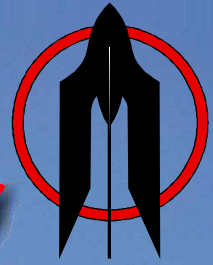


# TRIPOLI GERLACH

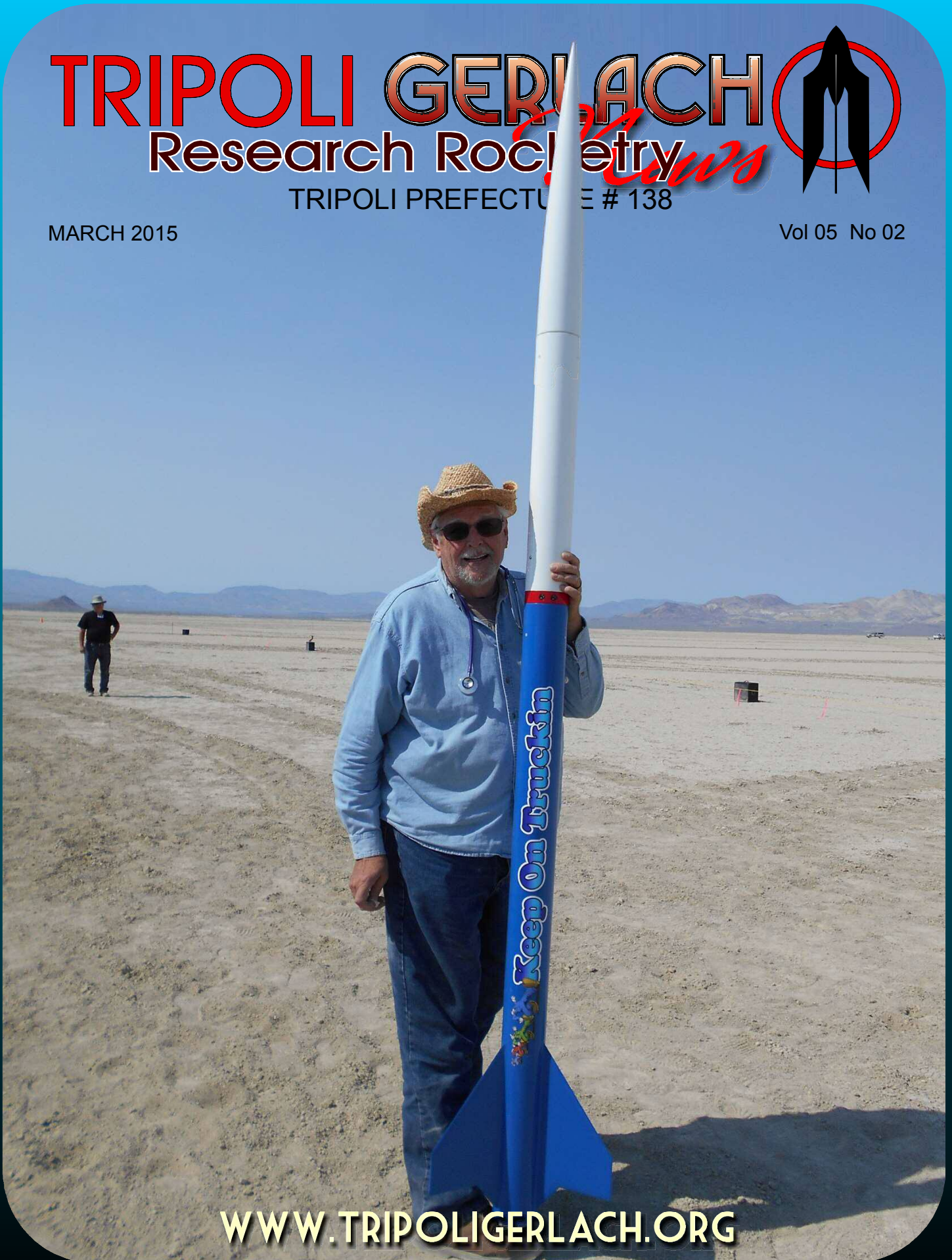
## Research Rocketry



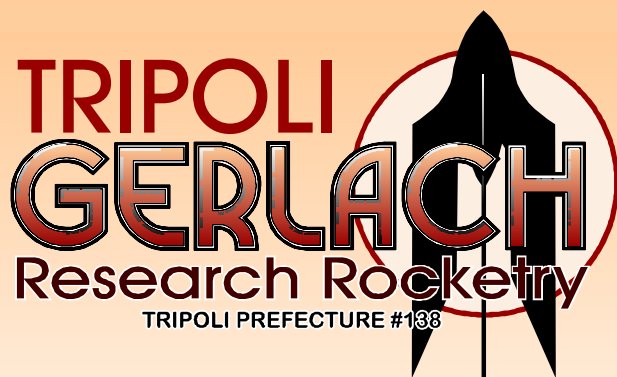
TRIPOLI PREFECTURE # 138

MARCH 2015

Vol 05 No 02



[WWW.TRIPOLIGERLACH.ORG](http://WWW.TRIPOLIGERLACH.ORG)



MARCH 2015

Vol. 05 No. 02

**PUBLISHED EXCLUSIVELY FOR  
THE MEMBERS OF TRIPOLI GERLACH  
AND ANYONE ELSE INTERESTED**

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Tripoli Gerlach was founded as a National Prefecture under the Tripoli Rocketry Association, Inc. Devoted to Research Rocketry and the Black Rock Desert area of Nevada, we welcome all National Tripoli Members, no matter their location or Certification Level.

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If you have anything to contribute in the way of information, articles, photos or whatever, please send them to Tripoli Gerlach Headquarters. Visit our WebSite on-line at:

**WWW.TRIPOLIGERLACH.ORG**

**ON THE COVER** Member Jim Callahan of Butler, PA stands with his successful KEEP ON TRUCKIN level 3 flight.

Jim showed persisrence traveling to Black Rock three times to capture his level 3. Seems like that is what a lot of people do

## MAGAZINE STAFF

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### CONTRIBUTING STAFF:

Chris Pearson

Dick Embry

Dave Rose

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## THE EDITOR

We've only got 20 pages this issue but I'm sure you will agree it's 20 pages full of interesting stuff.

There is a report from BoD Member Dick Embry showing the work he has accomplished behind the scene for the benefits of members who attend any and all Black Rock launches.

The Lassen/Clapper Murder Site is documented, something Black Rock visitors hear about but have no idea is what it is all about.

The photos of HAMSTER DANCE V were lost in transit but thanks to Chris Pearson we finally have a decent launch report on The Little Launch That Can, or at least trys.

Dave Rose shows his KATE installation, simple and sound. He also reports on how he keeps his single use research motors together.

Biggest feature is our coverage of Robert Goddard and his work. Best of all is the presentation of The Goddard Museum in Roswell, New Mexico. hopefully it will inspire others to visit it.

20 Pages, but 20 pages full of Tripoli Gerlach interest.

### DISCLAIMER

Tripoli Gerlach does NOT promote nor certify any activities presented here as safe nor appropriate to all readers of this Publication. Information is for educational purposes only. Tripoli Gerlach, its members & officers, the authors of articles presented and the Tripoli Rocketry Association, Inc. are not responsible for reader's activities, conduct or participation in the use and pursuit of any content presented.

# TRIPOLI GERLACH UPDATE

## PROJECT GERLACH

Our GERLACH Project, to teach rocketry to the students in the Gerlach School, all 14 of them, is progressing nicely. The dates for implementation are September 16, 17 & 18, 2015. Lessons and construction on the 16th & 17th; launch on the 18th.

