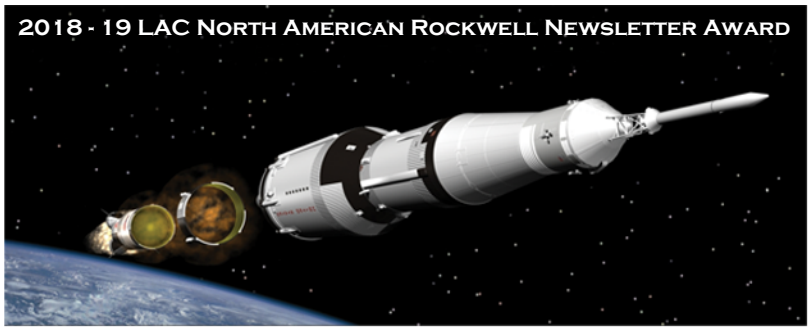

Total Impulse

Jackson Model Rocket Club
Huron Valley Rocket Society

Total Impulse Volume 19, No. 5

September - October 2019

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CLUB OFFICERS

President: Scott Miller
Vice President: Roger Sadowsky
Treasurer: Tony Haga
Secretary: Rob Dickinson
Editor / NAR Advisor: Buzz Nau
Communications: Dan Harrison
Board of Director: Dale Hodgson
Board of Director: Bob Dickinson
Board of Director: Mark Chrumka

MEMBERSHIP

To become a member of the Jackson Model Rocketry Club and Huron Valley Rocket Society means becoming a part of our family. We have monthly launches and participate in many educational events. We encourage our members to actively participate in our club projects, running for office in our annual elections, contributing to our monthly newsletter with articles or tips, and offering services to the club in their area of expertise. We have many members comprised of children, men, women, professionals, lay people, educators and people from many other walks of life.
You may fill out an application at a launch or request an application from one of our board members at scott@sfsmindustries.com and mail it along with a check for the annual membership dues ($30.00 individual or $40.00 family) to our mailing address:

JMRC/HUVARS
C/O Rob Dickinson
5059 Okemos Rd
East Lansing MI 48823

Members enjoy no launch fees, participating in club projects, and meeting an incredible group of positive people.

COMM CHANNELS

There are several ways to keep in touch with the JMRC/HUVARS and it's 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 also serves as our primary e-mail list serv. Follow this link to join, https://groups.io/g/jmrc

Facebook: If you have a FaceBook account search for "Jackson Model Rocket Club JMRC" and request to be added.

GroupMe: Our new chat channel for broadcasting notifications instantly using a free download client for IOS and Droid as well as by SMS text messaging. You can join the notification chat after creating a free account and following this link,
https://groupme.com/join_group/28013422/zc5IC1

EDITOR'S RANGE BOX

Welcome to the September/October 2019 issue. This caps off a very busy summer for our members where we only had one launch cancelled for weather. Some members competed in the Can Am Cup and/or attended CrapShoot VI in Muskegon. We also had a great presence at Rocketry Festival held in Muncie, IN for NARAM 61, the FAI Fly Offs, and sport flying.

With all of that going on we also held our annual Make It Take It at Maker Faire thanks to volunteers from JMRC and HUVARS. We were also asked to set up a static display and demo launch for the Hurst Planetarium's 50th Anniversary. We weren't able to provide the demo launch, but did meet 100's of local folks that expressed an interest in our hobby and took home fliers.

We're not done yet for the year. In October we plan to fly a fun Big Bertha Contest which appears to have drawn a lot of interest with the club. See page 21 for the details and I hope to see you all there on October 14th!

About Total Impulse

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

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

Send correspondence to:
Jackson Model Rocket Club
Buzz Nau, Editor
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Launch/Event Calendar - 2019

- April 13th (MIS)
- May 4th (TBD)
- CrapShoot VI - May 25,26 (Muskegon)
- June 15th (MIS)
- July 13th (MIS)
- NARAM 61 - July 27 - August 3 (Muncie, IN)
- August 17th (MIS)
- September 14th (MIS)
- October 12th (MIS)
- November 9th (TBD)

NOTE: Launch dates are subject to change without notice. Be sure to call the "launch hotline" at 517.262.0510 for the latest weather and field information or sign up for the JMRC Notification GroupMe chat.

PRESIDENT'S CORNER

Many clubs develop an identity that they are "known for", this is not a bad thing because it tends to be a certain field or area that their club excels at within their membership. I honestly don't know if the JMRC fits into this category utilizing conventional titles within the rocketry community. We have members that compete worldwide and even bring home trophies on behalf of the USA, we also have members that have travelled long distances just to push the extreme side of rocketry out in the desert. We then take another look and notice certain members taking more of a silly side and fly barbies or iconic movie lamps in the shape of a leg. We also have other interests within our club that are extremely notable, our equipment is all home-grown, based on more than 2 decades worth of use and advancement. This leads to a whole other path that anyone within the club can jump in to help us maintain and further advance. I may never truly know what other people think the Jackson Model Rocketry Club is "Known For", but I can certainly hope it is known for being "The club that can do that".
Do you need to put on an impressive display for a large public gathering?
- We can do that
Do you need help, guidance, and support for a school/group project from Elementary through University level?
- We can do that
Do you want to push your rocket to the extremes and measure speed in Mach and the altitude in miles?
- We can do that
Do you want to bring your family out for a fun day of flying rockets?
- We can do that
Do you have a Barbie you want to strap to a rocket?
- We can do that :-)
If there is something that any of our membership wants to accomplish and we aren't currently supporting that option, please let anyone on the Board of Directors know and we will try to work on that so we can say.... "We can do that!"
Thanks!! - Scott

On the Cover:

(top) A Sparrow III missile mounted on a F3H Demon - US Navy photo (bottom left) Steve Kristal and his E Altitude model at NARAM 61 (bottom right) Tony Haga and Maker Faire kids watch one of their "Build It Take It" rockets liftoff at the Henry Ford Museum.

Maker Faire 2019 at the Henry Ford Museum

Photos by Dave Glover and Roger Sadowsky

Dave Glover

The 10th annual Detroit Maker Faire was held at The Henry Ford Museum in Dearborn over the July 27th and 28th weekend with hundreds of interactive exhibits throughout the museum and outside as well. While mostly science related, e.g. robotics, electronic synthesizers, radio astronomy, etc., there were also hands-on activities like making cornhusk dolls brought over from Greenfield Village.

JMRC and HUVARS members once again co-ordinated the ROCKETS: Build It, Fly It, and Take it Home, assisting over 250 kids of all ages build and fly an Estes "Build It / Take It" kit. The builder's ages ran from just under four to parents in their forties and they all had big smiles on their faces as they launched their rockets skyward.

The Henry Ford provided quite a large canopy on the lawn outside the museum, with lots of room and tables for building rockets with the assistance of the JMRC & HUVARAS members and volunteers from The Henry Ford.

Roger and Tony headed up the JMRC contingent with Tony operating the launch board both days, which meant a lot of time in the sun and looking into the sun as that's where the rockets all seemed to head. Roger manned the final assembly & motor placement table along with the occasional launching of rockets. I stuck with assisting builders and then photographing them launching their rockets.

HUVARS members Robert Houseman ran the sales table while Doug Houseman and John Potts assisted builders. Brother's James and Pat Houseman worked the building tables, assisted Tony setting up rockets on the pads, and retrieved rockets that landed across the road or in a tree. A number of Henry Ford volunteers assisted both days with building, many of whom come back each year just to help out in the rocket building.

The Rob Dickinson family, including Bob and Mandy setup an indoor display of high power rockets inside the main hallway of the museum in addition to small and giant sized V2's, Bob's Nike Smoke, a giant Crayon, and relatively "smaller" HP rockets belonging to Tony. They passed out club flyers, other rocketry information, and directed people outside to watch and possibly build their own rocket.

While not as busy as last year's record number of 350 rockets flown, approximately 250 rockets were built and launched over the two days. The limited number of volunteers kept everyone busy from start to finish both days and while tiring, it was an enjoyable weekend seeing the faces of the kids while building and flying their own rocket.

My youngest builder was almost four years old and completed the rocket build by himself with occasional assistance from his parents who showed great patience while he went about the construction. The look on their faces when they launched their rocket is one of the main reasons I enjoy these weekends.

It is hoped The Henry Ford will continue to host Maker Faire next year and we enlist additional volunteers to come and have fun helping young people learn about model rocketry. We do need more volunteers and will hopefully not be competing with the NAR's 'NARAM", which was held nearby in Muncie, Indiana the same weekend.

A special thank you to Roger Sadowsky and Tony Haga for bringing the trailer out to Dearborn, coordinating the setup and the take down each day, and providing refreshments for the volunteers as well as the HUVARS members who worked in all areas of the project, and the Henry Ford volunteers.

Rocketry Festival / NARAM 61 Muncie, IN

Buzz Nau

Entrance to the AMA's International Aeromodeling Center

This year's Rocketry Festival / NARAM 61 was hosted in Muncie, IN at the Aeronautical Model Academy's (AMA) International Aeromodeling Center (IAC). In addition to Sport Flying and NARAM, the FAI USA Team Flyoffs were held in the days prior to NARAM. The Sport Range was open from Saturday July 27 through Saturday August 3. The FAI Flyoffs were held Sunday July 28 through Tuesday July 30. Finally, NARAM 61 was flown from Wednesday July 31 through Saturday August 3. Needless to say, there was a lot of flying!

JMRC and HUVARS were well represented in all the events. Trevor Harrison, Emma and Steve Kristal participated in the FAI Team Flyoffs. Steve also flew in NARAM in C division. Al de la Iglesia, Mark Chrumka and I flew in D division as the Escape Velocity team. Also, in attendance Peter and Bob Alway as the Bumbling Brothers Flying Circus team, Jay Calvert, Pam Gilmore, Justin Stotter, and Matt Johnson of the Royal Rocketeers team, and Roger Wilfong flew on the sport range.

Al and I arrived Friday afternoon (July 26) to the IAC as we were going to be camping at the RV sight adjacent to the competition range in Al's motorhome. It couldn't have been more convenient than to wake up, grab a coffee, and walk out of the RV right onto the range. There were several other attendees that used the RV park while most stayed at the event hotel that was a 15-minute drive to downtown Muncie.

Saturday – Tuesday (Sport Range & FAI USA Team Flyoffs)

Al and I had planned to put in a lot of sport flights in the days leading up to NARAM, but several factors limited our flight count. The biggest was the corn field located directly north of the range and the prevailing winds from the southwest. Many rockets found the corn on that first day. Al and I each put one in the corn.


Al's V-2 on the sport range

Al was able to get a good line on his and recover it. I thought my Pulsar II was lost for good, but two hours later someone else had found it and put it in the lost and found box. To the east of the corn was a soybean field. Though easier to locate rockets there, it had its own challenges. For one, depth perception was really bad and models were going much further away than they appeared.

Another significant problem was the launch equipment. The host section initially had a nice wireless controller setup that was attempting to support twenty-four low power pads, twelve high power pads, and several far away pads. The system began overheating halfway through the first day and had to be replaced by a wired system that couldn't support even half of the original pads. Though the available pads were reduced significantly, I didn't see many backups of modelers waiting for a pad. At the end of the event there were over 900 sport launches flown. As a result of the launch equipment issues, the NAR board voted on Monday to provide launch equipment for sport ranges in addition to the contest range equipment they already provide. This was welcome news.

I put up three flights on Saturday and three on Sunday. Monday was a wash due to high winds and with better weather on Tuesday I got in six flights. Our flight highlights included my Centuri Orion clone on a D12-5, THOY Peacock on a F50-6, Chero-

Al preps his Big Bertha on the sport range

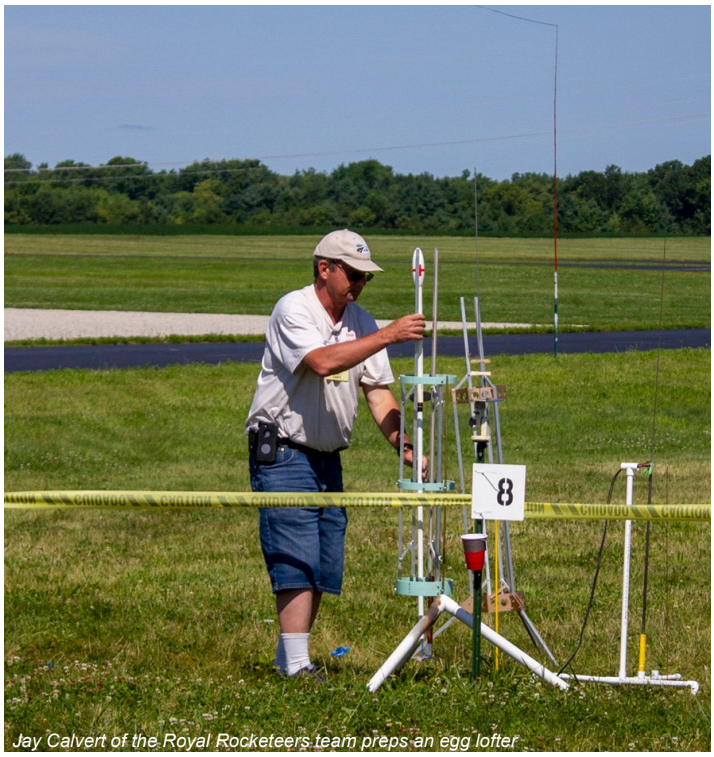

Emma and Steve Kristal on the 1st day of the FAI Fly-offs

kee G on a F36-8, THOY Falcon on an I430-12, Interceptor E on a E31-6, and Argus II on a F79-8. Al put in several nice flights as well including his Big Bertha, Initiator, V-2, National Aerospace Plane, Mega Der Red Max, and upscale Mosquito. Mark showed up on Monday and put in some sport flights on Tuesday including his 3D printed Aries and 1/200 Estes Saturn V.

Instead of chasing rockets on Monday Al and I spent most of the day watching the FAI Flyoffs and hanging out with Trevor, Dan, Emma, and Steve. Congratulations to Trevor who qualified for all nine events in the junior division while Emma and Steve both qualified in S3 (parachute duration).

Wednesday (C Eggloft Altitude, B Eggloft Duration, A Boost Glider Duration)

This year NARAM was compacted into four days instead of five. Altitude events were flown in the mornings and duration events in the afternoons. Another difference was range duty. There were three shifts. Each would pull an hour of duty in the morning and one and half hours in the afternoon. I was a little skeptical of this change, but it actually worked out really well.



