13mm or 18mm motor mount (13mm adapters may also be used)
- Must use a rod or rail for launching. Towers and pistons are not allowed.

Awards:
- Trophy for overall winner
- Prizes for top three finishers

Entry cost is $5, which will go towards the club's operation costs. You may enter a second model for an additonal fee. John Potts donated Alpha kits for the contest. They are available at the field for $5. The contest will take place at our October launch with November as a backup date.

Recent Upgrades to GSE & the Mule

The BOD recently made some improvements to our ground support equipment and the Mule used to transport our equipement trailer. Roger Sadowsky built brand-new robust cables for our PA system. These replace the old extension cord cables that were showing their age. Roger also acquired a new flag pole and mount for the trailer so we can display the flag at launches again. Thanks Roger!

Tony Haga used one of our incoming grants to purchase a split windshield for the Mule. He and Buzz installed it and it works great for keeping bugs and dust out of your eyes and will keep the driver warmer for those late Fall, early Spring events.



New flagpole at the 29 August launch

2026 Precision Altitude Contest

This year's target altitude is 518 feet. The object of the contest is come as close as possible without going over. Our random number genterator used a low altitude range to better fit the Horning 3 field we are flying on for most of the year.

Precision Altitude Rules:
- At the end of the flying season, have the closest recorded altitude to the target altitude (518 feet) without going over
- Any commercial altimeter may be used
- The cost of entry is $5 and must be paid before the flight
- You must state on your flight card that the flight is participating in the Precision Altitude contest
- You may enter as many times as you like
- We must have at least 10 adult entries during the flying season, or the contest will be extended to 2027

Awards:
Adults (18 and older)
First place is 50% of the money collected
Runner-up is 25% of the money collected
Club fund receives the final 25%
Juniors (Under 18 years old)
A trophy and prize kit

New Members

Please welcome our newest members
James Dulbs
Patrick Lester



CURRENT EVENTS IN SPACE EXPLORATION

Buzz Nau

July through August has been a busy period for space exploration news. Of the 27 SpaceX launches, 18 were Starlink missions including the final Falcon 9 Starlink launch from Cape Canaveral. Other Falcon 9 missions will continue to launch from the Cape, but remaining Falcon 9 Starlink flights will take place at Vandenberg Space Force Base. Of the remaining SpaceX flights, seven were Falcon 9's with one Starship (Integrated Test Flight 13) and one Falcon Heavy that sent the Nancy Grace Roman Space Telescope to Lagrange Point 2.

Northrup Grumman made one Pegasus XL flight, United Launch Alliance flew one Atlas V 551, and Rocket Lab held two Electron launches to round out the recent space flights.

Not all the news has been launch related. Blue Orion continues repair work at Cape Canaveral Launch Complex 36A after the New Glenn explosion on 28 May 2026. Instead of rebuilding the old tower, Blue Origin is converting the pad to a new horizontal-to-vertical concept that was already in the works.

On 28 August, the Artemis II crew was honored at the White House where the President awarded them the Congressional Space Medal of Honor. In other Artemis news, the Artemis III Orion modules have been mated and the RS-25 engines are now mounted on the Core stage.

SpaceX announced on 25 August the plans for a second, larger launch Starship launch complex, Starbase Louisiana. The complex will consist of five launch areas with two pads each. Construction will begin in 2027 with the first launch occurring in 2029.

SPACEX

Transporter-17 was a successful dedicated SmallSat rideshare mission flown on a Falcon 9 from SLC-4E at Vandenberg Space Force Base on 7 July. The flight delivered 81 payloads including cubesats, microsats, hosted payloads, and orbital transfer vehicles, into sun-synchronous orbit (SSO). Notable payloads included South Korea's CAS500-4 imaging satellite, Iceye radar satellites, Spire Lemur spacecraft, Planet's Pelican-11 tech demo, FireSat wildfire-monitoring satellites, and the first commercial nuclear-powered payload (City Labs' BOHR betavoltaic demonstration).