Bob and Neil, of Liberty Launch Systems, have delivered mass quantities of ROCKETS Magazines and DVDs as well as Rocket Kits and Motors to the project. We have a few others stepping in with even more items to help the kids.

We are looking for a few people to assist in the school with the lessons and helping the kids build their rockets. Help with the launch would also be nice.

The students, once again, will be attending BALLS on Friday, as they did last year. Plans are forming to build a larger High Power Rocket for the school to launch at BALLS. Naturally a Tripoli Member will actually do the launching but the rocket will be signed by all of the kids and become part of the school property.

Any volunteers wishing to participate by either attending and assisting at the sessions or donating items and/or ideas for the Project please contact Tom at [justtom@rimworld.com](mailto:justtom@rimworld.com).



## MEMBERSHIPS

Membership in Tripoli Gerlach runs from January to January. Those people who join during a given year MUST renew by January 1st of the new year. We begin accepting memberships for the new year at our September Member's Meeting. Those people who join, or renew at that time, need not worry about the January date.

We thank the multitude of members who have renewed their support of Tripoli Gerlach for 2015. We still hold quite an impressive list of people. Later in the year all current members will be receiving, in the mail, a card entitling them to partake of our "free" Banquet at the 2015 Members Meeting.

Those persons whose membership is expired and joining - at the meeting - for our 2016 year - will be required to pay an extra \$10 to enjoy our great dinner. This will take their membership up to \$30. New people joining Tripoli Gerlach - for the first time - need only pay the normal \$20 Membership Fee and enjoy the benefits.

Despite several attempts to obtain renewals from some members we have to report the lose of their support. A few have voiced their reasons for not renewing, all of which have been valid. Yet another few have just remained silent after several attempts and, as of February 1st, were dropped from our roster.

If you know any of these people please have them use the form below to renew for 2015 while they still can.

Please fill out this form completely. It is necessary to supply us with your TRA number and certification level. Membership runs from January to December. Renewal will be January 1st,

**YEARLY DUES  
ARE \$20.00**

Make Check for \$20 Payable to

**DAVE ROSE**  
13385 Lincoln Way

If at all possible please E-Mail your photo to be posted to:

[justtom@rimworld.com](mailto:justtom@rimworld.com)

## MEMBERSHIP APPLICATION

NAME \_\_\_\_\_ TRA# \_\_\_\_\_

ADDRESS \_\_\_\_\_ CERT LEVEL \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_ EXP DATE \_\_\_\_\_

E-MAIL \_\_\_\_\_ @ \_\_\_\_\_

PHONE (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ CAN WE PUBLISH (YES) (NO)

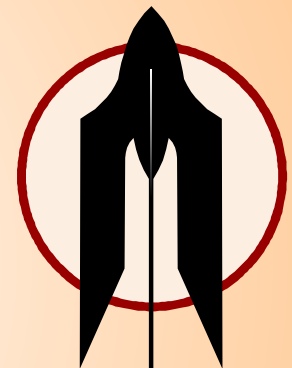
HOME PREFECTURE \_\_\_\_\_

PERSONAL WEBSITE \_\_\_\_\_

As a member I will abide by all rules set forth by the Prefecture as well as those set forth by the National Organization. I pledge to pursue a commitment to the Prefecture's designated Launches & Activities and support the Prefecture to the best of my ability.

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
DATE



**TRIPOLI GERLACH**  
Research Rocketry  
TRIPOLI PREFECTURE #138

[www.tripoligerlach.org](http://www.tripoligerlach.org)



# 2015 BLACK ROCK SCHEDULE

THE FOLLOWING IS AN E-MAIL SENT OUT BY DICK EMBRY TO THOSE CONCERNED HOLDING LAUNCHES ON THE BLACK ROCK PLAYA IN 2015.. ALL PART OF TRIPOLI'S EFFORT TO EASE RED TAPE. THERE'S SOME INFORMATION FLYERS WILL BE INTERESTED IN AS WELL.

The actual permit paperwork is making its way through the process and should be done in a couple weeks. I'll give each of you a heads up when the paperwork is sent out.

We are once again the only Organization allowed the use of a single permit. Last year was a trial effort; a probation period to ascertain our performance. I'm happy to say we did well. This permit will be awarded for a period of 5 to 10 years!.

A few FAQ's in regard to the permit stipulations. READ them. They aren't that hard and vital to our continued use of the playa. Of special note is the number to call for the Nevada interagency group if you need to retrieve a rocket in a wilderness area.( Makes sense. They are vastly more capable in terms of survival equipment) or need help fighting a fire. If you decide to go into one of the wilderness areas, go only on horseback or foot, no motorized vehicles.

**TAKE WATER WITH YOU AND HAVE WATER IN YOUR VEHICLE OUT ON THE PLAYA> THIS IS A REQUIREMENT.**

## **Funding Schedule:**

For permittees from last year, nothings changed.

For those who are new to this or forgot from last year:

Tripoli prefectures (AeroPac, AHPRA, Mavericks)  
The fee is 5.00 per registered flyer per day. Payable directly to the BLM

University teams the fee is 5.00 per active team member per day. Clean up crew and spectators need not pay. Payable directly to the BLM.

Tripoli Gerlach (Hamster Dance) the fees are waived.

All payable to BLM at the address on your permit.

**Vendor Schedule:** Same as last Year:  
For those who are new this year or forgot:

Vendors and Permit holders have two Choices:

- 1.) Be included on the permit.(AHPRA)
- 2.) Obtain your own permit. (AeroPac)

1.) Fees if you are included on the permit. 3% of your total gross for the event. The Launch Director will collect the fees and forward to BLM.

2.) Fees if you obtain your own Permit from BLM. Up front cost of the permit-105.00.( yes up 5 dollars from last year) Permit is good for the entire flying season. 3% of your gross. Nothing due to the BLM until the 3% exceeds 105.00. In other words, your gross would have to exceed 3500.00 before you would owe anything to BLM. Your initial license fee would cover the first 105.00. The Vendor will submit the fees to BLM at the address on the permit.

**PLEASE HAVE A COPY OF THE PERMIT ON YOUR PERSON AT THE LAUNCH ON THE PLAYA. THE RANGERS WILL CHECK!!**

If you forget email me immediately at [jetviper@aol.com](mailto:jetviper@aol.com). I will forward you a copy ASAP.

If you need to change dates. Cancel dates. Need to add or subtract Vendors or any other problems with the BLM or the Schedule. Please contact me at [jetviper@aol.com](mailto:jetviper@aol.com).

## **One more thing: FAA FAQ's**

FAA has this same Schedule. The only difference is Robin is the addressee for the BLM permit. Waysie is the addressee for the COA.

The COA format will be the same as last year.

Class 3 (and Class 1/2 above 50K) to Kent Newman, [kent.newman@comcast.net](mailto:kent.newman@comcast.net) 90 days Prior to Launch. Complete packages to the FAA 45 days prior. ESPECIALLY SPACE SHOTS. FAA/AST needs a big lead time to coordinate with the airspace people to clear the area for your vehicle.

If you are doing a Space Shot. Expect two hour windows:...

ALL 7711's need to go through Kent Newman of the

Class 3 Committee, [kent.newman@comcast.net](mailto:kent.newman@comcast.net) or myself Dick Embry, [jetviper@aol.com](mailto:jetviper@aol.com). A format acceptable to both Western Region and FAA/AST was agreed on after numerous telecons. We like to keep the formats standardized.

Again all Class 3 vehicles must be submitted to Kent Newman for a stability check 90 days prior to the launch. The format is found on the Tripoli web page. Again also if you have a vehicle regardless of impulse programmed above 50,000 feet, it has to be reviewed by Kent. Especially if its two stage! Ignition inhibitors like Tiltometer or telemetrum are much appreciated in two stagers.