Jay Calvert of the Royal Rocketeers team preps an egg lofter

Wednesday morning was C Eggloft Altitude. We flew this event last year and we were plagued with altimeter issues. Thinking these were resolved we ended up with the exact same problem again. Beautiful straight piston boost and an altimeter reading of 52 meters. I could have chewed nails. We put up a second flight only to break the egg on that one. The Bumbling Brothers took fifth with 298 meters.

We had much better luck in the afternoon. Our first B Eggloft Duration stayed up for over two minutes and was good enough for second place. Our second flight was a no deploy and another broken egg. The Bumbling Brothers took fourth with 64 seconds.


Morning on the NARAM range from the RV

In A Boost Glider we got the single best-timed flight of the meet at just over six and a half minutes. We had a great timer team that saw the reflective chrome while it thermalled away. We detrimmed the next glider and launched it in sinking cool air and it still got over 50 seconds, but we returned it for first place.

Thursday (B Payload Altitude, 1/4A Helicopter Duration, 1/4A Parachute Duration)

I was really looking forward to B Payload Altitude this year. We had put in a respectable qualifying flight last summer and I had tested the design prior to NARAM successfully. That said, altimeter problems hit us again in addition to a booster problem. Another great boost and long search for the payload however we were DQ'd for the booster streamlining in the range head area instead of tumbling. After we found the payload and checked the altimeter, we found that it had not triggered at launch and was reporting the prior flight's altitude. Steve Kristal offered to let us use one of his brand-new altimeters. It worked, but….. staging didn't and the upper stage crashed. DQ again. We're flying this event again next year and my goal is to redeem ourselves. Royal Rocketeers were seventh in D division with 191 meters and Bumbling Brothers eighth with 185 meters. Steve put up a great flight of 314 meters for first place in C division! This was the one event he wanted and I'm happy to see how well he did.

Dan and Trevor Harrison with Dan's fin jig

In 1/4A Helicopter Duration we had a couple of choices. Mark had a model that had flown before and worked and Al had a new Rose-a-roc design that hadn't flown yet. We went with Mark's model and put in flights of 21 and 15 seconds for eighth place. Royal Rocketeers took second with a total of 49 seconds.

Al had his 24mm vellum paper models for 1/4A Parachute Duration with large 1/4mil poly chutes. The first flight was a partial deployment and we only got 14 seconds, but the second flight was flawless and put in 211 seconds for fourth place. Bumbling Brothers had a total of 492 seconds for third place.


Royal Rocketeers Black Brant XII


Pod Bay Doors MLAS

Friday (E Altitude, C Rocket Glider Multi-Round)

E Altitude was the morning event and our approach was a 24mm paper model with 1/16" tissued fins, balsa nose cone with an E6-8 motor coming off a nine-foot rail with fly-away rail guides. We were one of the first flights and put in a high mark of 1368 meters. That was a bit higher than it simmed so I was pretty happy with it. That mark stood in the lead for most of the morning, but near the end of the round we were gradually knocked down to fifth place. Bumbling Brothers put up a 1413 meter flight with an insanely short model that was recovered. Royal Rocketeers took ninth place with 990 meters. Steve took fifteenth in C division with a bad altimeter reading of 150 meters.

We had originally wanted to fly a radio-controlled entry for C Rocket Glider Multiround, but weren't able to get a model built in time. I brought a 20-year-old sliding wing model I designed and Mark also brought a sliding wing model. We flew mine first since it was heavier and we expected to get it back easily. We weren't really trying to pick a thermal, but we sure hooked one. The glider was last seen climbing towards Muncie and had easily gotten a max score. We prepped Mark's model and waited for cool air before launching. Unfortunately, the motor plume burned through the center of the wing and the glider shredded about 100' up. Al and I collected the pieces and proceeded to rebuild it. With two minutes left to check in we got a pad assignment and I finished prepping the glider. The boost looked good and it got a little higher this time before a horizontal stab let loose and we DQ'd again. That single max flight was good enough for sixth place though.


Flying I-Beam Kids prep their Argo scale entry

Saturday (Scale, Awards Banquet)

Mark went with his scale entry from last year, the WASP sounding rocket. With two stages and recruit clusters it does pretty well with the mission points as well as a high static score. However, this year we were going up against two three-stage entries. The Flying I-Beam Kids Argo D-4 Javelin and the Royal Rocketeers Black Brant XII. After static scoring we were in second place with 832 points, slightly ahead of the Royal Rocketeers 816. Flying I-Beam was well ahead with 890. We flew first and had a flawless staged flight that picked up 137 mission points (staging and clustering). The I-Beam Kids also put up a flawless flight which heavily padded their lead getting a further 160 mission points. The Royal Rocketeers first flight failed to stage, but luckily all of the recovery charges went off and there was no damage to the model. Justin prepped it again and got in a second flight that went perfect, getting them a cool 172 mission points that leapfrogged our WASP for second place. The Bumbling Brothers Astrobee 1500 took fifth in scale.

The most painful flights to watch included the Pod Bay Doors team's MLAS. It was underpowered with a cluster of four D12's and crashed rather spectacularly. Also painful was H-Bomb's large Vostok. Three of the four motors lit which was barely enough to get it off the rod and then impacted the ground under power. Damage didn't seem to be that bad, but they elected not to try it again.

The awards banquet is always a bittersweet event. It's great to see everyone recognized for how they did during the week and to enjoy one another's company, but when it's over you kind of wish there was another day to fly.

Mark, Al, and I took fourth place in the final standings and the 1st place in A Boost Glider also included the Event Specialist Award. JMRC won the LAC Rockwell Trophy for best section newsletter for a second year in a row. The Bumbling Brothers Flying Circus took third place overall beating Escape Velocity by a single point! The Royal Rocketeers finished in eighth place.

NARAM 62 will take place at Geneseo, NY on July 25-31, 2020 with Dan Wolf as the contest director. The sport range will be hosted by the Monroe Area Rocket Society and Syracuse Rocket Club.

Events:
1/2A Boost Glider*
1/2A Streamer Duration*
1/2A Helicopter Duration*
1/2A Parachute Duration*
1/2A Altitude*
B Payload*
1/2A Flexwing Glider
D Superroc Altitude
Sport Scale
Research & Development
(*NRC events)

LAUNCH REPORT

JMRC August Sport Launch

Just like last year, the August Sport and NRC launch had some of the best weather of the year for sport and competition flights. We had 23 fliers that put up a total of 117 flights for the day.

Ron Watkins' Big Daddy

Sport Flying

Ron Gutzeit and Edred Pickett were tied for most flights of the day with 18 each! Ron put up a huge variety of models including his scale Bullpup and Nike Smoke on a B6-4, V-2 on a C6-3, MX-774 on an A3-4T, and Little John on an A10-3T. He also flew his Golden Duel on a cluster of 2 B6-4's and Maxi-Alpha Stretch on a D12-5. Eldred drag raced an entire rack of Estes Crayon rockets that was a lot of fun to watch. I think he got them all back. He also put in several mid-power flights including his Phobos on a AT F40, Small Endeavor on a AT G40, and Yellow Sparkle on a Loki I430.

Ron and Shirley Watkins were in attendance. Ron put up 3 flights that included his Estes Big Daddy on a D12-5, Semroc Iris on a B6-4, and Estes Impulse on a cluster of 2 D12-5's. Among Art Upton's 4 launches was another Ascender GPS tracking flight with a Big Red Bee GPS. Later he posted a neat GoogleEarth image with the 3D flight path.

Mark Chrumka tried his staged, side pod, boiler plate again after a previous attempt earlier in the year. Again, one of the pods caused issues releasing, but the staging worked. He also flew his Estes 1/200 RTF Saturn V on a Quest C12-4 which is a nice motor for that model. Another great flight was his FlisKits Deuces Wild on 2 B6-4's. Another interesting flight was his Estes Firebird kit bash that he flew from a piston launcher.

Sarah Glover had 3 flights while Dave put up 4. Sarah's Bumblebee went up on a CTI G69-14 Skidmark for an impressive flight but got dinged up a little on landing. She also flew her Estes Dark Silver on a C11-5 and Mega Mosquito on a D12-5. Dave put up nice flights with his Madcow Torrent on a Loki G94 blue, Red Bandit on a CTI G80 Skidmark, and Starliner on a AT H250 Mohave Green.

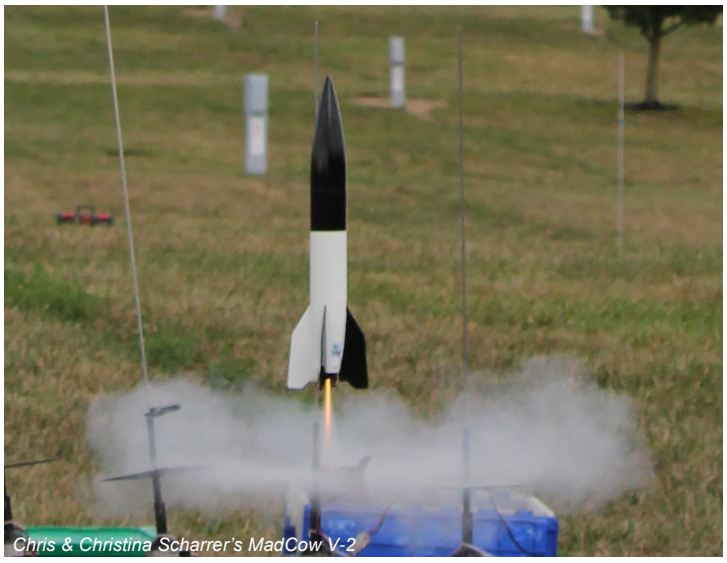
Dale Hodgson is starting to get his gliders dialed in. He flew his Semroc Blue Jay several times to improve the trim. He also flew his upscale Mosquito "Mozzie" on an E20-4 and a great two stage flight with his Estes Spirit on a D12-0 to a C6-5. Finally, he flew his "54 Dart" on a Loki I430 Blue.

In preparation for his upcoming Level 3 certification flight, Herb Crites flew his Mach Schnell SLK 75m on an Aerotech

Dale Hodgson's two-stage Spirit

I599N Warp Nine. Onboard were two RRC2 altimeters and a Jolly Logic Chute Release. It was a great shakedown flight and we're all looking forward to Herb's Level 3 flight. Herb also flew his SLK 54m on an AT H130W and H210 Redline. Chris Palmer tried his "Major Award" rocket and once again, the motor flew fine, but left the leg and lampshade model on the pad.

The Skittles rocket from Chris and Christina Scharrer made another attempt to blanket the field with candy, but I'm not sure any Skittles were recovered. Together, they also flew their nicely done Madcow V-2 on a G78-4 and Odin on a cluster of 3 D12-7's. Christina also flew her Venom MkII and beautiful Semroc Starlight, both on Estes B6-6's.



Chris & Christina Scharrer's MadCow V-2


Mark Chrumka's Deuces Wild

Steve Lindeman resurrected his XF-48 White Knight for a great flight on a F15-6 for one of his 5 flights. He also put up veteran fliers Spartacus on a D21-5 and Tinkerbell on a F15-6. Peter Alway sent up his V-2 and Mercury Redstone on C6-3's for scale flights. In addition, he launched his upscale Astron Constellation with several suspected bad altimeters. Only one recorded a believable altitude.

Al dela Iglesia had 6 flights, 3 of which were sport flights. These included his Alpha III on a B6-4. Super Big Bertha on a D12-3, and regular Bertha on an A8-3 "test run" for the Big Bertha contest next month. In addition to competition flying, Buzz Nau had 6 flights including 3 on the Skydart to fix a trim problem. He also flew his North Coast Rocketry Patriot on a CTI G80 Skidmark, Estes X-16 on a B6-4, and Astron Farside 3-stager on an A8-0 to A8-0, to A8-5.

Competition

Much like last year's August launch, there was a fair number of NRC competition flights that took advantage of the good conditions. Mid-day saw several models hook monster thermals. There were two 1/2A parachute duration flights. Al dela Iglesia piston launched one of his 24mm vellum models for the Escape Velocity team which drifted off in a thermal for a duration of 3 ½ minutes. Trevor Harrison had a similar flight with a FAI style model and timed for over 4 ½ minutes.


Herb Crites and his L3 Mach Schnell

Al also flew his micro Rose-a-roc for 1/2A helicopter duration. The first flight, on a long delay, ejected on the way down and it never flipped back over. The second flight ejected better, but a blade angle issue kept the duration low for a total of 44 seconds. Jay Calvert of the Royal Rocketeers team also flew 1/2A Helo twice for a slightly better total of 56 seconds.

In 1/2A Boost Glider Duration Jay fought a tight trim on his I-Vee for a total of 92 seconds. Bob Alway of the Bumbling Brothers Flying Circus team was next best with a total of 116 seconds. Most of that time coming from the first flight that lasted 1 minute and 49 seconds. At the top of the list was Buzz Nau from Escape Velocity. The glider was left-over from NARAM 61 for A boost glide. It was detrimmed a little on the first flight for 41 seconds. Properly trimmed it hooked a thermal on the second flight and seen for over 4 minutes for a total of 270 seconds.

Trevor also flew some FAI practice and had a great gapped two stage flight on an A10-0 to a 1/2A3. Steve Kristal had an unstable flight for his B Payload Altitude but made up for that by setting two altitude records in C Division for 1/8A Altitude and 1/8A Superroc Altitude. Congratulations Steve!

Super thanks to everyone that showed up to fly in such great weather, those that showed up early to set up and stayed to help put everything away. Special thanks to Mike and Natalie Jacobs for the great donuts in the morning and their support and dedication to the club. The next launch is September 14 when we will be hosting the fun "Big Bertha" contest. Hope to see you there!


Royal Rocketeers 1-Vee boost glider

LAUNCH REPORT

JMRC September Sport Launch

Sport Flights

They all can't be good launch days. Sometimes you have to make the best out of the conditions you are given. Take our September 14th launch for example. The best thing we could say is it wasn't raining, and the temperature was pleasant. Unfortunately, it was pretty breezy and the direction was towards the woods most of the day. Regardless, in true JMRC/HUVARS fashion, we adapted and still put up a total of 114 flights from 24 different fliers. We had originally planned to hold fun Big Bertha Contest, but decided to postpone that until October and hope for better conditions.