SDA Tranche 1 Transport Layer E was a U.S. Space Force / Space Development Agency (SDA) mission launched on a Falcon 9 Block 5 from SLC-4E at Vandenberg Space Force Base on 16 July. The flight delivered 21 York Space Systems satellites into polar low Earth orbit as the third dedicated batch of Tranche 1 Transport Layer spacecraft. These form part of the Proliferated Warfighter Space Architecture (PWSA), a proliferated LEO mesh network using optical inter-satellite links to provide resilient, low-latency military data transport, tactical communications, and support for missile warning and tracking.

MRV-1 was a Northrop Grumman / SpaceLogistics satellite-servicing mission launched on a Falcon 9 Block 5 from SLC-40 at Cape Canaveral Space Force Station on 21 July. The flight delivered the Mission Robotic Vehicle (MRV-1) and three Mission Extension Pods (MEPs) to geosynchronous transfer orbit. The MRV is a robotic servicing spacecraft designed to attach MEPs to aging geostationary satellites, extending their operational life by several years; two of the pods were destined for Intelsat spacecraft and one for Optus.

Starship Flight 13 was SpaceX's thirteenth integrated test flight of the Starship system, launched from Pad 2 at Starbase, Texas on 24 July. The vehicle consisted of Super Heavy Booster 20 and Ship 40 and was the second flight of the V3 vehicles. The suborbital mission was the first Starship flight to deploy operational satellites; 20 next-generation Starlink V3 spacecraft, which completed short-duration communications and systems tests before reentry. The Ship also performed an in-space Raptor relight, then executed a landing flip and the softest splashdown yet remaining intact in the Indian Ocean and providing the first clear views of a flown heat shield. Ship 40 was eventually towed to Christmas Island where it was loaded aboard the semi-submersible heavy-lift vessel Forte. The ship is en route to Brownsville, Texas and expected to reach port in late October. The booster completed its boostback burn but experienced landing-engine issues and a hard splashdown in the Gulf. Overall, the flight marked a significant step forward for V3 hardware.

NROL-95 was a classified, hush hush, National Reconnaissance Office mission launched on a Falcon 9 Block 5 from SLC-40 at Cape Canaveral Space Force Station on 30 July. The flight delivered a national security payload to low Earth orbit under the National Security Space Launch (NSSL) Phase 2 contract. Payload details were not publicly released, though analysis points towards a traditional NRO maritime SIGINT satellite. The mission was the third NRO launch flown by SpaceX under that contract.

BlueBird 11–13 was an AST SpaceMobile mission launched on a Falcon 9 Block 5 from SLC-40 at Cape Canaveral Space Force Station on 5 August. The flight delivered three next-generation Block 2 BlueBird satellites (also called Block 2 FM6–8) into low Earth orbit. These large direct-to-cell broadband spacecraft, each with about 2,400 sq ft communications arrays, expand AST SpaceMobile's constellation for space-based cellular service to unmodified smartphones.

Globalstar 2-R Mission 1 was a constellation-replenishment flight launched on a Falcon 9 Block 5 from SLC-40 at Cape Canaveral Space Force Station 15 August. The mission deployed eight Globalstar 2-R communications satellites built by MDA Space (with Rocket Lab buses) into low Earth orbit. They are the first batch of 17 second-generation refresh satellites ordered to extend Globalstar's LEO network for voice, data, IoT, and direct-to-device services.

USSF-366 was a classified (hush hush) U.S. Space Force mission launched on a Falcon 9 Block 5 from SLC-4E at Vandenberg Space Force Base on 15 August. The flight delivered a national-security payload to low Earth orbit under an NSSL task order. Officials released almost no details about the satellites or their exact destination. Independent tracking

later noted a flight profile similar to prior Starlink Group 15 / suspected Starshield missions, but that identification has not been confirmed.

Nancy Grace Roman Space Telescope was successfully launched on a Falcon Heavy from LC-39A at NASA's Kennedy Space Center on 30 August. Roman is NASA's next leading infrared survey observatory, designed to study dark energy and dark matter, map billions of galaxies, and search for exoplanets. It has a field of view at least 100 times larger than Hubble's. After separation, about 31 minutes after liftoff, it began a roughly three-month cruise to a halo orbit around Sun-Earth L2, about 1.5 million km from Earth. Solar arrays and the lower sunshade deployed as planned. First science images are expected in early 2027. Falcon Heavy's two side boosters returned to land at LZ-2 and LZ-40; the center core was expended to send the 10.5-ton observatory onto the high-energy transfer trajectory.

