PEAK OF FLIGHT NEWSLETTER

Issue 605 / August 1st 2023

APOGEE COMPONENTS
www.ApogeeRockets.com
4960 Northpark Dr, Colorado Springs CO 80918
Ph# 719-535-9335

In This Issue:

Learnings From The World SpaceModeling Championships 2023 - Part 2

Also In This Issue:

Tim's Messy Desk

https://www.apogeerockets.com/Rocket-Kits/Skill-Level-4-Model-Rocket-Kits/Goblin

PEAK OF FLIGHT NEWSLETTER

Issue 605 / August 1st 2023

Learnings From The World SpaceModeling Championships 2023 - Part 2

By Tim Van Milligan

In our last issue, I started this article describing my learnings and experiences at the World SpaceModeling Championships held in Austin, Texas during the first week of July. I'm picking up where I left off, and will talk about what actually happens on the contest range, and what I personally did during the day.

Volunteer Opportunities and Responsibilities

Every American that went did some type of extra duties to support the hosting of the event. That includes the supporters. Many people worked as timers and range crew to actually run the event. My wife helped with recovering the rockets, and I was assigned to the motor tent.

This "motor tent" was unique for this event. Previously, the teams had to arrange to get their own rocket motors to the contest. For teams from outside the USA, this would be next to impossible. So this time, the common motors were supplied to the contestants by the organizers. That made it convenient for those people coming in from other countries, and also evened out the playing field. Everyone had the same motors, so you were never at a disadvantage that some other country had special motors that only they had access to.

The rocket motors were supplied in the motor tent. The tool boxes on the right, behind Matt Steele (red shirt) were filled each day with the motors the teams needed.

The motors were supplied by Estes for the small rocket events and Aerotech for the events where motor choice was more specific to the models being flown. For example, the scale rockets could have any motor, but you'd want something that was specific for the model you were flying. For those events, the competitor would "order ahead" of the competition, and they picked them up on the field.

That was the job that I helped out with. We'd inventory the supply of motors that came in from Aerotech and Estes, divvy them up, and hand them out on each contest day to the appropriate contestants.

Of course, there were hiccups in the system. Some competitors didn't order the right motors, or they didn't order enough. So there was a lot of horse-trading of motors that went on behind the scenes to make sure everyone had what they needed to get off a successful flight.

The other big hiccup is that there were some events where we didn't anticipate what motor delays competitors would choose. For example, in the A-engine streamer duration event, you had to use an A3 motor from Estes (that was required). But which delay would you use? A 2, 4, or 6 second delay? That part is up to the competitor. The assumption was that everyone would use the 4 second delay, but many Europeans wanted the 6 second delay for their rockets. So we ended up with a critical shortage of A3-6T motors. There were barely enough to go around for streamer and parachute duration. Plus the altitude event also needed that same motor, which is what caused the problem to become extreme.

The shortage was so bad that an emergency supply was needed. Even after cleaning out all the local hobby stores, the problem didn't improve much. So on Sunday afternoon, an Estes employee in Penrose Colorado got a call, and they had to go into the warehouse and box up more motors to be shipped to Texas. But here is where it got more complicated. The motors couldn't be sent until Monday, and they couldn't be shipped overnight. Due to regulations, motors have to go by ground shipment, which meant that they wouldn't show up until at least Thursday

Continued on Page 3

About this Newsletter

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

Newsletter Staff

Writer: Tim Van Milligan
Editor: Michelle Mason
Layout: Sky Luther

afternoon. To complicate things further, remember that this was Fourth of July week, and everything was closed. The motors did ship out, but they weren't going to arrive in time.

I have to give Estes credit here for the way they stepped up. They decided that Ellis Langford would go back to Colorado via airplane on the Fourth of July. He then drove for 3 hours in a rental car from the airport in Denver to the factory in Penrose to get another box of motors. Then he personally drove an additional 14 hours down to Texas to hand-deliver them. They arrived at 6 a.m. on Wednesday, just in time for the competition at 8 a.m. So a big well deserved shout-out goes to Ellis and the other folks at Estes for supplying the event the necessary motors.