President Scott Miller brought his wireless remote pad cam and launch controller he is developing. He's also looking into using it for a wireless PA system. So far it is showing a lot of promise.

We had a couple of new faces including Kent Pecte from Ohio and new member Andrew Fischer. We also saw the return of Dean Brown who has been absent for awhile and it was great to see him at a launch again. Kent had five flights with some nicely finished models including a Semroc Mini-Omega on a full C motor stack, The new Estes Cherokee E on a D12-5, Quest X-15 on a B6-4 and two-stage Estes Solar Flare on a B6-0 to an A10-3T. Andrew put in an impressive 13 flights which included his FC-803 (Estes Air Commander) two-stager on a D12 booster to C11-5 sustainer, and Estes L.G.M. (little green man) on C6-7s. Dean flew his Estes Fatboy several times on C6-3s. Welcome back Dean!

The Sinclair brothers Matthew and Jonathan combined for 9 flights. Jonathan's Snitch was a perfect rocket for the windy weather. His other flights included an Estes Flip-flyer on an C6-5 and Bullpup on a B6-4. Matthew's flights included an impressive Falcon 9 scale model on a D12-5 and "If I get it back I'll name it" (THOY Peacock) on a F30-6. He got it back so we're waiting on the new name.

Dave Glover put in 7 launches and finally got in a good flight on his Estes Twin Factor without cato'ing a motor. He wasn't so lucky with his upscale Quad Runner when the recovery system failed to deploy and he broke a fin on landing. Dave also flew his Sirius Eradicator on an AT F50-6, Mega Vertico on a F67-0, and Estes Silver Comet on a D12-5.

The title for most flights of the day goes to….. you guessed it, Eldred Picket with 20 flights. In addition to flying an entire box of Estes Crayon rockets, Eldred stuck with low power putting up many recent Estes kits like the Rampage, Scorpion, Big Dawg, as well as classics like the Big Bertha, and Alpha III. He also flew his Blue Ninja and Maniac on D12-5s.

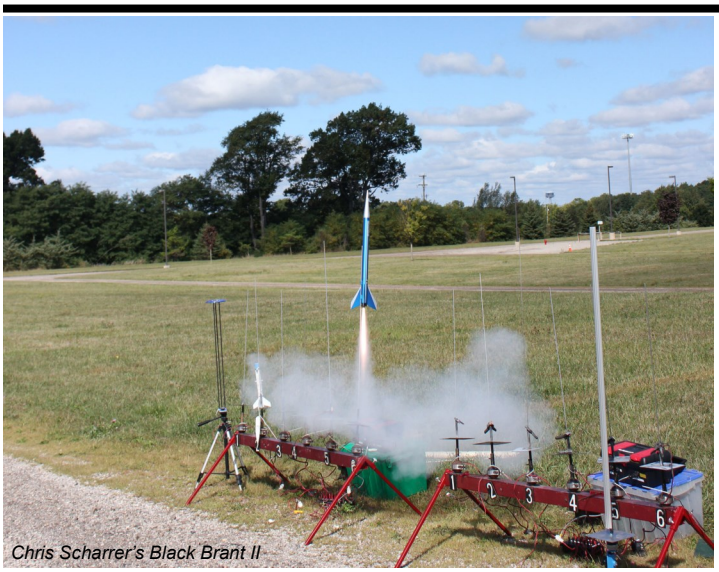
Rick Arden's Trajector

We also had single flights put in by Fred Zeigler, Dale Hodgson, and Rick Arden. Fred flew his Stars and Stripes crayon-roc on a AT H238-M. Dale loaded a Miller-Special I Hybrid in his "Outlandish" that spanked, but the main chute deployed at apogee. It managed to hook one of the tallest trees in the woods to the east where it taunted Dale for the rest of the day. It's an all fiberglass rocket, so in theory it will last as long as the Kevlar shock-line. Rick was somewhat luckier. He's lost a couple Estes Trajectors so far and thought he lost another on an Estes F15 motor. Luckily, Dan Harrison found it later in the day where it had managed to miss all the trees and made it to the ground.

Andrew Fischer's Air Commander

While Trevor stuck to competition flights, his dad Dan, and grandfather John put in 8 flights between them. John flew an Estes Argent twice, once with a F50-4 and again with a H123-12. He also flew his Estes SkyDart II 3 times which glided really well considering the wind. It's nice to see another SkyDart flying! Dan flew his contest Big Bertha on a C6-5 and a couple of experimental rockets. Trevor continued practicing with FAI parachute duration models.

Chris and Christina Scharrer had two flights each. Chris flew his MadCow V-2 on a F67-6 which did a really weird weather cock into the wind. He also flew a Black Brant II sporting a cool blue and silver paint scheme also on a F67. Christina flew her rebuilt Venom MkII on an A8-3 that has a great metal foil patch scheme on black paint. She also flew her awesome looking FlisKits Mystic on an A8-3.


Chris Scharrer's Black Brant II

Kelsea Nau showed up with dad Buzz to fly in the Big Bertha contest, but with that postponed she flew her "Fireworks Underwater" (Quest Falcon) on a B6-4 and Estes Birdie clone on an A10-0. Buzz flew his SkyDart once and that walk was long enough. He also flew his Der Red Max a couple of times, and Mega Mosquito on a C11-3. Finally, he flew his MPC Yankee on a Quest D16 which weather-cocked right into the soybean field to the west for a loss.

Another addition to the lost list was Al dela Iglesia's Estes Majestic that is in the woods near Dale's rocket. He had better success with his Mega Der Red Max on a AT G79-4, and Super Big Bertha on a D12-3. Al also got in flights with his Alpha III, Mini Mars Lander, and National Space Plane.

What I thought was a for sure goner was Mark Chrumka's Estes X-wing Fighter. The nose cone and chute separated from the main body which streamlined in. Unbelievably, the model suffered no damage. Mark also had chute issues with his 3D printed upscale of the Estes Saros. Once again, he was able to escape repairing damage.

Another of the new Cherokee E kits was flown by Art Upton on a D12-7. Not quite calm enough for an E. He also flew a new Estes Tigress on an AT D10-7 which was promptly eaten by the woods. Finally he CATO-staged an Estes Mongoose with a C6-0 which cato'd and lit the C6-7 sustainer. Not sure he planned it that way, but it was effective.

The heartbreak of the launch award goes to Rick Sharp. First, his Stinger on an F26 hooked the power lines to the west on recovery. Then his LOC Big Nuke 3E level 2 certification flight failed when his main recovery chutes stripped during the main ejection event. The drogue managed to slow it enough so it wasn't damaged much, but too much to make a second attempt. Rick says he'll be back in October.


Kelsea Nau and her "Fireworks Underwater"

Peter Alway had 3 sport flights while his brother and team-mate Bob, flew NRC flights. Peter flew his Fluffy-Roc on a C6-5, Little Joe II on an A3-2T, and Estes Jetliner on an A10-3 which flew surprisingly well.

The steadiest flier of the day was Herb Crites with 4 flights, all successful. Though he also hooked a tree, he managed to pick one that was 10' tall and the model was inches from the ground for an easy recovery. Three flights were his Mach Schnell SLK 38 on AT F67 and F64 White Lightning motors. Herb also flew his Mach Schnell SLK 54m on a H100 White Lightning.

NRC Flights

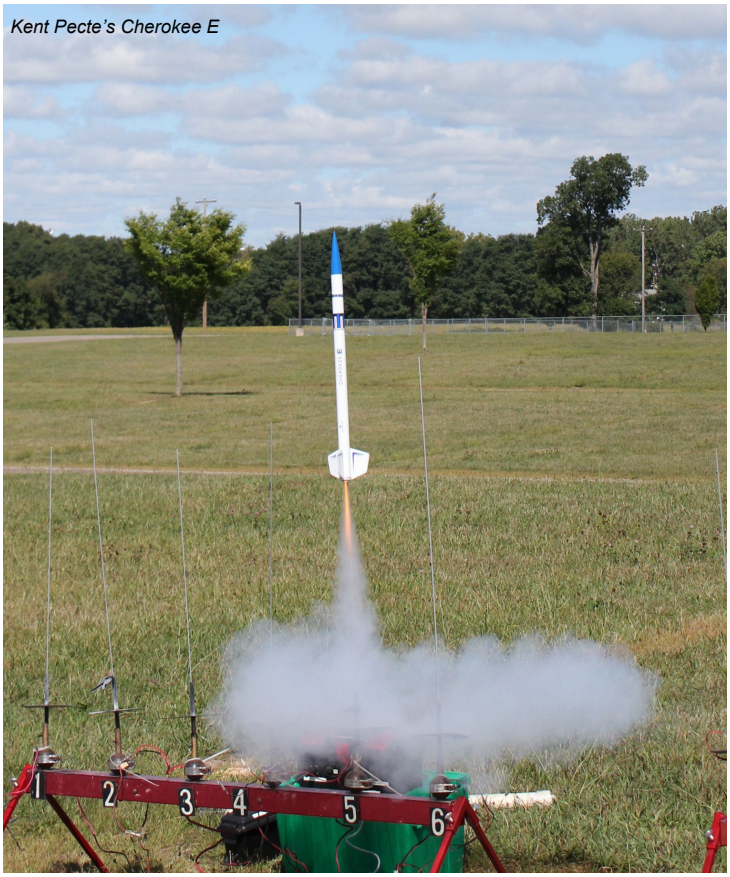
In addition to FAI practice, Trevor also put in two 1/2A PD flights for NRC. The piston tube remained on the model for the first flight, so he didn't get much altitude and only 9 seconds duration. His second flight was a DQ for unsafe boost which the wind contributed a bit to that.

Bob Alway of the Bumbling Brothers Flying Circus team had a successful B Payload Altitude flight to 253 meters. He also had two 1/2A Helicopter Duration flights. The first was a DQ due to separation of the fin can. The second flight was successful and stayed up for 18 seconds.

Jay Calvert of the Royal Rocketeers team flew 1/2A Streamer Duration. His first flight was a respectable 45 seconds. Not bad considering there were no thermals to be had. His second flight was not even half that at 22 seconds.

Next Month & Thanks

The October launch is scheduled for 10/12/2019. We will attempt to fly the Big Bertha Contest. See page 21 for the list of events and details. As always, thanks to all the volunteers to come early to help setup and stay afterwards to tear down the range and put everything away. The more that help the quicker the chores get done. Thanks again to Mike and Natalie Jacobs for the awesome donuts and constant support for the club. We all appreciate everything you do and contribute. See everyone in October!


Kent Pecte's Cherokee E

AAM-N-6 (AIM-7) SPARROW III

ROCKET SCALE DATA

Buzz Nau & Peter Alway

The AIM-7 Sparrow III is a medium range, semi-active radar homing (SAHR), anti-aircraft missile. It can be fired from a rail or ejector launcher when carried by aircraft or a multiple cell launcher when fired from a ship (RIM-7 Sea Sparrow). Developed by Raytheon, Sparrow III was the third iteration of the AIM-7 design and has become one of the most produced missiles since it became operational in 1958 with over 69,000 rounds built (USA). New missiles are no longer being produced, but older rounds were upgraded to the AIM-7P configuration which are still in service.

The Sparrow III was originally intended to intercept slow, non-maneuvering soviet bombers from beyond visual range (BVR), but through changes in doctrine and real-world threats it eventually became an effective dogfight missile. Latest versions of the missile are still in operation, though in the United States it is being phased out in favor of the AIM-120 AMRAAM. Sparrow III was used by many western third and fourth generation fighters including the F-4 Phantom II, F/A-18 Hornet, F-14 Tomcat, F-15 Eagle, F-16 Fighting Falcon, Japanese F-2, British Phantom FG.1/FG.2R, and Tornado F3 (Skyflash).

AIM-7C Sparrow III's on a F3H Demon pylon rail launcher - US Navy photo

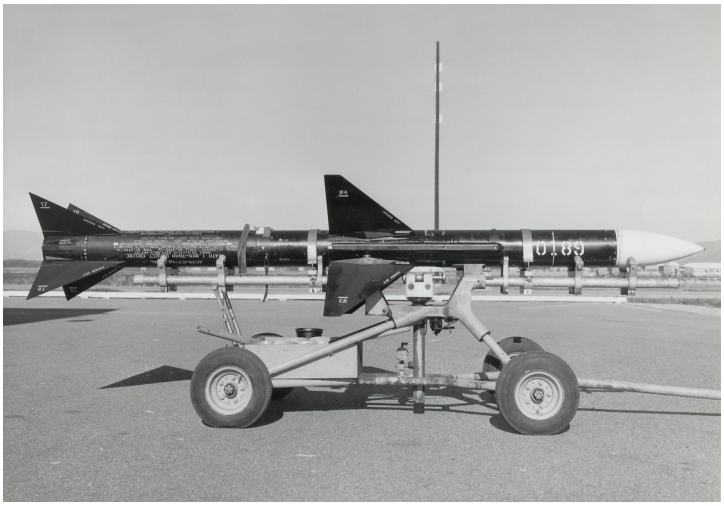
The Sparrow lineage was born out of the 1946 project *Hotshot*. The prime contractor was Sperry Gyroscope which was tasked with developing three radar guided air-to-air missiles. All three began development at the same time. Sparrow I (AIM-7A) was a needle shaped, radar beam-riding, air-to-air missile which saw limited service (1955 – 1959) due to the fast advances in tactical aircraft and missilery at the time. It had limited effectiveness like many missiles of that period, but did provide much needed experience in this new, quickly developing technology for pilots and maintenance crews. Production of the Sparrow I was limited to 2,000 rounds.

Sparrow II (AIM-7B), developed by the Douglas Aircraft Company, was intended to be an active-radar homing air-to-air missile, but size limitations in electronics and guidance made it impractical to fit the avionics in the space available. The missile was cancelled in 1956, but several design features were borrowed by Raytheon in the development of Sparrow III (AIM-7C), most noticeably the fin sizes. To counter issues with roll control, the dimensions of the tail fins and mid body wings from Sparrow I were basically reversed for Sparrow II with the wings now having

AIM-7C Sparrow III's on a F3H Demon pylon rail launcher - US Navy photo

a larger span than the tail fins. Additionally, the pitch rate gyro was utilized by the auto pilot to create a "synthetic stability" allowing the missile to launch guided rather than free flight. This reduced the minimum launch range significantly, a benefit that would show its usefulness out of the lessons learned from the Vietnam War.