Amazon Leo (LA-08) was a United Launch Alliance (ULA) mission flown on an Atlas V 551 from SLC-41 at Cape Canaveral Space Force Station 2 July. The flight deployed 29 Amazon Leo broadband satellites (the constellation formerly known as Project Kuiper) into low Earth orbit. All satellites were confirmed deployed about 70 minutes after liftoff, bringing the on-orbit Leo count to 396.

The Swift Boost Mission was an air-launched Northrop Grumman Pegasus XL flight on 3 July. The rocket was dropped from the L-1011 Stargazer carrier aircraft over the Pacific near Kwajalein Atoll in the Marshall Islands. The payload was Katalyst Space Technologies' ~425 kg LINK robotic servicing spacecraft. Under a $30 million NASA contract, LINK is intended to rendezvous with and attach to the Neil Gehrels Swift Observatory. The gamma-ray burst telescope was launched in 2004 and its orbit has decayed toward reentry. After attachment the servicing payload will raise Swift to a higher, longer-lived altitude over about three months before LINK itself deorbits. This was Pegasus XL's 46th flight and it's first since 2021. It is described as the last planned Pegasus launch. The air-launch profile was chosen in part to reach Swift's low ~20.6° inclination.

The Grain Goddess Provides (iQPS Launch 7) was a Rocket Lab Electron mission from Launch Complex 1A on New Zealand's Mahia Peninsula on 6 August. It deployed a QPS-SAR synthetic aperture radar Earth-observation satellite for Japan's iQPS into a planned 575 km, 42°-inclination orbit. It was Rocket Lab's 92nd Electron mission and continued a 100% success record with iQPS.

The Lightning God Defends (iQPS Launch 8) was the next dedicated iQPS flight on Electron from the same Mahia pad, lifting off 21 August. It successfully deployed another QPS-SAR satellite (nicknamed Susanoo) to a similar 575 km orbit as iQPS builds toward a weather-independent radar imaging constellation. It was Electron's 93rd orbital mission and the ninth iQPS satellite Rocket Lab had placed on orbit, still with a perfect record for that customer.



Starship 40 - SpaceX photo



Starship 40 on Forte - SpaceX photo

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Falcon Heavy launching the Nancy Grace Roman Space Telescope - SpaceX photo



Northrup Grumman Pegasus XL under the Stargazer L-1011 mothership - NASA photo



LAUNCH WINDOWS

Launch dates from spacelaunchschedule.com

September 9, 2026
ROSCOSMOS, Progress MS-35 (96P), Soyuz 2.1b
Launch site: 1/6, Baikonur Cosmodrome
Progress resupply mission to the International Space Station.

September 12, 2026
SpaceX, Crew-13, Falcon 9 Blk 5
Launch site: SLC 40, Cape Canaveral SFS
SpaceX Crew-13 is the thirteenth crewed operational flight of a Crew Dragon spacecraft to the International Space Station as part of NASA's Commercial Crew Program. This mission is part of NASA's Commercial Crew Program, a partnership with private companies like SpaceX to transport astronauts to and from the International Space Station.

September 14, 2026
Avio S.p.A, Sentinel-3C & FLEX, Vega-C
Launch site: ELV 1, Guiana Space Centre
Sentinel-3C is the third satellite in the Sentinel-3 constellation, which provides high-accuracy optical, radar and altimetry data for marine and land services. The Fluorescence Explorer (FLEX) satellite is a part of ESA's Earth Explorer program. The satellite will map vegetation fluorescence to quantify photosynthetic activity.

September 2026
SpaceX, Flight 14, Starship
Launch site: OLP 2. SpaceX Starbase
14th test flight of the two-stage Starship launch vehicle. 3rd flight of Starship V3.Mission will attempt to catch Booster and Starship.

