PEAK OF FLIGHT NEWSLETTER

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EXPERIENCE THE WORLD SPACEMODELING CHAMPIONSHIPS

PART 2 OF 2

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PEAK OF FLIGHT

Experience the World Spacemodeling Championships Pt. 2

By Tim Van Milligan

This article continues the report of my trip to Romania for the World SpaceModeling Championships (WSMC). In the last issue, I wrote about the Covid events that affected our preparation for the contest, and the few days in Europe prior to the actual flying events. This time we'll conclude this journal of my experiences.

FIGURE 1: ASHLEY PUTS AMPLE AMOUNT OF POWDER ON HER PARACHUTE AS SHE FOLDS THEM FOR FLIGHT.

Day 1: The Contest

The actual contest started Sunday morning. The weather was ok at the start. Clear skies, with a moderate wind and very chilly temperatures. It was about 45° F at the start of the day, and would eventually warm up to about 60° F. It was just at the point where you could take off your jacket and be comfortable in a long-sleeve T-shirt.

The way international competition works is that you fly one event in three timed rounds. So for example, if you were flying in a streamer duration event, you fly three flights, but each flight has to occur in a specific launch window. There is usually plenty of time in the rounds if you're well prepared ahead of time. And most people at this level are well prepared.

What makes it challenging is that you only get two models to fly the three flights. And in the case of duration events, where the object is to have a long duration in the air, it is likely that it will be difficult to retrieve the rocket because it will be a long way downwind. That is where the team comes in. While you're flying the rocket, the rest of the team is out searching for your model. Since I was not a contestant, I spent a lot of time out in the grass searching for rockets of other modelers. At the same time, I was trying to be close to the pads so I could get photos of my daughters and their models. So I did a bit more walking in and out of the field than I did at past world championship events.

The adult team (called seniors) started the day flying A-engine Streamer Duration, and the Juniors (the 18 and under group) flew A-engine Parachute Duration on a separate rocket range. Since I had a daughter in each event, I was going back and forth between the two contest ranges to take photos and run tools plus equipment back and forth between them. I did bring two launch towers with me on the trip, but only one set of tools. I was tuckered out by the end of the day from all the walking.

My oldest daughter, Allison, flying in the senior division had three really good flights in the streamer event. This event, in my opinion, is one of the hardest events to do well in. Why? There are several reasons.

For starters, it is a deceptively simple event. It is just a streamer model after all. Because of that, it is easy for every country to fill up a three-person team. Compare that to an event like Scale Modeling, where it takes extensive preparation and a high amount of building skills. Not every country has a three-person team for the scale event, but everyone has a full team for streamer duration.

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You can subscribe to receive this e-zine FREE at the Apogee Components website www.ApogeeComponents.com, or by clicking the link here Newsletter Sign-Up

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FIGURE 2: COVERED IN BABY POWDER, ASHLEY ADJUSTS THE LAUNCH TOWER OF HER PARACHUTE DURATION ROCKET.

With so many people in the event, and where all the models are essentially the same, "luck" can play a big role in who does well, and who doesn't. If your model launches just when a boomer thermal passes over the field, that will give you a really good flight. If you can string two or three lucky flights together in this event, then you have a shot at winning a medal.

How do you beat a lucky person? That is the real trick in this particular event. It takes a really lightweight model, a perfectly straight boost in order to get good altitude, and some good air-pickers to determine when a thermal is passing by so you can launch into it.

Remember my quest to build carbon-fiber rockets in the two-part molds? This event was the driver for all the experimenting with building techniques I did the two previous years. For the first time of my competition experience, the models my daughters and I had made were as light or lighter than any team on the field. If luck and thermals were taken out of the equation, they could compete head-to-head with anyone in the world.

Starting out in the cold morning with no thermals made it even more challenging. So while she had good flights, she finished in 27th place out of 44 contestants.

But the rest of the team was also doing well in this event. Kevin Kuczek was the only contestant in the first round to get a max flight. A "max" is 180 seconds in streamer duration. At 180 seconds from lift-off, the timers turn off their stop-watches. Kevin finished in second place, taking home the silver medal. Additionally, Steve Kristal from Detroit also had decent flights, finishing in 13th place.

The combined scores of the American contestants were good enough to put the USA in second place. Therefore, my daughter Allison did get a silver medal in the team division for streamer duration.