The first guided Sparrow III (AIM-7C) flight occurred on 13 February 1953 and it became operational in 1958 with Navy F3H Demon squadrons. It is nearly identical in appearance to the Sparrow II with the exception of the longer ogive radome. The airframe is ~12' long (depending on version) with a diameter of 8". The smaller aft delta shaped fins are fixed, and the mid-body mounted delta shaped "wings" are moveable for guidance. The warhead for most Sparrow versions was a high explosive, continuous rod blast fragmentation type of varying weight. Guidance is provided from the launching aircraft by continuous-wave (CW) or pulse doppler radar. The AIM-7C was powered by an Aerojet General solid propellant motor that burned for two seconds producing 7,100 lbs. of thrust accelerating the missile to mach 4. Operational intercept envelope was from sea level to 60,000 feet and could be launched by an aircraft exceeding mach 1. Aerody-



AIM-7C Sparrow III on loading dolly - US Navy photo

AAM-N-6 (AIM-7) SPARROW III

ROCKET SCALE DATA

Buzz Nau & Peter Alway

-namic range was 14mn with a seeker range of 6.5nm. The AIM-7C version was short lived with less than 2,000 rounds produced and was replaced by the AIM-7D in 1959.

Missile technology advancements in the late 50's, earlier 60's were fast and furious. The AIM-7D replaced the earlier -7C with improvements to the guidance section making it more effective against faster closure rates. It also replaced the Aerojet General solid fuel motor with a pre-packaged liquid fuel motor by Thiokol (formally Reaction Motors) that increased performance to an aerodynamic range of 24nm. This version was also earmarked for use on the newly developed joint service F-4 Phantom II in semi-submersed contours on the underside of the fuselage. This was a performance design compromise between wing pylon rail launching and using an internal storage bay. Production of the AIM-7D was limited to just under 7,500 rounds though the missile saw some operational action early in the Vietnam war accounting for five Mig-17 kills.

AIM-7 Sparrow IIIs await loading on an Air Force F-4 Phantom II - USAF photo

The first version of the Sparrow III to be produced in large quantities was the AIM-7E with just over 25,000 rounds built from 1963 to 1973. This version reverted to solid fuel with the

AIM-7 Sparrow III on loading dolly - US Navy photo

AIM-7 Sparrow IIIs await loading on an Air Force F-4 Phantom II - USAF photo

Hercules Mk38 or Mk52 motors which increased the aerodynamic range to 27nm. Operational intercept envelope was increased to targets up to 90,000 feet altitude and mach 2.2. However, the minimum range of 1nm severely handicapping its ability against small fighters and the restrictive rules of engagement (ROE) that required a visual ID of the target. The AIM-7E saw several upgrades during its operational lifetime mainly to improved durability, reliability, guidance, and dog fighting ability.

The Vietnam War was a huge eye opener for fighter aircraft, air-to-air weapons, and tactics. The US Navy and Air Force conducted several studies during and after the conflict in efforts to improve these areas. One such USN analysis produced the 1968 Ault Report named after lead investigator Captain Frank Ault. The result of the Ault report produced the US Navy Fighter Weapons School aka TOPGUN in 1969. With an emphasis on teaching fighter tactics, the results were phenomenal. The US Navy kill/loss ratio was 3.7:1 prior to the establishment of the school which coincided with the bombing halt of late 1968. By the time bombing resumed in 1970 most operational fighter squadrons possessed at least one FWS graduate crew that passed on the lessons they learned to the fleet. The kill/loss ratio for the remainder of the war increased to 13:1 attributed to the new tactics.

A similar USAF study called Project Red Baron, was a series of three investigations from 1968 through 1974. The performance of the AIM-7 during the conflict was just one small part of the study, but the findings were significant. From 1965 to 1973 there were 612 Sparrows fired by USN and USAF crews resulting in only 97 hits (15.8%) and 56 kills (9.2%). The Sparrow was designed to intercept bombers beyond visual range, yet only 2 of the 56 kills were BVR. The study showed most engagements during the war involved fighter v fighter at visual range due to the restrictive rules of engagement (ROE). Many AIM-7 Sparrow III's were fired outside their operational envelope in these dogfight scenarios where crews sometimes resorted to ripple firing AIM-7's hoping to increase their chance of a hit through volume of fire.

Another major issue uncovered was the harsh operational environment the missiles endured before being fired. The Sparrow was designed to be loaded in time of war, carried once and fired at incoming bombers. In Vietnam, missiles were loaded and unloaded daily without being fired and constantly underwent the

AAM-N-6 (AIM-7) SPARROW III

ROCKET SCALE DATA

Buzz Nau & Peter Alway

stress of catapult launches and arrested landings during carrier ops. Also, the humid salt air environment was brutal on pre-semiconductor electronics further decreasing reliability. These lessons were key in the development of the AIM-7F.

Capitalizing on newly available semiconductors, the AIM-7F Sparrow III began development in 1966, but did not enter service until 1975. The missile included a new seeker that improved performance against highly maneuverable targets even at low altitude with a range envelope of 1,000 feet to 22nm making it a much better dogfighter missile than previous versions. It also included a Hercules Mk58 rocket motor with a 4.5 second boost greatly increasing aerodynamic range to 54nm, nearly double that of the AIM-7E. Production ran until 1980 with almost 10,000 rounds built.

AIM-7F Sparrow III in semi-submersible mount on a F-4J Phantom II - US Navy photo

AIM-7M on a F-14 Tomcat wing pylon - US Navy photo

The AIM-7M was another major upgrade which increased reliability and reduced cost per round. It entered service in 1982 and production ended ten years later with 15,000 rounds produced. It utilized an inverse monopulse seeker similar to the Italian design used in their copy of the Sparrow III called Aspide. The warhead was also changed to a WDU-27/B blast fragmentation type. It had improved resistance to electronic countermeasures and even better performance against low altitude threats. Additionally, it was It was deployed to great success in the 1991 Gulf War by the USAF. There were 44 AIM-7Ms fired with 30 (68.2%) hits resulting in 24/26 kills (54.5/59.1%), 19 of which were BVR. Advancements in Airborne Warning and Control (AWACS) contributed greatly in the success of BVR intercepts.

The final production version of the Sparrow III was the AIM-7P. The upgrade included a new autopilot, computer, and fuse to improve performance against anti-ship cruise missiles. They are only deployed by the F/A-18 Hornet but were also used by the F-14 Tomcat when it was still in service. Roughly 1,200 new rounds were produced between 1992-93 and existing -7M rounds were gradually upgraded to -7P.

AIM-7M Sparrow III fired by a USAF F-15C Eagle - USAF photo

An AIM-7R version was under development by 1990 through the Navy's Missile Homing Improvement Program (MHIP). This version would have added an infrared seeker to the SARH seeker for terminal guidance. The version cancelled in 1997 due to budget constraints and the deployment of the AIM-120 AMRAAM.

A shipboard version called Sea Sparrow, was developed as a short-range missile for the basic point defense missile system (BPDMS) to counter anti-ship missiles. Sea Sparrow was based on the AIM-7E which had clipped delta tail fins and folding wings to fit in the multi-missile cell launcher capable of holding 8 rounds. The current version called Evolved Sea Sparrow Missile (ESSM) RIM-162, resembles the original Sea Sparrow in name only and is a completely different missile that looks more like a miniature Standard Missile.

In addition to 69,000 rounds produced in the United States, the Sparrow III AIM-7E was licensed by several allies. Italy's version

AAM-N-6 (AIM-7) SPARROW III

ROCKET SCALE DATA

Buzz Nau & Peter Alway

RIM-7 Sea Sparrow fired from a cell launcher on the USS Midway - US Navy photo

called Aspide was upgraded with a monopulse semi-active seeker and was used by their F-104S Starfighter fighters and also as a shipboard surface-to-air missile. The United Kingdom developed their Skyflash air-to-air missile also with a monopulse semi-active seeker and other upgrades. In addition to deployment on British Phantoms and Tornados, the Skyflash was exported to Sweden for use on the Viggen. The AIM-7F/M was licensed by Mitsubishi for use on the Japanese Defense Force F-2 fighter but is getting phased out in favor of Mitsubishi's AAM-4 air-to-air missile.

British Skyflash missiles on a RAF Phantom

Sparrow was also used in sounding rocket applications such as the Sparrow-HV Arcas and Sparoair. The Sparrow-HV Arcas used surplus AIM-7D liquid fuel Sparrow III motors and lower fins as a booster for the Atlantic Research Arcas atmospheric sounding probe. Sparoair was a US Navy project developed by the Missile Test Center at Pt Mugu Naval Air Station, CA which consisted of two Sparrow III motors staged together and air-launched from Navy fighters. Three versions were built and flown in the late 50's to mid-60's before the project was cancelled.

AIM-7M Sparrow III on wing pylon of a USN F/A-18C Hornet - US Navy photo

Sparrow III took advantage of technological breakthroughs from the dawn of the guided missile age through the 1990's allowing it to maintain its status as the primary medium range air-to-air guided missile for the United States. It redeemed its legacy from the poor performance during the Vietnam War with a stellar record in the 1991 Gulf War and minor conflicts since.

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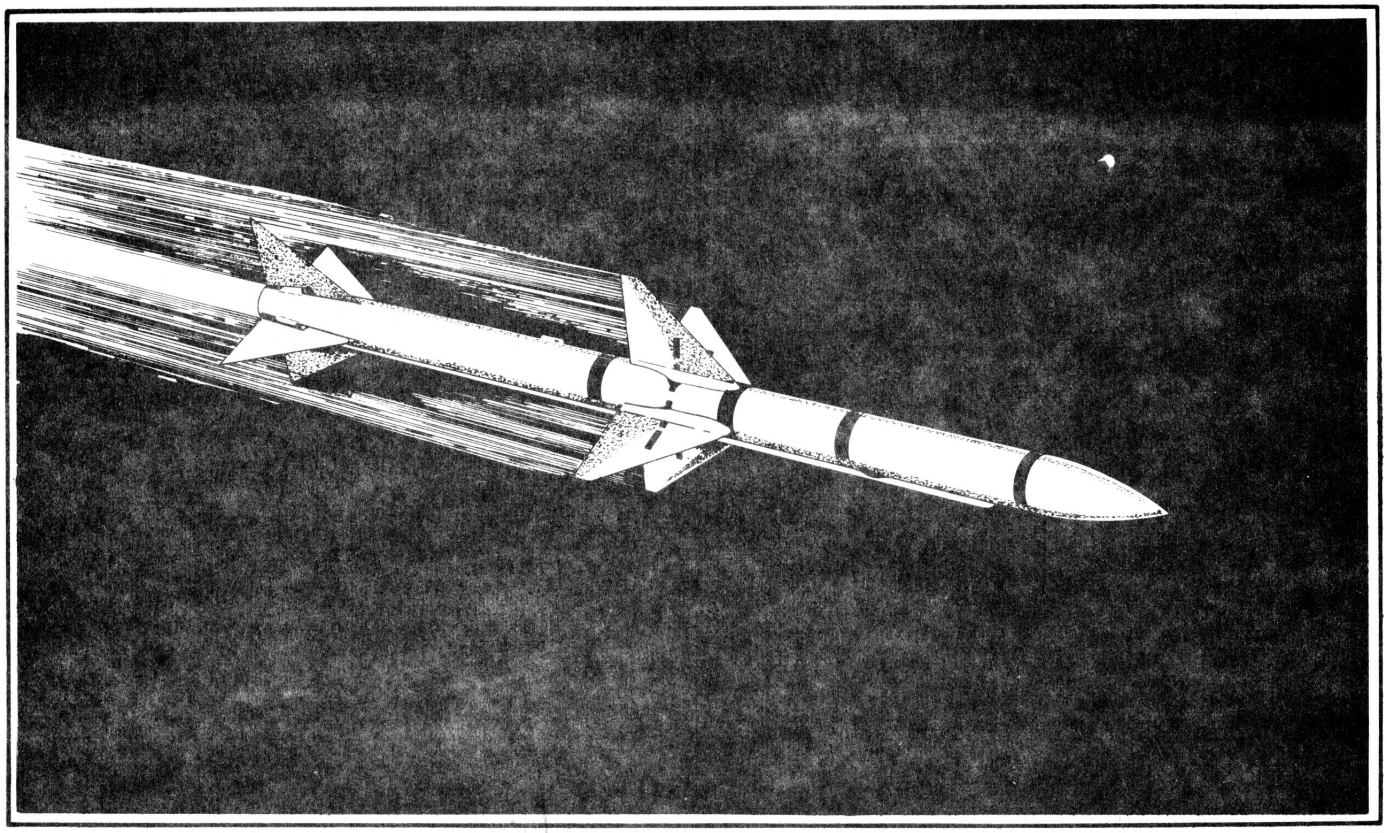
Sparo-Arcas Sounding Rocket



