

TOTAL IMPULSE



JACKSON MODEL ROCKET CLUB

TOTAL IMPULSE VOLUME 21, No. 3

JMRC
HUVARS

HURON VALLEY ROCKET SOCIETY

MAY - JUNE 2021



National Sport Launch: 2021

WINNING STRATEGIES FOR LEVEL ONE CERTIFICATION

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Muskegon June Launch Coverage



Der Big Red Max Build Part 2



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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/zc51C1

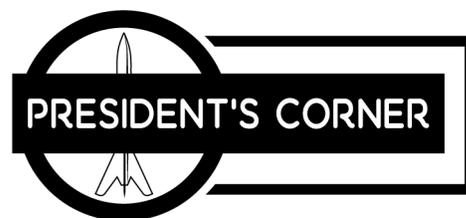
Fade To Black Rocket Works

Heavy Duty Launch Pads For Every Need

All pads are powder coated for lasting durability

<https://www.facebook.com/fziegler13/>

Concept Mini \$119	Concept X-treme \$325
Concept \$285	Ground Pounder \$345
TARC Pad \$285	Ground Pounder Heavy \$425
+Shipping	



Welcome to the May/June 2021 issue of *Total Impulse*. Things are finally returning to the old normal in Michigan and launches have resumed in the state. We are behind others in returning to operations due to issues with our sites. It just goes to prove you can never have too many options. As we are on the cusp of flying together as a club I want to take a moment to thank everyone who provided material to the newsletter which allowed me to provide issues on a regular basis. It has been a hard period that has taxed my motivation, but I felt it was important to keep our hobby in our minds as much as possible for when the time came that we were able to fly again. Until we do I highly encourage members to fly where and when they can. Several clubs in the state are flying regularly and in some cases, back to back weekends. Take advantage of these opportunities when you can. Several of us flew at Muskegon on June 19th and it was just what I needed to improve my motivation and look forward to the next launch. Most important, take care yourself and continue to be safe. Enjoy rocketry when and how you can and I hope to see you on the field soon!

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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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 Pending (MIS)
- September 11 Pending (MIS)
- October 9 Pending (MIS)
- November 13 Pending (MIS)

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.

What to do when life gets in the way of your plans?

I guess the next best thing to being out on the range flying is to prepare and invent to avoid excessive lost time when we can get back out there. I personally have wandered in many directions to help mentally as well as provide progress for the club. My two main topics have been refining python coding and a lot of 3d printing. Python has proven to be extremely universal and also has dialect for microprocessors which could be interesting for flight computers, launch components, etc.

The 3d printing has taken many turns as well. New avionics bays, nose cones, and basically any part that can appear in cad. The hybrid motor game has lots of room to experiment with new grain geometries or even a weeping grain to introduce new fuels during a burn. I hope everyone else has found a means to cope, and if things continue on the positive path we can all be back out on the field to formally test all of our builds and experiments that have been piling up

All organizations should pause from time to time and take stock in their assets. When looking at a rocket club I think the two most important assets are our members and land owners. A club without members is just a bunch of paperwork for nothing and a rocket club without a field is just hanging out with friends.

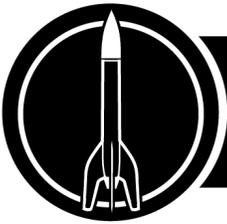
As we personally take stock I think we have an awesome membership and the BOD is trying to protect that asset as much as possible. We know it is a small token but suspending membership dues was a go to move. Thanks to the memberships past actions we are financially sound, not rich by any means but comfortable.

The other asset that is vital is our land owners; generous families, businesses, etc. That allow a lot of people to drive onto their property lighting propellant on fire with the anticipation that it flies straight and recovers safely. They put a lot of trust in us to adhere to safety protocols so we can continue to use the fields. We still have 3 great fields but the availability just hasn't been lining up for us yet. We will continue to try to find days that will work with schedules, crops, races, mother nature, and any other obstacles that presents itself.

I think we might have some good news in the very near future, but in the mindset of protecting our important assets I will let the suspense linger until we have official confirmation. I hope everyone stays safe and healthy and we can see everyone on the field very soon.

On the Cover:

(top - left) Steve Kristal at NSL 2021 (top - right) Randy Gilbert and his Level 1 LOC Ultimate. (bottom - left) JMRC/HUVARS at the June Muskegon Launch (bottom - right) The new Estes Der Big Red Max - Estes LLC photo



National Sport Launch: 2021

Steve Kristal

National Sport Launch was held May 29th through 31st in Alamosa, Colorado. The event, postponed from last year, was sponsored by a newer NAR section, the San Luis Valley Rocketeers, with assist from the group 2 hours north from Pueblo, CO, SCORE. Incredibly cool that such a new and small section contacted NAR offering to host NSL. They just thought the field was so nice that lots of fellow rocketeers would enjoy flying there. Being somewhat out of the way (4 hours south of Denver, 2 hours north of Santa Fe) they thought most rocketeers wouldn't ever consider coming there unless there was a special event. That was probably true, but I can tell you most of us who were there would definitely love to return.

Some of you may have been to NARAMs hosted by SCORE on their field right near Estes headquarters in Penrose. That field, too, is quite large but my understanding is the Alamosa field is even bigger.

Those of us living east of the Mississippi river have difficul-



(L-R) Chris Flanigan, Steve Kristal, and Matt Steele

ty even imagining flying on fields this big and beautiful. Absolutely spectacularly large, and beautiful. Waiver was to 30,000 feet and I RSO'd at least one flight flown to 23,000 feet. Truly amazing variety of rockets and impulses. Winds tended to pick up in the afternoon but the mornings were all really calm.

In all honesty, though, even better than the field was the group who ran the event. Headed by Matt Abbey, the host section could not have been nicer or more accommodating. Just incredibly nice, helpful folks. I wouldn't classify Alamosa as a resort destination but apparently they are quite busy during the summer with a wide variety of outdoor activities. Great Sand Dunes National Monument is located just a short drive away, and a number of attendees visited it during their trip. Food and accommodations in Alamosa were great. Rumor has it that NSL may return to Alamosa in the next few years. If so, try to make it.

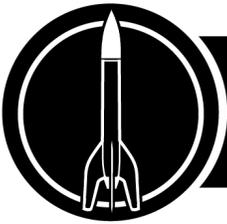
Highlight flights of the weekend for me were a number of the sport scale high power flights and seeing Frank Burke, of Dynasoar Rocketry, fly his huge RC gliding Astron Spaceliner on one of the Aerotech long burn H-13 Super Thunder motors. 15 second burn time!!! Watching Frank fly that thing to altitude, almost out of sight, was truly amazing!

Another highlight flight for me was watching Bob Sanford, who invented the Aerotech Initiator, fly an original, 50 year old, Centuri Jayhawk in memory of Doug Frost who passed away this year. Bob flew his ancient rocket on the newest motor from Quest, a Q-Jet B4-4. Wonderful flight.

Also of real note was getting to see Kevin Kuczek and Tim



Bob Sanford with his Aerotech Initiator which he designed



National Sport Launch: 2021

Steve Kristal



(L-R) Frank Burke and Matt Steele with their F-117 Knighthawks

Van Milligan's new FAI streamer model fly. Female molds for the model were made by our own Dan Harrison. Absolutely beautiful model which flies extremely well. Way better than anything I have. But, then, Kooch and Tim take streamer duration WAY more seriously than most of us. Just a real treat to see such high technology applied to such a theoretically simple event.

Final highlights were my setting a new NAR C-Altitude-Altitude record (635 m) and, sort of, watching Chris Flanagan set a new E-altitude record. I say "sort of" because we watched Chris's flight leave the tower, then we all lost sight of it. We had no idea which direction it went so we didn't even try to look for it. We just figured it was another donation to the altimeter gods. Then, about an hour later, I was doing RSO duty and happened to notice something glinting in the sun right next to the tape fence separating spectators from the launch pads. I walked over and, sure enough, it was the 15 foot long aluminized kapton streamer of Chris's rocket. It was no more than a 100 yards from where it lifted off. His altimeter data showed it took almost 3 minutes to fall to the ground from a little over 6000 feet. Absolutely incredible that no one saw it come down.

Chris's flight proved that we were correct in our desire to fly altitude record attempts in Alamosa. At 7500 feet, the air is very thin there. And Chris's record absolutely crushed the prior record set at NARAM 2 years ago in Muncie. I also flew an E-altitude attempt, saw mine come down far in the distance, but never found it after searching for over 3 hours. :(

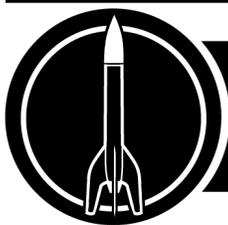
The first two days of the launch also coincided with the FAI North Coast Cup. Unfortunately, because of COVID travel restrictions, our great friends from Canada could not be with us this year, so the Cup was not an official FAI event. But flying on that field was just amazing. Lots of thermals and seemingly unlimited room to recover models. Indeed, 8 out of 23 of the parachute duration flights (S3) achieved the 5 minute max, with one flight being timed for over 14 minutes until it disappeared. The field had so little ground cover that almost all the models were recovered. One of mine landed over a half mile away and it was visible on the ground from the launch site! Absolutely amazing.