My other volunteer task - Thermal Picker

The other job I helped out with even though I wasn't asked, was to help with thermal picking. An extra set of eyes helps when looking for those clues that indicate a thermal is approaching the launch field.

Thermals are columns or bubbles of warm air. They naturally occur as the sun heats the air above the ground. Then the wind blows that warm air across the field. Thermals can be advantageous in competition, especially duration events like parachute, streamer or gyrocopter. The warm air is buoyant and naturally rises (think of a hot air balloon). If you can get your rocket into the center of a thermal, it will stay in the air a lot longer. In some cases, the rocket can actually gain altitude and fly away.

For events like streamer duration, where the rocket naturally falls fairly quickly, it is critical to get into a thermal. Without a good thermal, you probably can't win.

But how do you detect a thermal blowing through the launch site? You can't see warm air with your eyes. Fortunately, there are other clues. The big ones are dust devils and flocks of soaring birds (vultures and hawks). So we were constantly scanning the horizon looking for clues. We also had some temperature measurement devices that were positioned upwind to detect if the air was getting warmer or cooler.

NEED A PARACHUTE?
APOGEE HAS THE ONE YOU'RE LOOKING FOR!
www.ApogeeRockets.com/Building-Supplies/

There are a lot of false signals as well, such as a lull in the wind. And it takes time for the sun to heat up the ground after a cloud passes through to cool things off. There is also the opposite of a thermal, which is called a "sink." It is cool air that descends downward from the sky. Due to the conservation of momentum, there is always an equal amount of sink as there is a thermal. You want to find the thermals, and avoid the sink. That is what makes thermal picking so hard. The difficulty in deciphering all the signals is why there is a team of individuals. There were debates amongst the people picking thermals to form a consensus as to whether or not a thermal is approaching, and the contestants should attempt a launch.

Temperature monitoring equipment was used to try to detect thermals.

Further complicating the process and adding additional pressure on the thermal picking team is that the competition is flown within a time window of one hour. Each event had four team members, who all had to fly their rockets sequentially within that same time period. Each has to install the motor, prep and put the model on the pad, wait for a thermal to come through, get the attention of the RSO and wait for them to allow the launch of the rocket, and then wait for the timers to finish tracking the rocket. At that point, the next flyer on the team could begin to wait for the next thermal to come through. If anyone on the team had a misfire of an igniter, that basically means you have to stop the process and restart to wait for the next thermal and the RSO to give permission to launch. It is the team manager that controls the order of the launches, and decides when a flyer absolutely has to get off the pad so the next team member has time to wait for a thermal to come through. Misfires of the rocket motor can really screw up

Continued on Page 4

clock management. There were times when the clock was running down, that a decision was made to launch, even though there wasn't a thermal coming through.

I'm not an expert at picking thermals. That's why I wanted to help. I want to learn how to pick them better to be able to help in future competitions. So I'd stand off to the side and give my observations to the more senior thermal pickers so that they had extra data to decide whether or not it was a good time for the other flyers to launch their rockets.

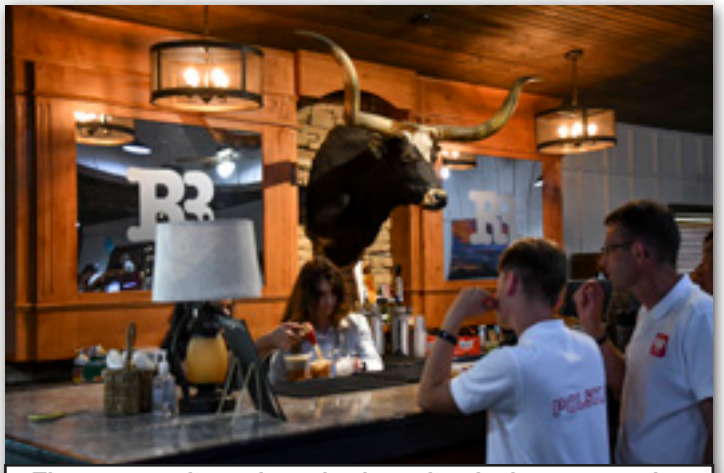
To be honest, in the end, it is really just a guess. Our team had good thermal pickers, but there were a couple of times that they did get it wrong. Ashley had one gyrocopter flight where her model was in sinking air instead of a thermal, and the time aloft was really poor. It just happens, and all you can do is shake it off and be optimistic that the next launch will be better.