Meanwhile, over on the junior range, Ashley was struggling in A-engine parachute duration. This event is just as competitive, as with a big parachute it is relatively easy to get a max duration of 5 minutes. It really turns into a steeplechase event - where you have to run down and retrieve that parachute that has been floating in the air for 5 minutes.

But Ashley's first flight was only marginal. It didn't catch any thermals, and dropped out of the sky after just three minutes. If you don't get a max in all three rounds in this event, you don't really stand a chance of getting a medal. So we knew after the first flight that she was out of contention for any medal.

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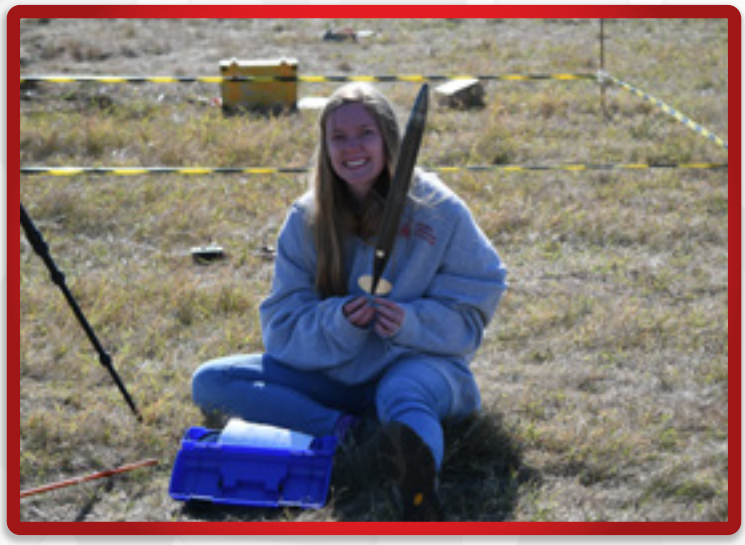

FIGURE 3: ALLISON SHOWS OFF ONE OF HER STREAMER DURATION ROCKETS. THE LIGHTWEIGHT CARBON-FIBER/EPOXY ROCKET WAS A KEY FACTOR IN THE FLIGHT'S SUCCESS.

And it went downhill from there. Both of her second and third flights boosted fine, and the parachutes popped out of the tube nicely too. But they failed to fully inflate. And that is an automatic DQ in the event. The parachute must fully open in international competition - no partially open chutes like you might see in a NAR contest event.

So in the end, Ashley finished dead last in the parachute event out of 36 contestants. She laughs about it now, but at the time it was discouraging.

Why didn't the parachutes open fully? That is a good question. She powdered the heck out of them, and they were folded very nicely. So we think that one reason might be that the rockets she was flying were too lightweight. The tube didn't have enough weight to jerk sharply on the shroud lines to snap the canopy open. But who can say for certain? The flights were good, and those two flights should have worked like the first one. They just didn't.

Allison didn't have any event for Monday afternoon, but Ashley did. She was in the A-engine Altitude event.

This is another very hard event. It requires launching a two stage model with 1/2A engines in both the upper and lower stages. The models we built were very similar to the ones we used in Poland in 2018 where Allison won a silver medal, and the team took home the gold medal. The new models differed in that they were lighter in weight, because they were 100% carbon-fiber instead of being made from fiberglass.

So personally I was feeling cocky that Ashley would do good. And you know what happens when you start feeling cocky… Things end up going bad.

That is exactly what happened with all of Ashley's flights.

When she tried to put the first rocket engine into her booster stage, she found that it didn't fit into the tube. I suspect they were left-over 10.6 mm motors from previous contests. At this point, there was nothing she could do about the problem, as they were the only booster motors available.

In order to get it to fit into the motor tube, she had to sand off some of the paper casing. It took a long time, but she finally got it to fit.

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But sanding them down turned out to be a mistake, because with the thin wall of the sanded casing, it couldn't contain the chamber pressure when it ignited. It blew up really good right when it came out of the launch tower.

The fireball destroyed the rocket completely. Nothing was salvageable from the booster stage except the motor tube. When it blew, the gases all came out the front end and ejected the motor tube completely out the back of the rocket.

The good thing is that because it was a motor cato, she could fly a second flight. But that flight had to be made in the same time window of the first round. In order to qualify, she had to prepare her second flight with less than 20 minutes left in the launch window.