Of particular note was that I won the S2P precision altitude and duration event. My fairly lackluster performance came out on top because of a variety of technical problems for my competitors, LOL, rather than any real expertise on my part. As for my flying in the other events, best left unmentioned.

Overall, a truly wonderful weekend. If they host another NSL there definitely try to go.



Frank Burke and his Astron Spaceliner



Winning Strategies for Level 1 Certification

Randy Gilbert

The Internet is a great place to find out about hobby rocketry and the process of certification for use of higher power hobby rocket motors. It's also a source of constant confusion and at-odds opinions about Levels 1, 2, and 3 and how to successfully achieve certification at each level.

This article will not address strategies for successful Level 2 and 3 certification, so if that's what you're looking for, this ain't it. This article is dedicated to those stalwart souls who want to fly something bigger using an H or greater motor to achieve their Level 1 certification.

Let's talk about Level 1 first:

- What Level 1 certification is not:
 - An altitude contest
 - A velocity contest
 - A beauty contest
- What Level 1 certification is:
 - A construction test
 - A recovery test
 - A safety test
 - All of the above assume a nominal flight free of unexpected variations (in other words, stable and normal)
 - An exercise in risk (safety) management

In short, you specify the H or I impulse motor you are using for your flight and then you and your proctor or sponsor, need to answer all the checkboxes in the below "HPR LEVEL 1 CERTIFICATION CHECKLIST", with a check including the final and most important question, "Successful Flight?".

HPR LEVEL 1 CERTIFICATION CHECKLIST (Certification Team - Use this section Only for HPR Level 1 Certification Attempts)			
Preflight:	Motor(s) used: _____	(At least one motor must be an H or I Impulse Motor)	
	<input type="checkbox"/> Motor is certified	<input type="checkbox"/> FAA Waiver available (if required)	<input type="checkbox"/> Safety checklist complete (see back)
Flight:	<input type="checkbox"/> Model is stable	<input type="checkbox"/> Recovery system deployed	<input type="checkbox"/> Safe recovery
Post Flight:	<input type="checkbox"/> Verify that no major damage is Present. Minor impact damage or "zipper" is acceptable		
	<input type="checkbox"/> Verify motor(s) is (are) present	Successful flight?	<input type="checkbox"/> Yes <input type="checkbox"/> No



Low and Slow

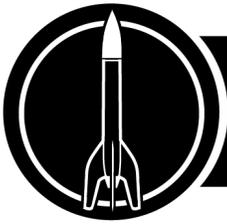
There are a lot of great rocket motors to choose from for your Level 1 certification flight. Chances are that you have already flown a G80 or G77, so you know how a motor with a high average thrust stresses a rocket. If you have done this successfully, great! If not, then you need to consider the stresses the rocket will endure with an H motor with anywhere from a low of 42 Ns to a whopping 399 Ns of average thrust. Because this is all about getting certified and this bullet is titled "Low and Slow" the example shared here will be an H motor in the 118 to 255 Ns average thrust range. These average thrusts should be sufficient to boost most 4 inch diameter rockets, which plays into the "Low and Slow" thesis again.

Circling back to remind you that this article is about how you can pass the Level 1 certification, the author is drawing upon the extensive experience of the sport rocketry community which I have accessed a many national and regional launches over the past ten years.

To implement low and slow, it is accepted that a rocket of not less than 3 inches in diameter is a good candidate for a Level 1 certification flight. There are a ton of great kit rockets out there that fill this niche. While you may choose to certify with a rocket of any diameter, this article recommends body diameters from 3 to 5.5 inches. Whether you choose a rocket powered by a 29 or 38mm motor is up to you. Rockets with 38mm motor mounts offer greater versatility and the option to use your existing 29mm motor hardware with a motor adapter from 38 to 29mm, to match your rocket's larger motor mount.

Regarding your high-power rocket motor, you may be assembling your high-power motor for the first time. This means you will be using reusable motor hardware you haven't used before. Get your sponsor or proctor to watch over your shoulder while you assemble the rocket motor.

USE THE MOTOR ASSEMBLY INSTRUCTIONS, you need them!



Winning Strategies for Level 1 Certification

Randy Gilbert

Your sponsor or proctor will also be able to confirm your motor assembly is proper and will result in a properly working rocket motor. They will also be able to guide you in tapering the delay grain to the proper time needed so your rocket will not eject the recovery system too soon or too late. Both situations could damage your rocket to an extent that may not allow you to pass your Level 1 certification.

In the case of large body diameters greater than 4 inches, your rocket may require an ejection charge greater than that included with your motor. You'll need guidance from your sponsor or proctor to know just how much, if any, black powder should be added to the ejection charge to pressurize the forward section of the rocket at apogee to deploy the recovery system. Finally, **DO NOT INSTALL THE IGNITER!** The igniter for high power motors should not be installed until the rocket is at the pad.

Don't Dual Deploy

Your Level 1 certification flight is an exercise in keeping it simple and straightforward. While the science of dual deployment has come a long way due to the Jolly Logic Chute Release (JLCR), it is not a requirement, nor is it particularly desirable, to add dual deployment to the list of things that can go wrong during your certification flight. Again, this article's about strategies to help you pass the Level 1 certification.

The author is a big fan of the JLCR and has used it without failure on tens of flights. The author has also seen it fail when used by rocketeers with far more high-power experience than he will probably ever have. Therefore, while the JLCR is a great device enabling dual deployment for the simplest of us, it is not recommended for your certification flight. It's just something else to go wrong and this article is about how to maximize your opportunities to do everything right. Just let your JLCR sit out your certification flight.

Not having enough experience with actuating altimeters and sizing black powder charges for "old school" dual deployment should tell you that it is not a risk mitigating strategy to employ in your Level 1 certification flight. Just don't do it now. Save it for L2 or later.

Attach the Parachute to the Base of the Nose Cone (Get the Laundry Out!)

There are as many ways to implement a recovery system in your rocket as there are rocketeers in the world. That known, shouldn't you use a method that gets the parachute out of the rocket body as soon as the ejection charge pushes off the nose cone? The answer is "yes". It is with that advice that you should attach your parachute to the base of the nose cone for your Level 1 certification flight. The proximity of the parachute to the nose cone should work to your advantage regardless of early or late ejection. Just do it and make sure you get the laundry out.

Keep Your Zipper Up!

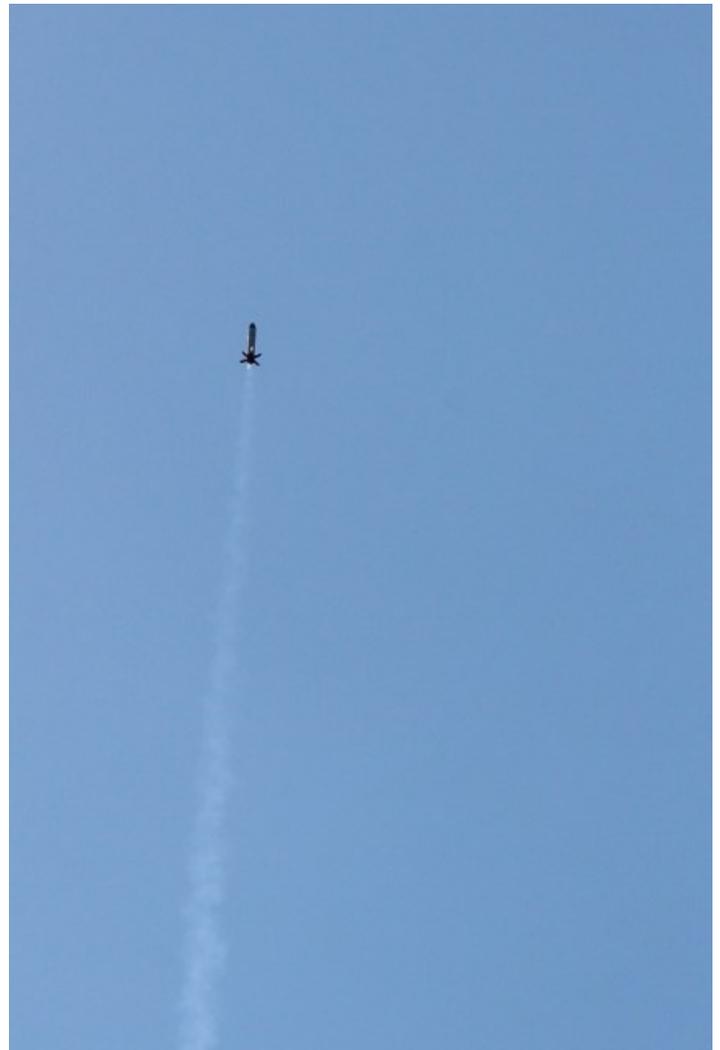
Early or late recovery system ejection increases the chance of "zippering" the main airframe tube with the shock cord. Zippering is the cutting of a notch or line by the shock cord when the rocket has too much velocity when the nose cone is ejected. The zipper is caused by the shock cord's ripping through the leading edge of

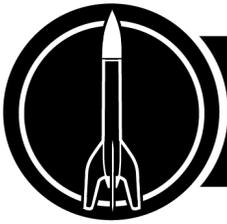
the main airframe and continuing down the side of the main airframe. It cuts like a wire through cheese, if that example helps.