### No review...No Flight!

When your simulation profile is complete Kent will return to you plus any input on your 7711. The package is now ready for you to submit to the FAA. Every effort will be taken to get it back to you prior to the FAA requirement of 45 days prior. If you get the package to us 50 days prior vice 90 days. We will try...

Approvals are for a year. If its the new calendar year and you didn't fly the prior year you still need to contact Kent. Kent and I will work it for you. The Fed on site

has the approvals in hand ONLY for that year.

Although a great deal of effort has been expended to simplify the stipulations in the FAA COA's some parts can be difficult to comprehend. IF you have questions contact me at [jetviper@aol.com](mailto:jetviper@aol.com).

Class 3' COA's flying under the aegis of a parent waiver; (AeroPac, AHPRA. Mavericks) will be assigned to the launch Director for that event. Contact the launch director for the FAA coordination. ONLY the Launch Director calls the FAA not the Class 3 holder!

There will be a TFR over Black Rock. If you plan to fly into the event, ensure you fly into the playa before or after the TFR is activated

So far..... Drone flying, subject to the dictates of the Launch Director is permitted in a TFR below 400 feet AGL.

Finally. The Launch Director is responsible for the Playa and the Airspace. Its his/her name on the documents. What they say is the way it is!

**Dick Embry**

Tripoli Board of Directors

### Rocket Motor Parts Propellant Chemicals Technical Training Informational Resources

RCS Rocket Motor Components was founded by Gary Rosenfield in 1995 to supply products for custom rocket motor fabrication. These products include molded phenolic nozzles, propellant casting tubing, phenolic motor casing material, phenolic and paper liner tubing, o-rings, casting plugs, forward & aft insulator washers, delay/smoke grain insulator tubes, and propellant chemicals such as oxidizers, binder polymers, plasticizers, curatives and burn rate catalysts.



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Serving Experimental & Professional Rocketry Since 1995

[www.rocketmotorparts.com](http://www.rocketmotorparts.com)

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### TC LOGGER-USB

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Propellant Characterization



Complete Systems just about virtually ready to go.

Basic units starting at \$300

Software • Load Cells • Transducers

Test Stands • Test Motor Cases

[www.tclogger.com](http://www.tclogger.com)

Returning from BALLS 23 photos from HAMSTER DANCE 4 were lost. Thanks to Chris Pearson several photos were found and he has put together this Launch Report

# 4<sup>th</sup> Annual HAMSTER DANCE

The National WEENEX Launch  
CHRIS PEARSON

Hamster Dance is billed as the “weenie EX launch” being that only Research Motors can be used, but they must be single use, with no metal casings, and no reloadables. Making a single use motor is harder than it sounds, with several flyers having their motors cato this year. Other rules are that the rocket can’t weigh more than five pounds and (new this year) there is a 15K altitude limit. If you exceeded it you were disqualified.

The date for the launch was supposed to be Thursday, September 18th, the day before the start of Balls, and it was to take place out from 3 Mile Entrance. However, the forest fires in California had a say about that. Smoke from the fires was blowing across the state and what was usually unlimited visibility across the desert was limited to about one thousand feet. The mountains around us could not be seen, and the smell of burning wood was heavy. The wind was also high, so high that the event was scrubbed until the next day, during the Balls launch.

Friday dawned with perfect weather, temps in the 80’s (a near record high for Balls), light wind out of the northeast, which blew the smoke away, and no clouds. We flew off the closest pads, which at Balls are the M pads, 500 feet away.

Bill Good Sr. with his minimum sized rocket, which won the Best Looking and Lightest Weight awards, unfortunately it went unstable because of a motor case burn through at the nozzle and crashed near the pads.

Gary Dickinson with his Blackhawk 38 carbon fiber minimum diameter entry, which won the Alpha Hamster 2014 award for hitting 9574 feet. This is Gary’s second time winning the ALPHA HAMSTER Award.

David Wilkins flew in from Australia and built a LOC Vulcanite in him motel room right before the launch. He is shown turning on his electronics. He had one of the few successful flights of the day

Larry Benek from Pittsburgh, PA had his entry, which won the award for heaviest rocket, go horizontal a hundred feet off the pad and do a spectacular land shark on the other side of the parking area.





Ken Finwall came with his minimum diameter 38mm entry, which unfortunately catoed at ignition.

Chris Pearson poses with his 38mm diameter entry using the same 29mm I 235 motor that he flew at Hamster Dance two years ago. He was expecting it to hit 9000 feet, however it never left the pad when soft-cured propellant caused the motor to cato at ignition, blowing the rocket in half.

## FEATURED



Former Tripoli president Ken Good displays his demonstration rocket (left). The rocket was a three-stage rack rocket called KG-15B, Exeter II. The motors were all AeroTech single use, 29 mm. They were a G-125/G-125/G-80 staging in that order. It worked perfectly using a Featherweight Raven 3 to

control all staging and dual deployment as well. The expended motors were expelled from the airframe.

What's a dance without a hamster. Deb Koloms brought

her latest fur covered rocket, which unfortunately went unstable and crashed without having the recovery system activate - didn't go very high but made a bunch of loops!. Deb had other altimeter problems with her Ravens in a high altitude flight, which allowed the rocket to impact the playa at nearly Mach - she killed KATE !.



Flyers not shown, or that registered but never flew: Bill Good, Andy Limper, Gary Rosenfield, Ron Freiheit and Rich Hagensick.

**HAMSTER DANCE 5**  
September 24th 2015  
[www.hamsterdancelaunch.com](http://www.hamsterdancelaunch.com)  
More Fun Than A Pocket Full of Hamsters



HAMSTER DANCE 5 will be held straight out from the 3 Mile Entrance. This will give those with no sense of humor a higher waiver and plenty more open area!! Also the whiners of off roading can take a break !!!



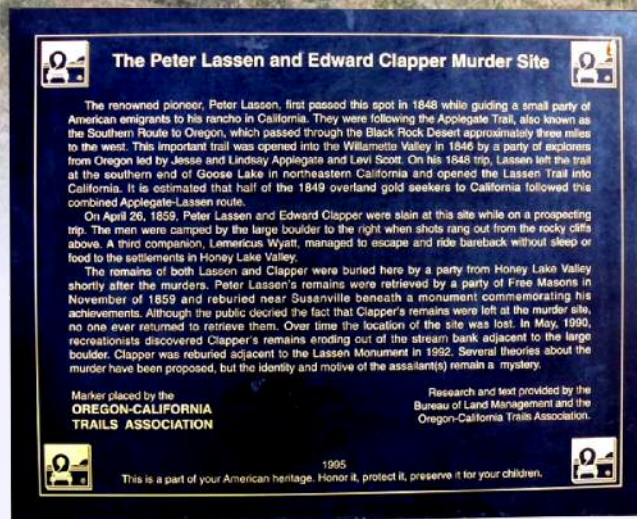


# THE LASSEN/CLAPPER MURDER SITE

Those people who come to Black Rock and ask any sort of question regarding its history, hear about the Lassen/Clapper Murder Site. It really means nothing except in history Peter Lassen was a leader of the Western Immigration, leading many pioneers to the promised land of the West.

This is really an isolated place with nothing "historic" to show other than a plaque acknowledging the site and a big broken boulder of some importance. It is past Hardin City 15½ miles north of Double Hot Springs. Most definitely take an SUV or Pickup.

