

TOTAL IMPULSE



JACKSON MODEL ROCKET CLUB

TOTAL IMPULSE VOLUME 21, No. 4

JMRC
HUVARS

HURON VALLEY ROCKET SOCIETY

JULY - AUGUST 2021



LAUNCH COVERAGE

NARAM 62

CRAPSHOOT VII

AUGUST SPORT & NRC LAUNCH



DER BIG RED MAX PART3
NIKE SMOKE SCALE DATA
50 YEARS AGO: APOLLO 15



CLUB OFFICERS

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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@sfsindustries.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 Bob Dickinson
 5668 Big Fish Rd
 Goodrich, MI 48438

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

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

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It is near the end of August and within the past two months I have attended four launches including NARAM 62. That's four more than I attended in nearly two years. I'm not sure it is a sign of returning to some form of normality, but it is a welcome change nonetheless. It was great to catch up with several members and friends at Crapshoot in Muskegon, NARAM 62 at Geneseo, NY, and our first Sport Launch this year on 21 August at the Horning 1 field. All of these events had lower than normal attendance and it may remain like that for a while longer, but it's a start. If all goes well, we will be back at Horning 1 on September 18.

Next I'd like to thank all the newsletter contributors and readers over the past year. We were honored at NARAM 62 by winning the Rockwell LAC trophy for a third time in four years for having the best section newsletter. This is a great achievement everyone should be proud of. We couldn't have done it without the constant flow of articles and content, especially during the past couple of years when we weren't even flying. Thanks everyone and please keep the material coming!

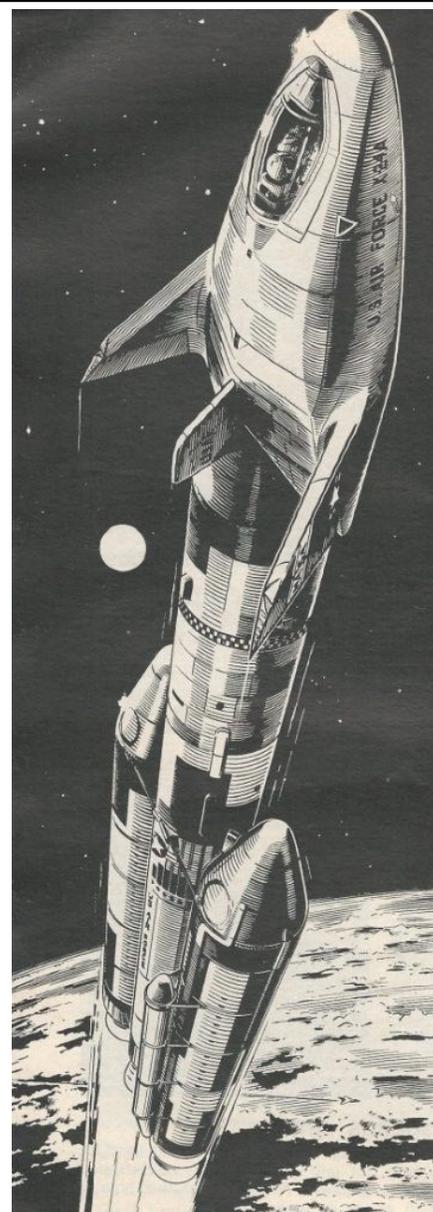
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Launch/Event Calendar - 2021

- May 8 Pending (MIS)
- June 12 Pending (MIS)
- July 10 Pending (MIS)
- NARAM 62 - July 23 - 30 (Geneseo, NY)
- August 14/15 Crapshoot VII (Muskegon)
- August 21 (Homing 1)
- September 18 Pending (Homing 1)
- October 9 Pending (Homing 1)
- November 13 Pending (Homing 1 or 2)

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.



About Total Impulse

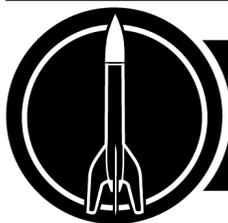
Total Impulse is the official newsletter of the Jackson Model Rocket Club (JMRC), Tripoli Prefecture 96, NAR Section 620. Published Bi-Monthly, *Total Impulse* is a space-modeling newsletter devoted to representing the diversity of interests in today's hobby of model rocketry. This newsletter is in the public domain except where otherwise marked. Unmarked articles, photographs, and drawings may be re-printed elsewhere, but credit to the author and this newsletter is expected. Material marked as copyrighted may not be re-printed without the consent of the author.

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

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On the Cover:

(front page) Herb Crites' Mach Schnell 75-M SLK Level 3 model liftoff



Rocketry Festival / NARAM 62, Geneseo, NY

Buzz Nau

It took an extra year, but NARAM 62 / Rocketry Festival was finally held a year late on July 23rd through the 31st. Several club members, including Al and I attended the very first Geneseo, NY Nationals, NARAM 37, in 1995. That was also our second time winning national champion in teams division. The field is the site of the [National Warbird Museum](#) and hasn't changed much at all after all these years. Al De la Iglasia and I represented our team, "Escape Velocity". Our co-member, Mark Chrumka missed the trip as he was waiting on the birth of his first grandchild. Congrats Mark!



My Centuri Quasar on the NARAM 62 Sport Range

Sat/Sun Sport Launch – First of all, the weather was excellent with moderate temps and light winds. The sport range was surrounded by corn and bean fields, but they were quite a ways off. Most flights were easily landing in the field. Al and I took advantage of the weather and field and put in a fair number of flights. I had a couple fouled chutes and lost the payload section



to my 3-stage Farside, but everything landed fine with little to no damage.

Vendor support was really light this year. Jay Calvert of Impulse Buys with help from Pam Gilmore were there providing motors. Peter Alway was present selling his \$20 booklets of scale data. Dan Michael was there representing Aerotech and had his full-scale Patriot missile on display. It is supposed to launch next year on a cluster of 1 O and 4 N motors. The sport range was



Al (left) stands behind Dan Michael's (right) full scale Patriot

well organized allowing the right and left ranges to go hot and cold independently.

Sunday night was the Contestant Briefing and Sport Scale turn in. The only thing of real note in the briefing, which we were already aware of, was all rockets powered by F impulse and higher were required to use a launch rail and not a launch rod.

We were blown away by some of the sport scale models. There were some incredibly detailed and high degree of difficulty models this year. This included Guy Gehlhausen's Atlas V-411 with BSP thrust vectoring system and John Brohm's Black Brant VIII for the Flying I-Beam Kids team. We couldn't wait until Friday to see many of them fly.

Monday - 1/2A Altitude and 1/2A Parachute Duration - It took us a few flights to figure out the new Adrel altimeters. You would have thought we could have boned up a little on them over the down period between NARAMS, but apparently not. We were making it harder on ourselves than necessary. After a brief conference with Steve Kristal, we were able to get in a pretty good flight in 1/2A Altitude of 177 meters and 7th place. It took several "track lost" flights to get there though. Steve put up a flight of 210 meters which was good for 7th in C Division.

Our first flight in 1/2 A Parachute Duration was barely qualified because the piston tube stayed attached to the model. On our second flight the model was too light to open the chute fully. We qualified but were disappointed knowing we've done much better in the past. Steve had a separation DQ his first flight but followed it up with a 118 second flight for 17th.

Monday night's activity was the Manufacturers' Forum and Cannon Auction. Present at the Manufacturers' Forum was Peter as I mentioned earlier, selling his "Rockets of the World" Supplement books as well as some new ones on WWII Rockets, US Air Force Missile, and the V-2 Painting Guide.

eRockets owner Randy Boadway was next to present. Randy mentioned the lack of Semroc stock has been due to the balsa shortage. To overcome some of that draught eRockets will soon start 3D printing nose cones, adapters, and tail cones. His new release is the Pro Cherokee 29mm upscale of the Cherokee D. The kit will sell for \$90 and will include a motor retainer, rail buttons, and Sticker Shock vinyl decals. Other items announced as "coming soon" included 3D printed sanding bars, a Centuri Hummingbird clone, and rail button conversion kits that mount on existing launch lugs.



Al's Super Big Bertha



A Der Red Max drag race with sparkies



Randy Boadway of eRockets with his new Pro Cherokee

ASP was represented by Bill Daulphin who started off mentioning the history of Aerospace Specialty Products and the types of products available. New products centered on micro scale kits including the Astrobee D and Black Brant III.

The latest news and product from Jack Hagarty's ARA Press continues to be the recently released X-20 *DyanSoar* book by Roy Houchin III. I got a copy from the startup and it really is the best resource around on the X-20. Jack also mentioned that orders over \$50 will receive a free rocketeers pen. It includes a screwdriver, built in level, and comes in four different colors. You can also order one for \$10.

Mallory Langford was there to talk about the recent news from Estes. The Antar is already out and the upscale Mars Snooper is due out in September. She spent some time discussing the Space Corps line of kits including the newly released Centurion and Darc -1. She also showed off the new Blue Origin New Shepard kit. It is a RTF similar to the 1/200 Saturn V and SLS kits. A SpaceX Falcon 9 was strongly hinted at for Spring 2022. Mallory also said that Estes was reworking many of the lesson plans for educators.

Representing Aerotech was Gary Rosenfield, Dane Boles, and Dan Michael. Dan performed much of the presentation which mentioned a new Aerotech catalog that was included in everyone's registration packet as well as a DMS brochure. Most of the discussion centered around new motors including the D22, E26, F52, B6, G8 and G12. They also announced the new 24mm kits coming later this year named the *Sport*, *Falcon*, and *Icarus*.

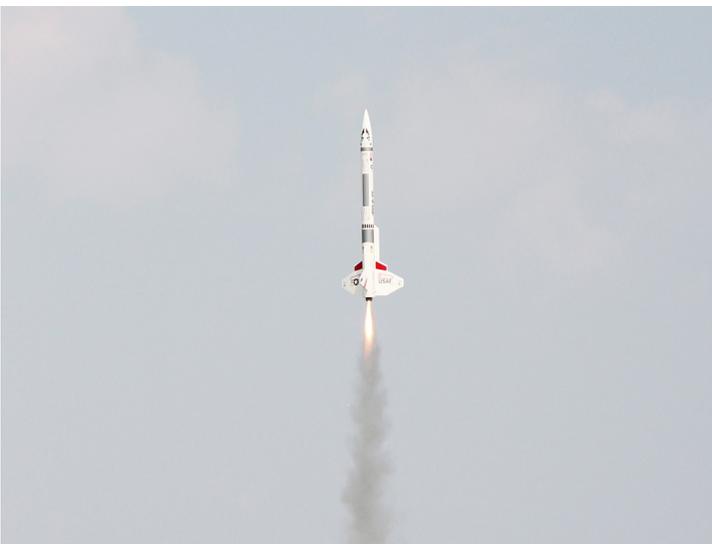
The Cannon Auction was fun as always, but there were no Estes surprise boxes which I always like to bid on. I did manage to win a Centuri ALCM Cruise Missile for a ridiculous \$30. I also got a MPC Tomahawk and a couple Estes diamond packs of D12's.



