

Aeronaut

Volume 16 Issue 1 May 2009

Tripoli Rocketry Association, Inc Prefecture no. 23



Presidents Pad

I'd like to start off by saying thanks to Ken Adams for taking on the job of newsletter editor.

I've always like reading clubs newsletters. Thanks Ken! So what's new in the world of rocketry? There are **new FAA rules** that will apply to some of our members. If your rocket has more than 40,960Ns total impulse then you need to get FAA approval for that flight. You can get more info in Steve Wigfield's "The FAA Guy" article. I did hear the TRA is working with the FAA trying to simplify the process. Speaking of TRA. There are some new rules concerning Research Launches. To be able to fly at a TRA Research Launch your must be a TRA member in good standing and at least 18 years old. You have to be at least L2 to fly/test research motors. You can only fly/test mo-

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2009 Launch Schedule

Mudroc June 18th-21st

Aeronaut July 30 — August 2

ARLISS September 14th-18th

XPRS September 17th-21st

Mudroc opens the season on Thursday June 18th with setup in the afternoon and a Research day on Friday (Research Rules Apply). *Saturday night launch 8—10 PM.* New this year is the addition of the ARLISS Spring launch Friday & Saturday and student presentation banquet on Sunday. The new addition is to make flights available to US universities normally off during the Fall ARLISS week.

Aeronaut setup day begins on Thursday July 30th with Research day on Friday. *Saturday night launch 8—10 PM.*

ARLISS Fall setup day Sunday September 13 with ARLISS activities thru Friday the 17th and the student presentation banquet on Friday the 18th.

XPRS Setup Day Thursday the September 17th XPRS flight operation beginning on Friday the 18th with a Research Day on Monday the 21st.

Other Events

Black Rock Rendezvous May 22- 25

Maker Fair, May 30—31

See page 7 for details.

LDRS Potter, New York July 2-6 2009

BALLS 18 Black Rock October 2-4 2009





AERO-PAC Officers

President / Prefect - Tony Alcocer

Vice President / Equipment Manager - Richard Hagen

Secretary - Mike Brest

Chief Financial Officer - Eric Kleinschmidt

FAA Liaison Officer - Steve Wigfield

Education Director - Ken Biba

Social Outreach Director - Peter Clay

Launch Director - Peter Clay

Assistant Launch Director - Seth Wallace

Webmaster - Jamie Clay Contest Director - Cliff Sojourner

AERO-PAC Board Of Directors

Chairman — Ken Biba

Tony Alcocer

Erik Ebert

Steve Wigfield

Gary Rosenfield

Mike Brest

John Coker

Eric Kleinschmidt

Karl Baumann

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tors to your certification level, and certification flights L1-L3 are now permitted at Research Launches. For more info check out http://www.tripoli.org/documents/ResearchSafetyCode_Jan_09_r3.pdf

Also, TRA has dropped its policy of requiring flights over 25K to obtain TRA approval. But, there's always a but! AERO-PAC has implemented its own 25K approval process. This has been put in place to keep our flights inside our FAA waived area. As most of you know we have a 100K waiver. Along with this, we also have an 8 nautical mile radius area that we must stay inside. We've had a couple of rockets get outside this area. AERO-PAC is now limiting the size of drogues used on rockets flying over 25K. To obtain AERO-PAC approval for flights over 25K, check out the web page at http://www.aeropac.org/safetyrules.html#25k_approval

ARLISS is growing and is now having flights at Mudroc to encourage US participation. Also, ARLISS had a LARGE anonymous donation that has been put to good use. To find out more check out the ARLISS column. Peter Clay is going to be busy as the "Social Out Reach Director". That's a pretty fancy title. Check out Peter's column to see what he has going on and how you can help. Speaking of help. I showed up to the Equipment Cleaning Party fashionably late. I did get the word from the "Equipment Manager" that we were "good to go"!

I'm not sure if everyone is aware that at XPRS 2008, that Curt Von Delius set two new Tripoli altitude records! Curt took the M record with an M1450 and set the bar at 45,328'! Yes 45,000 feet. Just 4 years ago the record was just under 34,000. Not as if that was enough, the next day Curt took the J altitude record with a J570 at 19,758'.

So, as we approach the 2009 flying season, it looks like our FAA waiver is in place (with a few new rules). Our BLM permit is on track. Our launch equipment is ready to go. ARLISS is bigger and better than ever. We have a couple of public education events coming up. So all looks like a "GO" for the 2009 season. -Tony

Editors Note: Latest TRA / NAR May 18th announcement on BATFE can be found on the TRA or NAR websites.



Amateur Radio Repeater

Paul Hopkins KE6DAX will be fielding his portable simplex repeater again this year on **147.470** with a **PL of 100.0** Paul's repeater has been very helpful extending the communications reach for folks that have needed assistance and coordinating flight and recovery operations. FRS will be coordinated for local flight line activities as well, Thanks' Paul.



What is a simplex repeater??

A simplex repeater consists of a radio on a simplex frequency and a digital voice recorder. When a signal is received, the recorder stores the message (usually up to 60 seconds worth max). When the received signal ends, the digital voice recorder retransmits the message on the same frequency. A commonly used term to describe this activity is "store and forward".