So how do you avoid the zipper? The simplest way is to hold your shock cord taught and mark the shock cord at the point where it touches your main airframe leading edge with a marker or piece of tape. Now get creative and take a sponge, or an old rag (there are any number of household items that can be used), and wrap it around the shock cord exactly at that point where the cord touches the leading edge of the airframe.

Don't make a ball (although the author has seen them work), but more of a pillow, and secure the pillow to the shock cord with duct tape or some heavy duty thread or fishing line to hold it in place as a cushion against the leading edge of the main airframe tube (The author has also seen tie-wraps used to secure the pillow in place, but advises careful use.).

You fly with the hope the pillow will never be used, but in the event of an early or late recovery system deployment, you'll be





Winning Strategies for Level 1 Certification

Randy Gilbert

glad you installed it. That little pillow will, instead of allowing the shock cord to zipper through the leading edge of the main airframe and down the airframe's side, distribute the force broadly over its width at the airframe's leading edge, preventing the cut / zipping and saving your rocket.

Choose a Rocket with Fins Forward of the Rocket's Rear End (Avoid Swept Fins)

Reminding you again, this article is about strategies to help you pass the Level 1 certification. The certification has no requirement regarding fins. Retrieving the rocket intact with minimal or no damage is a big part of your certification flight's goals. For this reason it is recommended that you choose a rocket using fins of minimal rearward sweep and most preferably, fins that don't extend beyond the rear edge of the main airframe tube.

Why, you may ask. The answer is simple: Swept-back fins can put a huge stress on the fin/airframe joint at recovery. The rearward fin sweep creates a lever between the ground and the airframe at landing and the fin/airframe joints wind up bearing the entire load of the rocket's weight on one or two fin/airframe joints. The fins' landing loads have a completely different vector than the aerodynamic loads on the fins during flight. Fins that may be more than strong enough to withstand the highest of average impulse motors can fail in the blink of an eye when hurled into the ground sideways at velocities of greater than 18 feet per second. Inertia, in this respect, is your enemy. Thus, the recommendation of no sweep or minimal rearward swept fins for your certification flight rocket.

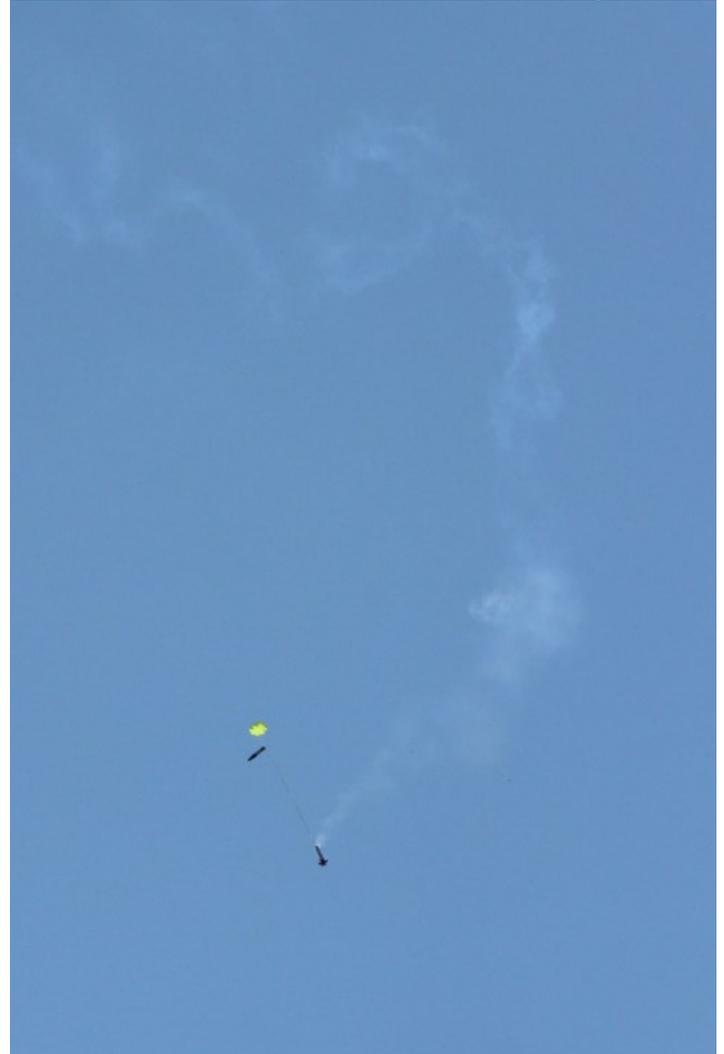
Copy a Fellow Rocketeer's Successful L1 Flight

Rocket club members are a wealth of experience when it comes to high-power certification at all levels. There's no rule that keeps you from copying another rocketeer's success, in fact I would encourage it. Ask that person to be your Level 1 mentor. Use what they learned, do what they did on their Level 1 certification flight. Success begets success.

Exercise Risk Management

Finally, your Level 1 certification is an exercise in risk management. Put otherwise, an exercise in safety management because a safe Level 1 flight means a low-risk flight and that's what you're striving for, elimination or mitigation of as many risks as possible. Think through your flight preparation, the flight and the recovery. Identify the points of failure (risk) by creating a checklist reflecting your individual, customized flight plan to eliminate or mitigate each one. It will be time well spent and it will have the advantage of being your guide when you get to the field on the big day. There's enough to concern yourself about when you get to the field, weather, timing, number of flyers and audience. The checklist will keep you focused and maximize your chances for success.

A final note on certification flight evaluation: It is important to realize there is a lot of room for subjective evaluation when it comes to the post-flight examination because there are no hard and fast published objective standards. I'm not saying there are not published criteria for what makes a safe Level 1 flight, I am saying there are a lot of ways to interpret those published standards.



Good luck. I hope this will help you ace your Level 1 Certification flight!

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www.impulse-buys.com
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LAUNCH REPORT

MMAR JUNE SPORT LAUNCH Muskegon, MI

JMRC/HUVARS has been pretty much grounded since October of 2019 except for small park launches. We are still waiting for MIS management to allow us back into Graves Campground and the Horning Farm crop rotation is not conducive for launch operations this summer. However, MMAR has resumed launching at their site in Muskegon. On Saturday, June 19th, several of us made the day trip over to the "Big Icky".

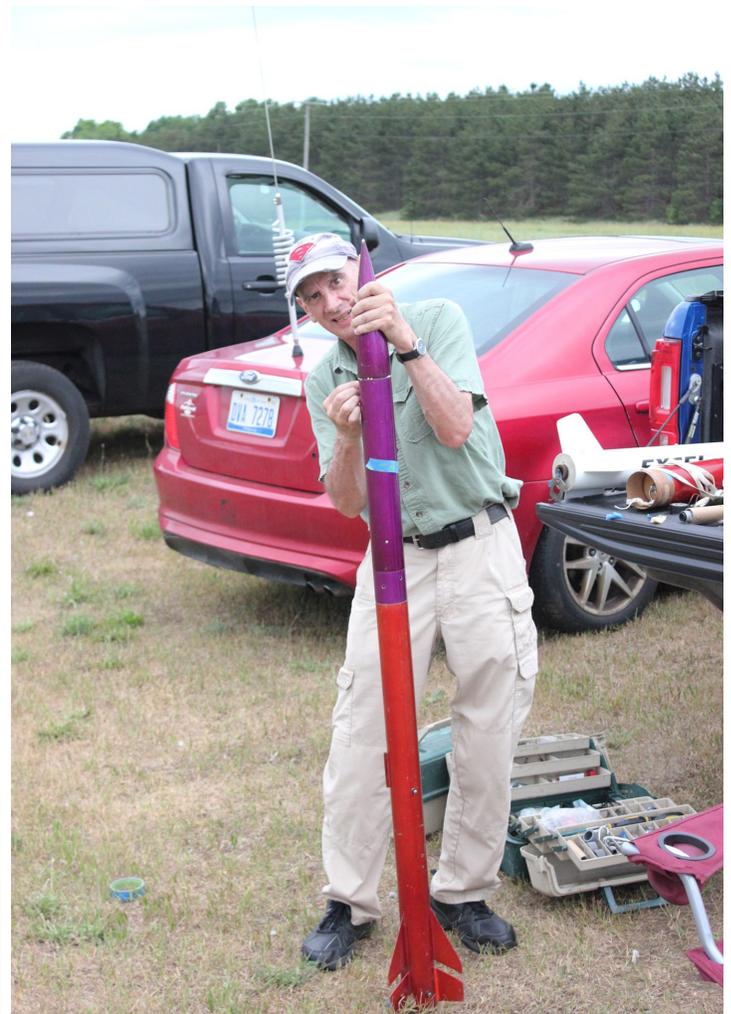
The weather looked pretty bad at first, but the storms cleared out as Tony and I got there. Conditions continued to improve throughout the day, and it ended up being a decent launch. Also attending from JMRC/HUVARS was Tony Haga as I mentioned, Eldred Picket and his wife Deidre, Steve Kristal, and Jay Calvert. It was great to see Pam and Dave Gilmore from MMAR as well.