An Experience of Americana

The organizers wanted to give all of our foreign guests a little taste of Americana. What better way than to take in a baseball game and fireworks? So after flying rockets during the day, on the evening of the Fourth of July we went to the ballpark in Round Rock, Texas, and had the opportunity to see the AAA farm teams from the Texas Rangers and the Houston Astros. What made it nice was that we were treated to free food and beverages in the skybox area. The fireworks after the game were also nicely done, and we also got to witness the city's fireworks as we waited in the parking lot after the event.

View from the first base line where the rocketeers sat for the game.

The other piece of Americana that we got to experience was the final banquet on Friday night to conclude the event. The closing ceremonies were held on a ranch, and the food was served in a barn that was converted to a banquet hall. But it still had all the old ranch memorabilia, including a Texas long-horn cow. I thought the live band would be playing country music, but they just performed a lot of classic pop songs. It was a bit loud for my ears, so we hung out outdoors and played some horseshoes and sat on some old time rocking chairs.



The western themed ranch where the closing ceremonies were held.

Launch Report

For a more generalized launch report, look for the articles by the contestants that will be in Sport Rocketry magazine. I'll just give you a quick rundown of how Ashley did, since that was where my attention was focused.

Continued on Page 5

Her first event was S9, which is an A-size engine Gyrocopter Duration. As mentioned previously, we thought we had the problem with the rocket going unstable by putting the nose cone on the tube tighter. But on her first flight, the problem cropped up again. The launch started out great - very fast and straight up coming off the piston launcher. But that quickly turned to a disheartening disqualified flight (DQ), as the rocket shattered into confetti bits as it broke apart when it turned sideways. There was nothing that was salvageable from the rocket except the Kevlar shock cord.

Ashley and Terrell Willard prep their helicopter models

I think I was just as heartbroken about the flight as Ashley. While she has had DQ's in competition in the four previous World Championships she has competed in, it still is not something anyone can get used to. Having said that, I have come to admire her composure in the face of adversity. She calmly picked up the pieces and went to get her next rocket ready for the second round of flying.

For her next two flights in the event, she decided to not use the piston to help propel the rocket into the sky. Without the piston, the rocket wouldn't go as high. But on the other hand, it wouldn't decelerate as hard because it was a more gentle take off.

The next two flights were perfectly straight up, which was beautiful to see in their own right. And the rotor blades spun up nicely following ejection, so they both ended up as qualified flights. The first one didn't catch good air. In fact, it deployed its rotors and spun in a sink, the opposite of a thermal. Since it was being pushed down by cool air, it barely stayed in the air for 30 seconds. That was disappointing, but at least she got points for the team. Her third and final flight did catch a small thermal, and floated into the cornfield.

How costly is a DQ? The way the contest is scored is that you get one point for each second your rocket stays in the air - up to a maximum of 180 points (or three minutes for the rocket being aloft). In the team division, the scores of the top three members of team USA are added together. The combined score for the team was only good enough for fourth place. But get this, it was only 2 points behind the bronze medal winning team from Romania. Had Ashley's model not DQ'ed, even if it had been another poor flight of 30 seconds, the team would have won at least a bronze medal. I don't mean to lay all the blame on Ashley's flight, as there were DQ's by other team members as well. I just wanted to illustrate how costly a DQ is in international competition. But congratulations to Team USA member Sally Vineyard who took the individual bronze medal in the event.

Ashley's second event was A-engine Streamer Duration that was held on Tuesday afternoon.

Streamer duration is an event that looks stupidly simple. Just pop a rocket into the air, and get the streamer to deploy to slow the rocket as it descends to the ground. How hard could it be? In reality, because it is so simple, it is actually a difficult event to win. You have to build a rocket that is ultra lightweight, and optimize everything. No detail is too small to ignore if you want to achieve success. Not only do you have to build perfect models, you also need help from some thermals to help lift your rocket, or at least slow it down sufficiently as it descends. Picking good air (where thermals lift the rocket up) to fly in is critical.