Helpful tips for simplex repeater use include:

- Talking across the microphone rather than directly into it.
- Taking pauses between transmissions to avoid doubles and clearing the repeater with your call sign when finished with conversations.
- Keeping content short and to the point as store and forward has recording time limitations.

Help Wanted

Do you have a story, project, review, feature, cartoon or a "that's the one" photo you would like to share? Well, we have a format to help get it out; AERONAUT Newsletter. We are actively seeking contributing content for upcoming publications. Contact us at : newsletter@aeropac.org



AERO-PAC Engineering Party

By David Mathes

Black Rock Desert does not forgive. Lack of advance preparation can become an emergency for someone else. Health and safety depend on equipment in good condition, repaired from the brutality of the desert sun, sand and wind. Worse, if it doesn't work, we can't launch safely. On January 31st over 25 people showed up for the AERO-PAC Equipment Session to repair, restore or replace the equipment from the wires to the layout in the trailer the group made it better. From all over Northern California people came to help.

The basic plan was to do everything on Richard's Equipment List. With the doors to the trailer open, the unpacking of everything onto the sidewalk began. Tubs of cables, flags, iron launchers, iron stakes, aluminum rails and a host of other stuff that was crammed in an organized manner into the trailer. One unwritten goal was to make more room in the trailer – for more stuff.

With new launch site lessons learned, this was yet another round of implementing a few of those lessons we learned the hard way on the playa. Every piece of equipment, great and small, had desert dust, that wonderful alkali dust you learn to live with since Black Rock desert dust gets into everything. With a sidewalk full of equipment, everyone grabbed a project of their own and went off to the various parts of Richard's shop to work on fixing, sewing, dusting and coiling. The 1000' Away pad cable was unrolled down the sidewalk.

Lunch was generous; everyone wanted to get the work done so lunchtime was short with most folks standing up, then back to work; snacking continued as projects were finished and the trailer was loaded.

By mid-afternoon the trailer was awaiting the LCO table. Inside, the work party was cooperative and the place was peaceful with everyone doing the hard work here so that those who setup, operate and tear down can do so efficiently and everyone who launches will be especially grateful for no waiting in line or to launch as field repairs are

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(Engineering Party continued from page 3)

made. Outside, the rocket banter continued from the folks centered around the equipment they were working on and the equipment list which was strategically placed on a large 55 gallon drum for reference.

What follows is a roll call of those attending. I'm sure to have missed someone and did not get to everyone. My apologies in advance if I missed you this time.

In the morning madness Bob Feretich restored our wind-damaged easy-ups to normal operation. Grant Saviars with his magic band saw cut down the pad bases to size in support of our hinging modification and Darryl Paris was everywhere from repairing the LCO table mounting hardware to starting in on our HP pad mast reconstruction.

As I walked through Richard Hagen's business, I saw the hair and sure enough, there was James Marino fresh from restoring full solar power to the trailer now working on cables for both launch and PA. Marino also brought a few of the LUNAR folks. AERO-PAC members support LUNAR during the winter and spring months with the launches at Snow Ranch, and many of the group are members of both organizations. Snow Ranch is the wintering grounds for many an AERO-PAC member during the six months or so Black Rock Desert is inaccessible.



Sewing is not usually associated with rockets however, there always seems to be something to sew and sew it was at our gathering. Steve Kendal was flag shortening by trimming and sewing the numbered flags to stay low to the ground, this will reduce the wind damage. The winds at Black Rock can flatten tents, make pretzels out of easy-ups



and rock RVs. Usually, a weather front brings on the heavy wind, but the daily dose of dust devils do their part too. Between the mud, sun, dust and wind, any fabric takes a beating from

launch pad number flags to the American Flag. Tom Fetter batted cleanup on the toughest flags deciding to take them home where flags requiring all four sides to be trimmed could be done on his setup. The desert winds are merciless

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CFO Report

Eric Kleinschmidt



With the 2009 season about to get under way, I can say that AERO-PAC is in good shape. We have enough money to fund our launch season, and ARLISS has benefited greatly from a very generous grant.

With that said, the BOD elected to raise the walk-on fee to \$10 per person per day at last year's annual meeting. We were charging \$5 per person per day, but our actual costs are over \$7 per person per day, and costs are only expected to increase. The BOD elected to maintain all of the other fees (membership and launch) at the same level they have been at for many years.

A generous anonymous donor gave \$20,000 to support ARLISS. \$15,000 of that is to be paid out in the form of grants to schools to help defray the costs of an ARLISS project and open the program up to more students. The rest will help build the infrastructure for the program. There were a couple other donations given so far this year to help AERO-PAC, and we value them just as much. We must not forget that we are a member driven non-profit with an educational mission. We depend on the efforts and generosity of our members to succeed.