Peter Lassen was a renowned wagon train guide who drove many immigrants to California and Oregon. His name is on trails throughout the Black Rock desert. Peter Lassen, first passed this spot in 1848 while guiding a small party of American emigrants to his rancho in Honey Lake Valley, California. They were following the Applegate Trail, also known as the Southern Route to Oregon, which passed through the Black Rock Desert approximately three miles to the west. This important trail was



opened into the Willamette Valley in 1846 by a party of explorers from Oregon led by Jess and Lindsay Applegate and Levi Scott. On his 1848 trip, Lassen left the trail at the southern end of Goose Lake in northeastern California and opened the Lassen Trail into California. It is estimated that half of the 1849 overland gold seekers



The Actual Murder Site Now Just A Broken Boulder



The Wash Where Remains Were Found



Years Of Rain Have Washed Down Tons Of Boulders



to California followed this combined Applegate-Lassen route.

The Lassen/Clapper Murder Site holds a weird place in Nevada history. On April 26, 1859, Peter Lassen and Edward Clapper were slain at this site while on a prospecting trip. The men were camped by a large boulder when shots rang out from the rocky cliffs above. A third companion, Lemerich Wyatt was out of camp at the time hunting when he returned he found Lassen and Clapper murdered. Claiming it was Indians he managed to escape and ride bareback without sleep or food to the settlements in Honey Lake Valley.

The remains of both Lassen and Clapper were buried here by a party from Honey Lake Valley shortly after the murders. Peter Lassen's remains were retrieved by a party of Free Masons in November of 1859 and reburied near Susanville beneath a monument commemorating his achievements. Although the public decried the fact that Clapper's remains were left at the site, no one ever returned to retrieve them. Over time the location of the site was lost.

In 1990, one hundred and thirty-one years after the killing of Peter Lassen and Edward Clapper in the Black Rock Desert in Nevada, a rock hound found some human bones exposed at the mouth of a canyon on the western side of the Black Rock Range. This chance discovery, first treated as a possible recent homicide by the Nevada authorities, set in motion a series of forensic investigations by the FBI and the Smithsonian Institution in Washington, DC, which determined that the remains were those of Peter Lassen. They had buried the wrong man in Lassen's grave in Honey Lake Valley just south of Susanville, California. A plaque was installed at the site where the remains were found so that the actual historical location of the double killing would not be lost again due to the passage of time.

Several theories about the murder have been proposed but the identity and motive of the assailant(s) remain a mystery. The Indians were almost completely removed as suspects. The best scenario was that Lemerich Wyatt killed them; his tale of riding bareback to Honey Lake Valley was all but disproved and the motive, unfounded, was robbery of collected riches.

The Entire Area Is A Washdown Of Rocks



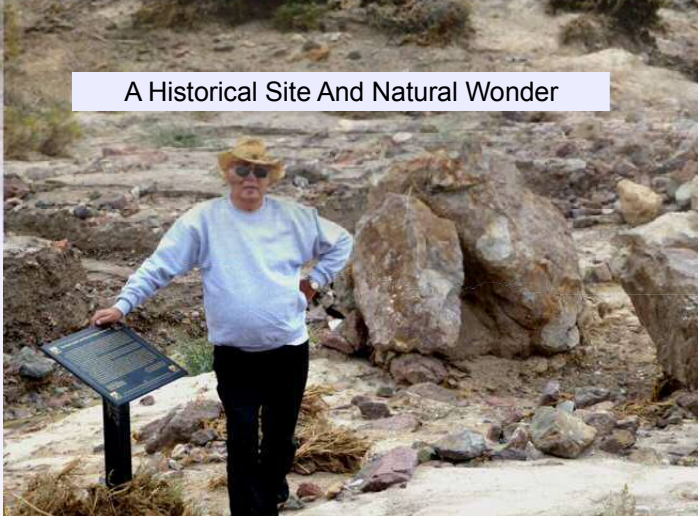
Some Like These As Big As A Volkswagon





The power Of Years Of Tremendous Flooding Have Forced Hugh Boulders To Actually Miss The Arroyo Bend And Spread Out Over Acres.

A Historical Site And Natural Wonder



The most interesting thing about the Lassen/Clapper Murder Site is the gigantic rocks that washed down from the higher mountains. For rockhounds it is an area of unimaginable rewards. For the regular visitor it is photographic wonder - and it's gaurenteed you too will take home a rock or two.

It is absolutely amazing just how many rocks and minerals INCLUDING Silver & Gold can be found by spending a day just looking.

A Curious Oddity To Wet Your Appetite For Adventure



A trip to the Lassen/Clapper Murder Site is a true four wheeling adventure. DO NOT take a car. Be prepared for a lot of walking, and while it will seem unhistoric to the out of town visitor,; the rest of the place is well worth the trip.



Ideal for high altitude flights, Rouse-Tech CD3 Recovery Systems are unique in they do not utilize black powder for deployment. Instead a unique CO2 systems is used for deployment reducing failures due to low oxygen levels at high altitudes.

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# KEEPING IT TOGETHER

DAVE ROSE

With a lot of people making single use small motors up to 54mm, some might be bigger; it has come to find a solution to gluing in nozzles and bulkheads has proven to be a challenge to most. When composite motors hit the market they were all single use. They all seem to work all the time, well really most of the time.

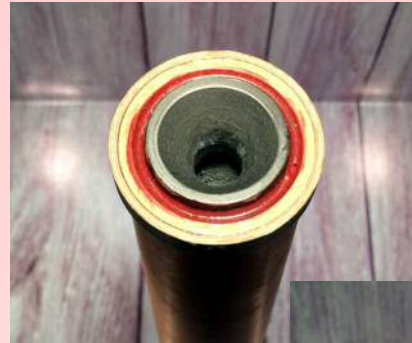
Making single use motors for HAMSTER DANCE proved a challenge. Making the propellant was not a problem. Finding Case material and nozzles didn't seem to be a problem but getting it all glued together and having it stay together under firing was interesting to say the least.

After trying several epoxies that didn't work I came across a solution. Emerson and Cuming STYCAST 3050 Epoxy Encapsulant. A maroon colored, very low viscosity, epoxy encapsulant resin that is readily machinable.

It's not cheap costing around \$53 for a quart, but it is worth it. It really holds stuff together.

It requires a hardener; Emerson and Cuming Catalyst 9 is a general purpose hardening agent with good chemical resistance and physical strength. A 4 oz Bottle cost about \$28. While these prices may seem like a lot, the stuff goes a long way if you plan right.

Mix only what you need. If making a few "small"



A Potted Nozzle and forward closure shows how nice this resin finishes off, and it's easy to work with.

motors mix a small amount. If making a bunch of motors, or a really big one, go ahead and mix a bigger amount



One problem you may have is in storage it hardens, even with the lid sealed on it. The maroon colored epoxy settles in the can and gets very thick...like clay. Last year to regenerate it I mixed by hand - forever. It worked fine but was a pain in the butt.

To resolve this issue I bought this paint mixer, shown below, at Harbor Freight for about 6 or 7 bucks and it worked like a dream. About 90 seconds, or so, and the epoxy was well mixed and ready to use. It's odd I never had to add anything to help it "liquefy".

One source we've found is [www.krayden.com](http://www.krayden.com)



LOKTITE has purchased Emerson and Cuming or vice versa. In any case STYCAST 3050 Epoxy is sold as either Emerson and Cuming or LOKTITE. It's the same.

# TAKING KATE FOR A RIDE

With MULTITRONIX LLC's new Telemetry™ Pro System coming on the market in 2014 the world of High Power/Research Rocketry is no longer the same. The system comes at a very heavy price and requires a different mounting than we normally find in today's rockets. Here is a basic mounting Dave Rose designed that is simple and effective.