This is what makes me so proud of Ashley. She didn't get frazzled or panicked. She knew she had to work quickly, and preparing the model was something she knew how to do. As an adult, I couldn't help her, even if she asked. But she didn't. She knew exactly what to do.

The first problem to solve was getting the motors into the tube without sanding them down. We were fortunate because the motor tube was able to slide out the rear of the tube. So she was able to slide the tube out the back, and slit it down the side. With the side open, a larger diameter motor could be slid in. Once in, she taped the side back up and further secured the motor with extra tape. It wasn't perfect, but it worked.

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FIGURE 4: CHRIS FLANNIGAN LOOKS ON WHILE ALLISON PREPS THE STREAMER DURATION ROCKET FOR LAUNCH.

But she did need help preparing the rocket from that point on. You know… when you are tying a knot, you need someone else's finger to put on the knot to hold it in place. That job would normally be done by a teammate. But she was the only junior American flyer in this event, and a teammate wasn't available. And only another junior could touch the rocket. It presented a dilemma, with the time clock ticking away.

So she ran over to one of her international friends from the Serbian team, and had her help her by putting a finger on the knot. I love the international diplomacy she exhibited. In the second and third rounds of the event, she got a couple of boys from the Ukrainian team to help her prep the rocket.

She did manage to get the extra flight off in the launch window. But the motor tube ejected out of the booster stage. All in all, it ended up being a DQ for the first round. Fortunately, the upper stage survived, even though the booster stage didn't.

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In the second round, the two stage rocket partially worked. The whole rocket took off at a wild angle. Instead of going straight up, it went off over the prep area. But it worked. Somehow, the upper stage was found (we think it was someone on the Russian team who found it), and there was a reading on the altimeter of 358.7 meters. It turned out to be a qualified flight, even though it was not pretty looking.

But again, the booster stage was partially destroyed. It was toasted really bad from when the upper stage lit.

FIGURE 5: THE UK TEAM (BACKGROUND) WATCHES ALLISON'S STREAMER DURATION ROCKET ZOOM SKYWARD.

Now Ashley was out of rockets to fly, and there was one round left. We felt that if she just got a straight boost, that she could be on the medal stand somewhere.

So we did what a NASCAR team might do, and took the parts of the damaged rockets back to the garage to cobble something together. It turned out to be a Frankenstein rocket (we were near Transylvania after all, so it was appropriate).

But it was too Frankenstein. The resulting cobbled-together rocket went unstable because the tube was crooked, and it crashed for another DQ.

Incidentally, the winning altitude was 399.2 meters. Ashley's one mediocre flight ended up being in 5th place overall. If only it had gone straight and not at an angle, it could have gone a whole lot higher. I'm absolutely sure it would have been a gold medal.

The reason I say that is because of another improvement we made on the rockets this time compared to what she flew in 2018 in Poland. This rocket had a laminar flow design. Laminar flow offers much lower drag compared to normal straight tube rocket, even though it is larger in size. Being lower weight from the carbon-fiber material and the lower drag of the rocket's shape, I thought it should have been well over 400 meters in altitude. But we'll never know now. And unfortunately, the event isn't being flown in 2023 when the World Spacemodeling Championships is in Texas. The altitude event is being replaced by the TARC style egg-lofting event.

Among the females flying the event, Ashley's flight was the second highest. So in the female category, she did finish 2nd place and took home a silver medal.

Day 2 of the Contest

The second contest day was on a Monday. The weather was much like it was on the previous day - cold in the morning, and slowly warming up to be another pleasant day. A bit windy, but not too extreme.

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FIGURE 6: THE US STREAMER DURATION TEAM TOOK HOME THE SILVER MEDAL. (L TO R) STEVE KRISTAL, ALLISON VAN MILLIGAN, KEVIN KUCZEK, EMMA KRISTAL

However, I wasn't on the contest field. I was taking my oldest daughter back to Bucharest to get a Covid PCR test. A negative PCR test was required in order to come back into the United States, and it has to be taken within 72 hours before the flight. Allison, because she is still in college, couldn't stay for the entire week of the contest, and was scheduled to leave and go back home on Tuesday morning. So it was absolutely required that she have the test done on Monday morning. And the only place that could give us fast results was the clinic at the Bucharest airport. Hence my 4 hour drive to/from the airport on day 2 of the contest.