Speaking of efforts and generosity, your expenses involved in participating in an AERO-PAC event may be tax deductible. AERO-PAC is an IRS recognized 501(c)(3) educational non-profit corporation. Of course, the usual disclaimers apply; i.e. consult your accountant, lawyer, astrologer etc. to determine the extent of deductibility. HOWEVER... your expenses must be incurred while supporting AERO-PAC's mission. This means that you must make some type of significant effort in order for it to be deductible. Simply showing up and flying rockets does not fit the criteria. You must VOLUNTEER! Working launch shifts, setting up, tearing down, being an officer, or helping to launch student payloads are some examples of volunteering. Sitting on your butt and whining about how someone else is supposed to help you are not!

Unfortunately, our vast congressional lobby failed in their noble attempt to have purchases of motors and reloads of 2560 Ns or greater declared as tax deductible. Everyone will just have to eat the cost of their AP. Members are still encouraged to stimulate the economy by buying and burning as many large motors as they can. -Eric



Did You Know?



The Black Rock Desert was once part of a ancient lake



named Lahontan. A massive inland lake that existed during the last ice age. Lake Lahontan covered much of north western Nevada with arms

into southern Oregon and northeastern California. At it's peak the launch area would have been about 500 ft under water. The surrounding area had a diverse collection of animals from sloths and saber tooth cats to 30 pound condors with 14 foot wing spans. Others included ancient species of bears, horses and mammoth. In 1979 not too far from the current launch area is where Oregon logger Steve Wallmann happened upon a fossil tooth in a channel of the Quinn River. He reported it to Dr. William Clewlow, Jr. of Ancient Enterprises, an archaeologist with extensive experience in Black Rock Desert archaeology. Dr. Clewlow examined the exposed tooth in 1981 and did a small test excavation to determine the

scope of the find. Finding evidence of extensive partially articulated bone, he re covered the bones and planned a exca-



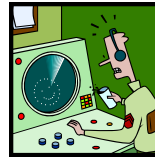
vation for the next field season. In the summer of 1982 the excavation team uncovered a mammoth. What type of mammoth? Some say it is a Imperial others say a Columbian. What other wonders go uncovered in the Northern Nevada Desert? The Mammoth and other Black Rock finds are on display at the Nevada State Museum in Carson City, Nevada.



THE FAA GUY

Steve Wigfield

NEW FAA RULES



The FAA made significant changes to the rules governing rockets since last year that all members need to be aware of. Flyers of new class 3 rockets will be impacted the most by the new regulations. For the rest of us, 2009 will be mostly business as usual. We may be adding a new launch duty position of "train spotter" to satisfy a new waiver stipulation.

There are new classifications for rockets:

Class 1 Model Rocket: means an amateur rocket that:

1. Uses no more than 125 grams (4.4 ounces) of propel-
2. Uses a slow-burning propellant.
3. Is made of paper, wood, or breakable plastic.
4. Contains no substantial metal parts, and
5. Weighs no more than 1500 grams (53 ounces) including the propellant.

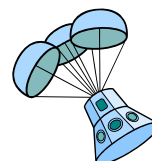
Class 2 High-Power Rocket:

means an amateur rocket other than a model rocket that is propelled by a motor or motors having a combined total impulse of 40,960- Newton-seconds (9,208 pound-seconds) or less.

Class 3 Advanced High-Power Rocket: means an amateur rocket other than a model rocket or high-power rocket.

Our waiver does not cover Advanced High-Power Rockets. Anyone planning to launch an Advanced High-Power Rocket will need to obtain their own waiver from the FAA. Waiver applications must be submitted to the FAA 45 days prior to launch date. I will provide contact information upon request.

New minimum separation requirement for high-power rockets or advanced-high power rockets:



(FAA continued on page 10)



(Engineering Party continued from page 4)

with any fabric and double stitching is a must along with special alignment.



The cables also take a lot of abuse beyond the weather being dragged or stepped on so a few repairs were in order. Jeff Stutzman unpacked and repacked cables while removing some of the desert dust coating, you can never remove it all. In fact I sighted Becky Green and Jen Curtis

undoing and recoiling some cables as well, and Eric Kleinschmidt took on the 1000 foot cable that goes to the Away Pad.



In the back, Charlie Wittman finely ground the shortened metal rods that were cut earlier, these rods hold up the flags. The grinding was so they will go in the ground easier. The LCO table was covered in hands from Allen Palmer, Anthony and Sheryl Cooper, and Erik Ebert. In a coordinated effort they went about their business working with a few



words thrown in to keep things interesting. The LCO table underwent a major overhaul. With space at a premium in the trailer, the LCO table was shortened and new clips and

labels were added to hold the new flight cards and Evan Curtis was working on brackets for the LCO table and the launch rail modification. Mike Pettipiece was part of the Pack Group that unpacked and repacked the trailer.

Richard and Laura are the greatest hosts. Richard's shop was the host for this work party. Richard had a full page of things to do. He did some preliminary work on the LCO, fixed one of the easy-ups and did a fair amount of prep work. As equipment Manager Richard was grateful so many people showed up and made short work of his list. Peter Clay took pictures of everyone the pictures are up



on the AERO-PAC website. With the trailer packed, all that remained was desert dust – on the sidewalk, in the shop, and



Congratulations AERO-PAC On 10 Years And 200+ Flights Of ARLISS



ARLISS Participants: Tom Rouse, William Walby, Randolph Mitchell, Griffin Mitchell, Pius Morozumi, Jim and Becky Green
Circa 1999 Aeronaut Newsletter

even on the smiles of everyone there. The trail of dust leads all the way back to Black Rock.