Standard Missile Characteristics

BY AUTHORITY OF
THE SECRETARY
OF THE AIR FORCE

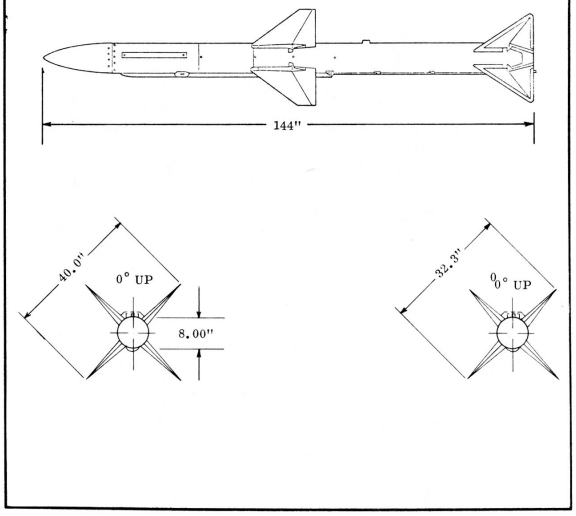
ONE SOLID ROCKET MK-58
HERCULES

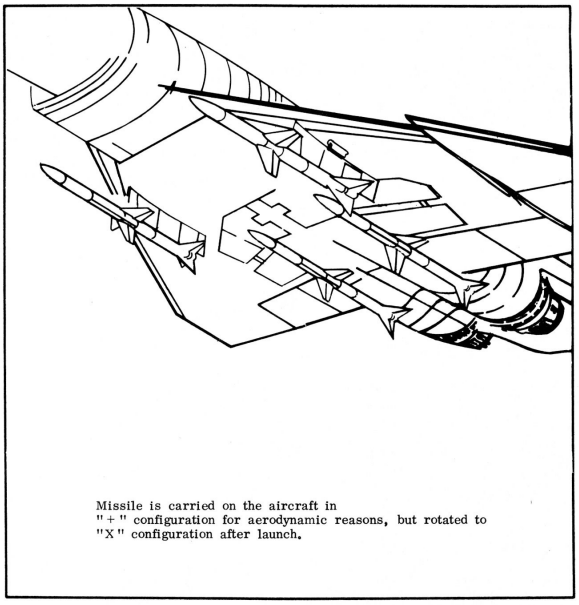
AIM-7F

SPARROW III
Raytheon

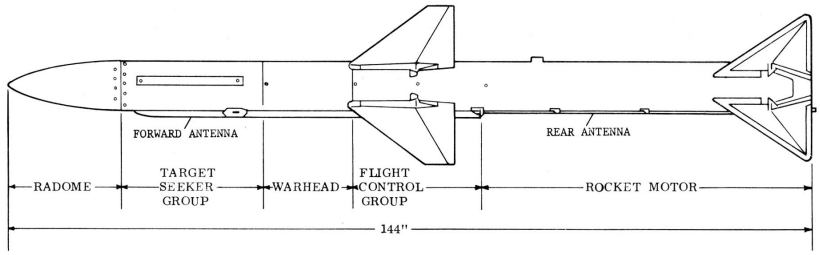
SPARROW MISSILE FAMILY

NOMENCLATURE	AIM-7C	AIM-7D	AIM-7E	AIM-7F
PRODUCTION	1958-1959	1959-1962	1963-	1974-
MAXIMUM LAUNCH VELOCITY	MACH 1.3	MACH 2.2	MACH 2.2	MACH 2.5
AERODYNAMIC RANGE (40,000 FEET) ALT.	14 NMI	24 NMI	27 NMI	53 NMI
SEEKER RANGE				
200 W CW INJECTION	6.5 NMI ($2M^2$)	8.3 NMI ($2M^2$)	13.5 NMI ($2M^2$)	22.0 NMI ($2M^2$)
MINIMUM RANGE		3000 FEET	1000 FEET (ECP-54)	1000 FEET
MAXIMUM TARGET				
ALTITUDE	60,000 FEET	70,000 FEET	90,000 FEET	90,000 FEET
VELOCITY	MACH 2.0	MACH 2.2	MACH 2.2	MACH 3.0





Missile is carried on the aircraft in "+" configuration for aerodynamic reasons, but rotated to "X" configuration after launch.



(C) POWER PLANT

Nr & Model	(1) Solid Rocket, MK 58
Mfr	Hercules
Type	Two Level Thrust
Length (overall)	60.6"
Diameter (nominal)	8.0"
Weight (loaded)	210 lb

(C) ENGINE RATINGS

S.L.S. @ 60°F	LB	-	SEC
Boost Phase:	5750	-	4.5
Sustain Phase:	1018	-	11.0

(U) Mission and Description

Navy Equivalent: AIM-7F Mfr's Model: ———

The AIM-7F (Sparrow III) is a supersonic missile whose prime mission is destruction of subsonic and supersonic bombers. The AIM-7F will be primary armament on the F-4 and F-15 aircraft. The airframe configuration features cruciform clipped delta wings and fixed planform tails in line with the wings. The wings are constructed from titanium and the tail fins from steel.

The control surfaces are thin airfoils with very fine (0.030 in. dia) leading and trailing edges.

The missile body is divided into five major sections: radome, target seeker, warhead, flight control and motor.

The AIM-7F design incorporates high density, solid-state packaging and microminiaturized circuits to provide a highly reliable electronics package.

The AIM-7F is similar to AIM-7C, D and E missiles but has been improved by reduced launch range, extention of maximum range, and an increase in overall reliability and ECM capability.

Development

Joint Navy and Air Force Program

IOT&E Completed	Sep 74
Full Production Approval	1 Oct 74
Contract Date (Full Production)	31 Oct 74
First Delivery (Full Production)	Jan 76

(C) WEIGHTS

Loading	Lb
Launch (Missile)	510
Motor MK-58	
Launch	210
End of boost	75
Warhead (MK71)	84.4

(C) FUEL

Propellant (Boost)	KAA-114
Type	AP/Binder/AL/Fe_2O_3
Weight	52.0 lb
Propellant (Sustainer)	KAA-105
Type	AP/Binder/AL/Oxamide/M_0O_3
Weight	83.0 lb

(U) DIMENSIONS

Span (wings)	40.0"
(tail fins)	32.3"
Length	144.0"
Diameter	8.0"

(C) GUIDANCE

Proportional Navigation

Semi active RF homing guides on continuous wave (cw) or pulse doppler

Accuracy not to exceed 25 ft

(C) CONTROL

Hydraulic actuated
- Wing Control
- Auto Pilot
  - Alt compensation
  - Velocity
  - Acceleration
  - Deceleration
  - Noise filter switching

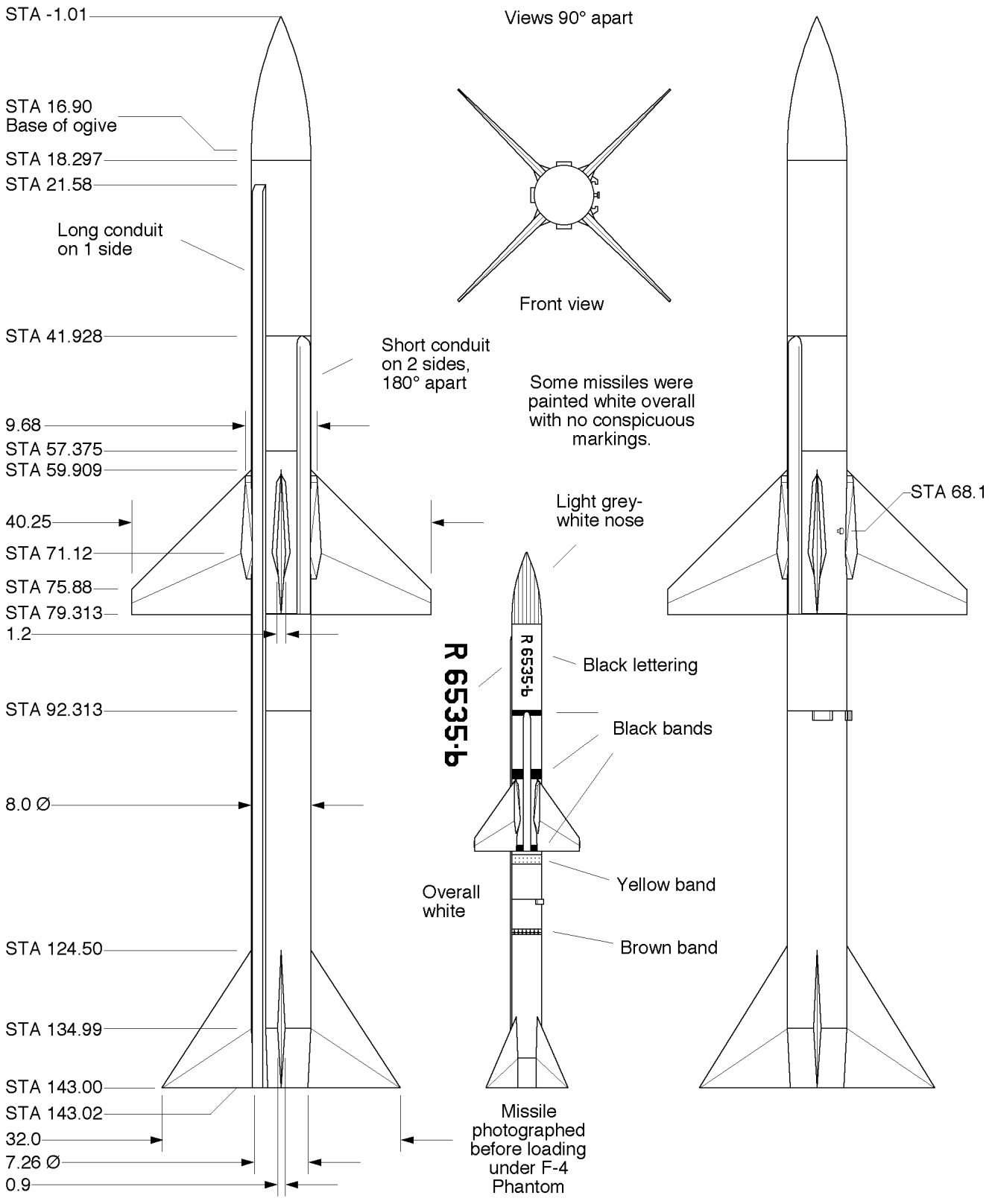
(C) LAUNCHING

Max Launch Vel	Mach
Sea level to 40,000 ft linearly	1.2 - 2.5
40,000 to 70,000 ft	2.5
Min Launch Vel	
Sea level to 35,000 ft	.5
35,000 to 70,000 ft linearly	.5 - 1.3

Rail or ejection launch

(C) WARHEAD

Type	(Continuous Rod) MK 71
Weight	84.4 lb
Rod Ring Expansion	40 ft
Striking Velocity	4900 ft/sec



AAM-N-6
AIM 7C
Sparrow III
1/20 scale
Dimensions in inches

Sources:

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Partial photocopies of various drawings provided by Tom Mcatee and Chris Timm.

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VIEW FROM THE FLIGHT LINE

Two Wrongs Can Make A Right

DALE HODGSON

Well, the September launch has come and gone and I was disappointed on two aspects of it. First, our Big Bertha contest had to be cancelled due to excessive wind. I definitely agreed with the decision; it was the right call to make. But, I was disappointed that I didn't get to fly my contest entry after putting a lot of thought into this particular project. This one was actually planned out and I incorporated some of the concepts that I learned when I decided to try my hand at some competition stuff. While I'm nowhere near the level of the guys that regularly compete, I am coming along. What I did with this one was fairly simple by their standards, but I never would have known unless I delved into the comp myself. I had learned to build a competition parachute not long ago so I used one in this project but with a twist. A Bertha is a bit heavier so used a comp chute but for an egg lofter. Still mylar, still very large…but the shrouds are affixed to the canopy and run over the top of it to strengthen the chute without adding much weight at all. Another thing I did was borrow a concept from those weird looking; but very cool to watch FAI projects. Instead of a normal internal shock cord I ran Kevlar thread along the exterior of the airframe with the attachment point located where the airframe would be horizontal when the chute deployed just like the FAI's. I also eliminated the standard Estes engine hook and opted for a simple thrust ring. I'll use tape to secure the motor so that actually saved some weight. A new concept for me too was that I built the rocket light; or at least light in my eyes. I wasn't going to rely on pure power to get the thing in the air this time. So, while I didn't get to fly it this time around it's ready to go on the day we decide to do this contest thing. I'm just curious to see how I fare against the big dogs.

Speaking of Berthas; I have a 4" version, a scratch built Super Bertha 29mm and the contest version. While reading the latest issue of *Sport Rocketry Magazine* I saw an ad from Estes stating there is now a two-stage version of a Bertha out there……I just love this hobby!

My other disappointment at the launch was that I lost what I believe to be one of the coolest rockets I've done. The only reason I even built the thing was to give Scott and Dan a bird to fly hybrids in utilizing their 3D grains. Basically what I did was get a Giant Leap 54mm Firestorm 54 and modified it to fit our needs. I increased the booster length to 60 inches; all one piece. I wanted PLENTY of room to stuff ridiculous casings in there. I incorporated my slider harness concept into the project (see issue V19I3) to again give us a wide option of motor choices.

Instead of the regular Acme fin can, I used the high-performance version. The difference is that there are several holes but into the fin can to reduce weight. We went full dual deploy on this one; the altimeter chosen was a Missileworks RRC3 Extreme; it has scads of downloadable data available because what's the sense of flying hybrid prototypes if you can't see how they perform? To round everything out I used good Kevlar shock cords and a reinforced high-performance chute because I wanted everything returned safely. The paint scheme was ridiculous; purple and florescent orange. Julie told me it was outlandish; so that's what I named the project…Outlandish.

I thought I had all the bases covered; we were ready to go. Since it was a little breezy we decided an I impulse motor was enough for an inaugural flight. The rocket was long and lean; usually long/lean rockets weathercock. So, we decided to point the thing straight up and let it weathercock to the west. Loading nitrous went off without a hitch, venting happened pretty quick, then the fuse was lit. The thing took off and took off quick; loud and very cool. The thing went straight up….like on a rope; no weathercock at all which was very weird. Remember I said I thought I had all the bases covered?

One thing I didn't do was shear pin the nose cone to the payload tube. Usually that's not necessary with something as small as a 54mm airframe. But, I'm prone to use rather substantial ejection charges. I'm from that old school of thought of "blow it out or blow it up", meaning I at least want the rocket separating to destabilize it. There is nothing worse than watching one come in ballistic. Well, the rocket separated right on cue but that charge… stretched the shock cord to it's limit and I'm guessing the inertia of it all popped the cone and kicked out the chute. This is different than drag separation that happens at main engine cut-off…the power down can cause the cone to pop as well but that's not what happened here.

So, I had a rocket with a main deployed at apogee rather than at the planned 500'. Because the thing didn't weathercock I lost probably 70% of the landing area I planned for. So, I watched

that cool project drift east…towards the pond. Well, it cleared that, so over the woods it drifted and landed in the tallest tree in Jackson county. At the top…we could see the chute from the launch area. Scott and I went over to look and there she was; dangling about 80 feet or so up; out of reach of our tallest recovery pole.

I'm stuck waiting until maybe the thing shakes loose. The rocket is all composite so nothing will weather and rot so it may be quite a while before I get it back if I ever do. Until then it will remain a lovely Christmas ornament. What good came from this you ask? The boost was spectacular; the motor was unbelievable. I liked it so much that Outlandish 2 is already in the works….same configuration but this time with a pinned cone and maybe neon green instead of florescent orange. Next time we will tilt the thing just a little to get some weathercock out of it if need be. After all; newer versions of the same prototype have to be better, right? So, I guess maybe these disappointments were really nothing more than learning curves overcome. That's what keeps us building and coming back for more.