The test was done within about 20 minutes, and later in the day an email came to us saying she was indeed negative for Covid. Allison actually had a mild case of Covid last spring, plus the vaccine during the summer. So I was pretty confident her test would come back negative.

But since I was in Bucharest, I missed Ashley's flights during the morning. While we were driving, she was having a great day flying A-Streamer duration.

I just got back to the field about 30 seconds too late to see Ashley's final flight in the third round. She had just launched the rocket when I walked out to the range, and she pointed to the rocket in the sky as it was floating away into the countryside. I could tell by the smile on her face that she felt she was doing well.

Her flights of 106 seconds, 160 seconds, and a final round max score of 180 seconds was good enough for an overall Third Place out of 38 contestants.

Her USA teammate, Catherine Liu, also had some great flight times of 99 seconds, 138 seconds, and 117 seconds. That was an 8th place finish overall.

But in the female division, the scores were enough for a Gold and Silver medal for the American team.

In the afternoon events, Ashley was flying A-engine Helicopter Duration. This is one of my favorite events, because I am just fascinated by models that transform in mid-air.

In this category, the rotor blades for the helicopter are carried internally inside the body tube, and are ejected out of the rocket by the deployment charge. They then spin up and act like a parachute to slow the descent of the rocket. The objective is to keep the rocket in the air past three minutes (180 seconds), which is what the max score is for the event.

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FIGURE 7: CRUNCH TIME FOR ASHLEY. SHE IS MOVING QUICK BECAUSE SHE HAS TO GET HER FLIGHT OFF IN THE ROUND.

USA teammate, Catherine Liu, did really well in this event. Her first flight was a max score of 180, and then she followed it up with flights of 171 seconds and 174 seconds. That put Catherine in fourth place overall out of 33 contestants.

Ashley's first flight was 150 seconds. That was OK, but this is a similar event to Parachute Duration where it is common to get a lot of max scores. And Ashley did improve in the next two rounds of flights with two max scores of 180 seconds. But that was only good enough for 7th place out of all the contestants.

However, in the female division for juniors, the girls from America did really well. Catherine's scores were enough for the gold medal, and Ashley was awarded the silver. So this was the reverse of the places from the morning streamer event.

Meanwhile, Allison had an afternoon event of B-engine Altitude. Like the one flown the day before, the rockets were two-stage. The difference was that full A-engines were in both the top and bottom stages.

This event was a disaster for the USA. The reason was the motors.

The booster motors were not producing any type of ejection that would be needed to ignite the upper stage motor.

It wasn't just Allison that this happened to. The entire team from USA suffered from the bad motors. Allison DQ'ed all three of her launch attempts due to no ignition of the upper stage. The same fate happened to Emma Kristal and Dr. Bob Kreutz as well. Steve Kristal was the lucky one. He got two of his three models to ignite. However, the flights weren't as straight as needed, and his best altitude of 539.2 meters was only good for 18th place. The highest altitude of the contest was 813.8 meters.

This problem should have been discovered on the practice day before the contest. But we chose to use ½A motors in the practice rockets instead of full A-size motors. We knew that a two stage rocket with A's in both stages would disappear in the sky. By using 1/2A motors, there was a good chance of getting them back. So we didn't test with the motors that were actually used in the contest, when we should have. That was a costly mistake that I fault myself for, because I made the decision myself. Had we discovered the problem, we might have found a workable solution.

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FIGURE 8: USING INTERNATIONAL DIPLOMACY, ASHLEY GOT SOME HELP FROM HER UKRAINIAN COMPETITOR TO PREP HER ALTITUDE ROCKET FOR LAUNCH.

Monday evening was supposed to be the awards ceremony for the first day's events. Allison was excited, because she was supposed to be getting that silver team medal for the streamer duration event. But because the days' events were running late, the organizers decided to postpone the awards ceremony until the following day. Allison was dejected, because she wasn't going to be able to stand on the podium with her teammates.

We were able to borrow the trophy from the Romanian organizers, and Allison did get some photos with her teammates. But it wasn't on the podium because it was too dark.

As soon as the photo session was over, I had to drive yet again back to Bucharest for the second time in the day. This time we went to stay at the airport hotel because Allison had an early flight back home on Tuesday morning. While Allison and I were in Bucharest, Ashley and my wife were staying at the team hotel in Buzau.

