Aeronaut

The Newsletter for the Association of Experimental Rocketry of the Pacific

Triploi Rocketry Association, Inc. Prefecture no. 23

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First Commissioner's Corner

by John Coker

Hello fellow fliers. Tom Rouse, our illustrious First Commissioner (Prefect), has become very busy with his construction business and is unable to continue to serve. In the mean time, I will serve out the rest of the year as First Commissioner.

It has been pointed out that I have not been elected to the position, but just appointed, so I guess this is really the "Acting First Commissioner's Corner." I will be standing for the position oficially at the end-of-year elections.

We all need to thank Tom for his years as the launch director, followed by two years as First Commissioner. Thanks Tom, but we still expect to see you at the launches!

I will also continue to be newsletter editor for this year. But, we need someone to take over the newsletter next year. If you are interested, please let me know. You can participate in the production of one of this year's newsletters to see how it goes.

Certifications

I will be happy to witness your level one and level two certification flights during the regular launch days (non-EX days). Please make sure that I know you are going to fly so that I'm available.

If you need to take the level two certification test, let me know before the launch. I will probably schedule a time to give the tests at each launch, but I'd like to know in advance if anyone wants to take it.

If you are plannning to certify level 3 this year, I will be happy to witness, but I am not a TAP comittee member so you will still have to contact local TAP members such as Pius Morozumi, Karl Baumann and Tom Rouse.

Motors

AeroTech has resumed production of motors, starting with the hobby line. However, the larger motors are still scarce. If you have a project that needs a larger motor, check around before the launch to make sure that you can get what you need.

Check with Kark Baumann for motors still available. Rocket Silo should also be on hand and they still have some motors as well.

Members Meeting

Don't forget the member's meeting on June 8th. It will be at my warehouse in Burlingame (same place as the trailer cleaning party).

Mudroc

Mudroc is coming up too. (Yay!) I hope to see you all on the weekend of June 22nd. Note that the EX launch on Friday June 21st is the only EX launch AERO-PAC is holding this year.

Our Black Rock launch (in September) is always too close to BALLS anyway, so we've effectively moved our EX launch to June. Also, the Black Rock launch is now XPRS (Extreme Performance Rocket Ships), which is focused on certified motors.

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Our August launch this year will again feature the ARLISS project. We're going to be flying even more this year (up to 20 flights) and we continue to need more help to get all the student projects in the air.

If you would like to participate, we would love to have your help. You must be level 3 certified (before Aeronaut) and able to build a rocket to the ARLISS specifications.

See www.arliss.org for more information.

XPRS

Our last launch of the year is now XPRS (Extreme Performance Rocket Ships), which is a national launch focused on higher and faster flights using certified motors.

AERO-PAC came up with this concept at LDRS last year and it is officially a second TRA national launch.

This year, it will also be called the Tom Cloud Memorial launch in honor of one of our most fun members.

Black Rock with standing water (photo by Sue McMurray).

Motor Making Demo at Mudroc

by Bob Fortune

JimX (an Aeropac member who wants to remain nameless for this newsletter) volunteered to put on a composite motor making demonstration/class for the folks at Mudroc this year. A lot of Aeropac members have expressed interest in rolling their own motors so Tom Rouse asked JimX if he would showcase some of his techniques. Lucky for us JimX said yes and it will take place on Saturday of the Mudroc launch. The motors will be burned Sunday in a static demonstration. If you want to see how these motors go together make sure you hook up with JimX. If you have a load cell and data acquisition system you'd like to bring for Mudroc to capture the data, drop me a line bob@aeroconsytems.com.

Here's my phone interview with JimX just to give you a little info on his experiences and what to expect at his demo:

BobF: What's your background? What do you do for work and does it jive with your being a pyro?

JimX: I do programming for computers. Started doing rockets long before that, around 12, going to the library reading all kinds of books. I read Brinley's book; read about candy rockets - sugar and KNO3; Goddard's books, pictures of his various liquid fueled rockets and stuff. That was way before I even thought about being a computer programmer.

BobF: How long have you been making this stuff for?

JimX: Oh I was starting out with black powder when I was 12. Learned it from encyclopedias and stuff like that.

BobF: Did you find a good formula?

JimX: No not back then. It was your standard black powder formula. Around 13 or 14 I read about how the Chinese made the nozzle and ramming tools for skyrockets so I took the designs from the encyclopaedia and made little 1/4 forming tools and 1/4 ID tubing and finally made a little black powder rocket that flew.

BobF: How high did it go?

JimX: Oh, a couple hundred feet, it landed in the neighbors yard. It was a motor taped on a stick.

BobF: What would you say is your most successful propellant?

JimX: Um, I like the Everclear formula I got from JasonX. It's just got a lot of power kind of low smoke, it works though. I like stuff that works.

BobF: Have you ever had a motor blow up?

JimX: Oh yeah.

BobF: What percentage?

JimX: Oh, starting out, probably 3/4 of them blew up.