Jay's only large rocket he flew was called "Michiana Mayhem 2021". It was a limited run LOC kit designed by Michiana Rocketry Prefect Jerry Vida. It is a 4" diameter rocket with a "waist" composed of the three 29 mm motor mount tubes connecting the upper and lower 4" sections. That and the three sets of three fins make it look multistage, but it is not. He has flown it twice before on 3 x H115DM motors at the Michiana Mayhem launch this spring. It was Jay's entry in Saturday's "Cluster" contest. He decided to try a mixed cluster of three flame colors and little smoke. Jay used an Aerotech H220T (blue), Aerotech H182R (red), and a CTI Pro 24 G84G (green) because he did not have a green H. Total impulse was 568 NS (a complex I). All three motors fired, and all three colors were seen. The flight had a bit of an arc to it as a result of asymmetrical thrust (as expected) but was safe and high. The 24" drogue chute opened at apogee as planned. The large X-form chute released by the Jolly Logic Chute Release at 300' failed to open completely before landing in the big field north of the road and pine trees. The rocket was recovered with no damage. Jay also flew two different helicopters for NARAM practice on 1/2A3-2T motors.

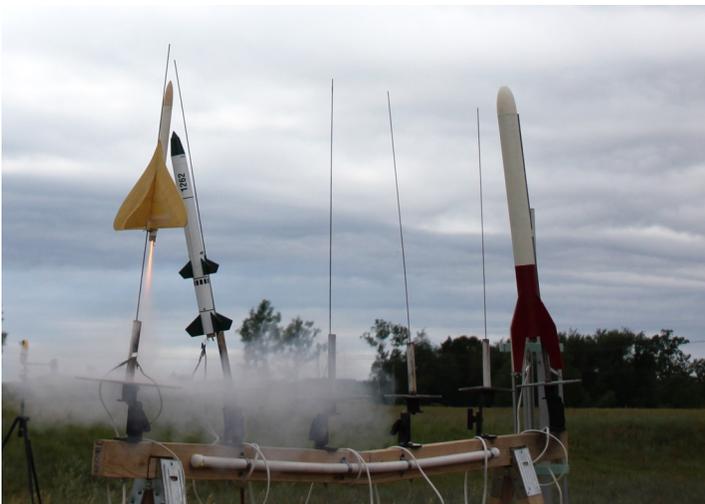
Eldred flew his small Endeavor on CTI G54RL and 38 Special on CTI G69sk, both good flights. His last flight was his big Yellow Crayon on a Loki J396 Spitfire which was an impressive launch,



Eldred's 38 Special



Tony struggling with his Small Endeavor's shear pins



Buzz's Sky Dart



MMAR JUNE SPORT LAUNCH Muskegon, MI

but the main chute failed to deploy. Eldred is still diagnosing the problem though the altimeter seemed to work fine and reported an altitude of 1273 feet. Unfortunately, it was the rocket's last flight.

Tony flew a Binder Design on an H135 White Thunder and the Small Endeavor on a H255 Blue Streak. Both were excellent flights. He also flew his Sky Dart on a C6 which promptly turned with the wind and disappeared downrange. Tony thought it was a goner and didn't bother looking for it, but it was recovered by someone else looking for their rocket.

Steve mainly flew NRC qualifying flights. He put in two great 1/2A parachute duration flights for a max in that event but had problems with rotor deployment on his Apogee Helicopter flights. Steve also had a nice cluster flight with his Flis Kits Deuces Wild.

I got in three flights, the first was my Sky Dart on a B4-2. It had a BIG loop at ejection which resulted in a short flight. Post flight review showed the elevon rubber band was old and weak. Next was my Centuri Quasar clone on a B6-4 which flew fine. Finally, I launched my NCR Brighthawk 2000 on a G88. This was a motor I prepped back at the last launch in October of 2019. I'm guessing the delay was not cut down enough or not at all which resulted in a late deployment. This caused the payload section to separate, but luckily it didn't zipper the main tube. Both sections were recovered undamaged.

There were plenty of other nice flights put up by other attendees. The weather really did turn out great. I can't tell you how much I certainly needed this, and I can't wait until we can resume flight operations at our own field.



Dusty's Red Nova



Jay's "Michiana Mayhem 2021"



Eldred's Small Endeavor

VIEW FROM THE FLIGHT LINE

Estes Der Big Red Max Modifications and Build Part Two....Why I Did What I Did

DALE HODGSON - PHOTOS FROM DALE H AND ESTES LLC

Well, in the last issue I talked about the Estes Der Big Red Max, a 29mm offering in a 3-inch upscale. Not one to leave well enough alone I added a few upgrades: Three ply centering rings rather than the two paper rings, plywood one-piece fins rather than the assembled balsa wood, a nylon X -form 'chute, rail buttons instead of the launch lug and a generous portion of Kevlar ¼" shock cord with the appropriate Nomex guards and chute protector. Because I added so much "stuff" I'm now calling this one Derr Big Redd Maxx just because I just about double-strengthened everything. One thing I did omit was the standard forward thrust ring for the motor tube that Estes provided. They did send along one of their 29mm retainers. I will use that and when I fly Estes motors I will use the corresponding adaptors but make rear thrust rings to use with the retainer. That way I'll be able to fly a whole range of composite motors. Why limit myself to just a few choices when there are so many new smaller diameter composites out there?

The build itself was fairly easy; no real magic involved. Actually, it was pretty straight forward. All I did was to include a few high-power assembly tricks I did to make sure everything went together smoothly.

The new centering rings from Rocketry Works fit like a dream. There were three rather than two....the center ring notched out to serve as a guide to mount the fins which made things really easy. On the front centering I installed a small eye-bolt and tied the shock cord onto that. I also slipped a cord protector that Roger usually has in supply. These are actually a car part; I believe they are heat guards for hoses but a small section works very well in this application. I anticipate no issues with the cord burning through any time soon. Even if it does there is a way to mount a new one but I'll save that for another time. I'm really big on filleting so I did so on every joint I had access to. In this case I used 15-minute epoxy; should be strong enough in this case since it's a fairly light rocket.



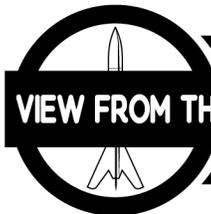
When mounting the fins I simply tacked them down with a small amount of thick CA and let that set up. Then, I filleted the joints again both inside and outside the airframe. I didn't put the aft centering ring in until almost the end of the build so I could maintain access to the inner workings; both for filleting and the installation of the rail buttons. A little trick I use is to run blue tape along the root of the fin and airframe. Then, apply epoxy to create a fillet. As

DER
BIG RED MAX

soon as that's done I simply remove the tape; it creates a very straight glue line and neat looking fillet.



Another trick I use to mount rail buttons I borrowed from our own Art Upton. Normally when putting rail buttons on a rocket you screw them into a centering ring so they are very strong and will



VIEW FROM THE FLIGHT LINE

Estes Der Big Red Max Modifications and Build Part Two....Why I Did What I Did

DALE HODGSON - PHOTOS FROM DALE H AND ESTES LLC

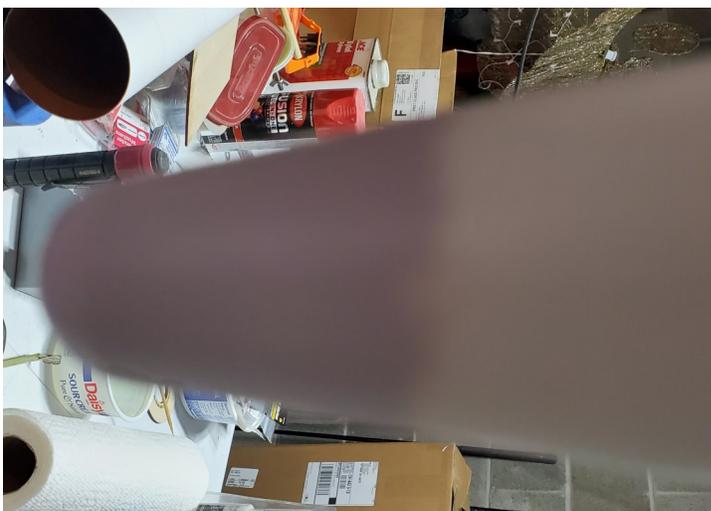
support the weight of the project. This one is light so I did something a little different. I simply drilled mounting holes in the airframe and used JB Kwik around the threads on the inside. I used enough to "pool" around the threads and airframe. Basically, it creates a kind of rivet to hold everything in place. I also did the same thing for the front rail button. Because of the length of the motor tube, I put the front button ahead of the front centering ring. The rivet created provided enough protection that the shock cord will not get hung up on the screw; actually it was a very smooth surface. Plenty of strength to hold the weight of the rocket on the rail. This goes back to my preference to rails over rods when it comes to bigger projects....rails eliminate the "rod whip" that sometimes happens that can send a rocket in all sorts of directions not exactly specified in the mission profile.



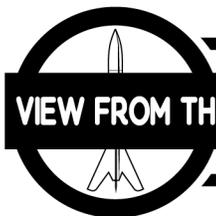
and according to Rocketry Works the same amount is called for even after the upgrade. Getting it into the front end of a long cone is fairly easy; simply use a dowel rod about the same diameter as the size of the hole that was pre-drilled into the cone. I took each piece of clay, kneaded it like dough until it became very pliable, rolled it into small "snakes" and tamped into the cone. Again, it was an easy process.