Al prepping away

and those that found a rare thermal typically won their division. Despite not being able to grab a thermal we had two flights over a minute which was good for 4th place.

Tuesday night was the NAR Townhall meeting and this one was pretty much a snoozer compared to previous townhalls. NAR President John Hochheimer had a slide deck of almost all positive news for the membership. The Q&A session was short and the meeting ended early.



My Argus II upscale

Tuesday - 1/2A Streamer Duration and B Payload Altitude - Sigh.... I screwed us over in B Payload. I accidentally grabbed a 1/2A-4T instead of a A3-4T for the sustainer on our first flight. I saw purple label and well, it was a bad choice. Our altitude was in the middle of the pack and it was legal as it was still in the B range, but barely. On the next flight the booster did not drop at staging so the altitude ended up much lower than our first flight. Steve Kristal tore up C Division with a 296 meter flight edging out Chad Ring by 4 meters for 1st place.

We did much better in 1/2A Streamer Duration. Thermals were very rare on Tuesday so many of the times were close together



Al's Aerotech Initiator

Wednesday - D SuperRoc Altitude and 1/2A Boost Glider - We tried a high-performance, high-risk D SuperRoc model first and it crimped on a D9 about 150' up. We wanted to qualify, so we went conservative next and flew a two section BT-50 model (180cm) on a D12 which flew straight and true to 325 meters and 9th place. This event is usually ripe for DQ's, but there seemed to be fewer this year or maybe it was just the low participation.

In 1/2A boost glider we put up a decent flight early and got a return. Our second flight was in a thermal for a while and then got violently thrown out. It seriously looked like someone swatted it out with a giant hand. The same thing happened to a few other gliders. Unfortunately, ours wasn't in the thermal nearly long enough and we settled for 5th place. Roger Wilfong broke out of hibernation and flew a couple of solid flights for 4th place in C division. Way to go Roger!

The evening activity was the A and B Division R&D presentations which we ended up missing due to a late dinner.



Buzz sitting in the bombardier seat

try and get everyone back. With the range shut down, Al, Steve, Ed Pearson, and I spent the afternoon at the War Bird Museum. We had a great time and got to crawl around inside a B-17 and C-47. The Flying Fortress was the one used in the movie, "The Memphis Belle". The original is on display at the US Air Force Museum at Wright Patterson. The C-47 Dakota, "Whiskey 7" was one of the lead paratroop dropships during the Normandy invasion.

Thursday's night event was R&D presentations from C and Team Division. Several of them were well done and noteworthy. I particularly liked Keith Vinyard's report on "No Moving Parts Rocket Gliders" and Alan Stokker's "Ideas for Improving Streamer Duration Reliability and Performance".



Al and Steve in front of "Whiskey 7"

Thursday - 1/2A Helicopter Duration (1/2A Flexwing Glider was cancelled) – Similar to Tuesday's weather, there were no thermals and a stiff breeze, so everything was just going down-range at a quick clip. Our two helo flights qualified, but they wouldn't flip back around. Al made incidence adjustments after the first flight, but it wasn't enough, or the wind was messing with us. The boosts were straight and very high, but we could only pickup 50 seconds and 9th place. Flexi was cancelled since the afternoon was forecast to be a rain out. It wasn't. It only rained for about 90 minutes, but everyone was gone, so it was impossible to



Al, Roger, and Steve next to a Fokker DVII



Al in the bombardier seat. Note the .50 cal machine gun



An AIR-2 Genie inert round

Friday - Sport Scale and Awards Banquet – Friday is a favorite day of NARAM, it's scale day. The quality of models this year was incredible. Since Mark was unable to make the trip, I decided at the last minute to throw together a Nike Smoke based on a nose cone I still had from the Centuri 1/10 scale kit. By last minute I mean I put it together and finished the painting in about four days. It was pretty breezy and I was worried the fins would come off if it hit anything. We put it up on a B6-4 and while it came down right in the parking area it managed to catch a nearby tall grass spot. There were plenty of simple, whoosh-pop flights like ours, but there were also several super cool flights. The best by far was



Mark "Bunny" Bundick and his Atlas Centaur

Guy Gehlhausen's Atlas V-411 with the BSP thrust vectoring system and launched from a scale pad. It worked perfectly, landed safely, and took first in C Division. Chad Ring took second with his staged Black Brant X flight. Twenty-six years ago, Chad flew a similar model and hit a tank that was on display at the museum. You can guess who won that fight. Bunny Bundick flew a nice, clustered Atlas Centaur. The Flying I-Beam Kids had a great flight with their Black Brant VIII for 1st place in Teams, though they almost put the sustainer in a river 2 miles away. The Italiano's team flew a two-stage Nike Hercules that failed to stage and planted the sustainer in the sport range. After the previous day's rain, the field was soft and though it didn't suffer any damage the



Me and our Nike Smoke sport scale entry



The Flying I-Beam Kids first place Black Brant VIII

Italiano's opted not to try a reflly. Other exciting flights included Feller DeWain's Soyuz that land sharked the sport range, Vern Richardson's Black Brant XII that failed to stage, and Chris Flanagan large Long March on two D12's that was a bit underpowered. The banquet that night was nicely catered. The food was great and Al and I shared a table with Vern Richardson and his wife. They were a hoot and I hope we can share their company again. Even though we didn't medal in any events we did qualify in every event we entered which we took as a major victory. I was also pleased when *Total Impulse* was awarded the Rockwell LAC trophy for best section newsletter a third time. This a great achievement for JMRC/HUVARS and I thank everyone that has contributed over the years and supported the newsletter.



Guy Gehlhausen's first place Atlas V-411

More Scale Photos From NARAM 62



The "G-Force" team and their Trailblazer II



The "Pastor's Kids" AIM-4 Falcon entry



John Cieslak and his Little Joe II



Chad Ring's Black Brant X



Glenn Feveryear and his Super Loki Dart

VIEW FROM THE FLIGHT LINE

Estes Derr Bigg Redd Maxx Teil Three
Final Assembly and Finish

DALE HODGSON - PHOTOS FROM DALE H AND ESTES LLC

Well, here we are; the final phases of the Derr Bigg Redd Maxx with all the upgrades installed. We'll look at the final assembly of the parts and applying paint and decals. I will state for the record that I'm not the best painter on the planet, but I do manage to get a finish put on a rocket. Not to the extent that Mark or Fred would do...I couldn't do a flame scheme with an airbrush to save my rear-end but, all in all the project didn't end up too badly. We are going to look at this stuff a little out of sequence since it made more sense so let's look at the final assembly.

I'm real picky when it comes to protecting a shock cord; must come from my younger days when I burned a few through.

Remember, we upgraded the supplied Estes elastic with Kevlar. I also put a shield over that that I acquired from Roger. I then folded that shield in half and slipped a Nomex sleeve over the whole deal and slid it down the cord all the way to the attachment eyebolt on the front centering ring. I used electrical tape and secured the Nomex sleeve to the shock cord at its forward most point; that way it can't slide upwards exposing either the cord or the eye bolt. I also installed a Nomex chute protector to sit at the point where the Nomex sleeve is attached but I am allowing the protector to slide freely. That way I can fold up the chute and the rest of the cord within the protector to keep all the ejection gasses away.

The chute was a simple matter; the stock version an 18in. Estes plastic. I went to a 30-inch X chute from Top Flight, black and red to keep the scheme in perspective. A 30 in chute may seem big but it is an X form; the decent rates are different. This one isn't out of bounds so it should be fine. Fast enough to not drift a ton; slow enough to protect those huge ply fins. I attached the chute to the cord itself



rather than to the nose cone. That way the opening shock will be on the cord and rings rather than the cone itself. I've seen too many separations happen during a hard opening with the chute attached directly to the cone.

Last thing with the assembly is the front of the shock cord to cone attachment. I used the extra hole I drilled through the end of the cone and simply looped and tied off the cord at that point rather than use the loop that was formed in the plastic. Those always seemed weak to me for all but the very light rockets. With everything packed inside there is still plenty of room for a Jolly Logic chute release should I decide to fly a motor with a bit more punch. After all, that's what the upgrades are for! That's another reason for using the supplied retainer but not a forward thrust ring, need to keep those options open and it's easy enough to make a rear thrust ring should I decide to actually use the Estes 29's.

Finishing the rocket wasn't too big a deal; I used all Krylon Fusion paints to keep everything compatible. After lightly sanding everything (I used the primer as a filler) I primed the entire airframe and fins with a satin white. Once that dried, I simply painted it with Gloss Red Pepper; the brightest red I could find for Fusion. Several light coats to keep runs away; for once I accomplished that. As for the cone I simply wiped it down with acetone to get any mold release, dust and oil from my hands removed. Another fairly simple job, several light coats of Gloss Black did the job. Once done I placed the rocket in my basement and let it sit to cure. Decals came later.

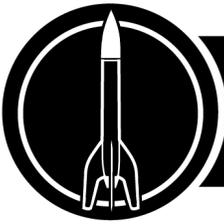


After letting the rocket sit a good two weeks to allow the paint to offgas and cure I applied the decals. These are the self-sticking type; not the water-slide type we were all used to. I followed the placement scheme that came on the box although I didn't have a complete picture. I looked for a pic of all sides but couldn't find one. I did find out there were different version of the decal sheets issued. So, I placed everything where I thought they should be placed. I didn't apply one decal because it wouldn't fit on the airframe; it would have gone almost exactly where the aft rail button was mounted. But other than that, there was really no difficulty. I was wondering how the decals would hold up unprotected, so I did a little research and asked a few guys that do this stuff all the time. Both Mark Chrumka and Tony Haga suggested an acrylic clear coat. Fortunately, it was available in Krylon Fusion so that's what I used. Again, several light mist coats and it seemed to coat the decals and hopefully fused them with the airframe a bit better. A few flights will tell the tale.