BobF: What's your batting average now?

JimX: Oh they hardly ever blow up now. I figured out what the Kn is supposed to be, how big to make the nozzle, and what kind of casing to use.

BobF: What's the most common failure mode you see in Ex motors?

JimX: In mine? Forward closure blows out as a result of various different failures. Sometimes the propellant, if I'm using a phenolic casing, the propellant will start to burn the forward part of the phenolic casing and weaken it. This is on a single use motor cause that's what I started out making.

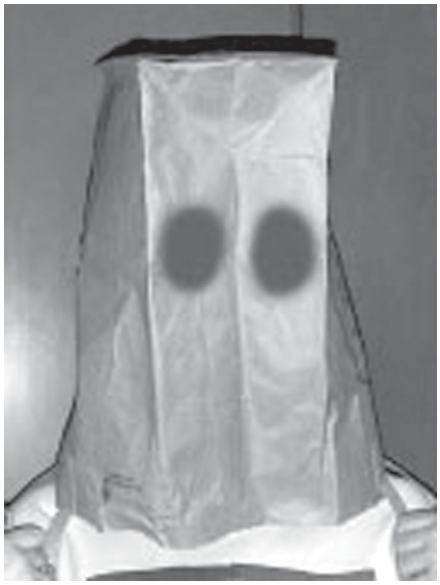
BobF: So how did you get roped into putting on this Ex class?

JimX: Rouse asked me, he thought it'd be a good idea. I thought it'd be okay, there are a lot of people interested in that sort of thing, I got started making by watching someone else, kind of like passing info on.

BobF: What can people expect to see at the propellant demo?

JimX: I was just going to mix the Everclear up and cast the grains. Then talk about the process. We let the grain cure and that usually takes overnight. So I'm going to make a 38 mm reload for a Kosdon case that I have. I'll hand out the formula and you just multiply each part by whatever, however much propellant you want to make. This will be the Everclear formula.

BobF: Have you done much with data acquisition?



JimX: I didn't do a whole lot of data acquisition besides trial and error and watching it burn. A lot of people use video cameras just to get the burn time and how the flame looks, how the burn looks on it. I did get to use Pius's test stand and got a pressure reading off that. I wasn't really concerned about what the pressure was because I could see how the motor burned in flight.

BobF: Did you ever use an accelerometer to collect flight data on the stuff you flew?

JimX: No, I'm just flying by the seat of my pants. (chuckle)

BobF: Some of us have heard of things like MDI and HTPB and Tepanol and some of us don't know beans this stuff, are we going to need to know any polymer chemistry when we do this?

JimX: No you don't need to know anything at the demonstration. Most of the formulas are pretty close to the same ingredients and there are substitutions you can make for the ingredients - when you start doing your own stuff.

BobF: How safe is making propellant in the conditions we'll see at Black Rock?

JimX: Oh it's pretty safe but you never know. Something could blow up at any point although I've never had it happen. Somebody could flick a cigarette butt into your pile, you could have a landshark plow into you.

BobF: What kind of ISP can we expect to get from your formulation?

JimX: Around 200 or so. Red is 182.

BobF: What about colors? Are they hard to do?

JimX: Red's pretty easy. Strontium nitrate and strontium carbonate. Green is Barium peroxide, which makes a pretty good green. Drawback with barium salts is they're poisonous. Copper oxide burn rate catalyst makes a nice blue flame. I lot of people think copper burns green like when you throw some copper pipe into the fire, but at the temperatures of a pyrotechnic composition it burns blue.

BobF: How do you get a real smokey propellant like the Kosdon Skidmark?

JimX: I don't know what he uses in the Skidmark. The one I make is similar to the Skidmark but it has castor oil in it and it has lower solids so the extra fuel makes it burn rich which makes it a little harder to light.

BobF: Do you have any recommendations on reading material before Mudroc?

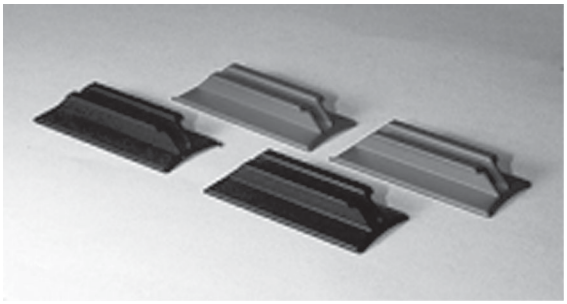
JimX: Oh uh, yeah that one McCreary is pretty good.

From the Launch Director

by Steve Preston

I want to thank everyone who made it out to the Equipment Party. Besides cleaning the gear we were able to start labeling all of the storage boxes with what equipment goes inside. This will speed up our teardowns. Special thanks to Bob Fortune, Henry Raygoza and John Coker for support above and beyond. Bob and John have allowed us to store the club's trailer at their facilities for extended periods. Henry and Bob have donated materials to the club like all the metal shelving and wood used to customize the trailer. Another member, Steve Ainsworth, donated 10 sealed batteries that we have been able to use to replace the leaky car batteries.