The individual - or the superhuman efforts - may not be fully recognized, even so, those who were there will recognize the work. Out in the desert, others may not notice



the cable, the flag or the reworked LCO table as they launch rockets; but for those who were there on work day in mid-winter, they will remember not only the equipment but the faces of the friends who worked on the equipment at the Equipment Party 2008. Cheers!

On to the Cleaning Party in Petaluma April 18th where we make the Big Attempt to remove desert dust from everything. Explore the depths of the Equipment from the equipment trailer (ET) while learning the art and science of really cleaning the equipment. –David



AERO-PAC IN THE COMMUNITY

Peter Clay

This year AERO-PAC will be participating in two external events, giving presentations and otherwise promoting our hobby and club. Thanks to the many donations from members we have lots of visual aids to display; inert propellant grains, samples of the materials used to make rockets, rocket motors, a visible rocket and even a visible motor.

The first event will be the Black Rock Rendezvous May 22nd thru 25th. This is an annual event hosted by the Friends of the Black Rock and the BLM. This event celebrates the diversity of use and history of the Black Rock Desert Region as well as fostering its stewardship. We encourage any of you with an interest in learning more about this amazing place to attend this event. Tickets are available through the Friends of the Black rock site (<http://www.blackrockfriends.org/blackrockrendezvous/>) and are \$75 for the weekend (\$55 if you are a member of Friends of the Black Rock). There are many tours and activities as well as a chuck wagon dinner, music, etc. - an awesome event for Playa enthusiasts.



AERO-PAC representatives will be there Friday thru Sunday giving presentations of who we are, what it is we do and how we care for the Playa. We will be launching various rockets for the crowd. Last year we generated a lot of interest and had a good crowd for the launching of the Black Brant. This year we plan to put up a few more rockets giving the crowd more of an opportunity to see just what it is that we are all so passionate about.

Our next event will be the following weekend May 30th and 31st, the Maker Fair. This is an annual event held at the San Mateo Fair grounds and put on by Make Magazine. As they state on their site (<http://makerfaire.com/>) it is a two-day, family-friendly event to MAKE, create, learn, invent, CRAFT, recycle, think, play and be inspired by celebrating arts, crafts, engineering, food, music, science and technology. I would describe it as kind of a Burning Man meets the techno world.

As in previous years, we will be there with several large rockets on display, the many visual aids and videos of our

past launches. We normally share a large room with our good friends at LUNAR . LUNAR offers a build session for



kids then takes them outside to launch their freshly built rockets. AERO-PAC will also be doing some static motor burns to give the crowd an idea of the power,

sound (and smell) of an APCP motor.

The Maker Fair is a great opportunity to talk to hundreds of creative people and expose them to our great hobby and what it has to offer.

The Community Outreach division of AERO-PAC, inc. is always looking for new opportunities to go out and present and educate the public about our hobby/sport. If you know of any events or opportunities that would be appropriate please send me an e-mail. -Peter

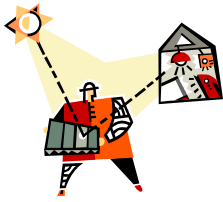


A note from AEROTECH

Both Gary and I plan on coming to all the AERO-PAC/ARLISS launches this year, as usual I will have "demo" motors for members to fly, soooooo Flyer's beware and come prepared with 54mm,75mm and 98mm powered rockets. We plan to have "T" shirts for sale and as usual provide support for flyers using our products. -Karl Baumann

Watts in the Desert

Richard Hagen



To support our rocket launches, we haul a lot of electrical equipment out to the Black Rock desert. Most of it is battery operated so we bring along several battery chargers, extension cords, gasoline powered generator,

several cans of gas and assorted spare parts to recharge our batteries when they inevitably go dead. Along with several tons of launch equipment, this electrical stuff all lives in a 7,000 lb. trailer that has it's own on-board electrical equipment. It has interior lights, breakaway braking system and a motorized tongue jack that was previously supported by a way too small 12 Volt battery. To run our tongue jack with the frequently dead trailer battery, we had come up with a cumbersome scheme that plugged in launch batteries for back up.

At some point, it occurred to me that a small solar panel might provide an easy method of keeping the trailer battery charged. After a brief Internet search, I landed at <http://www.morningstarcorp.com/en/home> and after recovering from sticker-shock, settled on a 40-Watt panel along with a controller. Since the panel voltage varies with available sunlight, it can be too high or too low for direct battery connection and needs a controller to protect itself and the battery. The panel mounted nicely on the trailer roof and an inside wall accommodated the controller. A run of wire and



the system was done, providing constant charging for the existing battery. I took a picture, posted a self-congratulatory note on our members list and one of our members asked if I needed more panels. Sure, I said and he delivered 3 more 80

-Watt panels. Didn't take much mental math to realize that we could have somewhere around 24 Amps worth of 12 Volts available.