One small, but critical item not to be forgotten is the addition of nose weight. Estes sent along some modeling clay and I used every bit of it. The "standard" instructions called for using all of it



VERBODEN



VIEW FROM THE FLIGHT LINE

Estes Der Big Red Max Modifications and Build Part Two....Why I Did What I Did

DALE HODGSON - PHOTOS FROM DALE H AND ESTES LLC

The last part of the airframe build was the installation of the aft centering ring and motor retainer. The ring went on very smoothly; I used enough glue internally to create a good internal fillet. When that cured I did the same to the outside. I had a bit of a dilemma with the motor retainer; I'm not used to using those made of plastic. I'm more of an Aeropack/Slimline/Rocketarium guy... aluminum and JB Weld. Estes recommends 30-minute epoxy and after conferring with a couple of members...namely Buzz and Mark Chromka...they have both had success. But, wanting to try something different I used Loctite Plastic Bonder. It's supposed to be good for any of the hard plastics and has a higher melting point. Installation was easy and the bonding seems very strong. Guess we shall see with the first flight.

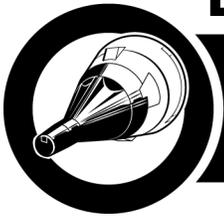
One other thing I did that was not standard was change the way the shock cord is attached to the cone. With the usual Estes cone there is a little piece of plastic that needs removed from a molded "loop". To me those never seemed to be strong enough since I'm prone to beefing un the ejection charge in composite motors just a touch....yep, the Ol' 'Miller Charge'...."blow it out or blow it up". Those that have flown with me over the years can probably not remember a time I didn't have a chute deploy unless I had an electronic issue with an altimeter. I also use way more cord than is normally called for; mostly to accommodate those larger charges. Longer cords dissipate the energy of ejection way better and reduces stress to the airframe.

So, with that the build is complete. Next issue will cover finishing and decal application. This may come as a shock but I've chosen the classic Der Red Max paint scheme and decal positions. Should be pretty cool if I can get the decals on straight. Hopefully the last part goes as well as the rest of the build. I'm confident this one is going to be a great flyer; can't wait to get it in the air!



TOP SECRET

Lockheed Sirocco Sounding Rocket

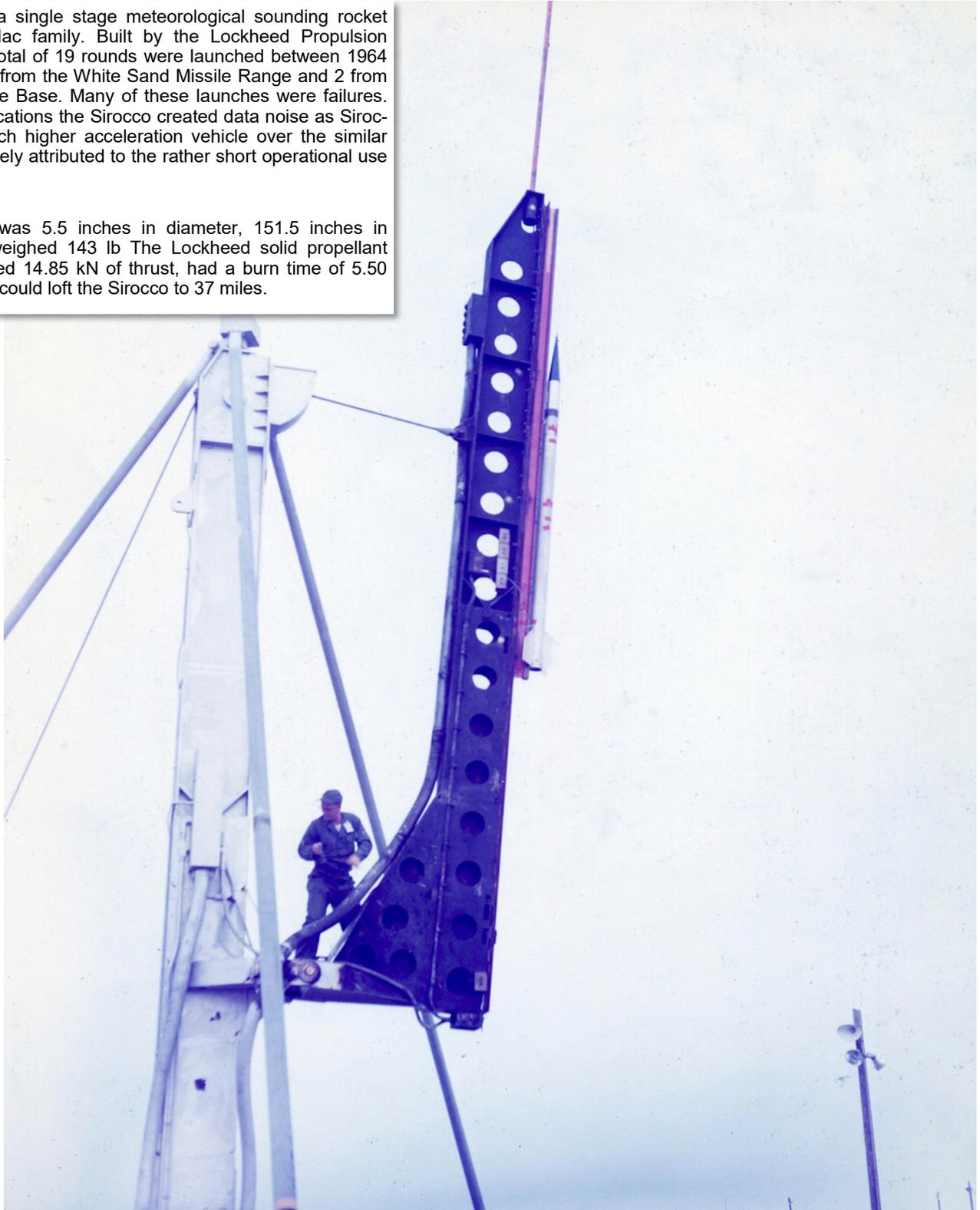


ROCKET SCALE DATA

Chris Timm

Sirocco was a single stage meteorological sounding rocket from the Hydac family. Built by the Lockheed Propulsion Company, a total of 19 rounds were launched between 1964 and 1966, 17 from the White Sand Missile Range and 2 from Eglin Air Force Base. Many of these launches were failures. In some applications the Sirocco created data noise as Sirocco was a much higher acceleration vehicle over the similar Arcas. This likely attributed to the rather short operational use of the rocket.

The Sirocco was 5.5 inches in diameter, 151.5 inches in length, and weighed 143 lb. The Lockheed solid propellant motor produced 14.85 kN of thrust, had a burn time of 5.50 seconds, and could loft the Sirocco to 37 miles.

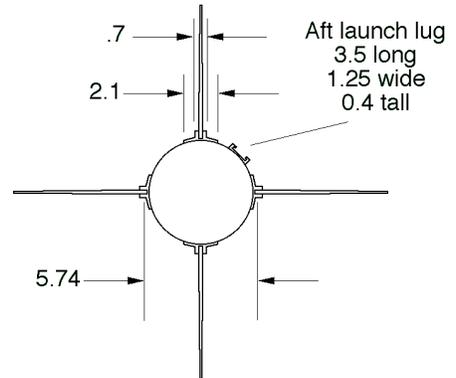


Sirocco
 1/20 scale
 Dimensions in inches
 © 2020 Chris Timm

Sources:
 Small Sounding Rockets, Richard Morrow with Mitchell Pines,
 Small Rockets Press, 2000, pp. 306-311, 354-367.
 Drawings and photos provided by Richard Morrow.

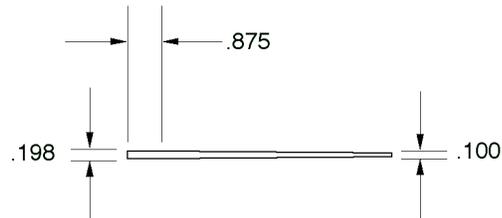
.094 R
 STA 0
 STA 0.9
 STA 7.40

Colors:
 Fins - Natural aluminum
 Motor - Natural aluminum
 Payload - Natural aluminum
 Nose cone - Black



STA 26.290
 STA 27.540
 STA 29.290
 STA 39.790
 STA 41.165
 STA 41.895
 STA 42.165
 STA 45.665

Spring steel band around motor joins at split launch lug. Lug fits into launch rail, then snaps away when it clears rail.



5.5 Ø

STA 135.79
 STA 136.665
 STA 137.415
 STA 138.665
 STA 138.915
 STA 140.415
 STA 141.915
 STA 143.415
 STA 144.915
 STA 146.415
 STA 147.915
 STA 149.415
 STA 150.102
 STA 151.165

Steel cuff
 .250 flush rivets

STA 142.79
 STA 143.29
 STA 144.04

Fin attachment bracket
 .612 Dia countersunk
 #10-32 flat head screw
 flush. Alternate screws
 from each side as shown.

STA 135.79
 STA 142.79
 STA 151.165
 STA 152.40

19.875

6.125
 6.383
 6.634
 7
 7.187



CURRENT EVENTS IN SPACE EXPLORATION

The past couple of months have seen another flurry of launches and several milestones. SpaceX again sent the majority of flights skyward with eight total.

halves were also recovered.

SPACEX

The first SpaceX launch of this period was Starlink 25, launched on 4 May 2021. The payload was a full load of 60 Starlink satellites successfully deployed. It was the 9th flight of the booster which was recovered aboard the dronship *Of Course I Still Love You*. Only one fairing was recovered.