So, there you have it...start to finish; how I bought, upgraded with my own enhancements, built, and finished my very first Der Big Red Max...which I renamed the Derr Big Redd Maxx after the upgrades. Besides, it's a tip o'the hat to the Old Addams Family TV show from the 60's. I distinctly remember John Astin's (Gomez) reply when why the whole lot of them were so outlandish and weird. He simply said "it's the extra D that does it." Go figure, I'm a fan of the outlandish and weird. Now all I have to do is to get to a field and fly the rocket.



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CRAPSHOOT VII 2021 - Muskegon, MI

Buzz Nau

On August 14/15 MMAR/SMASH and JMRC/HUVARS co-hosted Crapshoot VII at the Muskegon Wastewater Facility launch site. Named in honor of the wastewater plant, the launch has been an annual tradition since 2014 and only interrupted in 2020 due to the Covid 19 pandemic. No matter what time of year it is held, the weather has been typically fickle. Not this year as both days were pleasant with near perfect temps and low winds.

Attendance was way off from previous Crapshoots and understandably so since the state is still recovering, and another surge seems imminent. Regardless, the event had many successful flights, and it was good to be flying in Michigan again. Attendance from JMRC/HUVARS included Buzz Nau, Tony Haga, Randy Gilbert, Dan and Trevor Harrison, and Herb Crites.

Saturday – I failed to get in any sport flights Saturday since I was tending to contest director duties on both days for NRC flights. I spent Saturday putting in competition flights, but Tony was able to beta test Scott Miller's all 3D printed HPR rocket. The up part looked great, and it appeared it would be a successful test, however the lower section failed on landing, breaking the airframe and lower centering ring. Tony also had a nice dual deploy flight with his LOC EZI-65. Even though it landed in the pine trees he was able to recover it since the lower section fell through the tree.



Tony Haga's EZI-65

Randy tried twice to get a good flight with his Estes 1:200 Saturn V. The first flight failed to deploy the chute and the second was unstable with a Quest C18 composite. He did get a perfect flight with his Estes Mega Der Red Max on an F15-6. He also got in a good flight with his Dragon Train (Mega Der Max with a dragon decal) on a G64-4. His last flight was one of the new Estes Solo gliders. The glider (which looks like a modified solo cup) put in a surprisingly good glide duration and appeared to land near the booster. It took a while, but the glider was eventually found by Dan.

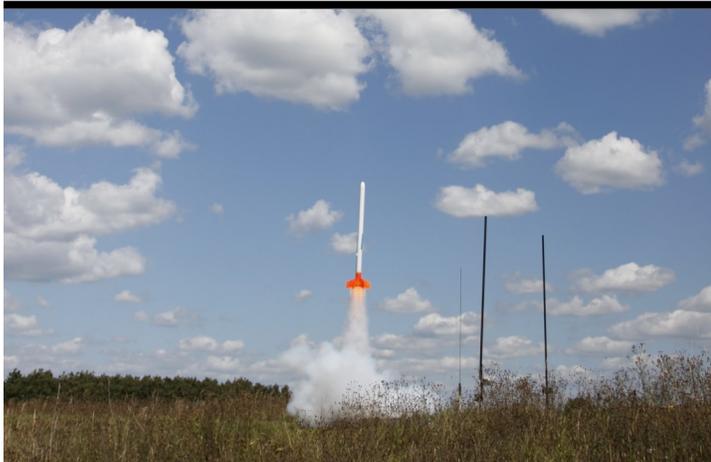
Dan and Trevor flew a couple of minimum diameter Wildman kits on I motors that just screamed. The big event was Herb Crites' level 3 flight. The model was his Mach Schell SLK 75 on a Loki M1378LR (red). The motor didn't behave very well by chuffing significantly and eventually lifting off, but to a much lower altitude than expected. Everything else worked as planned for a successful recovery.

The low wind and thermal activity made for nice competition flying. Flying for the "Escape Velocity" team, my 1/4A streamer duration flight ejected a motor and A helicopter duration pranged. I made up for those missteps with a 9 minute plus A parachute duration flight, maxing out the event on the very first attempt. I also set a new "unofficial" B Altitude record of 382 meters, but since I used a Firefly altimeter it wasn't eligible for records. The rocket also landed deep in the corn and was only recovered because of Tony's excellent line and directions by radio.

Bob Alway of the "I Don't Know Who" team put in two helicopter duration flights for a total of 60 seconds. Jay Calvert of the "Royal Rocketeers" also flew parachute duration and totaled 157 seconds while suffering some chute deployment issues. He made up for that with a great two minute, 1/2 A rocket glider flight that thermalled away.



Buzz Nau's Maxi Sark on a CTI G88 Smokey Sam



Joe Mosher's cluster with a ton of 13mm motors

Sunday – I was able to get in some sport flights Sunday. First up was my Estes Pro Series Nike Smoke on an Aerotech G40-7. This was a perfect motor for it with it landing nearby thanks to the Jolly Logic Chute Release. I followed that up with my Maxi Sark upscale on a CTI G88-6 Smokey Sam. The chute squirreled out from under the chute release at apogee, but still landed close due to the low winds. Finally, I put up my Interceptor E on an Aerotech F39-6. The delay is just a touch long, but otherwise it's a great motor for this model.

Joe Mosher put in one of the more entertaining flights, a cluster of "many" mini motors. It was a great flight with a lot of fire, smoke, and a loud "whoooosh" sound.

Competition flights on Sunday were light. I put up a couple of streamer duration flights for a total of 42 seconds. Jay was the only other competitor with an excellent 270 second A helicopter duration flight for a total of 334 seconds on the day. He also had a couple of nice A parachute duration flights for a total of 438 seconds.

We had an excellent time, even though the attendance was well below normal for this launch. Major thanks to Jay Calvert of Impulse Buys for covering launch fees and providing motor sales for the event. Thanks to Pam Gilmore for providing excellent food service on both days. Thanks to Tony, Pam, Dave Gilmore, and Tom Roland for taking on the LCO duties.

After flying at Muskegon in July, going to NARAM 62, and then Crapshoot within a month I'm starting to feel a little normality coming back.



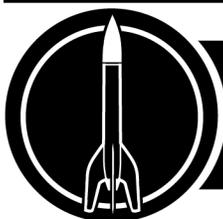
A Madcow Frenzy



Justin Stoddard's Black Brant



Dan Harrison's Wildman kit on a Loki I110



JMRC
HUVARS

Club News

Rick Sharp

At the August sport launch, Rick Sharp, Andrew Brown, and his son Jason, flew what is called “Geezer TARC”. Basically, it’s to build and fly rockets that meet the upcoming TARC contest rules except that you cannot fly in advance (trust the simulation), don’t have to paint the rockets, and everyone has to age-out of the TARC (middle and high school).

The contest is scored like golf with low score winning. One point for each foot above or below a qualification height of 835 feet AGL. The total flight time should be between 41 and 44 seconds with a 4-point penalty for each second above or below the target range.

Jason scored the best with 21 points as he had no time for points and hit 814 feet in altitude. Andrew was close behind and I was nowhere near as I missed by about 200 feet (embarrassing!!!).

The 2021-22 season calls for each rocket to be:

- No more than 650 grams max with motor
- Rockets must be at least 26 inches long
- Two body diameters (booster section and payload section)
- Single deploy using TARC approved motor
- Carry two large eggs laying on their side (cannot break)
- Perfect Flite altimeter to measure altitude (Firefly, Pnut, or Apra)
- Positive motor retention required (no friction fit)
- Both sections of the rocket must be tethered together
- Parachute or other safe recovery method of your choice
- Qualify at 835 feet between 41 and 44 seconds (finals will be two different altitudes and times)
- Make as many practice flights as you wish to “dial in” your design, but qualification flights due in April

Complete rules: <https://www.nar.org/wp-content/uploads/2021/06/Handbook-for-TARC-2022-V22.0.pdf>



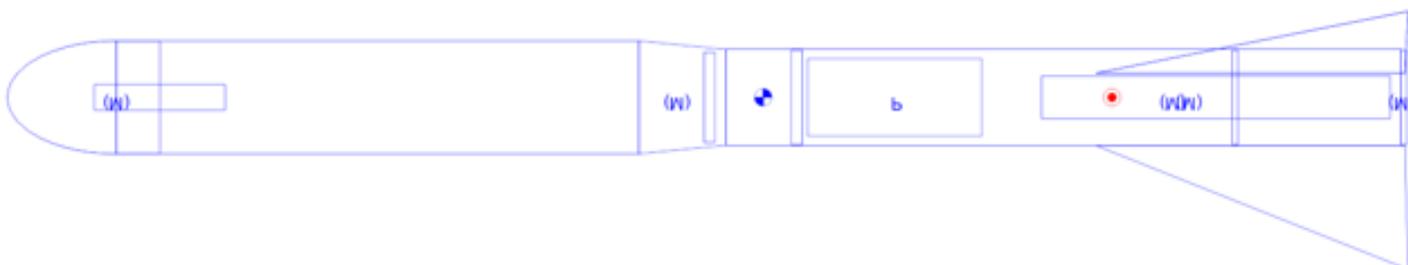
As you can see below, we all picked about the same basic design of fat on top and narrow on the bottom. If JMRC flies at Horning1 in September, we may all come back and try again. Other club members are welcome to join in.

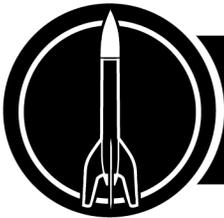
For background, the American Rocketry Challenge contest started in 2002 and is open to middle and high school students who must design, test, and build their rockets themselves. All teams must have a non-profit sponsor, usually a school, and a mentor.

Mentors can suggest but cannot build the rockets for the students. The teams register before December, build in the winter, and do their qualification flights by April. The top 100 teams are invited to the finals that are held just outside of Washington DC in early May.

TARC is also unique in that it is sponsored by commercial businesses including Thales, Boeing, Raytheon and others. It offers **cash** prizes for the top teams nationally. In June of 2021 the top national team took home a trophy, bragging rights, and a prize of \$20,000! Their school also received a cash prize.