Hurst Planetarium 50th Anniversary

Buzz Nau

On 20 September 2019 the Peter F. Hurst Planetarium in Jackson, MI celebrated its 50th anniversary. The Jackson Model Rocket Club was invited to present a static display in front of the planetarium for the event and if possible, perform a demonstration launch in the athletic field across the road.

Though the static display went on as planned and was well received, we were unable to gain access to field for the demo launch before it got too dark to fly and tear down the mini range. Regardless, we saw many visitors at the display tables where we had rockets on display and a large wide screen TV showing video footage of our launches. We also had the JMRC trailer in the parking lot across from us in addition to both lower power racks, one high power pad and two large high power rockets including "Too Big To Fail".

The planetarium staff was hoping for 350 visitors and that was exceeded early in the evening. JMRC volunteers fielded questions from the many visitors young and old including an ex-Morton Thiokol engineer who shared several tales from his time testing solid rocket motors for the Space Shuttle and Peacekeeper ICBM.

Attendees were also able to visit the adjoining Ella Sharp Museum. This includes the Lynne A. Loftis Jackson History Gallery. On loan there are several items from Roger Sadowsky's collection of Jackson Space Center memorabilia. There is even some Jackson Model Rocket Club items on display including a couple multi-pad launch controllers, photos, and the original Launch Control Officer stand. It was great to see these items on display alongside memorabilia of astronauts Al Worden, Jack Lousma, and Jim McDivett.

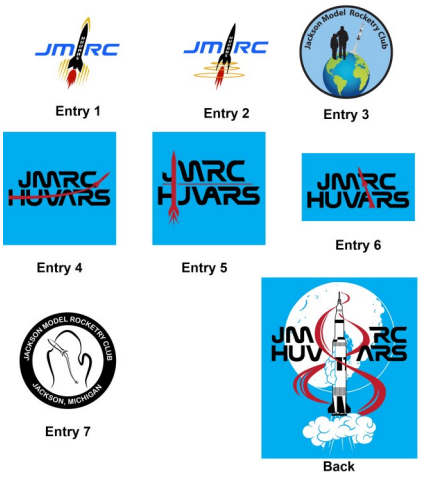
JMRC thanks Austin Edmister - Planetarium Operator and STEM Educator, Katie Gigliotti - Director of Learning and Engagement, and Rachey Veremay - Curator of Exhibits for the invitation to the event, warm welcome, and awesome display in the museum. Also thanks to JMRC volunteers, Scott Miller, Roger Sadowsky, Tony Haga, Buzz Nau, Dave Glover, and Chris Palmer. Special thanks to Jo-Anne Miller for bringing pizza!

JMRC HUVARS Club News

JMRC/HUVARS Shirt Logo Entries

At long last, we have closed the shirt logo contest and we are happy to share the entries. We will set up an online poll for members to select their three favorites. The winner will be selected as the official logo for the club and receive a one year free membership in addition to a shirt with their logo.

We will also look into options for ordering shirts, but more details on that once we select winner.



Big Bertha Contest

Goal

Make three flights with a single model (Big Bertha) and attempt to score the best in four events. To be flown at the October launch, weather permitting.

Vehicle

As mentioned, this is a Big Bertha contest. If you don't have a Big Bertha then any rocket with at least 18" of BT-60 and four fins will do. If you wish to build one from scratch you can download the plans here, https://www.spacemodeling.org/jimz/estes/k-23.pdf

Events

A Parachute Duration – Using an A impulse motor and parachute of any size, get a longest possible duration. Remember, you need to get it back for the other events!

B Streamer Duration Spot Landing - That's right, two events in one. Using a B impulse motor and streamer for recovery get the longest possible duration AND land closest to the target mark that will be placed randomly at the field.

C Altitude (altimeter) – Using a C impulse motor and electronic altimeter reach the highest altitude. I will have a couple of altimeters to loan out if you don't have a suitable altimeter.

Estes Saturn V Raffle

Reminder we are selling raffle tickets for a brand new Estes 1/100 Saturn V. The new release features a lot of re-engineered parts, plus a bonus Lunar Module plastic kit. Tickets are available at launches and the winter party when we draw the winner. Tickets are $5 each or 5 for $20. Good Luck!

Total Impulse Wins LAC

For the second year in a row, our newsletter has won the North American Rockwell Trophy for best NAR section newsletter.

I plan to bring it to the winter party so members will have the opportunity to check it out as well as the contents of the mystery box which only members of winning sections get to explore.

From the NAR's website,

The NAR long ago recognized the value that Section newsletters provided to the membership. This value was acknowledged in the creation of a special annual award, the LAC Newsletter Award. L.A.C. stands for Leader Administrative Council, an organization for teenage NAR members formed within the NAR many years ago but which was later disbanded. The one remaining legacy of the LAC is the Rockwell Trophy (originally donated by North American Rockwell) for the best NAR Section newsletter. This trophy was first awarded in 1969 and is presented at NARAM every year to the Section publishing the winning newsletter.

The awarding of the Rockwell Trophy to a Section newsletter acknowledges it as the best. The trophy is a fitting and historical award. It is also big and heavy. Today it requires two people to carry it for any long distance. The reason for this also has to do with a tradition. The trophy is hollow inside with lots of room. The winning Section is permitted to open the trophy and place in it rocketry memorabilia. The contents of the trophy are not to be divulged outside of members of the winning Section. This tradition has survived the years without being compromised.

This curiosity about the contents of the Rockwell Trophy has created situations where Sections want to win the trophy just to find out what is inside it. Reliable sources do state that one of the items stored in the trophy is a Model Missiles, Inc. Rock-A-Chute rocket motor. The rest of the contents remain a mystery.

The LAC Newsletter Award is steeped in Glory, Honor, Tradition, and has a nice trophy too! Become part of the history, create a newsletter for your Section today! If you do this, someday you may be present at a NARAM when the announcement is made, "… The winner of this year's LAC Newsletter Award and the coveted Rockwell Trophy for best newsletter is…"

Your First Contest

COMPETITION CORNER

Buzz Nau (T-34 Escape Velocity)

The night before NARAM 61 began, Mark, Al, and I attended the competitor's briefing at the event hotel. This is where you learn of any special procedures, schedule changes, range information, duty shift news, etc. When the contest director, Brian Musek was done he opened it up for questions. One question that especially struck me was from the mother of a B division teenager attending NARAM for the first time. She wanted to know if her son should walk up to the range when he was ready to fly or if he would be called upon when it was his turn. An excellent question and one we do not prepare first timers for. Not knowing the basics of how a contest is even run is understandably confusing and possibly intimidating.

Way back when I started competition I recall a little anxiety. The Pink Book told me the rules, but it didn't tell me "*how*" I was supposed to fly the events. My previous competition primer articles address strategies for specific events, but not how a contest is actually run by a contest director and flown by the competitors.

So, *how* does one fly in a contest? Today, with the National Rocket Competition (NRC) rules, it's pretty darn easy. Previously contest were usually held as separate club events with little to no sport flying. Contest had a contest factor, events had weight factors and the whole system usually took a seasoned contest director to understand. There was a lot more to the drudgery, suffice it to say it was a royal pain and you truly had to love competition to endure the labor it involved to run a contest.

Now the rules are much more relaxed. Contest and Weight factors are gone. Holding a contest event is no longer necessary, you can comptete just fine during a sport launch. With the NRC rules you are competing nationally and your results go online as soon as the contest director submits them electronically. That's not to say we couldn't hold an old fashioned regional contest, but it's no longer necessary and that makes contest flying much easier for the contestant and contest director. I'm sure the regional chairs are pretty happy with the new rules too. I used to be one and it was a chore.

So, what is it like then to fly a contest now? Well, if you're flying with JMRC/HUVARS you're in luck. As a Midwest club we are always associated with laid back, relaxing contests. All of our JMRC launches (except July) are available for flying NRC events. I am (usually) the contest director, so if you are interested in putting up any contest flights please see me or my designated replacement. I will need you to fill out an entry form so I can record your information. I will also give you flight cards to record your results. You will need to give these back to me when you're ready to fly along with the model. If it's a duration flight I will check off for safety, record the motor used, and wish you luck. You do not need to return NRC duration flights, so while no one likes to lose a rocket, at least you're no longer penalized for catching a hat sucking thermal on both of your duration flights. You do have to return one at NARAM. Sorry, dems the rulez.

If you're flying an altitude event I will need to record the current altitude reading or make sure the altimeter is "zeroed". I also need to record the temperature at the time you check it in to normalize all flights flown throughout the day. We don't have an egg loft event this year, but when we do in the future I will need to record an identifying number on the egg and then see your egg when you return it after flight. I need to be there when you open it to verify it is not broken. Also, you are responsible for providing your own eggs, altimeters, and payloads or arrange to borrow these from another flier. Payload is a NRC event again this year.

You also still need to fill out a regular JMRC flight card to present at the Launch Control Officer (LCO) table. Make sure you write down that it is a contest flight and if you need A timer or if it is an altitude flight. Don't let your rocket fly until you have a timer otherwise it will just be a sport flight. I will watch your flights to make sure they're qualified. It helps to read and understand the event rules, but if you have any questions I will be happy to answer them for you. I keep a copy of the latest sporting code at the launch if you need to look anything up.

After the launch I will enter results in a program called Contest Manager which will generate a form that I email to the regional contest chairman. I will also enter the results to the NAR website which will display on the National Scoreboard immediately with an * denoting that the results haven't been verified by the contest chair, which usually takes less than a week.

If you are in need of a tower let me know and we'll make one available. Several of us can also help out with pistons. Again, just ask one of regular competitors will be more than happy to assist.

That's basically it. With the exception of filling out an extra flight card and adhering to some simple rules, it's not much more different than a sport flight.

Just make sure you have timers….

CURRENT EVENTS IN SPACE EXPLORATION

July 22, 2019 RELEASE 19-061

NASA Administrator Remembers Mission Control Pioneer Chris Kraft

The following is a statement from NASA Administrator Jim Bridenstine on the passing of Chris Kraft, who died Monday in Houston at the age of 95:

"America has truly lost a national treasure today with the passing of one of NASA's earliest pioneers – flight director Chris Kraft. We send our deepest condolences to the Kraft family.

"Chris was one of the core team members that helped our nation put humans in space and on the Moon, and his legacy is immeasurable. Chris' engineering talents were put to work for our nation at the National Advisory Committee for Aeronautics, before NASA even existed, but it was his legendary work to establish mission control as we know it for the earliest crewed space flights that perhaps most strongly advanced our journey of discovery. From that home base, America's achievements in space were heard across the globe, and our astronauts in space were anchored to home even as they accomplished unprecedented feats.

"Once comparing his complex work as a flight director to a conductor's, Kraft said, 'The conductor can't play all the instruments--he may not even be able to play any one of them. But, he knows when the first violin should be playing, and he knows when the trumpets should be loud or soft, and when the drummer should be drumming. He mixes all this up and out comes music. That's what we do here.'

"Chris was flight director at some of the most iconic moments of space history, as humans first orbited the Earth and stepped outside of an orbiting spacecraft. For his work, he was awarded the NASA Outstanding Leadership Medal by President John F. Kennedy. Chris later led the Johnson Space Center, known then as the Manned Spacecraft Center, as our human exploration work reached for new heights following the Apollo Program. We stand on his shoulders as we reach deeper into the solar system, and he will always be with us on those journeys."

For more information about Chris Kraft, visit:

https://www.nasa.gov/chris-kraft-end-

Credits: NASA

SpaceX Falcon 9 August 6, 2019

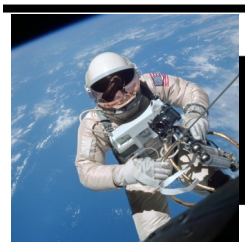
On Tuesday, August 6, SpaceX's Falcon 9 rocket successfully lifted off from Space Launch Complex 40 (SLC-40) at Cape Canaveral Air Force Station, Florida, carrying the AMOS-17 satellite for Spacecom. Liftoff occurred at 7:23 p.m. EDT, or 23:23 UTC and the satellite was deployed approximately 31 minutes after liftoff.

This was the third and final flight for this particular Falcon 9 first stage, having previously supported the Telstar-19 VANTAGE mission in July 2018 and the Es'hail-2 mission in November 2018. You can watch a replay of launch webcast below and learn more about the mission in our **press kit.**

Sierra Nevada DreamChaser to launch aboard Vulcan Centaur

United Launch Alliance (ULA) will supply launch vehicles for the Dream Chaser Cargo System. Starting in 2021, Dream Chaser – Sierra Nevada Corporation (SNC) Space Systems' reusable spaceplane – will launch aboard ULA's Vulcan Centaur rockets for six NASA cargo resupply and return services to the International Space Station (ISS). The Vulcan Centaur is currently under production at ULA's factory in Decatur, Alabama and will be ready to ship to Cape Canaveral Air Force Station in Florida late next year for processing.

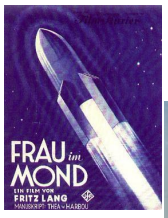
Under NASA's Commercial Resupply Services 2 (CRS-2) contract, the Dream Chaser will deliver more than 12,000 pounds of pressurized and unpressurized cargo to the space station and will remain attached for up to 75 days as an orbiting laboratory. Once the mated mission is complete, the Dream Chaser disposes about 7,000 pounds of space station trash and returns large quantities of critical science, accessible within minutes after a gentle runway landing. The Dream Chaser is the only commercial lifting-body vehicle capable of runway landings.



THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

90 Years Ago - 1929



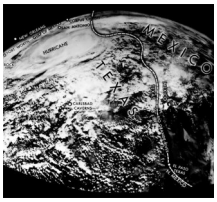
September 24: Premier of movie "Frau im Mond" (The Girl in the Moon), directed by Fritz Lang. Hermann Oberth served as technical advisor to this German classic.

70 Years Ago – 1949

September 25: TASS the Soviet News Agency, announced the first USSR atomic explosion, Moscow.

October 1: Long Range Proving Ground at Cape Canaveral, Florida, activated.

65 Years Ago - 1954

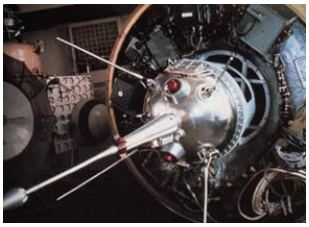


October 5: Naval Research Laboratory Aerobee rocket took first photograph of complete hurricane located off Texas gulf, launched from White Sands Proving Grounds, NM.