September 2026
SpaceX, O3b mPower 11-13, Falcon 9 Blk 5
Launch site: SLC 40, Cape Canaveral SFS
3 high-throughput communications satellites in Medium Earth Orbit (MEO) built by Boeing and operated by SES.

September 2026
SpaceX, SDA Tranche 1 Tracking Layer E, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
Tranche 1 Tracking Layer E is one of five missions by the United States Space Force Space Development Agency (SDA) for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Tracking Layer constellation, which will provide global indications, warning, tracking, and targeting of advanced missile threats, including hypersonic missile systems.

September 2026
SpaceX, SDA Tranche 1 Transport Layer A, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
Tranche 1 Transport Layer A is one of six missions by the United States Space Force SDA for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Transport Layer constellation.

September 2026
SpaceX, SDA Tranche 1 Transport Layer D, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
Tranche 1 Transport Layer D is one of six missions by the United States Space Force SDA for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Transport Layer constellation.

September 2026
SpaceX, SDA Tranche 1 Transport Layer F, Falcon 9 Block 5
Launch site: SLC 4E, Vandenberg SFB, CA, USA
Tranche 1 Transport Layer F is one of six missions by the United States Space Force SDA for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Transport Layer constellation.

September 2026
Rocket Lab, 6x HawkEye 360, Electron
Launch site: Rocket Lab LC 1, Mahia Peninsula
HawkEye 360 is a space-based civil global intelligence satellite network using radio frequency (RF) technology to help monitor transportation across air, land and sea and assist with emergencies, and to provide civil SIGINT (Signal Intelligence) mission.

September 2026
ISRO, IRNSS-1L (NVS-03), GSLV Mk II
Launch site: Satish Dhawan Space Centre
This is a replacement satellite for the Indian Regional Navigation Satellite System. The constellation will provide India with an alternative to GPS and will be used for military and civilian use.

September 2026
Rocket Lab, BlackSky Gen-3 5, Electron
Launch site: Rocket Lab LC 1, Mahia Peninsula
BlackSky Gen-3 Earth-imaging satellites.

September 2026
ULA, Amazon Leo (LV-01), Vulcan VC6L
Launch site: SLC 41, Cape Canaveral SFS
Amazon Leo, formerly known as Project Kuiper, is a mega constellation of satellites in Low Earth Orbit that will offer broadband internet access. This constellation will be managed by Kuiper Systems LLC, a subsidiary of Amazon. This constellation is planned to be composed of 3,276 satellites. The satellites are projected to be placed in 98 orbital planes in three orbital layers, one at 590 km, 610 km and 630 km altitude.

September 2026
ESA, T1H-1, Themis Demonstrator
Launch site: Launch Complex 3B, Esrange Space Center
First low altitude hop test of a Themis demonstrator, with a targeted altitude up to 100 m.

September 2026
ISRO, GISAT-1A (EOS-05), GSLV Mk II
Launch site: Satish Dhawan Space Centre
GISAT-1A (GEO Imaging Satellite) is an Indian earth observing satellite operating from geostationary orbit to facilitate continuous observation of Indian subcontinent, quick monitoring of natural hazards and disaster.

September 2026
SpaceX, SDA Tranche 1 Tracking Layer A, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
Tranche 1 Tracking Layer A is one of five missions by the United States Space Force SDA for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Tracking Layer constellation, which will provide global indications, warning, tracking, and targeting of advanced missile threats, including hypersonic missile systems.

September 2026
SpaceX, SDA Tranche 1 Tracking Layer C, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
Tranche 1 Tracking Layer C is one of five missions by the United States Space Force SDA for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Tracking Layer constellation, which will provide global indications, warning, tracking, and targeting of advanced missile threats, including hypersonic missile systems.

October 2026
Rocket Lab, StriX Launch 12, Electron
Launch site: Rocket Lab LC 1, Mahia Peninsula
Synthetic aperture radar satellite for Japanese Earth imaging company Synspective.

October 2026
KARI NeonSat-2 to 6, Nuri
Launch site: LC-2, Naro Space Center
NeonSat-2 to 6 are part of the South Korean government's Earth observation microsatellite constellation NeonSat (Newspace Earth Observation Satellite). The NeonSat constellation is the first satellite system developed by the government using a mass-production approach for precise monitoring of the Korean Peninsula.