Experienced NAR flyers are encouraged to offer their expertise as mentors to local teams.



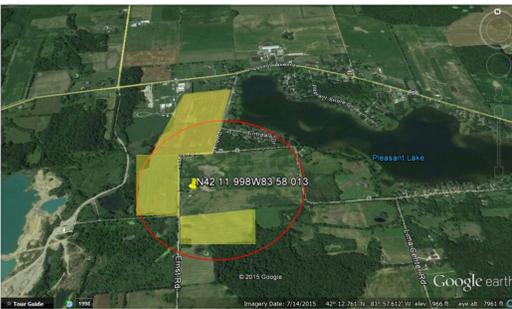


JMRC
HUVARS

Club News

We Are Flying Again!

Now that the winter wheat has been harvested from the Horning 1 field we are allowed back in for launches. Part of the field has alfalfa so we are restricted to getting in within ten days after a fresh cut, but there shouldn't be many more cuts this year. The surrounding fields all have corn which present a hazard, but not too bad as long as the winds normally blow from the West / Southwest. Refer to the GoogleMap photo for fields shaded that



have corn. Stay tuned to the email list for the next launch date confirmation, but it should be right around September 18. The status of Graves Campsite at MIS is still unknown.

Big Bertha Contest Is A Go!

Designed by Vern Estes, the Big Bertha is the iconic model rocket throughout the decades. Make Vern proud and enter your Big Bertha in this fun contest we will be holding... at the October Sport Launch.

Goal

Make three flights with a single model (Big Bertha) and attempt to score the best in **FOUR** different events.

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 at [JimZ Plans](#)

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 PLUS 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.

Member Highlight - Herb Crites Achieves Level 3!

Herb made a successful L3 flight at Crapshoot with his Mach Schnell SLK 75 powered by a Loki M1378LR (red). Congratulations Herb!



<http://www.millermotorworks.com/>



Buzz Nau is sponsoring a rocket design contest for the club. First place will be awarded \$50. Runners up will receive kits to be named later. The rules are simple;

- The design needs to be original
- The design must be capable of using currently available motors
- While you do not need to build or fly your submission, the design must be stable
- No up or down scales or modifications of commercial kits
- Entries can be submitted using Rocksim, OpenRocket or other drawing applications
- Hand drawn designs are allowed. Just scan and email them
- Entries will be judged by the BOD
- Deadline for submissions is open till further notice
- Send submissions to USSMidway@gmail.com



AUGUST SPORT & NRC LAUNCH Manchester, MI

Buzz Nau

The last launch hosted by JMRC/HUVARS was on 12 October 2019, nearly two full years ago. A lot has come and gone over that stretch of time. Our status with the Michigan International Speedway is still unknown, but recently we were given permission to use the location we call "Horning1" for a launch. The field crops prevented any launches until just recently and the Horning's generously permitted us back in the field. We were unable to get the JMRC trailer onsite, frankly, there just wasn't room, so we resorted to a misfire alley range setup. This worked out well. Everyone was spaced out and communicated when they were launching. There was also several high power pads including some brand new ones from *Fade To Black Rocket Works*



Randy Gilbert's collection of Red Max's

Turnout was low, but it included some new faces as well as some we haven't seen in years. The weather also cooperated with low winds and in a good direction, away from the corn. It was hot and humid though and only got worse as the day went on.

The most flights of the day award went to Mark Chrumka with nine. His highlights included the Sand Rocket(odd-roc sand pail with shovels) on an E30-4, a scale Bullpup missile, his Hawks Hobbies Super Sprite, and Estes Mars Snooper.



Mark Chrumka and his Mars Snooper

Behind Mark was Gary Nichols and Jim McLachilan with six flights each. Gary used to fly with us in the early 2000's and I believe this was Jim's first launch with us. Gary used to produce the "Scale Kits" line of scale models. Most of his flights were some of his old kits including the Bullpup, Patriot, and Exocet. Jim flew a couple of gliders, the Semroc Blue Jay and Squirrel Works Red Baron. He also flew an Estes QCC Explorer, two-stage Quest Navaho, and Estes Tazz which catod'd on an A8-3.

Rick Sharp and Andy Brown had three launches as the two competed in what Rick call's "Gezer TARC". See the Club News on page 13 for details. Rick did put one rocket in the corn to south, but fortunately recovered it.

Tony Haga and Dale Hodgson made several beta test flights of Scott Miller's all 3D printed high power rocket. Dale's went up on a Loki H90 red while Tony used a CTI H143 and H144. All three flights were impressive, but the joint just past the fins seems to be a weak spot for now.



Fred Ziegler had the Fade To Black Rocket Works store open for business



Tony Haga flies another 3D printed rocket from Fred's pad



Mark Chrumka's Hawks Hobby Super Sprite

Buzz put in a few sport launches including his Estes Interceptor E on an Aerotech F39, Star Blazer clone on an A3, and Gyroc clone on an A8. Chris Scharrer but in several flights, but unfortunately I don't have any flight cards for them. :(

There were several fliers that made single flights. Andy Tomasch is still breaking in his new knee and flew his Athena on a B4, Randy Gilbert launched a video Astrocam on a C6 which failed to record, Chris Palmer launched his "Flying Spider" odd-roc on a F15, and finally Fred Ziegler flew his Mega Der Red Max on a G54 red. All were nice flights and recovered on the field.

Competition flights were made by Dan and Trevor Harrison, and Al and Buzz of the Escape Velocity team. Trevor's big event was A parachute duration. He had two excellent flights of 106 and 432 seconds for a total of 538.... Two seconds short of a max! He also had two qualified 1/4A streamer duration flights but shredded his 1/2A rocket glider. Dan put in a single parachute duration flight of 152 seconds and 1/4A streamer duration flight of 23 seconds. He also tried a 1/2A rocket glider flight that DQ'd for no glide. Buzz put up a single 1/2A rocket glider flight that also shredded. Back to the drawing board on that one. Al tried a couple of different A helicopter duration models. One was unstable during boost, the second boosted straight and high, but would not flip back around. His first 1/4A streamer flight was a nice 25 seconds, but second one suffered a piston malfunction. Finally, Al flew two B eggloft altitude flights. The first one was the better of the two at 106 meters..

It felt great to be back at one of our fields to enjoy some cooperative weather and reunite in person. If all goes well we should be back at Horning 1 on September 18.



Some of the rockets Chris Scharrer flew



Gary Nichols' Scale Kits Exocet



50 YEARS AGO: APOLLO 15

Buzz Nau / Photos from NASA

On the heels of Apollo 14's success, Apollo 15 launched on 26 July 1971. Crewed by Commander Dave Scott, Lunar Module Pilot Jim Irwin, and Command Module Pilot Al Worden, Apollo 15 would pursue an aggressive and ambitious scientific mission.

This included the first use of the electrically powered Lunar Rover which allowed covering much greater distances during EVAs. The Service Module was also outfitted with a Scientific Instruments Module (SIM) Bay which would keep Al Worden busy during Scott and Irwin's three days on the lunar surface.



Gen. Sam Phillips (left), Wernher von Braun, Dr. James Fletcher, and George Low at the Apollo 15 launch

Significant changes were made to the Saturn V (SA-510) and Earth orbit to compensate for the added payload weight. Other changes to the mission included new space suits. The redesign made it easier to don and remove the suits in the cramped space. The EVA suits also allowed better movement for using the rover allowing the astronauts to bend over completely. The crew named the Lunar Module (LM) *Falcon* after the US Air Force Academy mascot and the Command Module was named *Endeavour* after the Royal Navy research ship, *HMS Endeavor*.

The launch and transit to the moon was largely uneventful with the most significant problem being a small water leak that was fixed by the crew. There was also broken gauge cover in the LM which required the crew to use a vacuum and tape to clean up the broken glass.

Lunar orbit insertion went as planned and like Apollo 14, the crew performed a descent orbit insertion burn to put the Hadley landing site at the orbit's low point of just under 9 miles from the surface. This maneuver saved considerable fuel for the LM's descent. The first attempt to undock the LM failed due to a loose connector. The second attempt was successful, and *Falcon* began its powered descent.

After the pitch over maneuver when the crew could finally see the lunar landscape, they were disoriented since the simulations did not accurately portray the lighting and shadows before them. Also, they were 3,000 feet off the planned flight path which added to the visual queue problem. Eventually Scott located Hadley Rille in the



Apollo 15 Dave Scott, Al Worden, and Jim Irwin

Apennine mountains and maneuvered towards the planned landing spot.

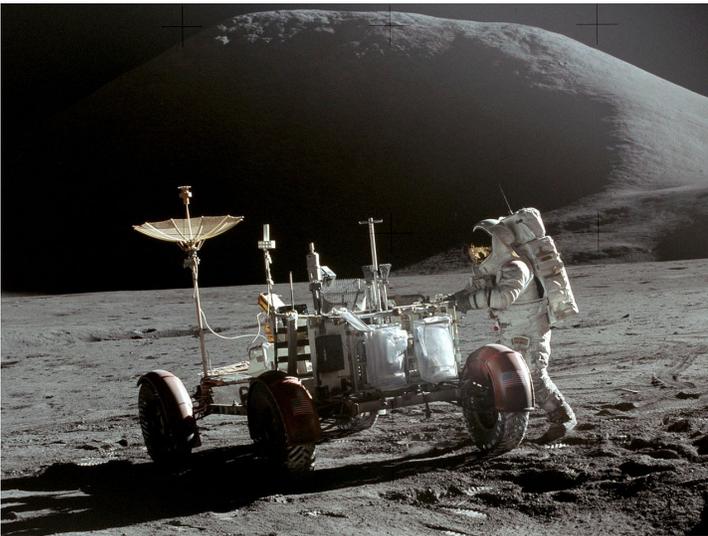
Visibility from dust blown about from the descent engine became a problem as they neared the surface. There was always a concern during LM landings that dust might blowback into the engine causing an explosion. For that reason, whenever the landing pad probes made contact the SOP was to throttle down the engine. When Irwin called out "Contact!" the LM was already in a descent and the remaining fall resulted in the hardest lunar landing of all Apollo missions. The LM also landed on the ridge of a small crater that had not been visible to the crew which resulted in the LM leaning backwards and to the left.