Starlink 26 was launched on 15 May from pad LC-39A and this time the payload was 52 Starlink satellites and two rideshares, from Capella Space and Tyvak. It was the 8th flight of the booster which recovered successfully aboard *Of Course I Still Love You*. Both fairing halves were also recovered. The Capella Sequoia is a synthetic aperture Radar satellite which will be part of a shell of similar spacecraft. Tyvak-0130 is an observation satellite developed in partnership with Lawrence Livermore Laboratory.



On 5 May 2021, the SpaceX Starship program met a major milestone with the launch of SN15. It was the fifth high altitude Starship prototype and the first to meet all flight objectives including a nominal landing. This has paved the way for possible hypersonic flight with SN16 and an orbital Super Heavy later this year. Preparations in support of these flights are continuing around the clock at the SpaceX Spaceport in Boca Chica, Texas. More exciting launches are just around the corner.



Next up was Starlink 28 launched on 26 May. The payload was a full compliment of 60 Starlinks. It was the booster's 2nd flight and was recovered aboard *Just Read the Instructions*. Both fairing halves were also recovered.



Four days later SpaceX would launch Starlink 27 from pad SLC-40 at Caper Canaveral. Payload again, was another 60 Starlinks. It was the first booster to achieve 10 flights and was recovered aboard the dronship *Just Read the Instructions*. Both fairing





CURRENT EVENTS IN SPACE EXPLORATION

The next SpaceX launch on 3 June, CRS-22, was a Commercial Resupply Service mission to the ISS. Over 7,000 pounds of supplies including two new solar arrays were delivered aboard the Dragon Cargo capsule. This was the booster's first flight which landed aboard *Of Course I Still Love You*.



Rocket Lab's single flight this period was the *Running Out of Toes* mission launched on 15 May 2021. The payload was two Blacksky Earth observation satellites. The mission was unsuccessful as the upper stage suffered an anomaly that automatically shut down the second stage engine resulting in a loss of the mission. Rocket Lab did successfully recover the first stage booster after a soft landing in the ocean.



On 7 June SpaceX delivered the Sirius SXM-8 satellite to a geostationary transfer orbit. The Falcon 9 booster had flown twice previously and recovered aboard the dronship *Just Read the Instructions*. Both fairing halves were also recovered.



The eighth SpaceX launch of this period was the GPS III SV05 mission on 17 June. This was a US Space Force payload for addition to the global navigation satellite system (GNSS). The Falcon 9 booster had flown once before and recovered aboard *Just Read the Instructions*.



United Launch Alliance (ULA) launched the SBIRS GEO-5 satellite aboard an Atlas V on 18 May 2021 from pad SLC-41 at the Cape Canaveral Space Force Station. The space based infrared system satellite will be used for early missile warning.





CURRENT EVENTS IN SPACE EXPLORATION



GALACTIC

Virgin Galactic performed a successful test flight of the VSS Unity (SpaceShipTwo) vehicle on 22 May 2021. The VSS Unity was carried aloft by the White Knight Two aircraft. After release it performed a powered ascent where it reached an altitude of just over 55 miles.

ROSCOSMOS launched the Pion-NKS No. 1 mission on 25 June from the Plesetsk Cosmodrome aboard a Soyuz 2.1b. The Pion-NKS is a naval intelligence satellite used for ocean reconnaissance.



NORTHROP GRUMMAN

Northrop Grumman launched a Pegasus XL carrying the US Space Force TacRL-2 satellite on 13 June. The Pegasus was launched from a Lockheed L-1011 TriStar mothership over the Pacific Ocean. The payload is part of a hush hush Tech Readiness Level project and was placed in a sun synchronous orbit.

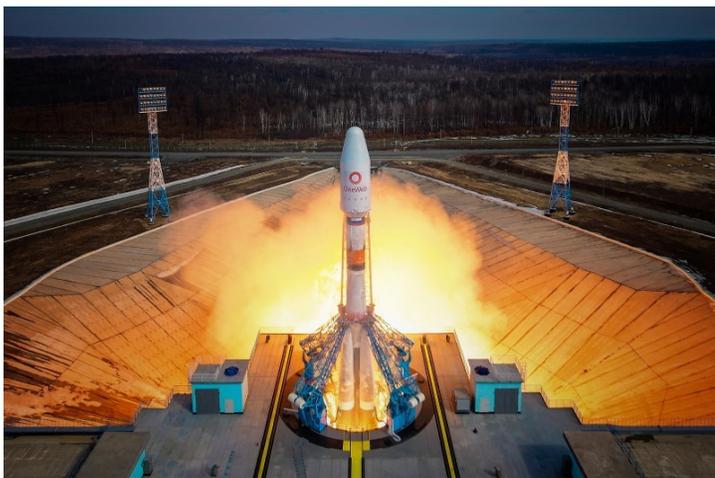


Two days later on 15 June, Northrop Grumman launched the NROL-111 satellite from the Wallops Flight Facility aboard a Minotaur Space Launch Vehicle. The National Reconnaissance Office (NRO) provided the payload in support of another hush hush program. NRL-111 was placed in low earth orbit.



РОСКОСМОС

Arianespace in partnership with ROSCOSMOS launched the OneWeb 7 satellite on 28 May 2021 from Vostochny Cosmodrome aboard a Soyuz 2.1b Fregat. OneWeb is a high speed internet constellation similar to Starlink. There are currently 648 satellites in the constellation. OneWeb expects to begin demonstrations in 2022 followed by service in 2022/23.





CURRENT EVENTS IN SPACE EXPLORATION



NASA NEWS

On 26 May 2021 NASA Wallops Island Flight Facility launched a Terrier-Improved Malemute suborbital sounding rocket carrying the viPER experiment to study the Earth's ionosphere. The objective was to study radio waves that escape through the ionosphere impacting the environment around GPS and geosynchronous satellites.

NASA Wallops Island Flight Facility launched a Terrier Improved Orion sounding rocket carrying 40 student experiments for the RockOn/RockSat-C mission on 25 June. The rocket took the students' payload to an altitude of 71.4 miles (115 kilometers) and then the payload descended by parachute into the Atlantic Ocean off the coast of Virginia, where it was recovered by NASA. RockOn is a hands-on workshop teaching participants how to create a spaceflight experiment, program a flight computer, and collect and analyze data. After attending RockOn, groups participate in the more advanced RockSat-C program to design, build, and launch a sounding rocket payload.



More Muskegon June Sport Launch Photos





THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

140 Years Ago - 1881

May 11: Theodore von Kármán born in Budapest, Hungary.



75 Years Ago - 1946

June 28: First fully instrumented upper air research V-2 launched, reached height of 67 miles. White Sands Proving Grounds, NM.



60 Years Ago - 1961

May 5: Freedom 7, astronaut Alan B. Shepard Jr., first U.S. suborbital flight from Eastern Space Missile Center FL, launched atop a Redstone IRBM.



experiments from Cape Canaveral, Fla.
June 2: Surveyor 1 landed on the moon, first US spacecraft to do so. Launched by Atlas Centaur from Cape Canaveral, Fla.



May 25: President John F. Kennedy sets Apollo lunar landing and return goal within the decade, in a speech to Congress, Washington, D.C.



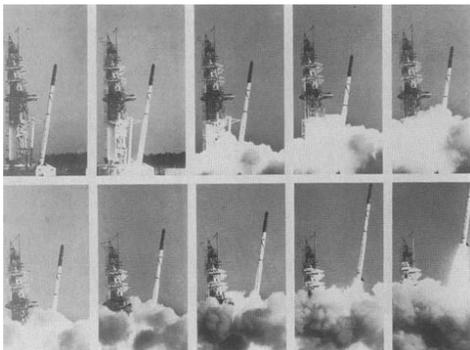
70 Years Ago - 1951

May 14: The Air Force Missile Test Center established at Cape Canaveral, Fla.

June 3: Gemini 9 (Gemini Titan 9A) launched, astronauts Thomas P. Stafford and Eugene A. Cernan from Cape Canaveral, Fla.



June 30: Meteoroid Satellite A or Explorer S55 launched by Scout from Wallops Flight Center, VA. failed to orbit.



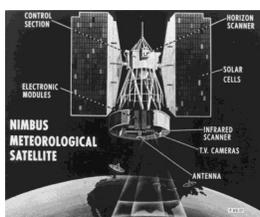
65 Years Ago - 1956

June 29: Aerobee Hi NRL-50, a sounding rocket with ionosphere research instruments, was launched by the U.S. Naval Research Laboratory at White Sands Missile Range, N.M.

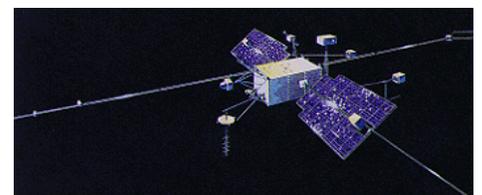


55 Years Ago - 1966

May 15: Nimbus 2 launched by Thor Agena from Vandenberg AFB, CA.
May 25: Atmosphere Explorer B (AE-B) or Explorer 32 launched. Upper atmospheric



June 6: OGO 3 launched by Atlas Agena from Vandenberg AFB, CA.





THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

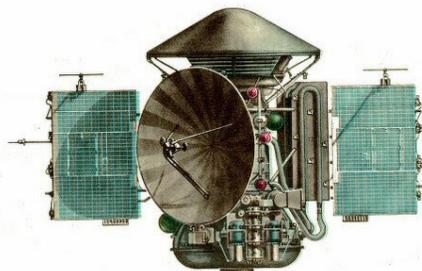
55 Years Ago - 1966 (continued)

June 23: Pageos launched by Thor Agena from Vandenberg AFB, CA.



50 Years Ago - 1971

May 19: Mars 2 launched, by Proton-K from Baikonur, USSR, first Mars impact.
 May 28: Mars 3 launched from Baikonur, USSR. First Mars soft landing.



May 30: Mariner 9 launched by Atlas Centaur. First spacecraft to orbit Mars, lifted off



from Cape Canaveral, Fla.

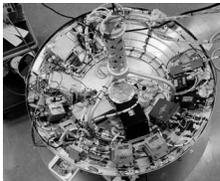
June 4: Last flight of the X-24A, Dryden Flight Research Facility, CA. Pilot John A. Manke.



June 6: Soyuz 11 launched from Baikonur, USSR. First crew to the Salyut 1 space station and to work on a space station. Crew composed of Georgi T. Dobrovolskiy, Vladislav N. Volkov and Viktor I. Patseyev. They died during reentry on June 30.



June 20: Planetary Atmosphere Experiment Test (PAET) launched on a Scout launch vehicle from Wallops Flight Center, VA. Ames Research Center used this 137-pound (62.1-kilogram) spacecraft, to study spacecraft heating and entry into Earth's atmosphere.



45 Years Ago - 1976

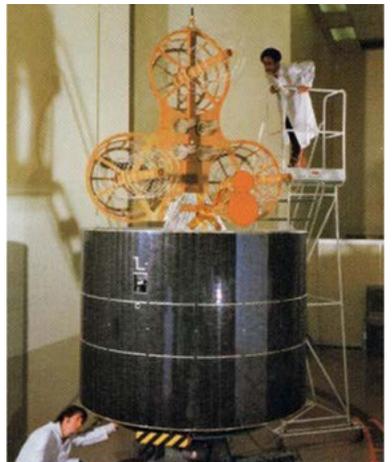
May 4: Lageos launched by Delta from Cape Canaveral, Fla.



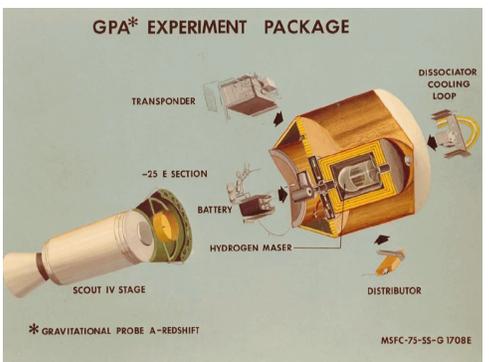
May 13: Comstar 1A launched by Atlas Centaur from Cape Canaveral, Fla.



June 9: Marisat 2 launched by Delta from Cape Canaveral, Fla.



June 18: Gravity Probe A launched by Scout from Wallops Flight Center, VA.





THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

45 Years Ago - 1976 (continued)

June 19: The Viking 1 orbiter arrived in Mars orbit. The primary mission objectives were to obtain high resolution images of the Martian surface, characterize the structure and composition of the atmosphere and surface, and search for evidence of life.

until it was deactivated in the summer of 1990.

June 8: Molniya 3-16 launched by Modified SS-6 (Sapwood) or Molniya from Plesetsk, for long-range telephone and telegraph radio communications and transmission of television programs in the USSR.

from Vandenberg AFB, CA.



May 18: Soyuz TM-12 launched from Baikonur by the U.S.S.R and docked with the MIR space station. On board were two Soviet crewmen: Anatoli P. Artsebarsky and Sergei K. Krikalev; and one British astronaut, Helen P. Sharman, who was the first UK citizen to fly in space.



June 22: Salyut 5 (USSR Space Station) launched by Proton K from Baikonur Cosmodrome.



35 Years Ago - 1986

May: "Pioneering the Space Frontier: The Report of the National Commission on Space" released.

May 12: James C. Fletcher takes office as seventh NASA Administrator, his second term in the office.



June 5: STS-40 (Space Shuttle Columbia). Launched from KSC. Crew: Bryan D. O'Connor, Sidney M. Gutierrez, M. Rhea Seddon, James Bagian, Tamara Jernigan, F. Andrew Gaffney, and Millie Hughes-Fulford. Spacelab (SLS-1) in cargo bay. Landed June 14 at Edwards Air Force Base, CA. Mission Duration: 9 days.



40 Years Ago - 1981

May 22: The second geostationary weather satellite, GOES 5 launched by Delta from Cape Canaveral, Fla. This satellite continuously monitored the temperature, clouds and moisture levels in the atmosphere



June 6: "Report of the Presidential Commission on the Space Shuttle Challenger Accident" released.

30 Years Ago - 1991

May 3: "America at the Threshold: America's Space Exploration Initiative", commonly known as the "Stafford Report" or "Synthesis Group", released.

May 14: NOAA 12 launched by Atlas E





THIS MONTH IN AEROSPACE HISTORY

Source—NASA / ROSCOSMOS Archives

25 Years Ago - 1996

May 19: STS-77 (Space Shuttle Endeavour) launched from KSC. Crew: John H. Casper, Curtis L. Brown, Daniel W. Bursch, Mario Runco, Jr., Marc Garneau (Canada), and Andrew S. W. Thomas. Released an inflatable antenna, IAE, a platform called Spartan 207, and an experimental 35 kg. minispacecraft, PAMS-STU deployed on flight day 4. Landed May 29 at KSC. Mission Duration: 10 days.

June 27: Galileo probe, Ganymede flyby.

20 Years Ago - 2001

May 8: XM 1, also known as Roll, a geosynchronous relay satellite designed to provide one hundred channels of digital music and entertainment to motorists in North America, was launched by a Zenit rocket from a floating platform, Odyssey on the equatorial Pacific ocean operated by the Sea Launch consortium.

ing the temperature of the cosmic background radiation (the remnant heat from the Big Bang), was launched by a Delta 2 rocket from Cape Canaveral.

15 Years Ago - 2006

May 24: GOES 13, a (NOAA) geostationary weather satellite, launched by a Delta 4 rocket from Cape Canaveral.

June 30: NASA announces name of the Crew Launch Vehicle, Ares 1 and heavy-lift cargo booster, Ares 5.



June 20: STS-78 (Space Shuttle Columbia) launched from KSC. Crew: Terence T. Henricks, Kevin R. Kregel, Susan J. Helms, Richard M. Linnehan, Charles E. Brady, Jr., Jean-Jacques Favier (France), and Robert Brent Thirsk (Canada). Carried Spacelab (LMS-1). Landed July 7 at KSC. Mission Duration: 16 days, 21 hours.



May 25: Galileo probe, Callisto flyby.
June 30: MAP (Microwave Anisotropy Probe), a NASA Explorer mission measur-

10 Years Ago - 2011

May 16: STS 134 (Space Shuttle Endeavour) launched from EDT, KSC. Crew: Mark Kelly, Gregory H. Johnson, Michael Fincke, Greg Chamitoff, Andrew Feustel and European Space Agency's Roberto Vittori. Delivered the Alpha Magnetic Spectrometer (AMS) and spare parts. Shuttle Endeavour docked with the International Space Station's (ISS) Harmony module on May 18. Landed June 1, at KSC. Mission Duration: 16 days. This was the 25th and final flight for Endeavour.