October 2026
SpaceX, Transporter 18, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
Dedicated rideshare flight to a sun-synchronous orbit with dozens of small microsatellites and nanosatellites for commercial and government customers.

October 2026
Mitsubishi Heavy Industries, Martian Moon eXplorer (MMX), H3-24
Launch site: Yoshinobu LC LP-2, Tanegashima Space Center
MMX is a Japanese scientific mission to land on Phobos, one of the two moons of Mars, to collect samples before bringing them back to Earth. The mission includes a small French/German rover to explore the surface of Phobos.

November 24, 2026
ROSCOSMOS, Progress MS-36 (97P), Soyuz 2.1b
Launch site: 31/6, Baikonur Cosmodrome
Progress resupply mission to the International Space Station.

November 2026
Innospace, InnoSat-0, HANBIT-Nano
Launch site: HANBIT Pad, Alcântara Space Center
Innospace's first in-house test satellite, 'InnoSat-0', will test various technologies for future development of satellites by Innospace themselves. The satellite will be deployed using Korean company SpaceBey's specialized deployer.

November 2026
SpaceX, Griffin Mission One, Falcon Heavy
Launch site: Launch Complex 39A, Kennedy Space Center
Demonstration flight of the Astrobotic Griffin lander and its engines, initially contracted for the canceled NASA VIPER (Volatiles Investigating Polar Exploration Rover) mission. The vacated payload spot will now host the FLIP (FLEX Lunar Innovation Platform) lunar rover from Astrolab.

December 2026
SpaceX, Rivada 2, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
24 satellites for Rivada's internet constellation.

December 2026
Isar Aerospace, Cassini, Spectrum
Launch site: Orbital Launch Pad, Andøya Spaceport
Three small satellites hosting payloads for companies across Europe as part of the ESA-European Union IOD (In-Orbit Demonstration) and IOV (In-Orbit Verification) programs.

December 2026
ULA, SDA Tranche 1 Tracking Layer D, Vulcan
Launch site: SLC 3E, Vandenberg SFB
Tranche 1 Tracking Layer D is one of five missions by the United States Space Force Space Development Agency (SDA) for the Proliferated Warfighter Space Architecture (PWSA) Tranche 1 Tracking Layer constellation, which will provide global indications, warning, tracking, and targeting of advanced missile threats, including hypersonic missile systems.

December 2026
SpaceX, Blue Ghost Lunar Lander Mission 2, Falcon 9 Blk 5
Launch site: Cape Canaveral SFS
2nd lunar lander developed by Firefly Aerospace. The Blue Ghost lander will be of a new two-stage version utilizing an Elytra Dark transfer vehicle to place it and the European Space Agency's Lunar Pathfinder experimental communication satellite into Lunar orbit.

December 2026
SpaceX, USSF-31, Falcon 9 Blk 5
Launch site: Cape Canaveral SFS
Classified US Space Force carrying two payloads directly to geostationary orbit.

December 2026
ULA, NROL-83, Vulcan
Launch site: SLC 3E, Vandenberg SFB
Classified payload for the US National Reconnaissance Office.

December 2026
Rocket Lab, Leidos-3, HASTE
Launch site: Rocket Lab LC 2, Wallops Flight Facility
Leidos-3 HASTE is the third mission in a series of Hypersonic Accelerator Suborbital Test Electron launches conducted by Rocket Lab for Leidos.

December 2026
Rocket Lab, BlackSky Gen-3 7, Electron
Launch site: Rocket Lab LC 1, Mahia Peninsula
BlackSky Gen-3 Earth-imaging satellites.

December 2026
SpaceX, Rivada 3, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
24 satellites for Rivada's internet constellation.
December 2026
SpaceX, Rivada 3, Falcon 9 Blk 5
Launch site: SLC 4E, Vandenberg SFB
24 satellites for Rivada's internet constellation.