Day Three - Tuesday

Allison's flight was at 6 a.m. and I was able to see her off as she went through security and back home via Amsterdam and Atlanta. Her trip home was safe and uneventful. But as a father, I was worried about her travelling alone. Only when she was on the plane in Amsterdam did I feel more confident about her safety.

I didn't have to hurry to get back to the contest field on Tuesday, because Ashley didn't have any contest flights that day. Tuesday was the day for the RC rocket glider events.

When I got back to Bazau a few hours later, I picked up my wife and daughter Ashley from the hotel, and we drove out to the field to watch some of the glider flights. While on the field, we talked with the organizers about getting our own Covid tests done so that we also could go back home on Friday morning. We found that there was a little clinic in Bazau that was rumored to do Covid tests. If true, it was cheaper and vastly more convenient than driving back to Bucharest, but we were unsure if it really was a PCR test rather than the quick Covid test.

After lunch on the field, we decided to head back into town and check out the clinic. While I was doing that, Ashley was able to do some homework in the hotel room.

I did find the clinic, which was less than 100 yards from the front door of the hotel. Unfortunately, they couldn't

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take us on Tuesday afternoon, so I made an appointment for Wednesday morning at 10 a.m.

After a much needed nap, we headed back to the launch field for the awards ceremony. It was a long session, because they had to present two days of medals instead of just one day.

Since Allison wasn't available to stand on the podium, Ashley stood in for her. It was funny, and made Allison a little jealous.

FIGURE 9: THE ONE QUALIFYING ALTITUDE FLIGHT FROM ASHLEY. YOU CAN SEE THE ROCKET ALREADY VEARING OFF COURSE.

After that, it was a late night meal at the hotel, and time to go to bed. Of course, I had to wait for the Russian party in the room next to us to finish - so I could get some sleep.

Day Four - Wednesday

The morning event for the Juniors was Scale Altitude. Ashley wasn't a contestant in this event, so we took the opportunity to sleep in an extra hour. That was nice. After breakfast, we walked over to the clinic and got our noses and mouths swabbed as part of the covid test. The clinic experience was really unusual, because we didn't speak Romanian, and there was only one person there that spoke just a little bit of English. Who knows what we were paying for, and we knew we were taking a risk -- but it was convenient. The back-up plan, in case it wasn't legit, was that we could still get a test done in Bucharest.

In the afternoon, Ashley had her final event of the contest - A-engine Rocket Glider.

This was another challenging event, as the gliders were complex swing-flop wings. They fold up very small, and at ejection the motor burns the release string, which allows a rubber band to rotate the wing, and then allow the tips to unfold so the glider can transition to a nice glide.

Unfortunately, Ashley DQ'd all three of her flights.

When the first glider launched, everything seemed to snap open. But then it looked like the wind caught under the left wing tip and closed it up. Since the wing was unbalanced, the glider just did a spiral death dive into the ground. DQ number 1.

For the second flight, Ashley put two rubber bands on the wing tip panels in order to make sure they stayed open once they deployed.

The boost was straight up and looked awesome. But then it became apparent that the wing didn't pivot to the open position. How frustrating was that? DQ number 2.

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When we inspected the rocket, Ashley discovered that she forgot to put on the rubber band that pivoted the wing to the horizontal position. So it was user error. She was so concerned about the rubber bands on the tip that she forgot the main one. She was so embarrassed.

On the third flight, everything opened just fine, and stayed open. But the rocket wasn't trimmed properly and just spiraled quickly to the ground. DQ number 3. On this flight, I don't know what happened. All I can say was that it was the glider's very first flight, and so it was obvious that it needed more trimming.

The lesson learned is that the gliders need real flights ahead of the contest, not just trim tossing. And this is hard to do, because if the gliders work correctly during practice, there is always a good chance that they will float away never to be seen again because of their super high performance.

FIGURE 10: THE SENIOR TEAM FOR THE B-ALTITUDE EVENT HAD MAJOR PROBLEMS GETTING THEIR ROCKETS TO STAGE SUCCESSFULLY. HERE THEY ARE PREPPING THEIR ROCKET ON THE RANGE.

That ended all of Ashley's flights at the contest. Overall, she DQ'ed 8 times in the contest. That is the part that really hurts. Our goal was to have no DQ's, and we ended up with way too many.