Our launch equipment continues to get better. For larger rockets we've added three 8-foot rails from 80/20 extruded aluminum. These rails have noticeably less "whip" than the 6-foot Blacksky rails. These larger rails are great for bigger rockets because they use the large rail buttons from http://www.railbuttons.com/ and attach to your rocket with ¼" 20 bolts. After two years of hauling Hypertech ground support out to every launch and not being used once, we decided not to carry it around anymore. If you need to use some Hypertech gear in the future contact the launch director and we'll try and arrange something.



Our regular size Blacksky rails are getting gouged and nicked by metal rail buttons. Because of this damage, we are no longer allowing the use of metal rail buttons. Metal rail guides are still OK.

Vendors- We'll reserve preferred vendor sites if you send me an E-mail with your space requirements (10' x10', 10' x 20' or whatever) or preferred adjacent vendor.

Please remember to sign up for launch duties. It makes everything run so much smoother if the jobs are assigned in advance.

Word from Karl Bauman is that there is limited availability of motor reloads from Aerotech. Get your order into Karl ASAP. For Mudrock there won't be any 75 mm or 98 mm reloads. White and blue 38 mm and some 54 mm motors will be available. No long burn 54's, Blackjack or red line motors till later this summer. Contact Karl Baumann at Mojave Desert High Power: mailto:mdhp@juno.com.

2002 Launch Schedule

June 21	**Mudrock EX**
June 22-23	**Mudrock 9.0** Night launch on Saturday June 22
August 2-4	**Aeronaut 2002** ARLISS launches on Friday and Saturday Night launch planned for Saturday No EX launch
Sept. 27-29	**XPRS** (Extreme Performance Rocket Ships) Certified motors only Events are in the planning phase

How to Contact the Board

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How We Got Into EX

by Tony Alcocer

This is a story about how AJ and I got into EX. Hopefully it will answer some the questions that a newcomer has.

We became interested in EX stuff about a year and a half ago. We talked to many people about how hard it was and how much it cost and what the legal requirements were. We checked for any info on it online and found very little there. We bought Terry McCreary's book on composite propellants and began reading it. At first I just skipped around, reading various chapters. I thought I knew some of the stuff and I became very confused, quickly! I then read the book from cover to cover. It made more sense that way. I then read it again to see if I really understood the basics. Along with Terry's book you get a computer program called ProPel that allows you to design a motors. Yes design! It's sorta like RocSim in that you enter a bunch of info and push some buttons and it will tell you how that motor will perform. How close is it? Depends on how accurate the info you put into it is. Just like RocSim. We then talked to more people, some from Utah, Colorado, and Aero Pac's very own Jim Green. They were all very helpful.

We then needed a push! A push, as in order the supplies and mix up a motor. Jim came in very handy supplying us with a shopping list and a formula. We placed an order with FireFox. I believe that this first order cost us about $200. For hardware we were using a Kosdon 38/640 case. The next item needed was Liners and Casting tubes. Liners protect the case from heat and the casting tubes are used to pack the propellant into. We found liners are available from various sources but opted to make our own from grocery bags. We were now ready to "pour" our first motor. We followed all the proper safety precautions and had all of our supplies. We looked like real rocket scientist with our bowls, scale and chemicals all lined up and us in all of our safety gear. We measured out the chemicals to the hundredth of a gram and mixed them in their proper order. Mixed it and mixed it some more. We then tried to pour this mixture into our casting tubes. The stuff would not pour! As we found out later "pour" is just a term. The final product has the consistency of fine sand with some honey in it. There is no way that we could pour this stuff. So we packed it into the casting tubes with a stick. We had just "poured" our first motor.

We had designed a "Bates" grain motor that, according to ProPel was to burn for 2.2 seconds and worked out to an I230. So, now for our first static test. AJ and I both were very excited to say the least. We had the camera ready and the video camera rolling...the video camera is used to time the burn, each frame is counted to determine the burn time..As AJ pushed the button "our" motor came to life and burned as well or better then any motor we had ever flown. With the video, we were able to count the frames and get a better idea about the formulas performance. As it turned out, the motor burned for 1.1 seconds, which worked out to an I450, give or take a few newtons. We have learned how to speed up or slow down the burn time by varying the core and/or nozzle size or even by changing the formula.

Most recently we flew an L830 with a 4.2 second burn time, with our own red formula called "wimpy red" in my L3 rocket to 11,600'. We have also static fired an M2100 with "wimpy red" that had a 2.8 second burn time.

How hard is to do? It's allot like baking Brownies. You can get a recipe form your grandmother and go buy all the ingredients mix them together and toss it in the oven and in a few minutes you would have some Brownies. But to know what the eggs do or why it has baking soda instead of baking powder, takes some time to figure out. Time, as in reading, testing and talking to other EX guys. It can be done! AJ and I are proof of that!