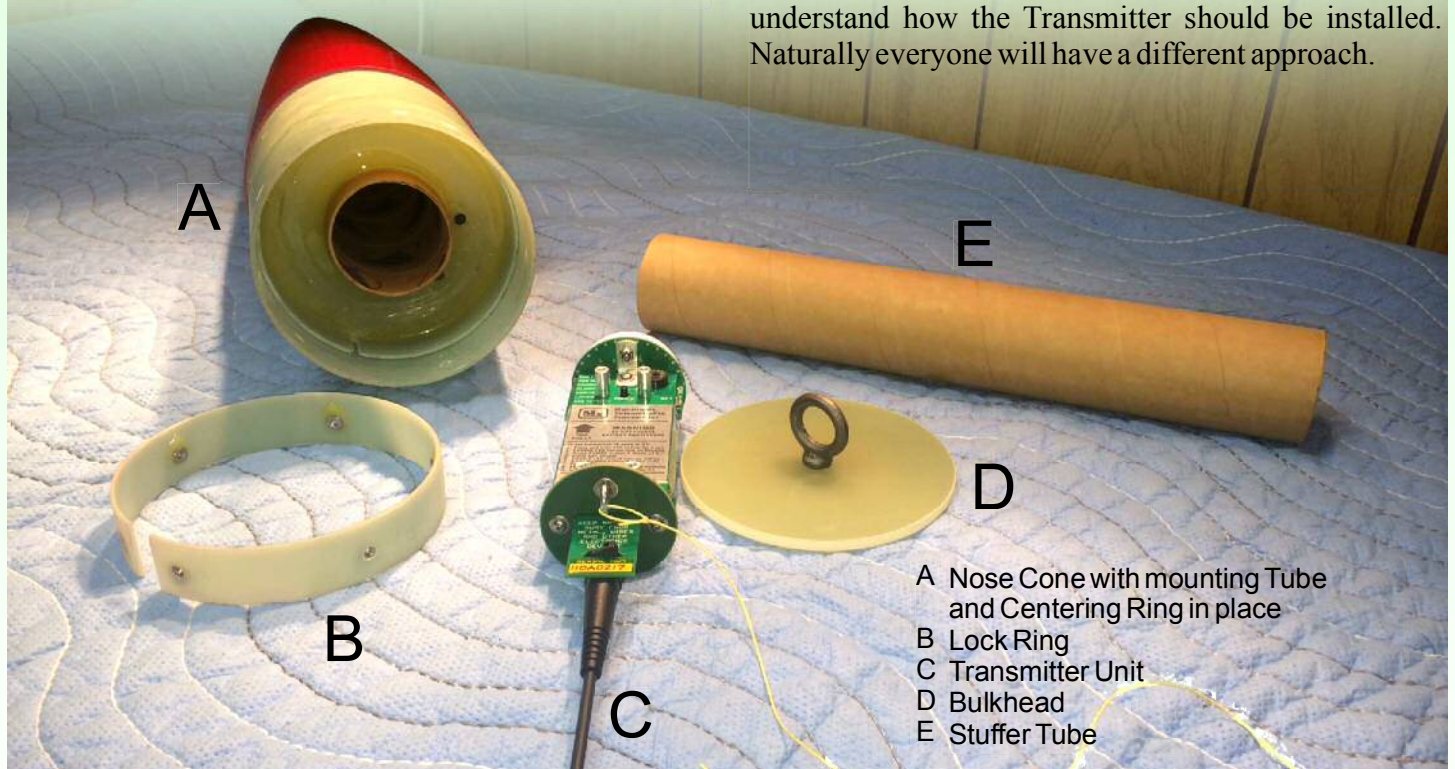
First, if you've already purchased your TelemetryPro Transmitter, you know it does not work well in the neighborhood of metal.  $\frac{1}{4}$  / 20 metal rods running through a nose cone, metal tips on nose cones and even metal eyebolts will affect maximum transmitter operations.

A nose cone is needed that does not have a metal tip and is not made of Carbon Fiber. (Carbon Fiber will not receive nor radiate signal). This is not to say that if the unit is mounted several inches away from metal objects it will not work. It is just that it may not operate to its fullest design. Placing the GPS unit directly under a metal nose cone tip will definitely have bad effects. Keep it several inches away and you should have better luck. Having the transmitter's antenna directly over a metal eyebolt is not proper either. Give the antenna 4 to 5 inches to the tip to radiate.



The above photo shows a cardboard mounting tube, actually a 54mm motor mount tube, installed in a nose cone and a fiberglass (or wood) centering ring epoxied into place to hold it centered and secure.

See Multitronix's basic installation diagram to better understand how the Transmitter should be installed. Naturally everyone will have a different approach.



TELEMETRY™ PRO  
TRACKING SYSTEM

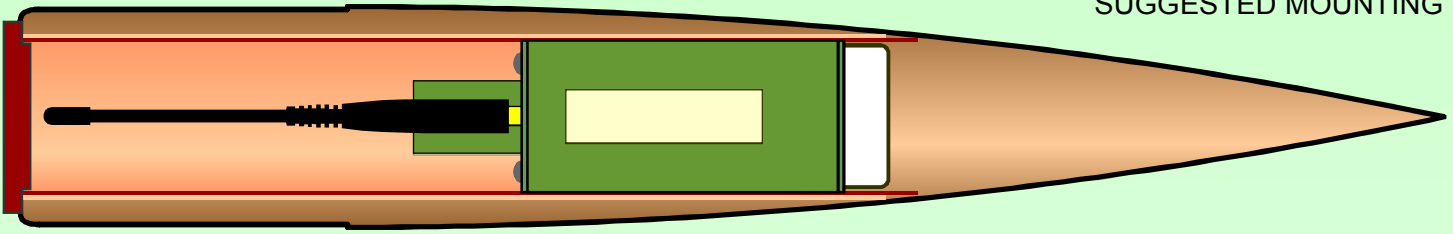


**Multitronix LLC**

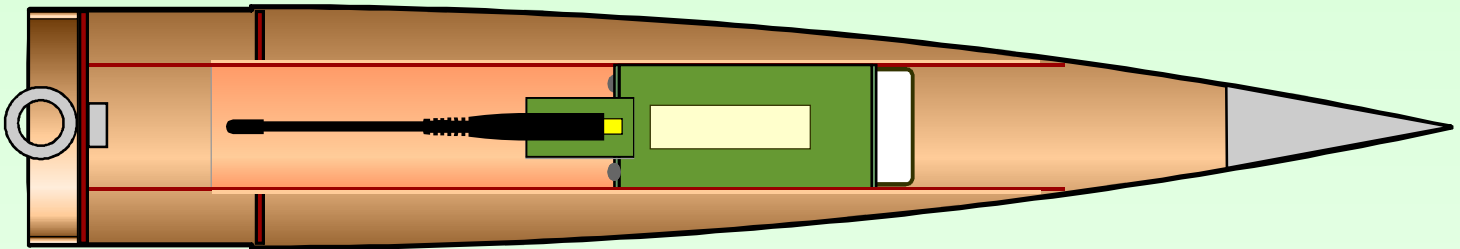
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Below is a possible installation in a 4" diameter nose cone such as Dave has set up. Note the distance from the metal nose tip and the metal eyehook at the rear. The more distance you can get from the metal items the better the GPS reception and data transmission.



Dave's installation in a 4" diameter airframe leaves adequate distance from the metal nose tip AND the lower EyeBolt. In a minimum diameter airframe the drawing at the top of the page best shows the standard Multitronix installation.

The yellow line protruding is the pull line to remove the unit. It is not advisable to pull it out by the antenna

Note the mounting ring used to recess the bulkhead. Since there is no way to use an all-thread rod to attach the bulkhead this ring method works nice.