After landing, Scott spent a half hour scouting the landing site from the docking hatch located at the top of the LM. Afterwards



Apollo 15 launch

the crew slept before debarking for the first EVA. The first order of business was to remove the rover from the descent stage which was difficult due to the angle of the LM. Upon deploying the rover, Scott and Irwin discovered the front wheel steering was inoperable, but it handled fine with just the rear wheel steering.



Jim Irwin and the Lunar Rover

They were able to see and navigate to Elbow crater after a short drive where they retrieved some samples. From there they drove near the Mons Hadley Delta and took more samples. Then they returned to the LM and began deploying the Apollo Lunar Surface Experiments Package (ALSEP) before concluding the first EVA.

Gremlins repaired the front wheel steering during the break between the first and second EVA and it would remain operational for the rest of the surface mission. The destination of the second EVA was Mons Hadley Delta. It was there that they collected a rock sample that would be known as the Genesis rock. It was found to be over 4 billion years old and likely from the early lunar crust. The chance of finding such rock samples was one of the reasons the Hadley Rille landing site was chosen for the mission. When they returned to *Falcon*, Scott and Irwin continued work on the ALSEP and planted the US Flag.



Falcon with the Swan Range in the background (Note the lander slant)

The third EVA concentrated first on retrieving a core sample which had proven difficult in the first two EVAs. After considerable time one was finally secured and proved to be an important sample in understanding lunar history. However, the time it took cut short the time available for the next road trip which was diverted from the North Complex hill region to the edge of Hadley Rille.

Back at the *Falcon*, Scott performed a demonstration of Galileo's theory that two objects in a vacuum will always fall at the same rate regardless of mass using a hammer and falcon feather.

Scott then moved the rover to a location where the onboard camera could relay video of the ascent stage launch. There he also left a plaque and small metal statue called *Fallen Astronaut* to memorialize the 14 US and Soviet astronaut fatalities.



Jim Irwin salutes the US Flag with Falcon and the Lunar Rover in the background

Combined, the three EVAs amounted to 18.5 hours of time spent outside the LM where the two astronauts also collected 170 pounds of lunar samples.

Al Worden was kept busy the entire time *Falcon* was on the lunar surface supported by his own CAPCOM. Much of this involved photography and running experiments located in the Scientific Instruments Module (SIM) bay.



Lunar surface photography by Al Worden



View of the SIM bay in the Service Module

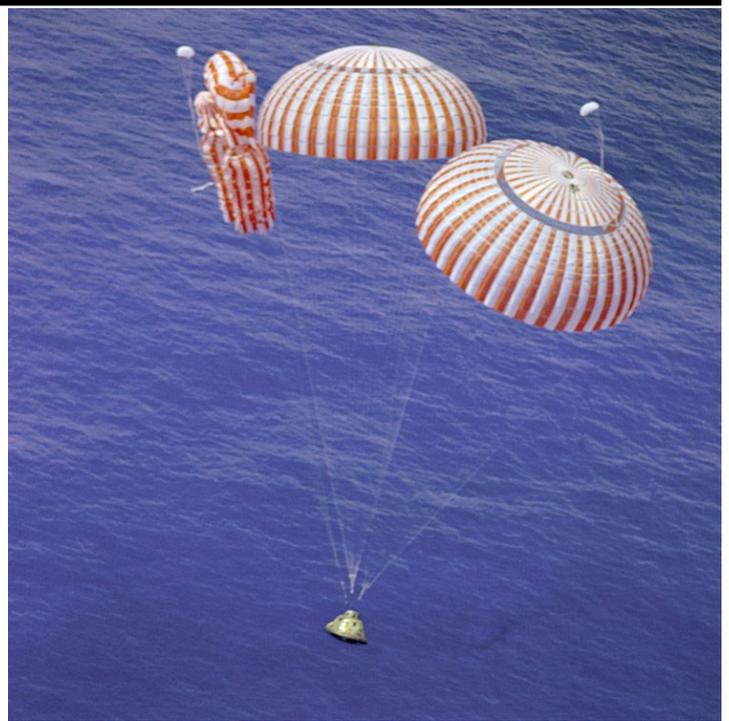
Falcon's ascent stage launched from the lunar surface on 2 August after spending just under 67 hours on the moon. Rendezvous and docking went as planned and once all the samples had been transferred to *Endeavour*, Falcon's ascent stage was jettisoned. It's impact on the lunar surface was recorded by seismometers left by Apollo 12, 14, and 15.



Al Worden performing a deep space EVA to retrieve SIM data cassettes

Apollo 15 remained in lunar orbit for two more days as the crew continued working on more experiments including the deployment of the Particles and Fields satellite. On 4 August *Endeavour* departed lunar orbit for the return trip to Earth. The following day, Al Worden performed an EVA to retrieve SIM data cassettes from the service module. This was the first deep space EVA, occurring nearly 200,000 miles from Earth.

During reentry, reaction motor fuel burned through the risers of one of the three main parachutes causing it to provide only about 1/5 its normal capacity. This resulted in the capsule landing with two chutes, which it was designed to do.



Falcon Command Module descending on two of three main parachutes

The heralded scientific achievements of Apollo 15 were soon overshadowed by a postage stamp scandal. The crew had made a deal with a West German stamp dealer to carry unauthorized postal covers. Some were kept by the crew and the rest given to the dealer in exchange for about \$7000 per crew member. Though the crew returned the compensation before the agreement was discovered, they nevertheless, were removed as the backup crew for Apollo 17 and never flew in space again.

Apollo 15 was a huge success and paved the way for the following two missions. They effectively tested and validated the Lunar Rover, brought back important lunar samples, and performed the first deep space EVA. The Apollo 15 Command Module Falcon is on display at the US Air Force Museum at Wright Patterson Air Force Base, Dayton, OH.



Apollo 15 crew boarding the USS Okinawa



1:10 Scale Nike Smoke Sounding Rocket

ROCKET SCALE DATA

Buzz Nau

This is the scale data pack for our team entry at NARAM 62. The Nike Smoke is a great scale round if you are interested in trying sport scale competition for the first time. This data can be applied to Nike Smoke kits by MPC, Quest, and Estes or a scratch-built model. Buzz

This Nike Smoke model is based on NASA color photo 68-HC-55 taken at Wallops Island Flight Facility.

Construction:

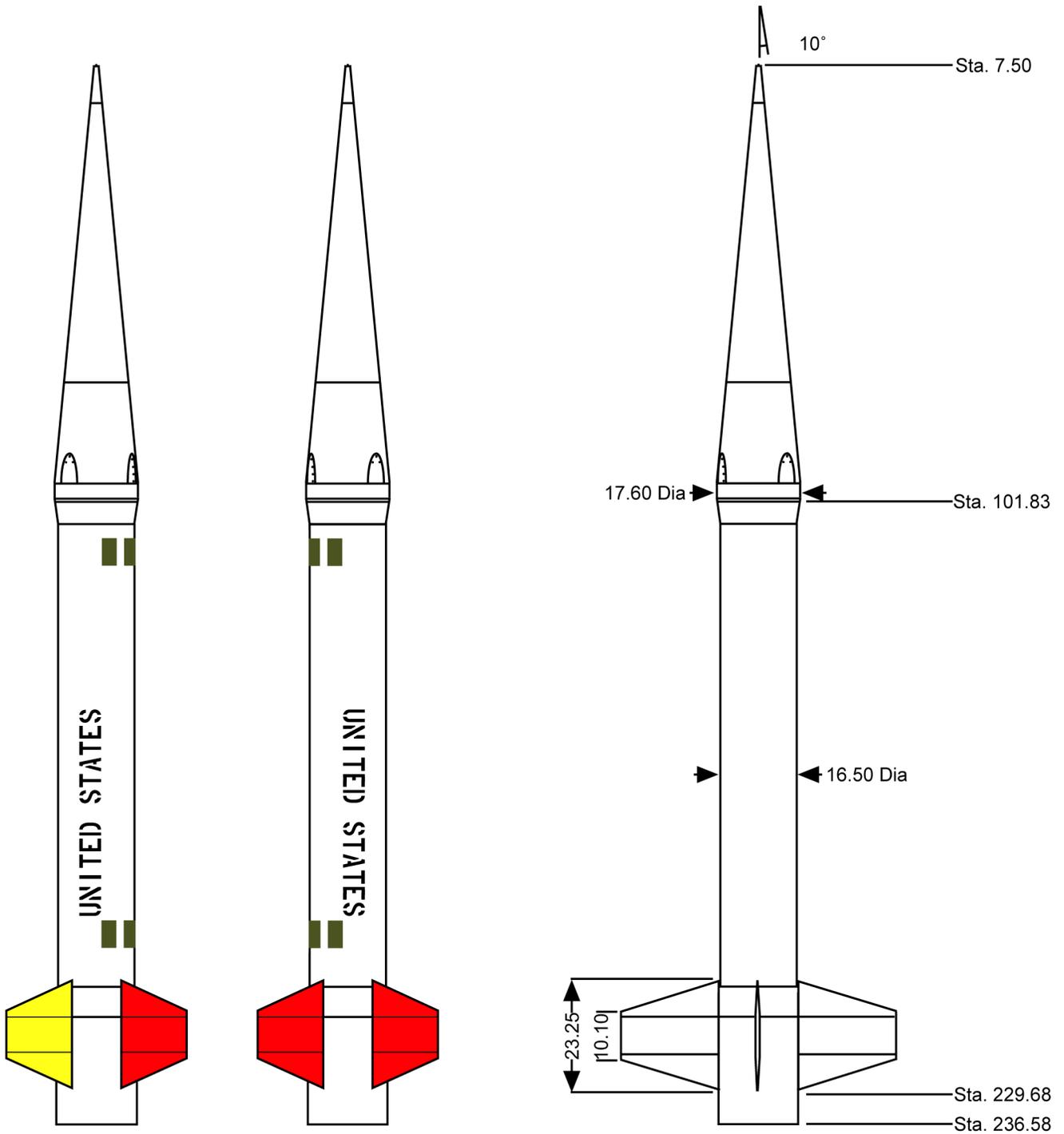
- 1 – Centuri Nike Smoke PNC-16 nose cone
- 1 – Centuri ST-16 body tube
- 1 – 18mm motor mount
- 4 – Card stock and balsa built-up fins
- 1 – launch lug and stand off
- 1 – Recovery system (16" parachute)

The card stock fins were drawn on a MacBook using Intaglio. Each fin was printed as one piece, folded at the leading edge, bent along the mold lines, and sealed along the trailing edge. There is an internal balsa core for support and added surface area for adhering to the body tube. The rest of the construction was performed using basic techniques and materials.