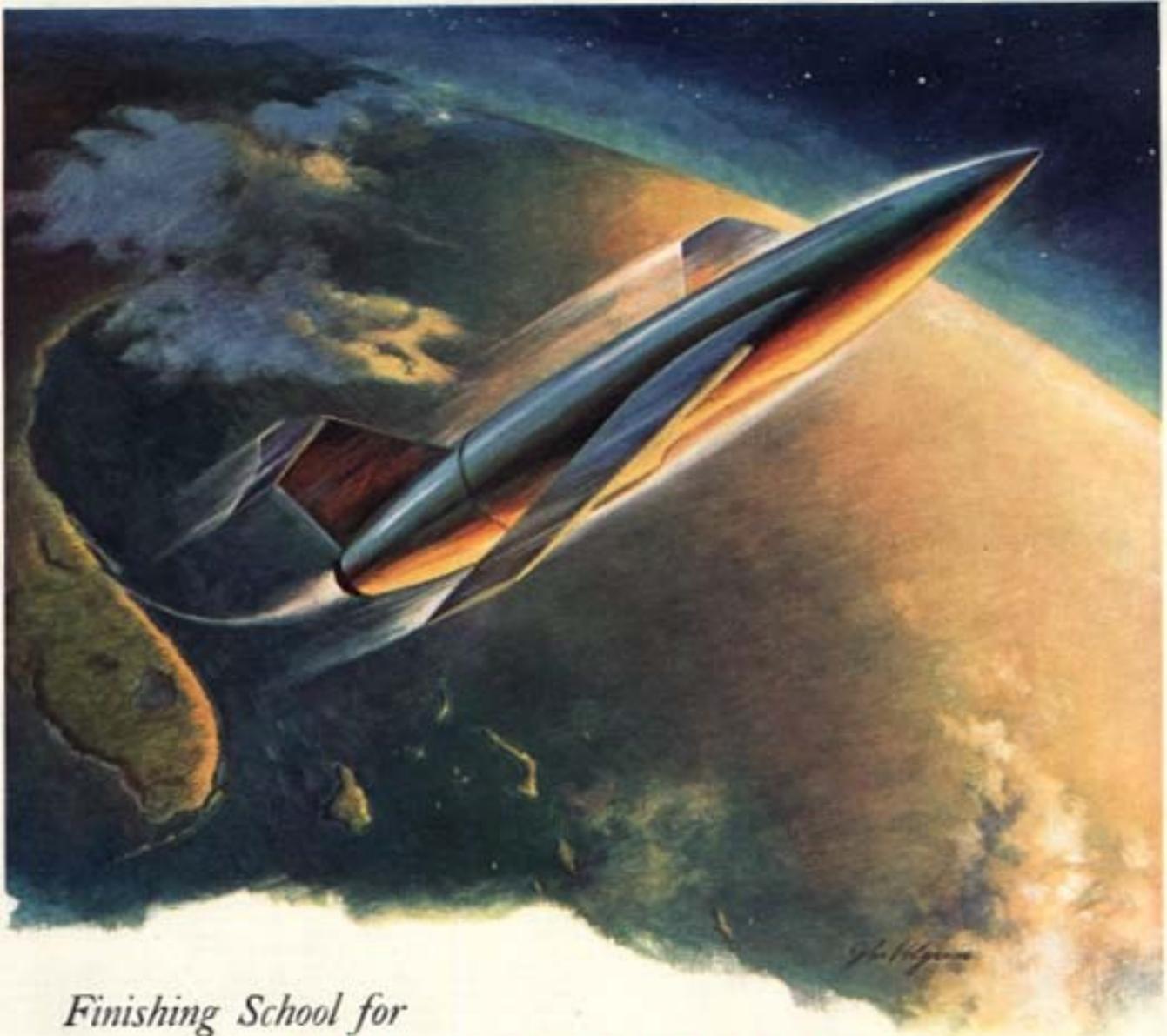


June 7: The Russian Soyuz-TMA 2M was launched from Baikonur by a Soyuz launch vehicle carrying Expedition 28's Mike Fossum, Sergei Volkov and Japanese astronaut Satoshi Furukawa to the ISS.



Vintage Ad

49



Finishing School for

GUIDED MISSILES

The Air Force Missile Test Center, used by all our military services as a long-range proving ground, stretches thousands of miles from Florida, out over the Bahamas, into the South Atlantic.

A PILOTLess BOMBER roars away from its launching stand, picks up speed, zooms into the blue. Setting its course for a far-off target in the ocean, it rockets over a chain of tiny islands where men and machines check its flight, its behavior, the operation of its guidance and control systems. It's a vital part of our air power of the future—aeronautical research and development laying the foundation for continued U. S. air supremacy!

Operated by the USAF's Air Research and Development Command, the Missile Test Center is geared up to test the wide variety of missiles, rockets and pilotless aircraft vital to modern air power. It reached its full stature with the recent completion of down-range observation stations. And the dramatic B-61 pilotless bomber, the Matador, designed and produced by Martin as part of its diversified missiles program, was the first to use the completed range. THE GLENN L. MARTIN COMPANY, Baltimore 3, Maryland.



Builders of Dependable Aircraft Since 1909

Illustration is artist's conception of Air Force Bell Matador pilotless bomber.

DEVELOPERS AND MANUFACTURERS OF: Navy P2V-1 Martin seaplanes • Air Force B-57A Canberra night intruder bombers • Air Force B-61 Matador pilotless bombers • Navy P4M-1 Messenger patrol planes • Navy KDM-1 Flower target drones • Navy Vli-

ing high-altitude research rockets • Air Force SB-21 developmental tactical bomber • Martin airlines • Guided missiles • Electronic fire control & radar systems • **LEADERS IN Building Air Power to Guard the Peace, Air Transport to Save It.**



LAUNCH WINDOWS

Launch dates from SpaceFlight.com

July 1, 2021

Soyuz - OneWeb 8

Launch time: 1248 GMT

Launch site: Vostochny Cosmodrome

A Russian Soyuz rocket will launch 36 satellites into orbit for OneWeb, which is developing a constellation of hundreds of satellites in low Earth orbit for low-latency broadband communications. The Soyuz-2.1b rocket will use a Fregat upper stage.

July 2021

Falcon 9 - Starlink

Launch time: TBD

Launch site: SLC-4E, Vandenberg Space Force Base

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

July 15, 2021

Proton - Nauka

Launch time: 1716 GMT

Launch site: Baikonur Cosmodrome

A Russian government Proton rocket will launch the Nauka laboratory module to the International Space Station. The Nauka module, or the Multipurpose Laboratory Module, will also carry the European Robotic Arm to the space station.

July 27, 2021

Ariane 5 - Star One D2 & Eutelsat Quantum

Launch window: TBD

Launch site: ELA-3, Kourou

Arianespace will use an Ariane 5 ECA rocket, designated VA254, to launch the Star One D2 and Eutelsat Quantum communications satellites.

July 30, 2021

Atlas 5 - CST-100 Starliner Orbital Flight Test 2

Launch time: 1853 GMT

Launch site: SLC-41, Cape Canaveral Air Force Base

A United Launch Alliance Atlas 5 rocket, designated AV-082, will launch Boeing's CST-100 Starliner spacecraft on second uncrewed test flight to the International Space Station. This mission was added after Boeing's decision to re-fly the Starliner's Orbital Flight Test before proceeding with the Crew Flight Test. The rocket will fly in a vehicle configuration with two solid rocket boosters and a dual-engine Centaur upper stage.

TBD, 2021

GSLV Mk.2 - GISAT 1

Launch time: TBD

Launch site: Satish Dhawan Space Center

India's Geosynchronous Satellite Launch Vehicle Mk. 2 (GSLV Mk.2), designated GSLV-F10, will launch India's first GEO Imaging Satellite, or GISAT 1. The GISAT 1 spacecraft will provide continuous remote sensing observations over the Indian subcontinent from geostationary orbit more than 22,000 miles above Earth.

TBD, 2021

PSLV - RISAT 1A

Launch time: TBD

Launch site: Satish Dhawan Space Center

India's Polar Satellite Launch Vehicle (PSLV), designated PSLV-C52, will launch the Indian RISAT 1A radar Earth observation satellite.

August 1, 2021

Antares - NG-16

Launch time: TBD

Launch site: Pad 0A, Wallops Island

A Northrop Grumman Antares rocket will launch the 17th Cygnus cargo freighter on the 16th operational cargo delivery flight to the International Space Station. The mission is known as NG-16. The rocket will fly in the Antares 230+ configuration, with two RD-181 first stage engines and a Castor 30XL second stage.

August 2, 2021

Soyuz - OneWeb 9

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. The Soyuz-2.1b rocket will use a Fregat upper stage.

TBD, 2021

Atlas 5 - STP-3

Launch time: TBD

Launch site: SLC-41, Cape Canaveral Space Force Station

A United Launch Alliance Atlas 5 rocket will launch the STP-3 mission for the U.S. Space Force. The STP-3 rideshare mission will launch the STPSat 6 satellite and several small satellites. STPSat 6 hosts several payloads and experiments, includ-

ing the National Nuclear Security Administration's Space and Atmospheric Burst Reporting System-3 (SABRS-3) payload, and NASA's Laser Communications Relay Demonstration (LCRD) experiment. The rocket will fly in the 551 vehicle configuration with a five-meter fairing, five solid rocket boosters, and a single-engine Centaur upper stage.

Mid-August 2021

Vega - Pléiades Neo 4

Launch time: TBD

Launch site: ZLV, Kourou

An Arianespace Vega rocket, designated VV19, will launch the Pléiades Neo 4 Earth observation satellite for Airbus. Pléiades Neo 4 is the second of four Pléiades Neo high-resolution Earth observation satellites built, owned, and operated by Airbus. The Vega rocket will also launch multiple rideshare payloads. Delayed from February after VV17 launch failure

August 18, 2021

Falcon 9 - SpaceX CRS 23

Launch time: TBD

Launch site: LC-39A, Kennedy Space Center

A SpaceX Falcon 9 rocket will launch a Dragon 2 spacecraft on its third cargo resupply mission to the International Space Station. The flight is the 23rd mission by SpaceX conducted under a Commercial Resupply Services contract with NASA.

August 26, 2021

Soyuz - OneWeb 10

Launch time: TBD

Launch site: Baikonur Cosmodrome, Kazakhstan

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. The Soyuz-2.1b rocket will use a Fregat upper stage. Arianespace will use an Ariane 5 ECA rocket, designated VA255, to launch the SES 17 and Syracuse 4A communications satellites. Built Thales Alenia Space, the SES 17 communications satellite will provide internet connectivity to airline passengers over the Americas, the Caribbean, and the Atlantic Ocean for SES of Luxembourg. The Syracuse 4A spacecraft, also built by Thales Alenia Space, will provide communications services for the French military.

OUR MEMBERS IN THE FIELD



Eldred and wife Deidre, with his Yellow Crayon



Steve Kristal and a NRC Helo model



Jay Calvert and Michiana Mayhem 2021