Ashley decided not to risk another first round DQ, and she launched her first streamer rocket of the event without the piston launcher. Again it was a beautiful straight up flight that just looked so graceful. I witnessed so many other flights that took off at an angle that it was nice to see one that was arrow straight. The streamer deployed just fine, and the rocket descended slowly to the ground.

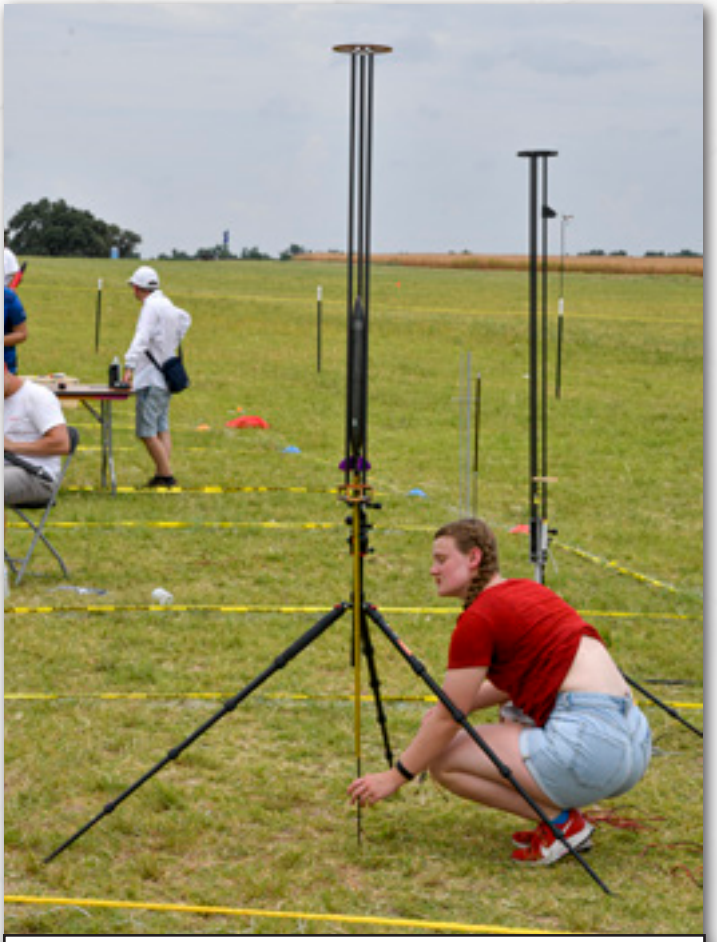
But it didn't catch a thermal, so I knew it wasn't going to be a "max." That is what we call flights that get a maximum score if it stays in the air for a full three minutes. It is hard to get a max flight in streamer duration, because you really have to get a good thermal to help lift the rocket.

Ashley and I had a lot of success at getting "max" flights during our practice launches here in Colorado. So we decided to risk another

Continued on Page 6

JOIN TRIPOLI.ORG
Mention Apogee Components

piston launched flight to see if her rocket could get a longer flight time if it went a bit higher in the air because of the effect of a piston launcher. We knew it would be a risk though.



Ashley adjusting the angle of the piston launcher below the rocket on her 2nd streamer duration flight.

We talked it over, and theorized that if we loosened the fit of the rocket into the piston launcher, then it wouldn't take off so hard. So instead of making the fit really tight, which is what you typically do when using a piston launcher, the fit was just barely snug. We also made sure the nose cone was on really tight.

Unfortunately, the rocket seemed to have gotten the full effect of the piston. It shot up straight for about 50 feet, and turned sideways as it had before. It was another DQ.

NEED A PARACHUTE? APOGEE HAS THE ONE YOU'RE LOOKING FOR!
www.ApogeeRockets.com/Building-Supplies/Parachutes

Having learned our lesson, for the third and final streamer flight, she went back to just launching the rocket without the piston launcher. And again, the rocket flew gracefully and deployed the streamer successfully. It was another good flight that seemed to land close to the same place as her first flight.