Finishing and Markings:

Gloss paints were used until the decals were applied and the model was then spayed with dullcote. The decals were created using Photoshop and printed on inkjet decal paper. The olive drab rectangles were areas covered by the rocket transport cradle and masked the original color of the Nike motor when it was painted white. Locations and sizes were derived from NASA photo 68-HC-55. The "UNITED STATES" stencil is centered on the motor (body tube) lengthwise on both sides and slightly higher than center between the fins (see page from G. Harry Stine's Nike Smoke *Model Rocketry* magazine article 10/69).





Color Data

- Flat White
- Flat Black
- Olive Drab
- Fluorescent Yellow
- Fluorescent Red

Nike Smoke Sounding Rocket

Drawn by Buzz Nau

References:

Nike Smoke Meteorological Rocket, G. Harry Stine, Model Rocketry, October 1969

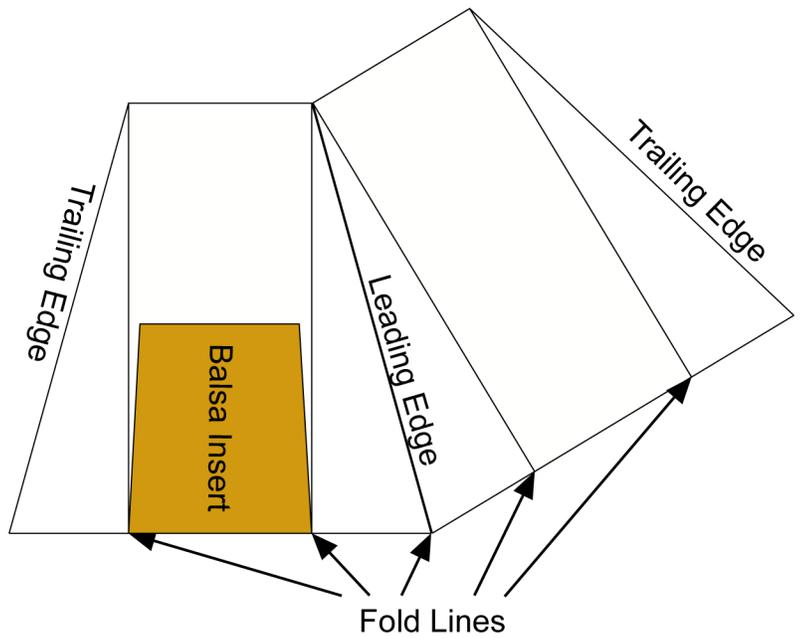
Nike Smoke Scale Data Sheet, Centuri Engineering Company, 1971
 NASA photo 68-HC-55

Dimensions in inches

A few notes on this particular model. The photo I used for color documentation isn't very good. It's faded and the colors are no longer close. Points were docked for that. Also, the cradle pad marks are not crisp rectangles like I modeled. Points were also docked there. The card stock fins could have been built a lot better, but I was under a time crunch. Still, I felt they were better and more uniform than if I had tried to sand the airfoils. You can't seem to get florescent red paint anymore. Orange and yellow, yes, even green, but I couldn't find red anywhere and settled for a red that sorta matched the photo (not really). Again, points were lost.

Tips

- Use a straight edge, ballpoint pen, and medium pressure to trace over the fold lines. This will result in sharp fold lines
- Use white glue to seal the trailing edges together
- Use a balsa insert to internally support fin core
- Use wood filler to seal the open fin tips
- Refer to the photo you use for your data for the location of the "UNITED STATES" and cradle mark decals
- Use gloss paints and finish with dull coat after decals



FIN PATTERN

UNITED STATES



DECAL MARKINGS





CURRENT EVENTS IN SPACE EXPLORATION

Launch activity was down over the past couple of months especially for SpaceX and there were a couple of missteps, but hopefully those programs apply what they learn from the failures and bounce back. There was also a space race of sorts to see which organization's founding billionaire would reach space first (and which definition of "space"), Virgin Galactic's Richard Branson or Blue Origin's Jeff Bezos.



The first launch from this period of coverage was Virgin Orbit's *Tubular Bells* mission on 30 June 2021. A *Launcher One* vehicle was launched from the Boeing 747 *Cosmic Girl* mothership over the Mojave Air and Space Port. The payload consisted of seven small military satellites from the Netherlands and US.



Richard Branson's other aerospace venture, Virgin Galactic, flew a historic mission on 11 July 2021. With Richard Branson among the crew, SpaceShip Two vehicle VSS Unity, made a "passenger" suborbital flight over Spaceport America in New Mexico. VSS Unity was carried aloft and launched from White Knight Two, VMS Eve, with two pilots and three other passengers to 53 miles, just beyond the edge of space as defined in the US. The FAI international recognized edge of space (the Von Karman line) is 100km or 62 miles. This flight paves the way for future Virgin Galactic tourism flights to space.



Trailing Branson's flight by 9 days, Jeff Bezos was one of four other passengers on the first crewed, suborbital flight of a New Shepard vehicle on 20 July 2021 from West Texas. The capsule separated from the booster and coasted to an altitude of 66.5 miles and then parachuted safely. The booster returned safely to the landing site a couple of miles from the launch pad.



The next New Shepard suborbital flight (NS-17) occurred on 26 August 2021, again from their launch site at Corn Ranch, TX. This was an unmanned test of Blue Origin's commercial payload capability. The vehicle carried 18 experiments, most of them for NASA. NS-17 reached ~350,000' and both the capsule and booster were recovered safely.



ROSCOSMOS performed two launches of their own and supported two more for Arianespace over the past 8 weeks. The first launch was a resupply mission, Progress MS-17 (78P) to the International Space Station (ISS) on 29 June 2021. The payload of 6,400 pounds of supplies was lofted by a Soyuz 2.1a launch vehicle. The mission was launched from the Baikonur Cosmodrome.



CURRENT EVENTS IN SPACE EXPLORATION



The following launch was a coop mission, WebOne 8, for Arianespace on 1 July 2021 from the Vostochny Cosmodrome. The Soyuz 2.1b/Fregat launch vehicle carried 36 WebOne internet satellites into a polar orbit. OneWeb is a competitor in the global satellite internet service.

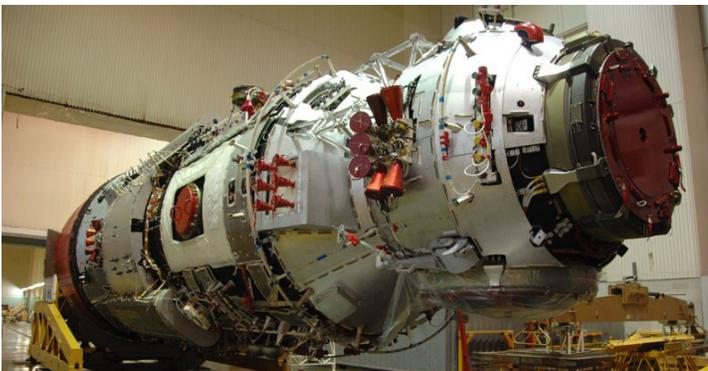
Finally, the fourth mission for ROSCOSMOS was another OneWeb flight (OneWeb 9) on 21 August 2021 from Baikonur Cosmodrome. The launch vehicle again, was a Soyuz 2.1b/Fregat with 34 OneWeb internet satellites. This mission increased the number of satellites in the polar constellation to 288.



MLM Nauka was the third ROSCOSMOS launch of this period. The launch vehicle was a Proton M which sent the Nauka research module to the ISS. Soon after it docked with the station it began firing thrusters which threw the ISS 45 degrees out of orientation due to a software glitch. Ground controllers were able to quickly resolve the issue and return the ISS back to its original orientation.

SPACEX

The first SpaceX flight of this period was the Transporter 2 mission on 30 June 2021 from Cape Canaveral Space Force Station. This was a dedicated rideshare flight carrying 88 satellites into a sun-synchronous orbit. The Falcon 9 utilized a third “transfer” stage which reduces interference with communications satellites. The booster had flown 8 times previously and landed successfully back at the space center.





CURRENT EVENTS IN SPACE EXPLORATION

SpaceX wouldn't fly again for nearly two months. The Dragon CRS-2 SpX-23 commercial resupply mission to the ISS flew on 29 August 2021 from the Kennedy Space Center. The Dragon resupply capsule carried 4,800 pounds of cargo and supplies to the ISS. This was the 4th flight of the Falcon 9 booster which made the first landing on the new drone ship *A Shortfall of Gravitas*. This also marked the 90th successful landing of a Falcon 9 booster.

On 10 August 2021 NASA launched a Northrup Grumman Antares with a Cygnus resupply module to the ISS in support of the Commercial Resupply Services. The Cygnus NG-16 vehicle carrying 8,200 pounds of supplies was named *S.S. Ellison Onizuka* after one of the astronauts lost in the Challenger incident.



NASA successfully completed DYNAMO-2 with the launch of the mission's second Black Brant IX sounding rocket on 11 July 2021 from Wallops Island. This mission was to study electric current in the atmosphere approximately 50 miles above the earth.

In addition to the previous OneWeb flights, Arianespace launched a pair of satellites on 30 July 2021 aboard an Ariane 5 ECA from the Guiana Space Centre. The One Star D2 telecom satellite is the 7th one in the One Star satellite constellation. The network will provide telecom services to South America, Mexico, and Central America. The Eutelsat Quantum is reprogrammable commercial telecom satellite servicing the Middle East North Africa region.





CURRENT EVENTS IN SPACE EXPLORATION

An Arianespace Vega vehicle was launched on 16 August 2021 from the Guiana Space Centre carrying the Pleiades Neo 4 high resolution Earth observation satellite. The satellite is owned and operated by Airbus Defense and Space. The Vega also carried four rideshare satellites.