VENDOR NEWS SCALE ROCKETRY

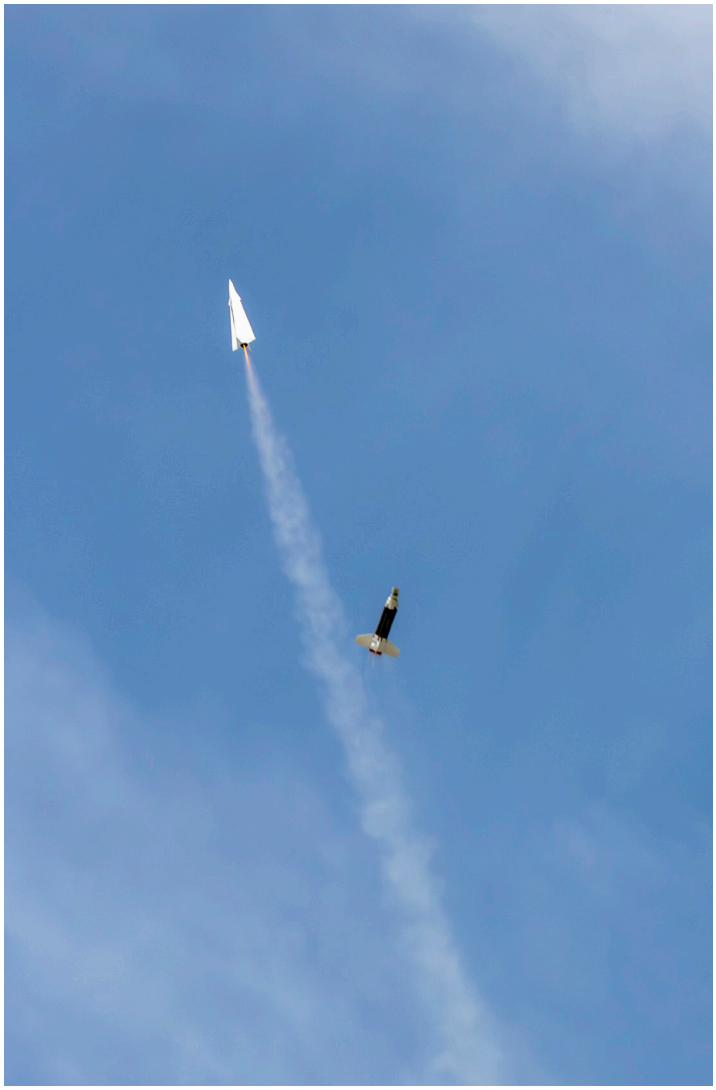
Buzz Nau

Boyce Aerospace 1:24 Scale Nike Hercules

Anyone who is a fan of the Nile Hercules knows what a challenge it is to cluster and stage. This difficulty is greatly reduced with the new 3D printed kit from Boyce. Developed with the help of JMRC/HUVARS member Steve Kristal, the cluster and gap-staged Nike Herc uses a unique gap-staging arrangement in the booster. A single B6-0 is used to ignite the sustainer through a gap stage channel, One B6-2 burns a section of hold-down elastic, releasing the interstage adapter from the booster, and two B6-2s eject a pair of parachutes for recovery.

Steve has test flown this several times at our launches in the past year dialing in the details that have resulted in the highly detailed scale model with scale-like flight performance.

This is a complete kit minus parachutes that includes 3D printed ABS parts, pre-cut body tubes, misc. hardware, and decals. It is 20.10 inches tall and weighs 4.3 ounces minus motors. The kit is available now at the Boyce Aerospace hobbies website for $69.95.