Hmmm, that would make a nice match with those big 12 Volt batteries that another member had donated the year before. Back to Morningstar for more controllers, some more wire and a little help from my engineering party friends and voila, the trailer became a major power source.

How to take advantage of all the power became the question. In addition to charging batteries, one of the things we have that consumes power is our FM transmitter, so we relocated it to the trailer. It required 24 VDC, so the two batteries were connected in series to produce a dual 12/24 Volt system. Now remote from the LCO table, the FM needed a wireless receiver to pick up the signal from the LCO. Two of the 80 Watt panels are continuously charging the two 12 Volt batteries that comprise that system. Power is provided to the FM transmitter, wireless receiver, trailer lights, breakaway brake system and tongue jack.

The remaining 80 Watt and the 40 Watt panels provide continuous charging power for the 12 batteries that power our PA system, launch controller and provide igniter power around our launch site. Since it's inception, our solar power system has routinely delivered our entire inventory of batteries to the launch site at around 13.5 Volts, which is sufficient to last through most of our launches. While the PA batteries still require charging, spare and depleted pad



batteries can be charged continuously during our launches. *—Richard*





Looking Ahead to XPRS Contests

Cliff Sojourner



Every year on the Saturday of the XPRS launch, AERO-PAC runs a series of rocket flight contests. AERO-PAC's XPRS Contest series is unique: as far as I am aware, no other club runs a regular series of HPR contests. This is for bragging rights only. The 1st Place trophies are really nice, 2nd and 3rd place get certificates. Among the 5 contests is at least one that every flier will want to enter. Take a look at the list below and get started building your rocket!

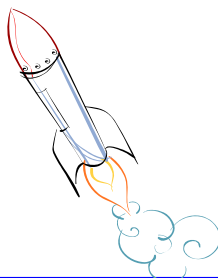
As I say every year: you need to enter to win! Occasionally there is no award in a category because no one entered. Entering is easy, fill out the slip and hand it to the RSO at check-in. Bring the rocket back & show us so we can record your flight on the whiteboard. The tension mounts over the day as people post their flight statistics. After the range closes Saturday evening, I'll disrupt your dinner by announcing the runners-up and winners, and sponsors.

Sponsors. Every contest has a sponsor. Sponsors enjoy helping the contests, but they enjoy it the most when you remember them for your next rocketry purchase!

The 5 contests for 2008 were:

- * **LOC Precision's "Dude Where's My Rocket"** - Parachute time duration for A, B, C, D, and E motor powered rockets. This contest is for juniors (under 18 years). In 2008 each division's top prize was a LOC Aura kit! In 2007 the prize was a D-Region Tomahawk kit. Very generous and thank you Barry & LOC Precision.
- * **What's Up Hobbies' Extreme Altitude** - best altitude for the motor class, from H to O motors. This one is the most competitive, with heavy action in I, J, and M motor classes. We'll accept barometric altitude from any production altimeter.
- * **Mojave Desert High Power Need For Speed** - top velocity for the motor class, from H to O motors. This one requires an altimeter with an integrating accelerometer, the differentiated barometric readings are not reliable enough. Download the altimeter and show us your Mach!
- * **Aerocon Systems' EconoMax** - best altitude for the cost of the motor. Show us the barometric altitude and manufacturer's suggest retail price of the motor, we'll do the math. Best feet-per-dollar wins!
- * **Hybrid Altitude:** For hybrid motors only, best altitude in the motor class, from H to O motors. Last year this was unsponsored, and neither of the two hybrid flights entered the contest. Looks like open season for your hybrid motor launch.

Please make a suggestion if you have a fun idea for a contest. AERO-PAC is your club and we all want to have fun. No I am not going to run a hybrid-cluster night-launch bowling-ball boosted-dart spot-landing contest. —Cliff





(FAA continued from page 5)

The new requirement now stipulates that any person or property not associated with the launch must be, the greater of, 1,500 feet or ¼ of the maximum expected altitude away from the launch site. High altitude flights will require us to monitor larger radius' around our launch site to make sure the area is free of all people and property not associated with our event.

In addition, the FAA has stipulated, in our 2009 waiver, that we must monitor the train tracks to ensure that there are no trains within 8 statute miles of the launch site at T-2 minutes.

In light of the new FAA rules, Tripoli has dropped its review of flights that exceed an altitude of 25,000 feet. However, AERO-PAC's BOD has decided to conduct its own review of any project that is expected to exceed 25,000 feet. Projects need to be submitted to the FAA Liaison Officer, Steve Wigfield, no less than 30 days prior to the launch date. A flight submittal form is available on our web site. There are also new maximum drogue chute size restrictions posted on the web site that apply to all rockets. The new restrictions are designed to keep all flights within our waiver cylinder at all times.