This installation is basically the suggested mounting from Multitronix, just on a larger scale. Still keep in mind a metal nose tip and eyebolt most definitely WILL interfere with signal transmission and reception. Get as much distance as possible from these objects.

The 54mm mounting tubes and stuffers work well. Avoid just packing KATE in foam, a solid mounting is always best.



The above photo shows the KATE Transmitter slid into the permanently mounted 54mm holding tube. A piece of coupler tube acts as a stop in the forward end.

The photo to the right shows a 54mm coupler stuffer tube inserted to move the unit completely into the holder tube. This stuffer tube is cut to fit exactly with the Bulkhead plate.



# ROBERT HUTCHINGS GODDARD

In 1898, a teenage Robert Goddard found his life purpose -- in the pages of a Boston newspaper. Captivated by the compelling realism of a serialized version of H. G. Wells' War of the Worlds, he "imagined how wonderful it would be to make some device which had even the possibility of ascending to Mars." He began enthusiastically filling notebooks with ideas for getting off the planet.

While Goddard was a graduate student in physics at Clark College, his youthful speculations crystallized into the pursuit of rocketry. Later, as a professor at Clark, his research began in earnest with a grant from the Smithsonian Institution. For the next twelve years, with intermittent Smithsonian support and occasional funding from other sources, Goddard achieved, in his spare time, many notable firsts in rocketry, including the construction and flight of the first liquid fuel rockets.

A 1929 news account of one of Goddard's outdoor tests caught the attention of Charles Lindbergh who quickly became an avid supporter. Funding arranged by Lindbergh, largely from the Daniel and Florence Guggenheim Foundation, made it possible for Goddard to work on rocketry full time and on a much larger scale. A search for open spaces and good year round weather led him to Roswell, New Mexico, a place, as his wife Esther would remark, "where we would not bother anyone, and no one would bother us."

In the Summer of 1930, the Goddards and a crew of four arrived at Mescalero Ranch, a 10-acre farm at the edge of Roswell. A test stand and workshop were built adjacent to



the house. With the permission of a local rancher a launch tower was constructed on a section of secluded prairie about 10 miles outside of town. Over the next twelve years Goddard and his crew made major strides in rocket propulsion, as well as the practical matters of launch control, stabilization, tracking, and recovery. In all, there were 56 flight tests in Roswell, with 17 flights reaching over 1000 feet in altitude. Unfortunately, just as the work was truly coming to fruition, a WW2 contract required Goddard to abandon his flight testing and turn his attention to specialized rockets for assisting heavily laden aircraft during takeoff. He died

while under Navy contract in Annapolis, Maryland.

After the war, rocketry grew quickly into a large scale enterprise. Owing largely to the far greater pace of wartime rocketry in Germany, and in part to his own secrecy, Dr. Goddard was all but forgotten. It was only through the diligence of his widow Esther, that many details of his pioneering work were finally brought to light. Some 214 patents were eventually awarded to Dr. Goddard, more than three quarters posthumously. In 1960 the armed forces and NASA paid one million dollars, the largest government patent settlement then on record, for prior infringement and continued use of Dr. Goddard's ideas. The recognition that this prescient inventor so richly deserved finally followed, including a Congressional Medal which Mrs. Goddard accepted in his memory in 1961.

An exhibit at The Roswell Museum and Art Center, in Roswell, New Mexico, contains four major components:

- 1) An extensive collection of assemblies, tools, and documents spanning all phases of Dr. Goddard's development of rockets between 1915 and 1945 including the first liquid fuel rocket, built in 1925, and several other nearly complete rockets.

- 2) An accurate full scale reproduction of Dr. Goddard's Roswell workshop as it appeared in the mid-1930's, featuring many of his original machine tools.





3) Dr. Goddard's Roswell launch tower, 1930-1942, which was transported from its original site on the prairie to the museum lawn in 1949.

4) A NASA Apollo XVII display featuring a space suit worn on the Moon by New Mexico geologist and astronaut Dr. Harrison Schmitt and a small fragment of

one of the samples that he brought back. Dr. Schmitt visited the Moon in December of 1972, with the help of a rocket much larger than, but in many ways similar to what Dr. Goddard had been flight testing in Roswell some four decades earlier. Dr. Goddard's first public suggestion of the feasibility of reaching the Moon appeared in his 1919 publication "A Method of Reaching Extreme Altitudes".

## THE FIRST LIQUID FUEL ROCKET

March 17. *"The first flight with a rocket using liquid propellants was made yesterday at Aunt Effie's farm in Auburn. . . It looked almost magical as it rose, without any appreciably greater noise or flame, as if it said, 'I've been here long enough; I think I'll be going somewhere else, if you don't mind.' . . Some of the surprising things were the absence of smoke, the lack of a very loud roar, and the smallness of the flame."* from Dr. Goddard's Diary

### BACKGROUND

For hundreds of years man lived with the deficiencies of the solid, gunpowder type rocket developed by the Chinese in the 13th century. So too, for a while, did Dr. Robert H. Goddard, the New England physics professor and American rocket pioneer. As early as 1909, however, Goddard considered the idea of a liquid fuel rocket utilizing hydrogen and oxygen. In his studies he recognized that solid fuels produced a lower exhaust velocity than could be obtained by the use of liquid fuels. After 17 years of theoretical and experimental work, Dr. Goddard finally achieved flight of a liquid fueled rocket on March 16, 1926. The manner in which that rocket worked is described here.

### TECHNICAL PROBLEMS

A liquid fuel requires a continuous source of oxidizer to be able to burn at a rate capable of producing the rocket thrust desired. A means for combining the fuel and the oxidizer at the proper rates in the combustion chamber had to be developed. The high pressures created by combustion required that the fuel and oxidizer be injected into the chamber under even higher pressure.

### NOVEL USE OF LOX

After a number of design attempts, Dr. Goddard finally chose gasoline as the fuel and liquid oxygen (lox) as the oxidizer. Below - 297 degrees F. oxygen is a liquid at atmospheric pressures. At higher temperatures it vaporizes, and produces tremendous pressures in closed containers. Dr. Goddard used the pressure of this gas to push both liquids simultaneously from their tanks, through separate pipes, to the combustion chamber where they mixed and burned. To speed the vaporizing of the lox, he applied heat with an alcohol burner.

### MECHANICAL INGENUITY

There was a pipe connection for the pressurizing gas

between the lox tank and the gasoline tank. Safety required that neither liquid should pass through this pipe and mix with the other before entering the combustion chamber. (Figure 1) shows the use of cork floats Dr. Goddard used to minimize sloshing of liquid into the pipe, but still allow gas to flow. Once the rocket left the ground, this gas pressure would be the only means for pumping fuel and oxidizer. Before launch, however, it was necessary to pressurize the system from an oxygen cylinder located about 30 feet from the rocket. Heavy rubber tubing fed the oxygen into the rocket's pressure line. As the rocket began to rise, this hose had to be pulled free. The resulting opening was rigged with a flap check valve to slam shut and prevent loss of pressure.

The combustion chamber was equipped with an igniter system containing match heads and black gunpowder to provide the starting fire for ignition of the lox and gasoline when they were forced into the combustion chamber (Figure 2).