That second flight, which was the DQ, was another big let-down. What makes it worse for me is looking back on it now with a different perspective. I didn't realize it at the time, but Ashley's first flight that didn't catch a boomer thermal, was actually pretty awesome if you compare it to the rest of the competitors. In fact, at the end of the first round of flights, she was actually in first place. Her flight time was better than everyone else's. And that third flight was also above average compared to the rest of the field.

This indicates to me that even though her rocket wasn't going as high as we thought it could, it was probably getting pretty close to the heights that everyone else was achieving. It was either that, or her rocket was descending a bit slower than the other competitors. That was totally possible too, because her rocket was really lightweight. Her rocket was a top dog that day, even without the piston launcher to push it higher.

The USA's S6 streamer team received their gold medals

Thinking out loud here… if she could have gotten even a 54 second flight - which was about the average flight time of the poorest performing models on the range that afternoon, it would have put her in third place overall. If she got

Continued on Page 7

another flight like her first or third flight, she would have easily been the gold medal winner.

"Would have… could have… should have…" Would I suggest doing the same thing and flying the second flight without the piston launcher if I had a time machine and could turn back the clock? Yea. But I don't have a time machine.

In the end, the DQ flight in this situation didn't affect the team. Her teammates helped to carry her and the whole team into victory lane. The first place medal for individuals went to her teammate Keith (Herbie) Vinyard, and the bronze went to another teammate Kevin Kuczek. So with Ashley's 10th place overall finish and score, the American team did indeed take the gold medal. And that is what the goal was to get - the team gold medal.

In the women's division, her two qualified flights were good enough to win a silver medal.

Why Would You Want To Try International Competitions?

There is high drama in competition rocketry. It is as intense as it gets, because you're pushing rockets to the limits of their capability. They fly faster and higher than a typical rocket. For example, the A-engine powered competition models are easily reaching 570 feet, which is about how high an Apogee Avion achieves with a B motor. When people pick up one of our competition rockets, they can't believe how lightweight they really are. With the tube, nose cone, and fins, the rocket by itself is under 6 grams.

There is a lot of strategy and tactics involved too. The USA team's strategy was to utilize the resources of our large team to help achieve success. The recovery crew, which ventured into the corn fields to find lost rockets, and the thermal pickers that told flyers when to launch rockets were critical to the success of the team. Countless other individuals worked behind the scenes to make the event run smoothly and that helped too.

In conclusion, the exhilarating world of competition rocketry showcased in this article presents many compelling reasons why aspiring rocket enthusiasts should consider trying out for the team next year. First and foremost, the intense and high-stakes nature of the competition fuels an adrenaline rush like no other, pushing rockets to their limits and challenging participants to push their own boundaries. The opportunity to be part of a dedicated team that strategizes and utilizes collective resources, such as recovery crews and thermal pickers, adds an extra layer of excitement and camaraderie to the experience.

Ashley (middle) with new rocketry friends from Croatia and Slovenia.

Moreover, the satisfaction of overcoming obstacles and setbacks, as demonstrated by Ashley's composure in the face of disqualification, highlights the resilience and personal growth that can be achieved through competition rocketry. You also saw the importance of meticulous planning and attention to detail, from building lightweight rockets to optimizing flight conditions, making it an ideal arena for those who revel in precision and problem-solving.

Additionally, participating in rocketry competitions offers a unique chance to witness the marvels of science and engineering in action. The rockets themselves reach impressive heights and speeds,

Continued on Page 8

providing a hands-on exploration of aerodynamics and propulsion. It is my hope that you'd like to test your own skills and creativity in designing high-performance rockets.

Lastly, the sense of achievement and potential for recognition should not be overlooked. Whether it's standing on the podium, like Ashley's teammate who won the gold medal, or the personal fulfillment of executing a flawless flight, competition rocketry offers opportunities for individuals to showcase their talents and dedication to a broader audience.

Just for fun, a ugly rocket was cobbled together by the crew of international modelers. Yea… it went unstable.

In summary, joining a competition rocketry team promises an exhilarating journey filled with challenges, teamwork, scientific exploration, and personal growth. The passion and determination exhibited by the contestants in this article serve as a testament to the rewards and adventures that await those who dare to take flight. So, if you're ready to aim for the stars and test your mettle, consider trying out for the team next year and embark on an unforgettable journey through the captivating world of competition rocketry.