Some old restrictions have been eliminated: The 15 second maximum burn time restriction has been eliminated and a ballistic coefficient of 12 pound per square inch or less is also eliminated. -Steve



ARLISS COMMITTEE UPDATE

Becky Green and Ken Biba

Time sure flies when you're having fun....and here's some proof. ARLISS is having its 10th Anniversary this year. It seems like it was just a few short years ago that ARLISS started out with just 4 flights in 1999. ARLISS has grown so much over the years....last year there was 50 plus flights. This year we have decided to add ARLISS launches during Mudroc too. We did this mainly to get more US universities to participate in the program. It always seemed that in September the students were all back in school which made it very tough for them to get to the launch. As Tony and Eric mentioned we received a very generous anonymous donation to ARLISS this year and we were able to give 6 US universities a \$2,500 mini grant. There will be 5 of those universities coming to the June launch and the 6th one is coming in September. For those of you wondering how many flights there will be in June.....I still don't know. I am waiting on a count from each of the universities. They didn't tell me how many teams or how many flights each university has. I will try to get word out to the list as soon as possible. I know Mudroc is used for the fliers to do their other projects so I want to thank everyone up front who has volunteered to fly ARLISS in June as well as September. I will try my best as always to get everyone a flight. Maybe you should plan on bringing those other projects just in case there are not a lot of flights. The last thing I have to report is there will be a website soon with ARLISS 10th anniversary T-Shirts for sale. I will send an email to both lists once it's set up. I'm looking forward to another very successful flying season to begin, Please see the additional ARLISS flyers from Ken Biba for more ARLISS program information on page 12.
- Becky

TRAVEL TO BLACK ROCK



An interesting Caltrans web site that could help to take some grief out of your I-80 travels to and from the launches.

www.getacross80.com

This website was designed to offer construction schedules and timelines, detour information and project updates. There are also links to weather, traffic cams and other relevant travel information. Nevada NDOT has a like utility to check out construction project on the Nevada side as well. safetravelusa.com/nv/





Launch Operations

Seth Wallace



As we eagerly await the 2009 launch season it's a good time to go over the state of the launch and a few new rules (and a few old ones). The state of the launch is well. Our BLM permit is in good standing and lets all work to keep it that way by keeping the launch site clean and leaving

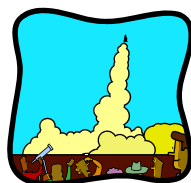
it the way we found it. If there's a windstorm, secure your camp and then think about helping secure the clubs gear. If this is your first year out on the playa, read and heed the "Desert Survival Guide" section of the [Aeropac.org](http://www.aeropac.org) website.

One new way we will be conducting launch operations this year has to do with the duty roster. Launch activities will not start on any given day until the duty roster is full. LCO and RSO are both fun ways to pitch in to the launch, except when you have to do 3 shifts in a row because no one else volunteered. If you have never served, sign up as an assistant and some one will show you, its easy and fun. Many hands make light work on the setup and teardown. Consider arriving early or staying late to help with that. Some of the most magical times I have had on the playa are before most people have arrived or after they have all gone and it gets quiet and desolate again.

The equipment is in great shape thanks to cleaning and engineering volunteers and the tireless efforts of the equipment czar. Lets all work to keep it that way. One of the most important things to remember is to stay off the launch control cables. Cars, motorcycles, bikes and even foot traffic can cause a break in the cable which would bring launch ops to a halt in a hurry. Finding and repairing a break in a 500' cable is next to impossible in the field, and there is no backup. Keep the igniter leads out from under the motor to prevent them from being burned. If your N motor digs a 4 foot hole under the launch pad, please be sure to fill it in.

A last note... please try and visit the vendors. They drive a long way to provide us with motors and other last minute items that we may have forgotten, as well as a chance to browse in real life as opposed to shopping online.

Lets fly rockets! -Seth



Check out [ThrustCurve.org](http://www.thrustcurve.org) long time AERO-PAC member John Coker has updated the user interface, what an excellent source of motor information for hobby rocketry, <http://www.thrustcurve.org/browser.shtml> Thanks John.

Membership Information

AERO-PAC memberships expire January 31 of each year. All members receive a membership card, subscription to Aeronaut Newsletter and notification of all meetings and launches. Voting and office-holding privileges are restricted to Premium and Regular members in good standing. Premium Membership and Family Add-On Members of Premium memberships include all launch fees for the year. Launch fees for Regular Memberships and Family Add-On Members of Regular Memberships are \$20.00 per person per launch. Launch fees for non-members are \$30.00 per person per launch. Spectator fees are \$10.00 per day. The AERO-PAC website <http://www.aeropac.org> provides specific meeting and launch information, AERO-PAC contact information, membership application and other useful information for all visitors to our launches.

A Rocket Launch for International Student Satellites



ARLISS began in 1999 as a cooperative program between Professor Bob Twiggs of Stanford, his colleagues at other universities worldwide and members of the non-profit Northern California high power rocket club AeroPac. In ten years it has been an extraordinary learning experience for over a thousand aerospace engineering students.

The ARLISS mission is the collaborative design, fabrication, launch and operation of sophisticated autonomous robotic payloads designed for near space-like deployment. ARLISS airframes, provided by AeroPac members, reliably deliver standard student payloads (CanSat, CubeSat and Open) to a consistent altitude (11000' AGL/15,000' MSL) with uniform deployment to subsequently accomplish a challenging mission - autonomously return to an agreed location on the playa. The ARLISS team takes extraordinary pride in never having lost a student payload to flight failure.