Indian Space Research Organisation

One of the two launch failures during this period occurred on 11 August 2021 when the third stage of an Indian GSLV MkII failed to ignite. The payload, the EOS-03 (GISAT-1) Earth observation satellite was lost.



Rocket Lab held one Electron launch this period, the *It's a Little Chile Up Here* mission, from their New Zealand launch site on 29 July 2021. This was a successful follow up to the previous launch which suffered a second stage failure. The DOD payload called Monolith was hush hush, so there are no details on the mission or what was carried.



The second launch failure was the STP-27AD1 mission by Astra Space. At ignition the Astra 3 began veering away from the pad and not gaining any altitude. The vehicle finally started climbing once enough fuel weight had been burned, but Ground Control cut the engines just before reaching Max-Q.



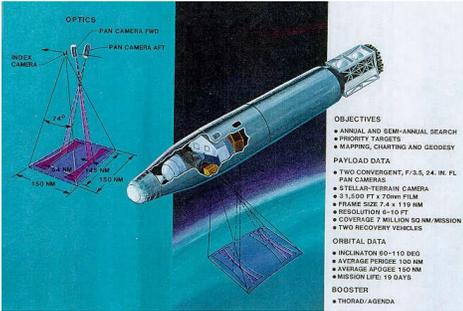


THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

60 Years Ago - 1961

July 7: Discoverer 26 launched by Thor Agena from Vandenberg AFB



July 12: Tiros 3 launched by Thor Delta from Cape Canaveral



July 12: Midas 3 launched by Atlas from Vandenberg AFB

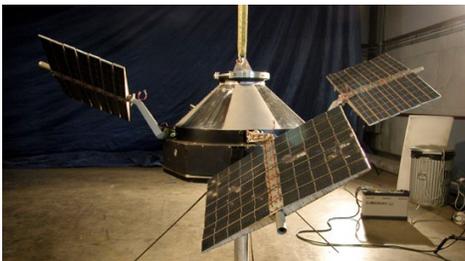
July 21: Mercury-Redstone 4 (MR-4) named Liberty Bell 7, Virgil I. "Gus" Grissom, second suborbital flight for the U.S.



from Cape Canaveral. Space capsule sank in Atlantic after successful landing.
 August 6: Gherman S. Titov launched aboard Vostok 2 from Baikonur Cosmodrome



August 15: Explorer 12 launched by Thor Delta from Cape Canaveral



August 23: Ranger 1 launched by Atlas Agena, failed from Cape Canaveral



August 25: Explorer S55 A (Explorer 13) launched by Scout from Wallops Island
 August 30: Discoverer 29 launched by Thor from Vandenberg AFB

55 Years Ago - 1966

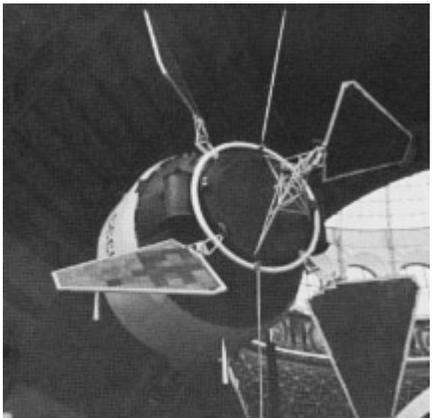
July 1: Explorer 33 launched by Delta from



Cape Canaveral
 July 5: Saturn rocket (SA-203) launched, orbital test from Cape Canaveral



July 6: Proton 3 launched from Baikonur Cosmodrome



July 12: First M2-F2 flight, pilot Milton Thompson, DFRF, Edwards AFB





THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

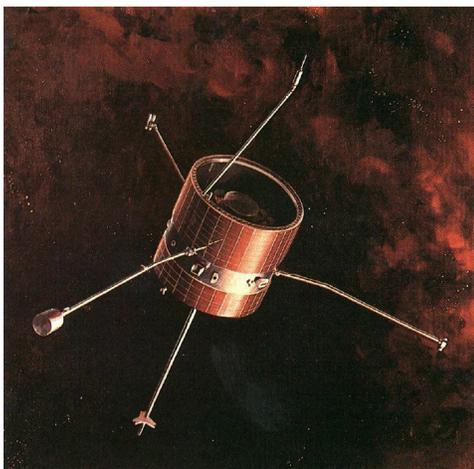
July 18: Gemini 10 (GTA-10 Gemini Titan) launched, with crew composed of John W. Young and Michael Collins, from Cape Canaveral. First dual rendezvous (Gemini 10 with Agena 10, then Agena 8).



August 10: Lunar Orbiter 1 launched by Atlas Agena from Cape Canaveral



August 17: Pioneer 7 (Pioneer B) launched by Delta from Cape Canaveral



August 24: Luna 11 (USSR Moon Orbiter) launched by Modified SS-6 (Sapwood) or Molniya
August 25: Saturn rocket (SA-202) launched, suborbital flight test from Cape Canaveral



50 years Ago - 1971

July 8: Solrad 10 (Explorer 44) launched by Scout from Wallops Island



July 26: Apollo 15 Saturn V launched with crew of David R. Scott, James B. Irwin, and Alfred M. Worden from Kennedy Space Center. First use of a lunar rover. Also launched The Apollo 15 subsatellite (PFS-1) into lunar orbit



August 25: First supersonic flight of M2-F3, pilot William Dana, DFRF, Edwards AFB



45 years Ago - 1976

July 1: The National Air and Space Museum, Smithsonian Institution, Washington, DC, officially opens to the public

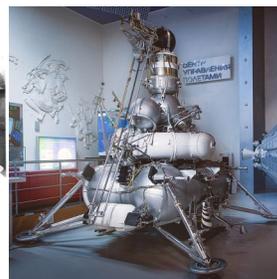
July 8: Palapa 1 launched by Delta from Cape Canaveral



July 20: Viking 1 lands on Mars, becoming the first successful operational spacecraft to land there



August 9: Luna 24 (USSR Moon Sample Return) launched by Proton K from Baikonur Cosmodrome. The last of the Luna series of spacecraft, the mission of the Luna 24 probe was the third Soviet mission to retrieve lunar ground samples



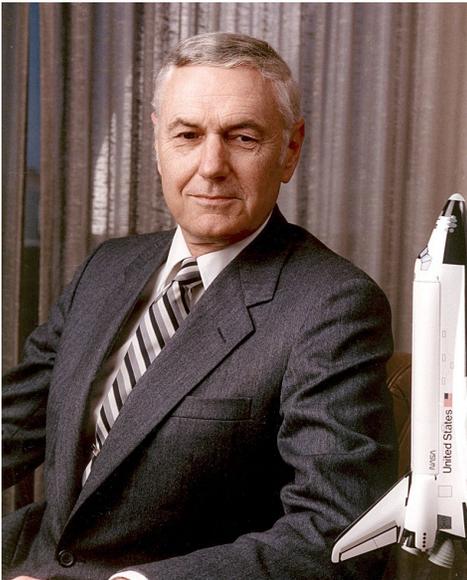


THIS MONTH IN AEROSPACE HISTORY

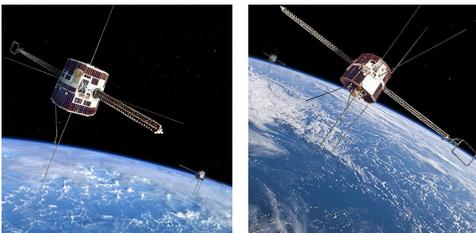
Source—NASA / ROSCOSMOS Archives

40 Years Ago - 1981

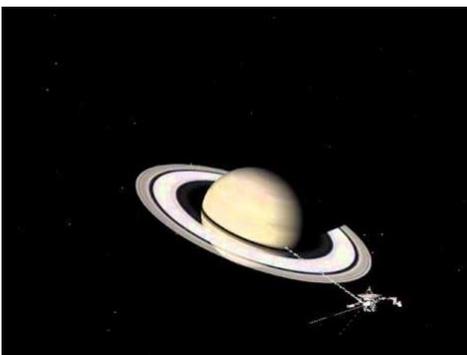
July 10: James M. Beggs took office as sixth NASA Administrator



August 3: Dynamics Explorer 1 & 2 launched by Delta from Vandenberg AFB



August 26: Voyager 2, Saturn flyby at a distance of about 63,000 miles. It captured images of the planet's moons and rings



35 Years Ago - 1986

August 4: Cosmos 1769 launched by a Modified SS-9 (SCARP) or SS-13 (SCRAG) from Baikonur to perform naval radar and signal reconnaissance as part of

the Electronic Ocean Reconnaissance Satellite (EORSAT) Program

30 Years Ago - 1991

July 15: Research pilot Edward Schneider flew the F/A-18 High Angle-of-Attack Research Vehicle (HARV), with thrust-vectoring paddles, for repair and reboost



August 2: STS-43 (Space Shuttle *Atlantis*) launched from KSC. Crew: John E. Blaha, Michael A. Baker, Shannon W. Lucid, G. David Low, and James C. Adamson. That same day the Tracking and Data Relay Satellite-5 was ejected into orbit from the cargo bay. Landed August 11 at KSC. Mission Duration: 8 days, 21 hours

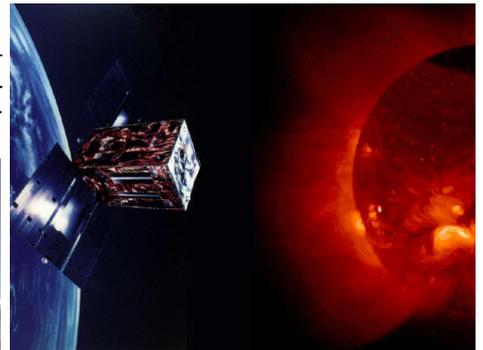


August 14: Intelsat 6 F-5, an International mammoth communications satellite, was launched from the Kourou Space Center, French Guiana using the Ariane 4 (44L model) booster rocket

August 15: Meteor/Toms (Meteor 3-5) launched by the U.S.S.R. using the Tsiklon 3 booster rocket from Plesetsk. The spacecraft also carried a U.S. built Total Ozone Mapping Spectrometer (TOMS) on a joint U.S. and Soviet mission to study the ozone layer

August 30: Solar-A launched by M3-SII from Kagoshima Space Center. A joint UK, US, and Japanese venture, it provided val-

uable data about the Sun's corona and solar flares



25 Years Ago - 1996

July 2: TOMS-EP (Total Ozone Mapping Spectrometer-Earth Probe) spacecraft launched by a Pegasus XL rocket from an L-1011 airplane over southern California. Intended to complement ADEOS-TOMS to monitor global ozone distribution and measure sulfur dioxide from volcanic activity.