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 e-zine newsletter about model rockets. You can email him by using the contact form at **https://www.apogeerockets.com/Contact**.

Tim Van Milligan

Tim's Messy Desk

John came from out of town on a rocketry pilgrimage to Apogee last week. From what I heard from Allie at the front desk, the first thing he asked was: "Is Tim in the office today?" He wanted to meet me, which I find very humbling. Just like if you visit the North Pole, you just have to say hello to Santa Claus.

A selection of rockets in the Apogee display area.

John was typical of all the rocketeer pilgrims that visit in the summertime. He was wide-eyed as he entered the display area of our building where we have all of our built models. You'd think they were rabbits, the way they multiply. The models get touched a lot, which is fine by me. I like to think they each have a human personality, like in the Disney Toy Story movies, where they want to be played with. Unlike those toys, our customers never outgrow rocketry, so they get played with for a lot longer.

Anyway, John had a bunch of technical questions, and somehow Martin (our product developer) got called up to meet him. Martin's soul is that of a teacher, and I secretly believe that he lives for this type of interaction. Through the hallways, I could tell that they were both enjoying the talk, which went on for several minutes.

Product area of Apogee Components

Because John was in good hands, I went about my own daily duties. I was making another video in the studio. I lost track of time, but eventually I was in my shop putting away the props, and I heard Allie outside the door saying to John: "This is Tim's workshop where he builds the models that we sell…"

"And here he is now!" she exclaimed, with a look of surprise on her face. She was giving John a tour of the building, which

Continued on Page 10

Tim's Messy Desk Continued...

By Tim Van Milligan

is standard procedure when we have guests that come to Colorado Springs.

John was very happy to see me, especially in the workshop. We chatted for a few minutes, and then John asked me the most important question I've gotten in a long time. It is the philosophical questions that are the deepest and most meaningful.

He stated: "I've been in and out of many different hobbies over the years. I did rockets as a kid, and kind of got away from it for a while. Over the years, I've built a laser engraver, and done several 3D printers. How do you stay motivated and so passionate about rocketry for as long as you've been doing it?"

What I told John was off the cuff. And in hindsight, I think it was only about 30% of the real answer of how I stay motivated.

What I said was: "I just haven't run out of ideas to try out yet." And then I told John about my book Model Rocket Design and Construction (**https://www.apogeerockets.com/Rocket_Books_Videos/Books/Model_Rocket_Design_And_Construction**), which I packed full of all sorts of ideas that I've tried out over the years. It is definitely a good place to get a creative spark that can spur you on to try different things.

As I was driving home thinking about the conversation I had with John, I thought about it more and realized that it goes far beyond having great ideas to try out. Because where do those ideas come from? They don't just appear out of thin air.

My creative ideas actually come from other creative people. What I should have told John was: "I stay passionate about rocketry because it allows me to meet and interact with creative people. People like Allie, the Level 1 High Power certified rocketeer that is showing you around, John. Or Juan, who is Allie's fiancee, who is Level-3 certified and drops off her lunch on occasion. Then there is Martin, who you met earlier. Martin and I are constantly exchanging ideas. I've learned so much from him in the last year, that I feel like the student in the relationship. We also have Sam here at Apogee, who is a reservoir of information about what is going on with other modelers.

And there are all the members of our local rocketry club. Whenever I go to a club launch, there is always something new to see and conversations where I'm discovering new things to try out.

In addition, I am in a unique position that I get to interact with customers, just like you John. People from around the world, who are eager to tell me what cool projects they are working on."

All these people look up to me, like I know everything. But in actuality, I'm the one being energized and learning from them. They are giving me ideas to try out, and challenging me to explore them more fully.

If I had the conversation all over again, I'd conclude with something like this: "If you are looking for the secret to staying passionate about the hobby John, then you need to surround yourself with similar types of people. And the place to start is to get involved in a rocketry club. But you have to take the initiative."

Check out our Facebook page
www.facebook.com/ApogeeRockets