Day 5: Thursday

We didn't have any contest flights on the final day of the event. And it was "scale model flying" day. This is the showcase event that draws spectators because the models are simply gorgeous. It is literally the best scale models you'll see on the planet. Not only do they look awesome, but in order to get flight points, there are all sorts of motor events and deployments happening during the launches. It is visually spectacular to watch them fly.

The morning was scheduled for the flights of the junior competitors, and the seniors were to be done in the afternoon. Since the USA team didn't have any juniors in this event, we took another opportunity to get some additional rest and have a late breakfast.

By the time our family got to the field, it was mid-morning. And for the first time, the weather during the contest was awful. The temperatures were in the high 30's to low 40's. It was also overcast and gloomy, plus the wind was howling.

I really felt bad for the competitors, as it was freezing and miserable. I could see their fingers were numb and they were moving sluggishly. There were a couple of local school groups that came out to the launch to watch the rockets, which was the bright spot of the morning. While they stood out in the windy cold weather, my family and I spent most of the time huddled in the warmth of our rental van.

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FIGURE 11: ASHLEY TOOK HOME A GOLD MEDAL, AND HER TEAMMATE, CATHERINE LIU TOOK THE BRONZE IN THE STREAMER DURATION EVENT (FEMALE DIVISION). THEY REVERSED THE ORDER FOR HELICOPTER DURATION (FEMALE DIVISION), WHERE CATHERINE WON THE GOLD, AND ASHLEY TOOK SILVER.

From within the van, we could hear the PA system, so I could tell when a launch was about to happen. When the countdown started, I'd pop my head out the door to get a better view.

Ashley used the time to catch up on homework from the school classes here in the USA.

Incidentally, because of the Covid situation, it was actually an easy decision for us to pull Ashley out of school to attend the event. The schools in the country have dramatically modified their methodology, and most everything is online. So you don't need to be physically in class anymore to remain caught up. As long as you have a connection to the internet, you can literally be anywhere in the world. And we were proving that by being in Romania. The only drawback was for those particular classes that also had laboratory classes. Allison missed a day of labs at her college, and she did have to make those up when she got back home. That was the main reason that she left the contest after day 2 instead of staying for the entire event.

Because of the windy weather, there were a lot of unstable rockets that were DQ'd. These scale models, because they usually have small fins, are marginally stable as it is. So the wind wasn't helping anything at all. Even as a spectator, it was disheartening to see the beautiful models going unstable and crashing into the ground. You knew that the hundreds of hours put into construction were being dashed to bits.

We did stick around a bit after lunch to watch a few of the senior modelers launch their scale rockets. But in this event, things move slowly because of the long amount of time necessary to prepare a rocket for flight. It is just one big launch window, and you only are required to make one successful flight. So it can be a long time from one flight to the next. And the cold weather wasn't making it any better. On the US team, two of our competitors (James Duffy and Tony Reynolds) had elected to prepare their rockets in

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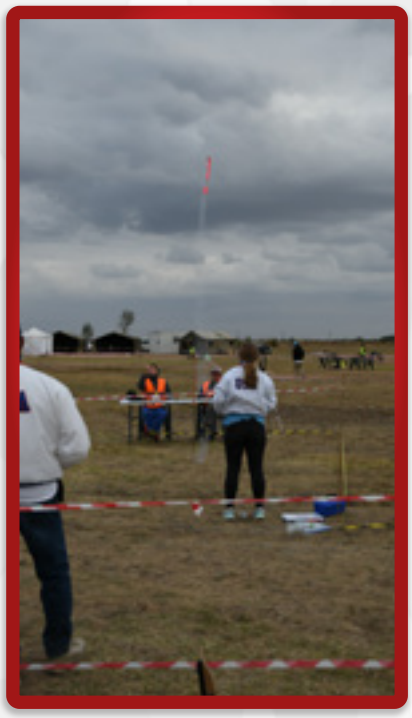

FIGURE 12: ROCKET GLIDER DURATION WAS FRUSTRATING FOR ASHLEY. THE UPWARD BOOSTS WERE GOOD, BUT THE GLIDE ELUDED HER MODELS.

the warm room of the hotel. I'm sure that many competitors from the other teams were doing the exact same thing. So from a spectator's point of view, watching modelers prepare their rockets on the field wasn't all that exciting this contest year.