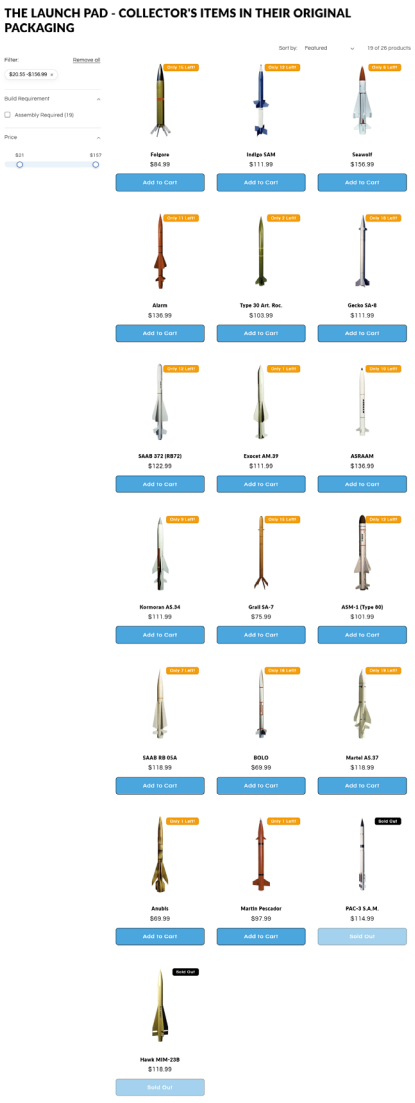


Estes Releases The Launch Pad Collection

Since the passing of Chuck Barndt, the popular line of scale models he produced through his small business, The Launch Pad has been largely unavailable. That was until now. Estes Industries recently acquired the remaining stock of kits which are availble on their website in the original packaging until stock runs out. As of this writing, stock is already low with several kits soldout.

If you are unfamiliar with The Launch Pad (TLP) kits, most are based on BT-80 body tubes with variations of single or cluster 24mm motor mounts. TLP kits did not include decals or markings so you are on your own to create them or source them from another vendor.

So, if you have any TLP kits on your wanted kit list, you better act fast before opportunity is gone and you are back to searching on eBay and other auction sites. Pricing ranges from $85 to $112 and they are final-sale, as is and will not be restocked.



In Memoriam - Dave McVeigh Red Arrow Hobbies

Scott Miller

I recently heard the news that Dave McVeigh from Red Arrow Hobbies passed away. This information hit me hard to be honest, as Dave was a key player in my rocketry journey for the past three plus decades. I'd like to take this opportunity to reflect on my personal history with Dave in an effort to pay my respects. I apologize in advance if I get any time frame wrong or misremember certain details, 31 years will do that to a memory.

All the way back to the beginning… Roger Sadowsky and I finished a 16-hour shift teaching an overnight rocketry camp at the Michigan Space & Science Center and decided that was a good day to drive down to Three Oaks to see our first High Power rocket launch. This would have been around 1995, I think? Dave owned Red Arrow Hobbies and was on site with his U-Haul rental. Seeing the cornucopia of Aerotech and Kosdon motors in Ziplock bags surrounded by 1.4C hazmat stickers had me hooked. Nothing physically transpired that day, but psychologically, my history was written deep within my soul.

Let's fast forward to when I became of legal HPR age and Dave sold me a LOC Mini Magg… this was back when Ron Schultz still owned LOC to date myself. I quickly built it and painted it in my certification red/yellow color scheme and Dave supplied me with the Aerotech H123 White Lighting. We only had a customer/vendor relationship at this point but the guy knew his stuff and treated people right which is important to me. A slight skip ahead, Dave furnishes me (after adequate monetary compensation) with a LOC Magnum and subsequently a J350 to attain my L2. This was the period when we shifted from customer/vendor status to real friends; not due to the transaction but because we started to bond and chat about additional things including business, websites, and various other topics we had in common.

JMRC was up and running at this time and my L2 flight was a step towards acquiring Tripoli prefecture status alongside our current NAR status. What in the hell do I do next to support the club, the hobby, and continue to learn? Dave's friendship grows into a mutually beneficial situation that far exceeds rocketry. At this time, I was going to Western Michigan University and working part time at a Rider's Hobby shop when there was still one in Kalamazoo. I also wanted to attain my L3 certification when I hit the required age at the time which was 21… being young, dumb, and broke Dave offered me "employment" to work off my rocketry supplies. If the IRS is reading this, I can assure you no money changed hands as I helped a friend and he gifted me with product he had laying around the shop.