60 Years Ago - 1959

September 9: Big Joe 1 launched, boilerplate Mercury capsule test from Cape Canaveral, Fla.

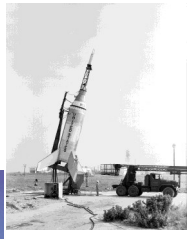
September 12: Luna 2 launched by Vostok rocket from Baikonur, USSR -- First probe to strike the Moon. It carried the first flags to be placed on the Moon: a pennant with the symbol of the USSR and the banner “September 1959”.



September 17: First powered X-15 flight, A. Scott Crossfield at the controls, Edwards, CA.

September 18: Vanguard 3 successfully launched by Vanguard rocket from Cape Canaveral, Fla.

October 4: Luna 3 launched by Vostok from Baikonur, USSR -- first probe to circle the Moon with first pictures of the dark side of the Moon.



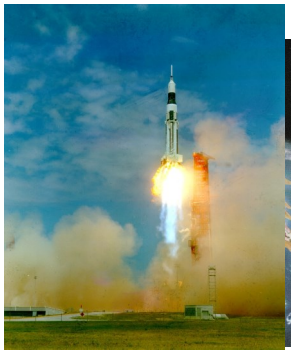
October 4: Little Joe 1, rest of integration of booster and Mercury Capsule from Wallops Island, VA.

October 13: Explorer 7 launched by Juno 2 from Cape Canaveral, Fla.

55 Years Ago - 1964

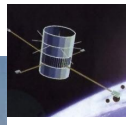
September 4: OGO 1 launched by Atlas Agena from Cape Canaveral, Fla. First Orbiting Geophysical Observatory, designed to conduct numerous space experiments simultaneously.

September 18: SA-7 (Apollo Boiler Plate 15) launched by Saturn 1 from Cape Canaveral, Fla. First demonstration of Launch Escape System (LES) design.



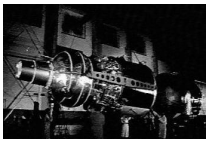
September 24: First launch of Minuteman II, ICBM, Cape Canaveral, Fla.

October 4: Explorer 21 (IMP 2) launched by Thor Delta from Cape Canaveral, Fla.



October 9: Explorer 22 (Beacon Explorer B) launched by Scout from Vandenberg AFB.

October 12: Voshkod 1, cosmonauts Vladimir M. Komarov, Konstantin P. Feoktistov, and Boris B. Yegorov aboard from Baikonur, USSR. first-three man crew in space. First civilian in space – Feoktistov.

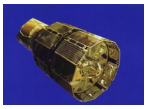


October 30: NASA pilot Joseph Walker conducts first flight in Lunar Landing Research Vehicle (LLRV).

October 31: First NASA astronaut or trainee to lose life, Theodore Freeman.

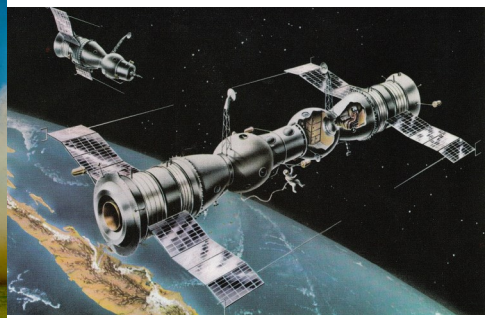
50 Years Ago - 1969

September 17: First public display of a lunar rock was unveiled at the Smithsonian Institution -- from the Apollo 11 mission.



October 1: ESRO 1B launched by Scout from Vandenberg AFB.

October 11-13: First simultaneous flight of three spacecraft: Soyuz 6, 7, and 8. Seven cosmonauts in orbit at the same time. Soyuz 6. Crew: Georgi S. Shonin and Valeri N. Kubasov.; Soyuz 7. ; Crew: Anatoliy V. Filipchenko, Vladislav N. Volkov and Viktor V. Gorbatko; and Soyuz 8. Crew: Vladimir A. Shatalov and Aleksei S.Yeliseyev. All missions were launched from Baikonur by a Soyuz rocket, USSR.

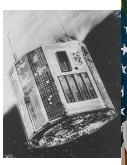


45 Years Ago – 1974

September 1: Pioneer 11 - Three times closer pass to Jupiter than Pioneer 10, then on to Saturn.

September 21: Mariner 10, 2nd Mercury Flyby.

October 10: Westar 2 launched by Delta from Cape Canaveral, Fla.



October 15: Ariel 5 launched by Scout from San Marco Platform, Kenya.

October 25: Fastest lifting body flight (Mach 1.76, 1164 mph), in X-24B, Michael V. Love pilot. Dryden Flight Research Facility, CA.

October 31: Intercosmos 12 launched by Cosmos rocket from Plesetsk, USSR.

40 Years Ago - 1979

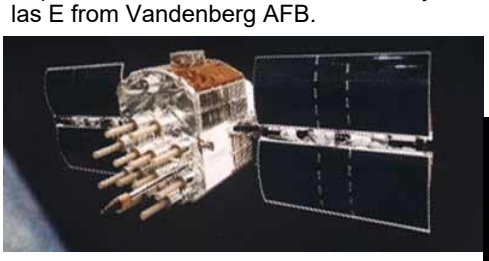
September 1: Pioneer 11 passed rings of Saturn, 13,000 miles above cloud tops. First spacecraft to fly by Saturn.

September 20: HEAO 3 launched by Atlas Centaur from Cape Canaveral, Fla.

October 30: Magsat launched by Scout from Vandenberg AFB.

35 Years Ago – 1984

September 8: NavStar 10 launched by Atlas E from Vandenberg AFB.



September 21: Galaxy 3 launched by Delta from Cape Canaveral, Fla.

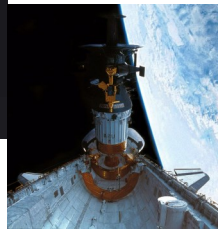
October 5: STS-41G (Space Shuttle *Challenger*) launched from KSC. Crew: Robert L. Crippen, Jon A. McBride, Kathryn D. Sullivan, Sally K. Ride, David C. Leestma, Paul D. Scully-Power, and Marc Garneau (Canada). Earth Radiation Budget Satellite (ERBS) deployed less than nine hours into flight. Office of Space and Terrestrial Applications-3 (OSTA-3) carried three experiments in payload bay. First space flight to include two women; (S. Ride/K. Sullivan). First American woman to walk in space (K. Sullivan). First Canadian payload specialist to fly in space. (M. Garneau). First oceanographer in space and the first oceanographer to observe the oceans from space (P. Scully-Power) Landed at KSC, October 13. Mission Duration: 8 days, 5 hours.

30 Years Ago – 1989

September 5: Soyuz TM-8 launched by Soyuz rocket from Baikonur. Ferry flight to Mir space station. Crew: Alexander S. Viktorenko and Aleksandr A. Serebrov.

September 25: FleetSatCom F-8 launched by Atlas Centaur from Cape Canaveral, Fla. NASA's final Atlas/Centaur launch from Cape Canaveral Air Force Station.

October 18: Galileo spacecraft launched from STS 34.



Rendezvous with Jupiter, July 13, 1995 releasing descent probe.

October 18: STS-34 (Space Shuttle *Atlantis*) launched from KSC, Pad 39B, Crew: Donald E. Williams, Michael J. McCulley, Franklin R. Chang-Diaz, Shannon W. Lucid and Ellen S. Baker. Landed at Edwards Air Force Base, CA, October 23. Mission Duration: 4 days, 23 hours.

October 27: Intelsat 602 launched by an Ariane 44L rocket from Kourou, French Guiana.

25 Years Ago – 1994

During September: NASA and Boeing announced agreement on the key elements of the prime contract for the International Space Station.

September 9: STS-64 (Space Shuttle *Discovery*) launched from KSC. Crew: Richard N. Richards, L. Blaine Hammond, Jr., Jerry M. Linenger, Susan J. Helms, Carl J. Meade, and Mark C. Lee. First flight of the LIDAR In-Space Technology Experiment (LITE). Also carried Shuttle Pointed Autonomous Research Tool for Astronomy (SPARTAN-201). First untethered U.S. space walk in 10 years (M. Lee & C. Meade). Landed at Edwards Air Force Base, CA, September 20. Mission Duration: 10 days, 22 hours.

25 Years Ago – 1994 (continued)

September 13: Spartan 1 (also known as Spartan 201) was released from STS-64 and was captured back after a few days. It carried optical instruments to measure the speed and acceleration of the solar wind in the corona.

September 30: STS-68 (Space Shuttle *Endeavour*) launched from KSC. Crew: Michael A. Baker, Terrence W. Wilcutt, Thomas D. Jones, Steven L. Smith, Daniel W. Bursch, and Peter J. K. Wisoff. Carried the Space Radar Laboratory (SRL-2) containing SIR-C. Landed at Edwards Air Force Base, CA, October 11, 1994. Mission Duration: 11 days, 5 hours.

October: Nimbus 7 was retired after more than 15 years of operation.

October 3: Soyuz TM-20 launched from Baikonur cosmodrome to transport a crew of Russian/European cosmonauts (Alexander S. Viktorenko Yelena V. Kondakova,, and German Ulf D. Merbold) and experimental apparatus used by Merbold in ESA's month -long Euromir 94 experiment program. During automatic approach to Mir's front port, the spacecraft yawed unexpectedly. Viktorenko completed a manual docking without additional incident.

October 6: Intelsat 703 launched by Atlas 2AS from Cape Canaveral.

October 12: Magellan burns up in Venus' atmosphere.

20 Years Ago – 1999

September 23: Mars Climate Orbiter lost due to a navigation error after the orbiter fired its main engine to go into orbit around Mars.

September 24: Ikonos 2 Launched by an Athena 2 rocket from Vandenberg AFB. First of a new generation of non-military Earth-imaging satellites to provide high- resolution images with detail at the 1m (3.3 ft) level for commercial use.

15 Years Ago – 2004

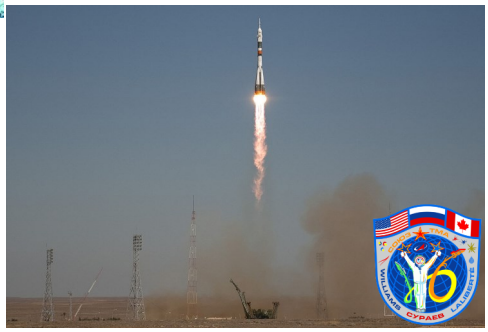
September 8: The Genesis sample return capsule with solar wind samples was released from the main spacecraft. It should have deployed a drogue parachute but it failed and the capsule crashed in the desert at a speed of 311 km/hr, severely damaging the capsule. The sample collection fragments, though damaged and contaminated by exposure on impact, were recovered for analysis.

October 14: Soyuz-TMA 5 launched by a Soyuz-U rocket from Baikonur. It carried two Russians (Salizhan Sharipov and Yuri Shargin) and one American astronaut (Leroy Chiao) comprising the International Space Station (ISS) Expedition 10 crew. It docked with the PIRS module of the ISS on October 16 with manual control by the commander after it was determined to be approaching the ISS at an excessive speed.

10 Years Ago – 2009

September 10: Ares 1DM-1 test – The successful test firing of the five-segment Ares 1 solid rocket motor. Development Motor-1 (DM-1)

September 30: Soyuz-TMA 16 launched by a Soyuz FG rocket from Baikonur cosmodrome Crew: a Russian cosmonaut (Maksim Suraev), a NASA astronaut (Jeffrey Williams) and a Canadian space tourist (Guy Laliberté) to the International Space Station (ISS) replacing two of the crew members of the ISS.



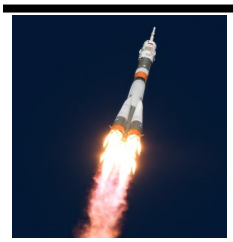
October 8: Worldview 2, a commercial imaging satellite, was launched on a Delta 2 rocket from Vandenberg. The satellite provides Earth imagery in eight color bands.

October 28: The Ares 1-X test rocket lifted off from KSC for the first major assessment of the test vehicle.

5 Years Ago – 2014

September 21: The Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft entered orbit around Mars.

September 25: Soyuz TMA-14M (Expedition 41). Launched from Tyuratam (Baikonur Cosmodrome), Kazakhstan to the ISS. The Meteor Composition Determination (Meteor) payload enabled the first spacebased observations of meteors entering Earth's atmosphere using high- resolution video and image analysis. First female cosmonaut to visit the ISS. Crew members: Barry Wilmore (NASA), Elena Serova (Russian Federal Space Agency), Alexander Samoukutyaev (RSA).



LAUNCH WINDOWS

Launch dates from SpaceFlight.com

Sept. 24, 2019
Long March 3B • Beidou
Launch time: TBD
Launch site: Xichang, China

A Chinese Long March 3B rocket will launch with a payload for the Beidou navigation constellation.

Sept. 25, 2019
Soyuz • ISS 61S
Launch time: 1357 GMT (9:57 a.m. EDT)
Launch site: Baikonur Cosmodrome, Kazakhstan

A Russian government Soyuz rocket will launch the crewed Soyuz MS-15 spacecraft to the International Space Station with members of the next Expedition crew. The capsule will remain at the station for about six months, providing an escape pod for the residents. The rocket will fly in the Soyuz-FG configuration.

September, 2019
Long March 11 • Zhuhai 1 Group 3
Launch time: TBD
Launch site: Jiuquan, China

A Chinese Long March 11 rocket will launch a third group of Zhuhai 1 remote sensing satellites for a commercial constellation of Earth-imaging craft for Zhuhai Orbita Aerospace Science and Technology Co.

Sept. 30, 2019
Proton • Eutelsat 5 West B & MEV 1
Launch time: 1026 GMT (6:26 a.m. EDT)
Launch site: Baikonur Cosmodrome, Kazakhstan

An International Launch Services Proton rocket and Breeze M upper stage will launch the Eutelsat 5 West B communications satellite and the first Mission Extension Vehicle for Northrop Grumman Innovation Systems. Both spacecraft are built by Northrop Grumman Innovation Systems, formerly known as Orbital ATK. Eutelsat 5 West B will join Eutelsat's communications fleet in geostationary orbit, replacing the Eutelsat 5 West A spacecraft providing digital and television services primarily in the French, Italian and Algerian markets. The MEV 1 spacecraft is the first in a series of satellite servicing vehicles for SpaceLogistics, a subsidiary of Northrop Grumman Innovation Systems. MEV 1 will dock with the Intelsat 901 communications satellite and provide propulsion and attitude control functions to extend the spacecraft's mission. Delayed from May.