August 17: Soyuz TM-24, a Russian transport spacecraft, carried cosmonauts Claudie Andre-Deshays (France), Valery G. Korzun, and Alexander Y. Kaleri to the MIR Space Station. It was launched by a Soyuz-U rocket from Baikonur and docked with Mir on August 19



August 17: ADEOS (ADVANCED Earth Observation Satellite) - Japanese remote sensing spacecraft launched by an H-2 rocket from Tanegashima Space center. Named Midori post-launch, it carried instruments to monitor wind and temperature on ocean surfaces and aerosols, ozone, and greenhouse gases in the atmosphere

August 21: FAST (Fast Auroral Snapshot explorer) dedicated to study the physical processes that produce auroras launched by a Pegasus-XL rocket from aboard an L-1011 cargo plane flying out of Vandenberg AFB



THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

20 Years Ago – 2001

July 12: STS-104 (Space Shuttle *Atlantis*) launched from KSC. Crew: Steven W. Lindsey, Charles O. Hobaugh, Michael L. Gernhardt, James F. Reilly, and Janet L. Kavandi. International Space Station Flight 7A. Delivered the ISS Airlock, and docked with the ISS on July 13. Landed July 24 at KSC. Mission Duration: 12 days, 18 hours



August 6: Galileo probe Flyby of Io
 August 8: Genesis probe launched by a Delta 2 rocket from Cape Canaveral. Part of NASA's Discovery Program. Genesis was designed to discover the origin/genesis of solar system. The spacecraft was directly injected into the Langrangian-1 (L-1) region (located at about 1.5 million km in the sunward direction) to collect solar wind samples. Crashed Sept. 8, 2004 at U.S. Army Dugway Proving Ground in Utah.

August 10: STS-105 (Space Shuttle *Discovery*) launched from KSC to dock with the ISS (Flight 7A.1). Crew: Scott J. Horowitz, Frederick "Rick" W. Sturckow, Daniel T. Barry, and Patrick G. Forrester. The payload included the Early Ammonia Servicer (EAS), to be installed on the outside of the ISS, and the Multi-Purpose Logistics Module (MPLM) Leonardo. Returned the Expedition 2 crew: Yury V. Usachev,



James S. Voss, and Susan J. Helms; and transported the Expedition 3 crew: Frank L. Culbertson, Jr., Vladimir N. Dezhurov, and Mikhail Tyurin. Landed at KSC on August 22. Mission Duration: 11 days, 21 hours

15 Years Ago – 2006

July 4: STS-121 (Space Shuttle *Discovery*) launched from KSC. Crew: Stephanie D. Wilson, Michael E. Fossum, Steven W. Lindsey; commander, Piers J. Sellers; mission specialist, Mark E. Kelly, pilot; Thomas Reiter of Germany with the European Space Agency and Lisa M. Nowak. International Space Station Flight ULF1.1. Completed the return-to-flight objectives by flying an improved external tank and testing on-orbit shuttle repair procedures and preparing the International Space Station for future assembly. Landed at KSC on July 17. Mission Duration: 12 days, 18 hours



10 Years Ago – 2011

July 8: STS 135 (Space Shuttle *Atlantis*) launched from KSC. It docked with the International Space Station's (ISS) Harmony module on July 10. Crew: Chris Ferguson, Doug Hurley; Rex Walheim and Sandy Magnus, it was the 135th and final Space Shuttle mission. The mission's primary cargo was the Multi-Purpose Logistics Module (MPLM) Raffaello and a Lightweight Multi-Purpose Carrier (LMC)



July 15: Dawn became the first probe to enter orbit around an object in the main asteroid belt between Mars and Jupiter, the asteroid Vesta

August 5: Juno launched from Cape Canaveral Air Force Station to provide the most extensive survey ever of Jupiter while in polar orbit for approximately one year from 2016 to 2017. The launch vehicle was an Atlas V 551



5 Years Ago – 2016

July 4: After an almost five-year journey to the solar system's largest planet, NASA's Juno spacecraft successfully entered Jupiter's orbit

July 7: Soyuz MS-01 launched by Soyuz FG from Tyuratam (Baikonur Cosmodrome), Kazakhstan. The MS variant is the last in a series of planned upgrades for the veteran Soyuz vehicle of the Russian Federal Space Agency. Crew: NASA astronaut Kate Rubins, cosmonaut Anatoly Ivanishin of the Russian space agency Roscosmos, and astronaut Takuya Onishi of the Japan Aerospace Exploration Agency (JAXA). (Expedition 48). Installed International Docking Adapters for future commercial vehicles.





LAUNCH WINDOWS

Launch dates from SpaceFlight.com

September 2021

Falcon 9 - Starlink 2-1

Launch time: TBD

Launch site: SLC-4E, Vandenberg AFB

A SpaceX Falcon 9 rocket will launch on the first dedicated mission with Starlink internet satellites from Vandenberg Space Force Base.

September 14, 2021

Soyuz 1 OneWeb 10

Launch time: TBD

Launch site: Baikonur Cosmodrome

A Russian Soyuz rocket will launch 34 satellites into orbit for OneWeb, which is developing a constellation of hundreds of satellites in low Earth orbit for low-latency broadband communications.

September 15, 2021

Falcon 9 - Inspiration4

Launch time: TBD

Launch site: LC-39A, Kennedy Space Center

A SpaceX Falcon 9 rocket will launch a Crew Dragon spacecraft on the first all-private, all-civilian orbital mission, known as Inspiration4.

September 2021

Electron - BlackSky 12 & 13

Launch time: TBD

Launch site: Mahia Peninsula, New Zealand

A Rocket Lab Electron rocket will launch two small second-generation satellites for BlackSky's commercial fleet of Earth observation spacecraft.

September 23, 2021

Atlas 5 1 Landsat 9

Launch time: 1811 GMT

Launch site: SLC-3E, Vandenberg AFB

A United Launch Alliance Atlas 5 rocket will launch the Landsat 9 Earth observation satellite for NASA and the U.S. Geological Survey.

Late September 2021

Ariane 5 - SES 17 & Syracuse 4A

Launch window: TBD

Launch site: ELA-3, Kourou, French Guiana

Arianespace will use an Ariane 5 ECA rocket, designated VA255, to launch the SES 17 and Syracuse 4A communications satellites.

Late September 2021

Electron - BlackSky 14 & 15

Launch time: TBD

Launch site: Mahia Peninsula, New Zealand

A Rocket Lab Electron rocket will launch two small second-generation satellites for BlackSky's commercial fleet of Earth observation spacecraft.

Sept. 30/Oct. 1, 2021

Epsilon - RAISE 2

Launch time: 0048-0059 GMT

Launch site: Uchinoura Space Center, Japan

A Japanese Epsilon rocket will launch the Rapid Innovative Payload Demonstration Satellite 2, or RAISE 2, technology demonstration satellite for the Japan Aerospace Exploration Agency. Eight smaller rideshare payloads will also be on this launch.

TBD

Falcon 9 - Starlink

Launch time: TBD

Launch site: SLC-40, Cape Canaveral Space Force Station

A SpaceX Falcon 9 rocket will launch a group of Starlink internet satellites.

October 5, 2021

Soyuz - ISS 65S

Launch time: TBD

Launch site: Baikonur Cosmodrome, Kazakhstan

A Russian government Soyuz rocket will launch the crewed Soyuz MS-19 spacecraft to the International Space Station.

October 2021

Soyuz - OneWeb 11

Launch time: TBD

Launch site: Vostochny Cosmodrome

A Russian Soyuz rocket will launch 36 satellites into orbit for OneWeb.

October 2021

Falcon Heavy 1 USSF 44

Launch time: TBD

Launch site: LC-39A, Kennedy Space Center

A SpaceX Falcon Heavy rocket will launch the USSF 44 mission for the U.S. Space Force. The mission is expected to deploy two spacecraft payloads directly into geosynchronous orbit, one of which is the military's TETRA 1 microsatellite.

October 16, 2021

Atlas 5 - Lucy

Launch time: 0934 GMT

Launch site: SLC-41, Cape Canaveral

Space Force Station

A United Launch Alliance Atlas 5 rocket will launch NASA's Lucy spacecraft which will fly by seven Trojan asteroids, a unique family of asteroids that orbit the sun in front of and behind Jupiter.

4th Quarter, 2021

Electron - CAPSTONE

Launch time: TBD

Launch site: Mahia Peninsula, New Zealand

A Rocket Lab Electron rocket will launch on its second mission from a new launch pad at the Mid-Atlantic Regional Spaceport at Wallops Island, Virginia. The Electron rocket will carry NASA's Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment, or CAPSTONE, mission to the moon.

4th Quarter, 2021

Vega - CERES

Launch time: TBD

Launch site: ZLV, Kourou, French Guiana

An Arianespace Vega rocket, designated VV20, will launch three CERES signals intelligence satellites for the French military.

Late October 2021

H-2A - QZS 1R

Launch time: TBD

Launch site: Tanegashima Space Center, Japan

A Japanese H-2A rocket will launch a replacement satellite for Japan's Quasi-Zenith Satellite System, which provides regional navigation services over the Asia-Pacific Region.

October 28, 2021

Soyuz - Progress 79P

Launch time: TBD

Launch site: Baikonur Cosmodrome

A Soyuz rocket will launch the 79th Progress cargo delivery ship to the International Space Station.

October 31, 2021

Falcon 9 - Crew 3

Launch time: TBD

Launch site: LC-39A, Kennedy Space Center

A SpaceX Falcon 9 rocket will launch a Crew Dragon spacecraft on its third operational flight with astronauts on-board to the International Space Station.

OUR MEMBERS IN THE FIELD



Mark launches his Bullup and AI watches on



Trevor Harrison and a Wildman Punisher at Crapshoot



Tony Haga preps one of Scott's 3D printed rockets



Fred Zeigler, Chris Palmer, and Dale Hodgson.... The Debauchery Brothers



AI De la Iglesia and his Initiator at NARAM 62