It is a mutual learning experience. For the students - they learn the complete collaborative design process to design a complex electronic and computer payload (an autonomous robot satellite) that will have to operate in the standard, but harsh environment of Nevada's Black Rock desert. For the fliers, they learn to hone their skills of designing highly reliable and repeatable flight operations.

In 2009 the ARLISS program will expand with multiple launches (a June launch intended for more convenient access for US universities) and a state-of-the-art satellite Internet and radio infrastructure that supports multimedia participation for worldwide student participation and advanced experimentation with radio telemetry and high performance WiFi communications both on the ground and in flight.

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ARLISS Facts

- Ten years of successful projects.
 - Over 1000 students
 - 6 satellites in orbit from alumni
- Open to domestic and international student high school and college teams
- Two multiday launches a year
 - June
 - September
- Proven launch and project delivery system
 - Over 200 flights without losing a student project.
- World class launch site
 - Black Rock Desert, Nevada USA
 - Multimedia Internet satellite Virtual Classroom
 - WiFi and APRS telemetry and flight communications

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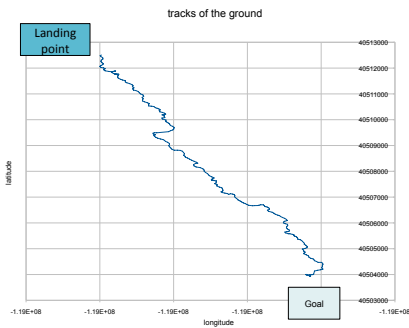
A Systems Challenge

An ARLISS satellite is a collaborative project to create a complex autonomous coffee can sized robot that:

- survives an 8G launch
- survives 15 G deployment at 11,000' AGL
- survives returning to the ground
- fastest to navigate back to the agreed destination on the ground: by crawling, flying or gliding and
- all in a physically extreme remote location far from the calm contemplation of the laboratory.



The ARLISS 2008 **Comeback** winner was a crawler that not only survived the flight, a parachute drop from 11,000' ... but navigated itself back over 2 km across rough desert playa in less than 15 minutes!



In 2009 ARLISS will expand to include not only classic **Comeback** projects but also **Bringback** projects in which larger, ground based robots can go out and retrieve the flight payloads and return them to the destination. Classic **CanSat** and **CubeSat** projects are always welcome.

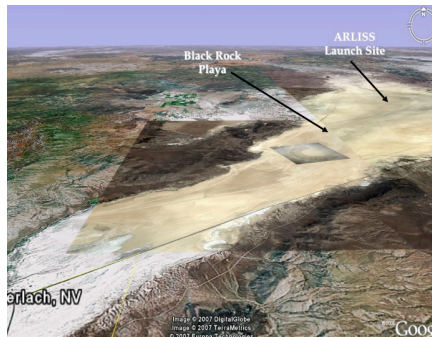
A History of Success



The ten years of the ARLISS program have seen more than 200 flights from projects of over 1000 students from over 10 countries.

These students have helped put up more than six LEO satellites before graduating to careers in science and engineering.

The Perfect Location



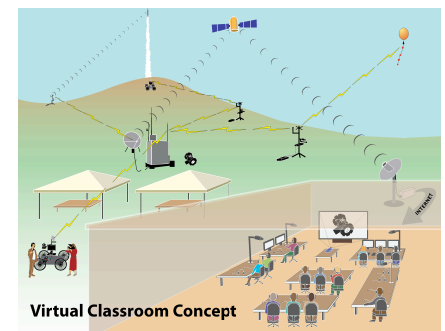
ARLISS events are staged at one of the premier locations for aerospace exploration and rocketry - Nevada's Black Rock Desert. Flights to 100,000' are possible with 20 miles of flat dry lake bed recovery and experiment area.

Local motels or camping on the playa provide logistical support.

World Class Facilities
AeroPac

One of the oldest amateur rocket clubs in the world, AeroPac has hosted ARLISS since its inception. Its members contribute their skill and the airframes to carry student satellites through an ARLISS mission. No student projects have been lost due to launch failure in the history of the program.

Virtual Classroom



After 2008 development under a US Department of Labor/California Space Authority grant, ARLISS will offer the **Virtual Classroom** capabilities in 2009 events.

The Virtual Classroom brings satellite Internet real time video, audio and data conferencing to extend the learning experience from the playa back to the classroom and students around the world.

The Program

Participation is open all college and secondary school teams.

Sign up by reviewing the information on the web site, contacting the ARLISS team for more information and questions, and beginning planning for your project. Generous donations have made modest grants available to participating teams to help offset travel and equipment costs.

The **Virtual Classroom** is an integrated wireless network system to provide a distributed, near real-time electronic collaborative environment that allows video, audio, data and sensor participation by a worldwide community of participants in experiments undertaken in physically remote locations. These locations, due to cost, accessibility, safety or other concerns often do not permit communities to participate at the location. For example, all of the student members of a robotic satellite team may not be able to be at the launch and recovery site. The **Virtual Classroom** permits all members of these teams with a broadband Internet connection to view and participate in these experiments with many of the tools that on-site experimenters have and might well bring access to remote analysis tools that are impractical to bring to the remote site.