Oct. 9/10, 2019
Pegasus XL • ICON
Launch time: 0130 GMT on 10th (9:30 p.m. EDT on 9th)
Launch site: L-1011, Skid Strip, Cape Canaveral Air Force Station, Florida

An air-launched Northrop Grumman Pegasus XL rocket will deploy NASA's Ionospheric Connection Explorer (ICON) satellite into orbit. ICON will study the ionosphere, a region of Earth's upper atmosphere where terrestrial weather meets space weather. Disturbances in the ionosphere triggered by solar storms or weather activity in the lower atmosphere can cause disturbances in GPS navigation and radio transmissions. The mission's staging point was changed from Kwajalein Atoll to Cape Canaveral Air Force Station in mid-2018. Delayed from June 15, Nov. 14, and Dec. 8, 2017. Delayed from June 14, Sept. 24, Oct. 6, Oct. 26 and Nov. 3. Scrubbed on Nov. 7. Delayed from 1st Quarter 2019.

TBD
LauncherOne • Inaugural Flight
Launch window: TBD
Launch site: Cosmic Girl (Boeing 747), Mojave Air and Space Port, California

A Virgin Orbit LauncherOne rocket will make its first orbital test flight after dropping from a modified Boeing 747 carrier aircraft over the Pacific Ocean off the coast of California.

October, 2019
PSLV • Cartosat 3
Launch time: TBD
Launch site: Satish Dhawan Space Center, Sriharikota, India

India's Polar Satellite Launch Vehicle (PSLV), designated PSLV-C47, will launch the first Cartosat 3-series Earth-imaging and mapping satellite for the Indian Space Research Organization. Delayed from mid-2019.

Oct. 17, 2019 (No earlier than)
Falcon 9 • Starlink 1
Launch time: TBD
Launch site: SLC-40, Cape Canaveral Air Force Station, Florida

A SpaceX Falcon 9 rocket is expected to launch the second batch of approximately 60 satellites for SpaceX's Starlink broadband network, a mission designated Starlink 1.

Oct. 21, 2019
Antares • NG-12
Launch time: 1839 GMT (2:39 p.m. EDT)
Launch site: Pad 0A, Wallops Island, Virginia

A Northrop Grumman Antares rocket will launch the 13th Cygnus cargo freighter on the 12th operational cargo delivery flight to the International Space Station. The mission is known as NG-12. The rocket will fly in the Antares 230 configuration, with two RD-181 first stage engines and a Castor 30XL second stage. Delayed from Oct. 1.

4th Quarter, 2019
Minotaur 4 • NROL-129
Launch window: TBD
Launch site: Pad 0B, Wallops Island, Virginia

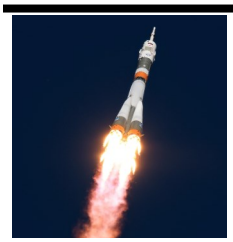
A U.S. Air Force and Northrop Grumman Minotaur 4 rocket will launch a classified spy satellite cargo for the U.S. National Reconnaissance Office.

October, 2019
PSLV • RISAT 2BR1
Launch time: TBD
Launch site: Satish Dhawan Space Center, Sriharikota, India

India's Polar Satellite Launch Vehicle (PSLV) will launch the RISAT 2BR1 radar Earth observation satellite for the Indian Space Research Organization. The mission will likely use the "Core Alone" version of the PSLV with no strap-on solid rocket boosters.

TBD, 2019
Atlas 5 • CST-100 Starliner Orbital Flight Test
Launch time: TBD
Launch site: SLC-41, Cape Canaveral Air Force Station, Florida

A United Launch Alliance Atlas 5 rocket, designated AV-080, will launch Boeing's first CST-100 Starliner spacecraft on an unpiloted Orbital Test Flight to the International Space Station. The capsule will dock with the space station, then return to Earth to landing in the Western United States after an orbital shakedown cruise ahead of a two-person Crew Test Flight. The rocket will fly in a vehicle configuration with two



LAUNCH WINDOWS

Launch dates from SpaceFlight.com

solid rocket boosters and a dual-engine Centaur upper stage. Delayed from Aug. 27, 2018. Delayed from January, April, Aug. 17 and September.

TBD, 2019
Rockot • Gonets M
Launch time: TBD
Launch site: Plesetsk Cosmodrome, Russia

A Russian government Rockot vehicle with a Breeze KM upper stage will launch three Gonets M communications satellites. Delayed from June. [June 21]
Late 2019Long March 4B • CBERS 4A
Launch time: TBD
Launch site: Taiyuan, China
A Chinese Long March 4B rocket will launched the CBERS 4A remote sensing satellite. CBERS 4A is the fifth China-Brazil Earth Resources Satellite for the collection of global imagery for environmental, urban planning and agricultural applications.

November, 2019
LauncherOne • ELaNa-20
Launch window: TBD
Launch site: Cosmic Girl (Boeing 747), Mojave Air and Space Port, California

A Virgin Orbit LauncherOne rocket will launch on its second flight after dropping from a modified Boeing 747 carrier jet. The flight will be conducted under contract to NASA's Venture Class Launch Services Program, carrying 14 CubeSats to orbit for NASA field centers, U.S. educational institutions and laboratories on the ELaNa-20 rideshare mission. Delayed from Aug. 1 and Sept. 1.

Nov. 4, 2019 (No earlier than)
Falcon 9 • Starlink 2
Launch time: TBD
Launch site: SLC-40, Cape Canaveral Air Force Station, Florida

A SpaceX Falcon 9 rocket is expected to launch the third batch of approximately 60 satellites for SpaceX's Starlink broadband network, a mission designated Starlink 2.

Nov. 11, 2019 (No earlier than)
Falcon 9 • JCSAT 18/Kacific 1
Launch window: TBD
Launch site: SLC-40, Cape Canaveral Air Force Station, Florida

A SpaceX Falcon 9 rocket will launch the JCSAT 18/Kacific 1 communications satellite jointly owned by SKY Perfect JSAT Corp. of Japan and Kacific Broadband Satellites of Singapore. Built by Boeing, the JCSAT 18/Kacific 1 communications satellite will provide mobile and broadband services across the Asia-Pacific region.

Nov. 22, 2019
Ariane 5 • Inmarsat 5 F5 & TBD
Launch window: TBD
Launch site: ELA-3, Kourou, French Guiana

Arianespace will use an Ariane 5 ECA rocket, designated VA250, to launch the Inmarsat 5 F5 communications satellite and a co-passenger to be confirmed. Built by Thales Alenia Space, the Inmarsat 5 F5 satellite is owned by Inmarsat of London. Inmarsat 5 F5 will be the fourth satellite in Inmarsat's Global Xpress network. Arianespace is expected to select and announce a co-passenger for this mission.

November, 2019 (No earlier than)
Falcon 9 • Starlink 3
Launch time: TBD
Launch site: SLC-40, Cape Canaveral Air Force Station, Florida

A SpaceX Falcon 9 rocket is expected to launch the fourth batch of approximately 60 satellites for SpaceX's Starlink broadband network, a mission designated Starlink 3.

VENDOR NEWS

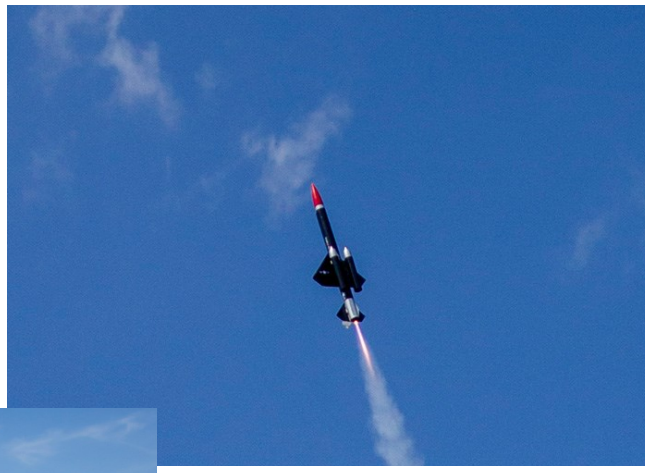
Those old-timers among us may remember the Estes Design of the Month Contest. You would mail your designs to Penrose, CO and Estes would pick monthly winners and runner-ups. The winners would get a $50 gift certificate, but sometimes the submitted plans would become kits. Many were also published in Model Rocket News and sent out with orders as a "bonus". The collection of published DOM plans are available for download at the JimZ Rocket Plans website.

Tim Van Milligan of Apogee Rockets has started a similar contest. He is looking for plans for his newsletter, *Peak of Flight* and if you submit one that makes the newsletter you will win $50 in merchandise credit with Apogee. You can also win bonuses by including a rocksim file of the plan and/or a built prototype.

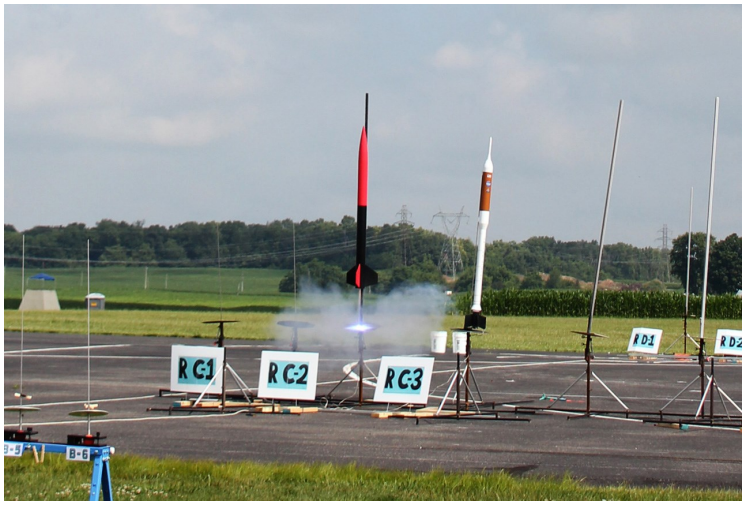
The rules and submission information are available at Apogee's website, Good Luck! https://www.apogeerockets.com/Rocket-Plan-Submission-Guidelines

More Photos From Maker Faire

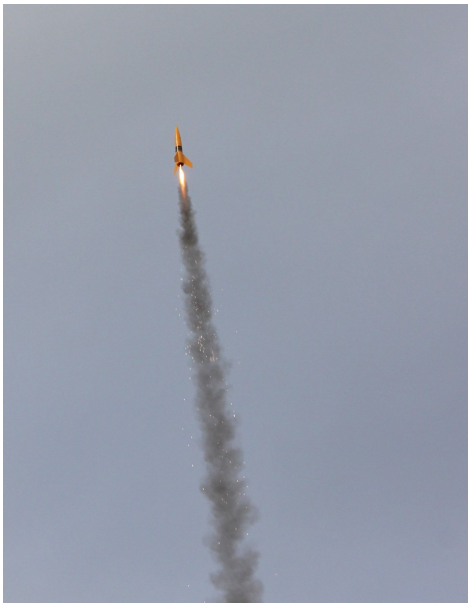
More Photos From NARAM 61

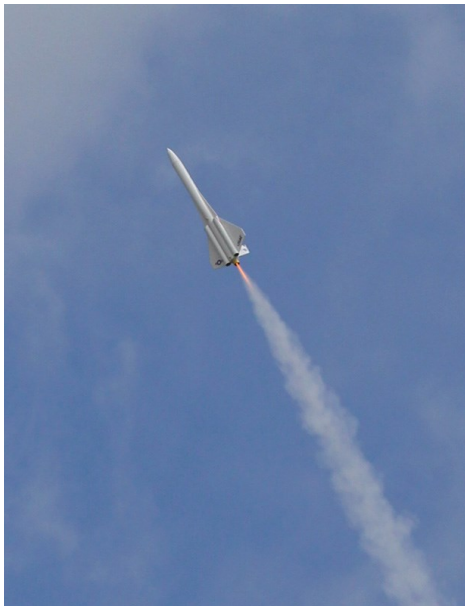


More Photos From NARAM 61

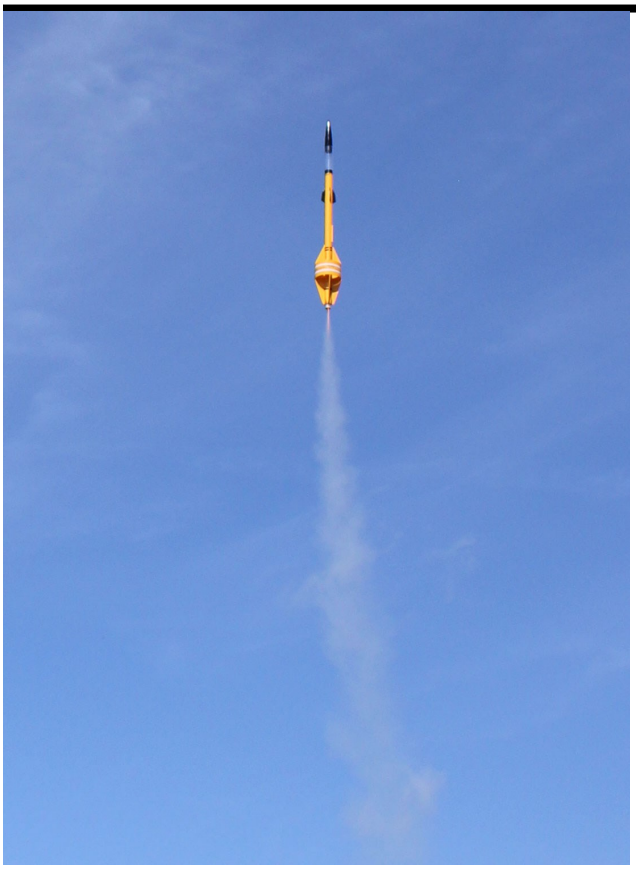


More Photos From the August Launch





More Photos From the September Launch



OUR MEMBERS IN THE FIELD

Buzz Nau and his Centuri Orion clone at NARAM 61

Eldred Pickett preparing an Estes Crayon-roc

Art Upton with one of his GPS rocketsondes

Christina Scharrer and her cool Venom MkII

Chris Scharrer and his equally cool Black Brant II

Steve Kristal was one of the RSO's at NARAM 61