I spent countless hours at Dave's shop, helping where I could and soaking up knowledge at the same time. Dave was a fireworks guy first with a Pyrotechnics Guild International victory desire and a rocketry guy second perhaps this is why my obsession with motor ignition developed? It was Dave's fault for inspiring me to make my first iteration of igniter dip. This first dip was later used at the first Rockets for Schools program in Muskegon, MI in 1996 and the homegrown igniters had 100% success on the first attempt… many iterations later with many late BS sessions with Dave helped refine my formula to its current state which I like to think is unique and reliable.

Well, that's my story of origin with Dave, but it lacks the key details that made him a great person. He was always honest with me, and blunt, which I ALWAYS appreciated. Early on I had a rocketry business that began with kits and hybrid rocket motors, but I was focused on being a supportive/extension



Dave McVeigh at the November 2010 JMRC Launch

business. I never sold the same product as Dave unless I sourced it through him and I wasn't starting my business to supplement my income but rather grow the hobby. Dave's business success was my number one focus and it was difficult during the ATF lawsuit era. My initial rocket kit line including all of the "Scott's Special" iterations that used Red Arrow Hobby parts… all inquiries on the historical designs should be directed to Dale Hodgson as he was the poster boy for testing them.

I realize this write-up is scattered and probably incoherent to most, I'm honestly struggling to write it. I still hold in my possession the door key to unlock Red Arrow Hobbies and I'm kicking myself because I honestly don't remember when Dave gave it to me. I remember offering it back when my life took me too far away to support him on a regular basis but Dave refused and said to keep it just in case I needed it someday. I never truly understood the trust, respect, and honor of that moment until just now. I had a friend that trusted me with his livelihood even though the future had no prediction or direction at that moment.

Backing up to 2001, it was because of Dave that I flew my L3 cert flight on a Kosdon M2240 and then had the privilege to talk to Frank himself on the phone afterwards to thank him for the motor. It was because of Dave that I was able to join the Rocketry for Schools Board of Directors early on and build the parts to the kits that many schools would build and fly. There is something special about being part of the design, implementation, and final product of such a program that really hits home; it was because of Dave who derived the idea of "flexible phenolic" tubing, that I developed a solid foundation of rocket tubing components and realizing the true failure points being in transit to/from the field and not really in flight.

Dave was always thinking about future ideas, or to quote Dave "I've been toying around with the idea of…". I've been toying around with the idea to reach out and check on my friend… but as I sit here with a tear in my eye, the hesitancy I displayed has now become another lost opportunity that I can never recover.

Dave McVeigh made a lasting impact on this hobby from its early inception; he also made a lasting impact on me I only hope I can keep his enthusiasm alive and keep the proverbial rocketry torch to continue and pass down to future generations as well as Dave to do my part and keep this great hobby alive and growing.

Thank you Dave, you were always a great friend and an avid ally to the rocketry community. You will be greatly missed!



OUR MEMBERS IN THE FIELD



Emma and Steve Kristal at NARAM 67 - Andy Tomasch photo



Al de la Iglesia recovers Andy's PD model - Andy Tomasch photo



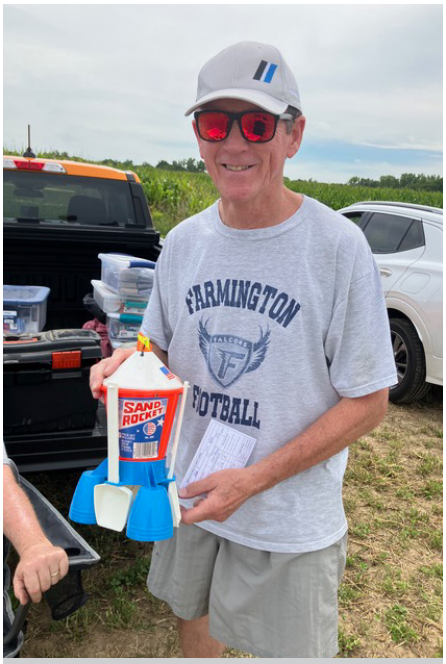
Andy Tomasch at the NARAM 67 Briefing - Andy Tomasch photo



Jay Calvert with his slightly toasted Helo Model - Steve Kristal photo



Jeff Jerzy and his Thomas the Rocket



Mark Chrumka his Sand Rocket - Steve Kristal photo