Virtual Classroom Facts

- Web 2.0 user interface available worldwide
- High speed packet satellite Internet backbone
- Data, VoIP, video Internet Gateway
- Wide experimental area radio coverage
 - 1200 km³
 - 70cm and 2m APRS geotracking, telemetry and weather
 - 36 Mbps IEEE 802.11 data, VoIP and video

ARLISS

The **Virtual Classroom** is used for the **ARLISS** student satellite program at Black Rock, Nevada. ARLISS has a ten year

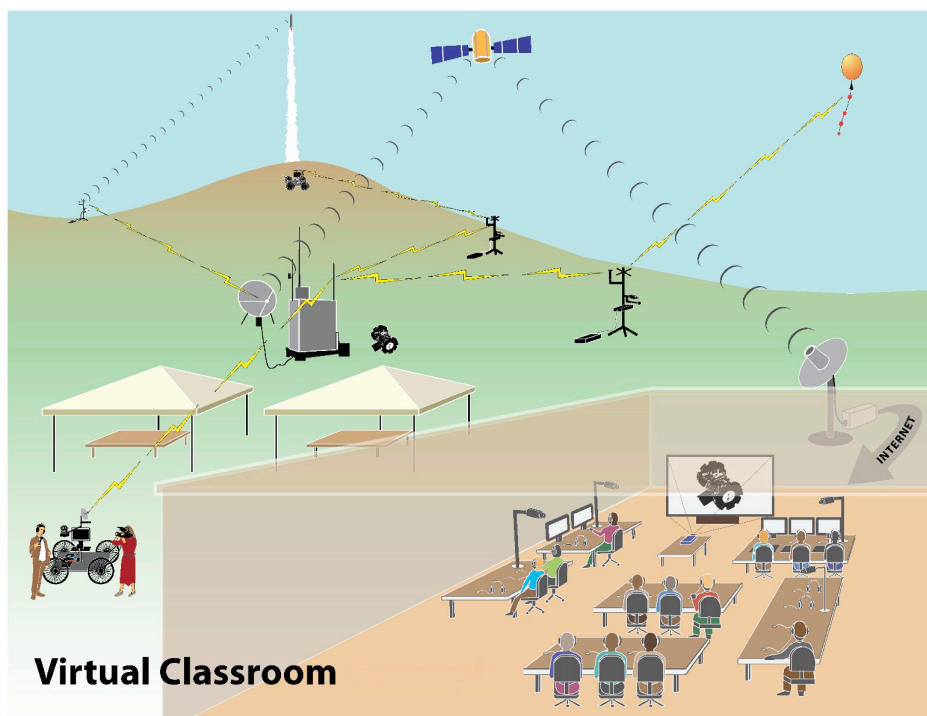


history of delivering over 200 autonomous robotic student satellite payloads to 3 miles altitude for recovery in harsh desert conditions. The **Virtual Classroom** provides real-time video, audio, chat and telemetry support for both payloads and airframes.

Balloon Flights

2m APRS services have often been used to track and support high altitude near earth balloon experiments. The **Virtual Classroom**

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supports these services but adds high bandwidth IEEE 802.11 services that can extend to the altitudes these balloons achieve. The **Virtual Classroom** provides real-time forwarding of these experiments to the Internet and real-time access from remote experimenters to these experiments.

Robot Tele-Presence

Robots can benefit from high bandwidth, multimegabit communications. High bandwidth communications permit near real-time remote processing of data rich media. The **Virtual Classroom** is expected to be a strong asset for such robotic experiments.

Improvements

The prototype **Virtual Classroom** has demonstrated the potential of the concept and exposes key opportunities for improvements.

User interface. The current user interface to the **Virtual Classroom** is the aggregate of existing, individual service user interfaces. Providing an integrated Web 2.0 based user interface to the aggregate services will likely substantially increase the usability of the system to experimenters that are not computer experts.

Increased performance. The IEEE 802.11 family of standards on which the **Virtual Classroom** is based is an evolving standard. The latest IEEE 802.11n standard promises to increase throughput performance by a factor of 2.

Increased Coverage. More repeaters and more access points can be used to increase the coverage area.

Power independence. Upgrade with solar panels to be completely power self-sufficient.

LEO communications. 2m and 70cm APRS has the proven capability for the support of APRS LEO satellite communications. The **Virtual Classroom** has the hardware capability to support this service and further integration to explicitly support LEO communications is likely.

New Applications

Originally designed for support of student satellite experiments, the **Virtual Classroom** can be easily extended to provide remote access to any field based experiments.

One intriguing future new application is the exploration of extending IEEE 802.11 communications to domains currently unexplored. Overhead high bandwidth network coverage to near space - high altitude rockets, balloons and LEO satellites - is a potentially profitable area of examination.

Replication

The **Virtual Classroom** is an inexpensive, open system constructed with the intent of ease of replication for other experimenters and applications.

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