That was the part I missed the most, as I like to see the internals of a rocket to see how other modelers solved the same types of assembly issues that we all face. Based on my experience at past World Championships, by scale day, the intensity of the competitors has worn off as all of the other events are completed. It just seems like the atmosphere changes and people are more outgoing and willing to trade secrets and techniques. But this year, everyone was cold and they wanted to bundle up to stay warm.

I didn't even get to see the flights of any of the teammates from the US delegation. We had to start our trip back to Bucharest to begin our final return back home.

Fortunately, I got the results of our Covid PCR tests via email, and everything came back as negative. With that result, we could get back into the USA without issue.

We previously made the decision to leave early when we bought our airline tickets. It had been announced in July that due to Covid, the final banquet and party was cancelled. As far as the closing ceremonies were concerned, those would be held on the field and would be limited to presenting the final awards and more speeches by politicians. To be honest, that wasn't all too appealing, which is why we bought an early exit from the event.

In hindsight, the weather really stunk, as it was a repeat of Thursday. I don't think we missed much in that regard.

The actual flights back home were uneventful. We left Bucharest at 5 a.m. Friday morning, to land in Paris a couple hours later. We switched planes, and entered the US in Atlanta. After switching planes again in Atlanta, we finally made it back home to Colorado about 10 p.m. (which was 7 a.m. the next day in Bucharest). So it was a long journey.

So that is my personal recollection of the trip. By no means do I consider my experience to be representative of what other team members went through. To get a more complete perspective on what the event was like, you need to see it through the eyes of more people. I know

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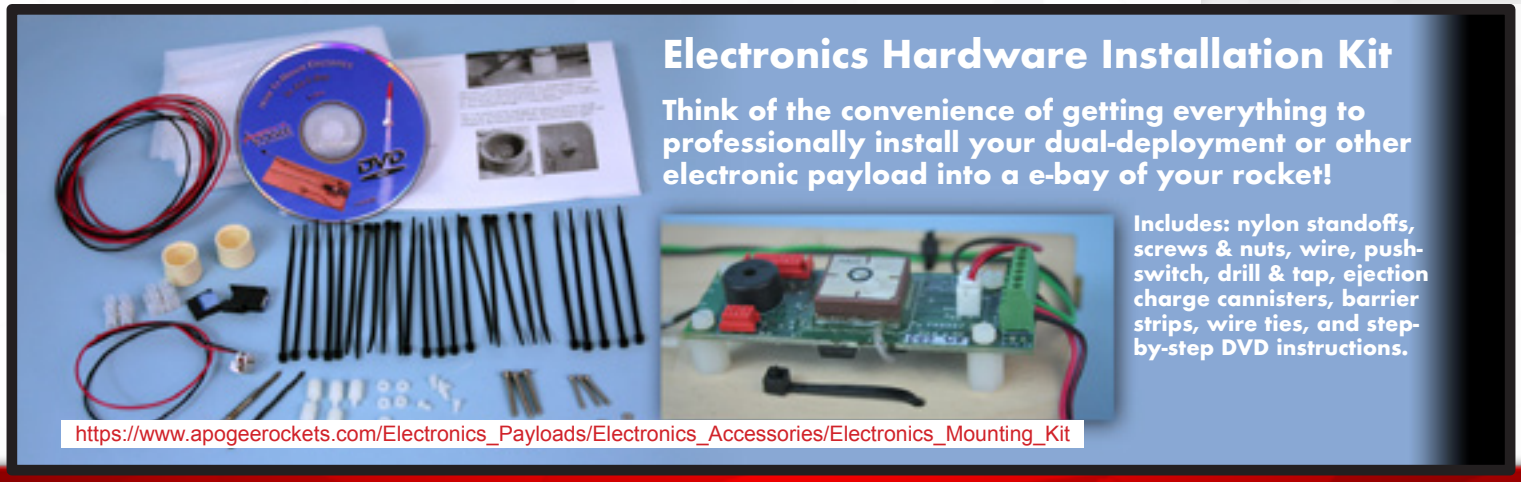