Figure 1

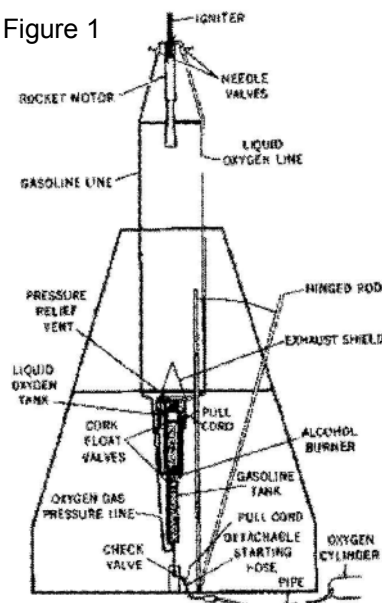
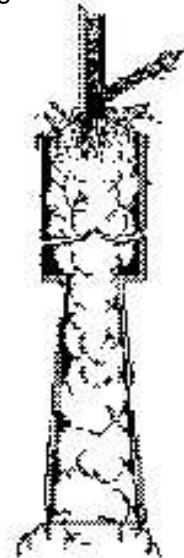


Figure 2

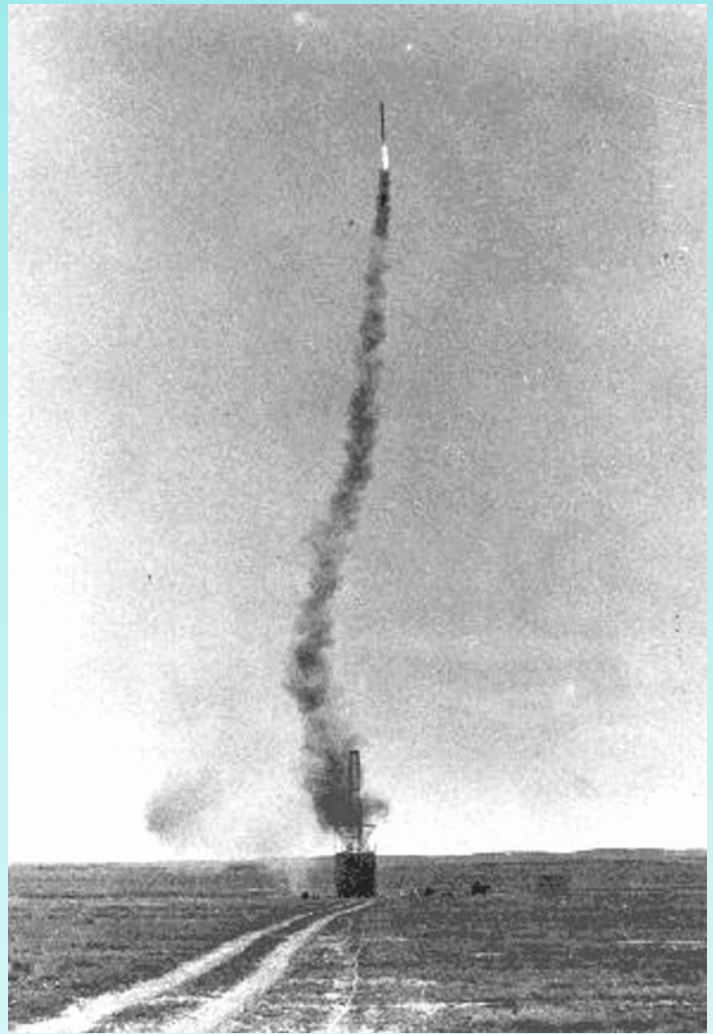


## THE LAUNCH

Only a few steps were necessary in the countdown and launch. First, an assistant using a blowtorch on a long pole reached up and heated the igniter casing until the enclosed match heads caught fire and ignited the black powder. He then closed the pressure relief vent on the lox tank and quickly lighted the alcohol soaked cotton in the burner. Next, Dr. Goddard piped oxygen from the cylinder to the propellant tanks at 90 pounds per square inch pressure. This forced gasoline and lox to the combustion chamber, where the igniter was still burning. With a loud roar, the rocket motor fired. When the rocket motor's thrust exceeded the weight, it rose a few inches from the ground, tethered only by the hose. With a long rope, Dr. Goddard pulled a hinged rod that yanked the hose away, and the rocket was free to fly. The swing of this rod also unseated a spring loaded valve, allowing lox to drip into the heated chamber surrounding the lox tank. Here the lox flashed into vapor, and the resulting gas pressure fed the liquids to the combustion chamber.

## THE FLIGHT

After 2½ seconds of flight, the fuel was expended, the roar ceased abruptly, and the rocket fell to earth 184 feet away. It had reached an estimated speed of 60 miles per hour and the height of 41 feet. This was the world's first liquid fuel rocket flight, an event considered comparable in its significance to the Wright Brothers' achievement of manned flight at Kitty Hawk.



*"It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow." --Dr. Robert H. Goddard*



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# THE GODDARD MUSEUM

## ROSWELL, NEW MEXICO

After BALLS 23 a few Tripoli Gerlach members head home to the East Coast via the Southern Route. Deb Koloms, Dave Rose and Tom Blazanin found themselves driving through Roswell, New Mexico and naturally what do you have to see when in Roswell - no not the fake UFO Site - The world famous Goddard Museum. Bet ya didn't even know it existed!

The Goddard Museum is inside the Roswell Museum and Art Center. To rocket people it means something much more than the Indian pottery, paintings and hangings most people were looking at. This is really a place those of us into Research Rocketry can look at with awe and understanding and just wonder at the accomplishments achieved with the outdated tools on display.

It is easily found by the old windmill tower used to launch those many rockets AND a life-size statue of Robert Goddard complete with rangebox and launch controller.



The tower is the original wind mill converted for rocket activities and it holds one of the original rockets of Goddard's creation.

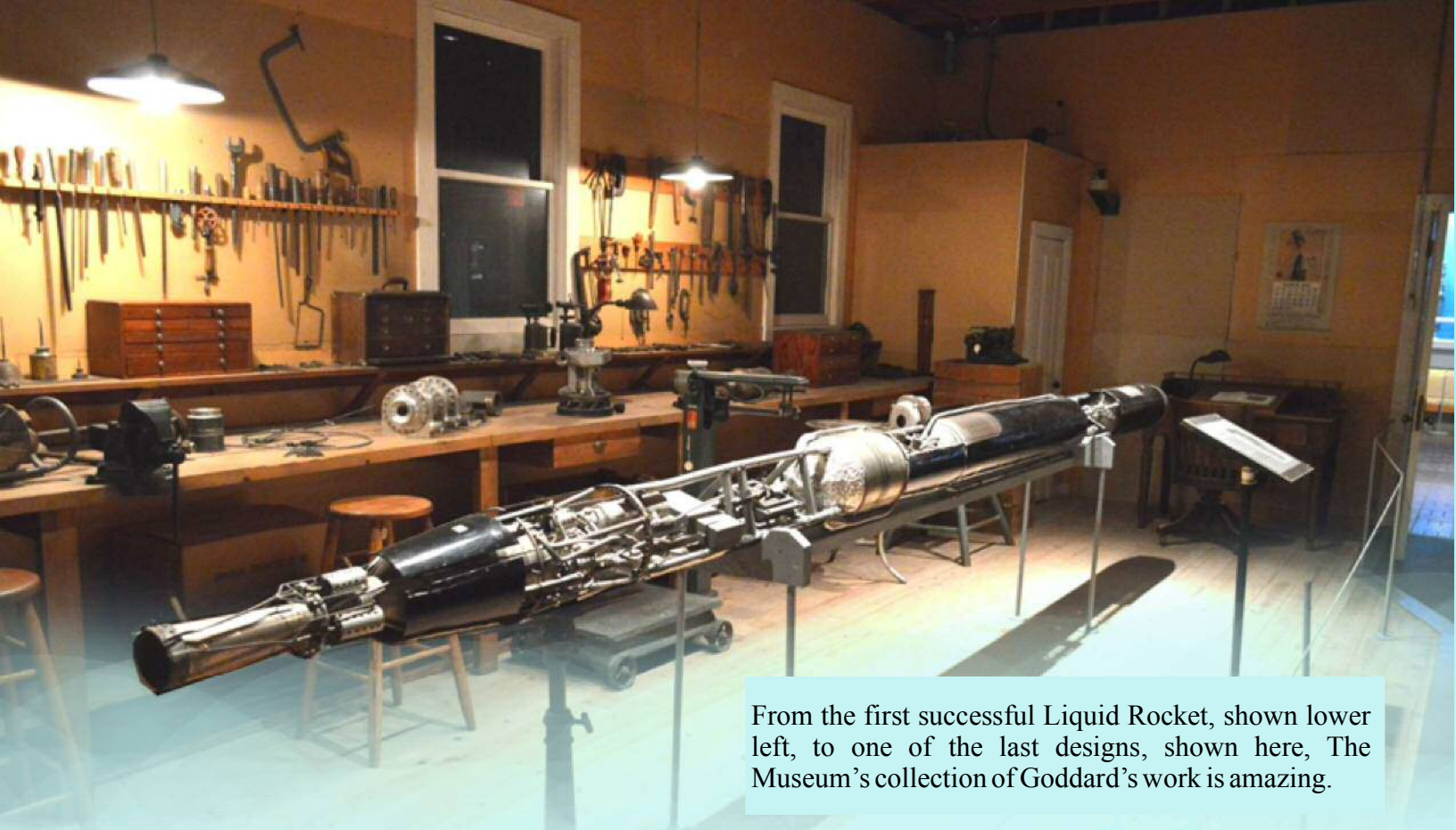
The Goddard Museum takes up a major portion of the Roswell Museum which also holds the Robert H Goddard Planetarium.

Walking through it is like walking back in time. While the museum holds many displays documenting Goddard's experiments and research: the amazing thing is it holds Goddard's tools, equipment, projects and the actual Goddard workshop from the 1930's.

First notable display is the real launch assembly used in the original liquid motor experiments. It holds a replica of the first successful liquid rocket. And if you just reach out you can touch it.







From the first successful Liquid Rocket, shown lower left, to one of the last designs, shown here, The Museum's collection of Goddard's work is amazing.







As the photos show, there is so much to see and enjoy from museum displayed items of Goddard's accomplishments to the replica of his New Mexico WorkShop.

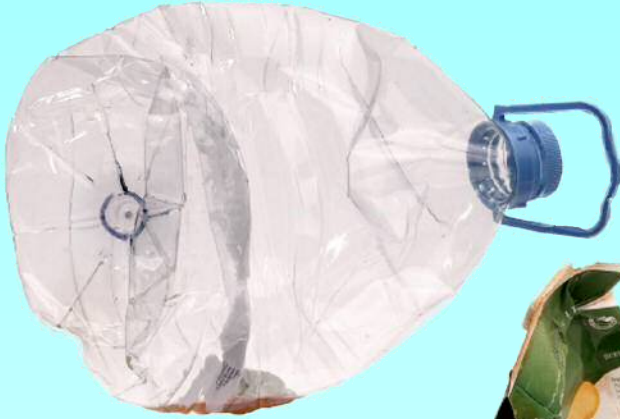
It seems all of Goddard's tools, pieces and parts are preserved from his last rocket design to the remains of things gone wrong. It's all there and true rocket history is preserved in New Mexico for everyone's benefit.





# DANGEROUS SPECIES OF PYRAMID LAKE

We've all seen Pyramid Lake off in the distance as we drive Nevada Rt447 heading to, or coming from, Gerlach. Unless you've actually visited it you have no idea how beautiful it is. Of all the lakes in Nevada it has to be one of the most indescribable lakes of all. Here are presented the most dangerous creatures to the lake's environment. If ever spotted please remove immediately and help keep the turquoise color of Pyramid Lake beautiful for others to enjoy.



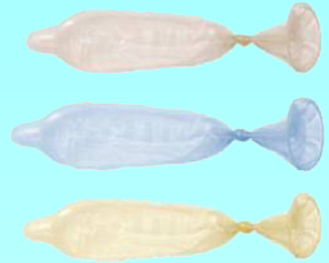
## THE PLASTIC DEMJOHN

Origin: City Streets, Beaches and Gullies  
Behavior: Can Be Ingested By Animals, Causing Serious Poisoning  
Average Life Span: 400 to 600 Years



## THE BATTERY

Origin: Toilets, Gullies and City Streets.  
Behavior: The Liquids They Discharge Are Highly Poisonous  
Average Life Span: Thousands of Years



## THE CONDOM

Origin: Toilets and City Streets.  
Behavior: They Can Be Ingested By Other Animals and Cause Digestive Problems.  
Average Life Span: 30 Years



## THE PLASTIC BOTTLE

Origin: Beaches, City Streets and Boats  
Behavior: Causes Serious Damage To Marine, Flora & Fauna  
Average Life Span: 300 to 500 years



## THE CARTON

Origin: Beaches and City Streets  
Behavior: Has An Abrasive Effect On Organisms Growing On The Sea Bed.  
Average Life Span: 25 to 60 Years



## THE PAPER BAG

Origin: Beaches and Boats  
Behavior: Has A Serious Effect On The Digestion Of Certain Sea Creatures.  
Average Life Span: 4 Weeks



## THE TIN CAN

Origin: City Streets and Beaches.  
Behavior: Causes Cuts and Lesions To Marine Fauna and Swimmers.  
Average Life Span: 200 to 500 Years



## THE PLASTIC BAG

Origin: City Streets, Beaches and Boats.  
Behavior: As It Resembles A Jellyfish, It Is Eaten By Other Animals and Poisons Them.  
Average Life Span: 35 to 60 Years



## THE CIGARETTE STUB

Origin: Toilets, Beaches, Gullies and City Streets.  
Behavior: Impedes The Digestion of Certain Animals.  
Average Life Span: 10 Years



## THE PLASTIC RING

Origin: Beaches and City streets  
Behavior: Traps Marine Organisms Causing Serious Injuries or Death  
Average Life Span: 450 Years



## THE BOTTLE CAP

Origin: City Streets, Beaches and Boats  
Behavior: Causes digestive Problems in Marine Fauna  
Average Life Span: 300 Years



## DIESEL AND ENGINE OIL

Origin: Boats.  
Behavior: Its Toxicity Destroys The Marine Habitat Where ever it reaches.  
Average Life Span: Depends On The Amount of Discharge.



## PIECES OF PLASTIC

Origin: Factories and City Streets.  
Behavior: Can Be Eaten By Other Animal and Poisons Them  
Average Life Span: Hundreds of Years Depending On The Quantity



## THE FOOD WRAPPER

Origin: Beaches and City Streets.  
Behavior: Causes Serious Damage To Marine Flora and Fauna  
Average Life Span: 20 to 30 Years



## ALUMINUM FOIL

Origin: Beaches, Streets and Gullies.  
Behavior: Can Envelop Certain Organisms and Prevent Them From Feeding  
Average Life Span: 5 Years



## THE GLASS BOTTLE

Origin: City Streets, Beaches and Boats.  
Behavior: Causes Cuts and Serious Injuries To Swimmers and Marine Fauna.  
Average Life Span: Thousands of Years



## THE ALUMINUM FOIL LID

Origin: Beaches and Boats  
Behavior: Has An Abrasive Effect On Organisms Growing On The Sea Bed.  
Average Life Span: 10 Years



## THE SANITARY PAD

Origin: City Beaches, Toilets and Boats  
Behavior: Impedes The Proper Digestion of Animals That Ingest Them  
Average Life Span: 25 Years