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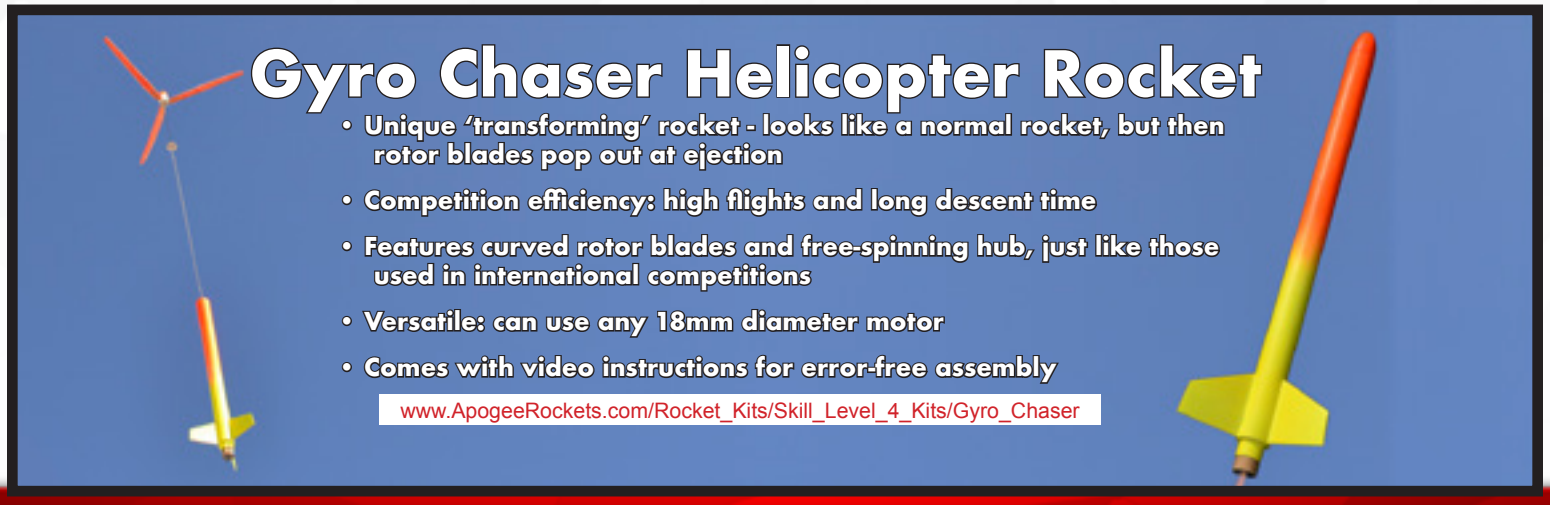
there will be an official write-up of the event in a future issue of the NAR's *Sport Rocketry* magazine. I would highly recommend that you read that if you are interested in the whole concept of international rocketry and competition in general.

FIGURE 13: ASHLEY WENT HOME WITH AN ARMFUL OF TROPHIES AND MEDALS.

I do have a lot of other photos to go through. In a future *Peak-of-Flight* Newsletter article, I want to present some of the models that I saw from other countries and what makes them unique. I'd also like to show you some of the new and unique techniques I came up with for our models. So stay tuned for that.

Note: If you are interested in getting involved in International Competition, so that you can be involved with the event in Texas in 2023, you can check out the specific models that Apogee Components has that would be a good starting point for getting familiar with the different events, and that conform to the FAI rules. You can check them out at: https://www.apogeerockets.com/Model-Rocket-Kits/FAI-Competition-Kits.

About The Author:

Tim Van Milligan (a.k.a. "Mr. Rocket") is a real rocket scientist who likes helping out other rocketeers. He is an avid rocketry competitor and is Level 3 high power certified. He is often asked what is the biggest rocket he's ever launched. His answer is that before he started writing articles and books about rocketry, he worked on the Delta II rocket that launched satellites into orbit. He has a B.S. in Aeronautical Engineering from Embry-Riddle Aeronautical University in Daytona Beach, Florida, and has worked toward an M.S. in Space Technology from the Florida Institute of Technology in Melbourne, Florida. Currently, he is the owner of Apogee Components (http://www.apogeerockets.com) and also the author of the books: *Model Rocket Design and Construction*, *69 Simple Science Fair Projects with Model Rockets: Aeronautics* and publisher of the "*Peak-of-Flight*" newsletter, a FREE ezine newsletter about model rockets. You can email him by using the contact form at https://www.apogeerockets.com/Contact.