TRIPOLI GERLACH Research Rocketry News

TRIPOLI PREFECTURE # 138

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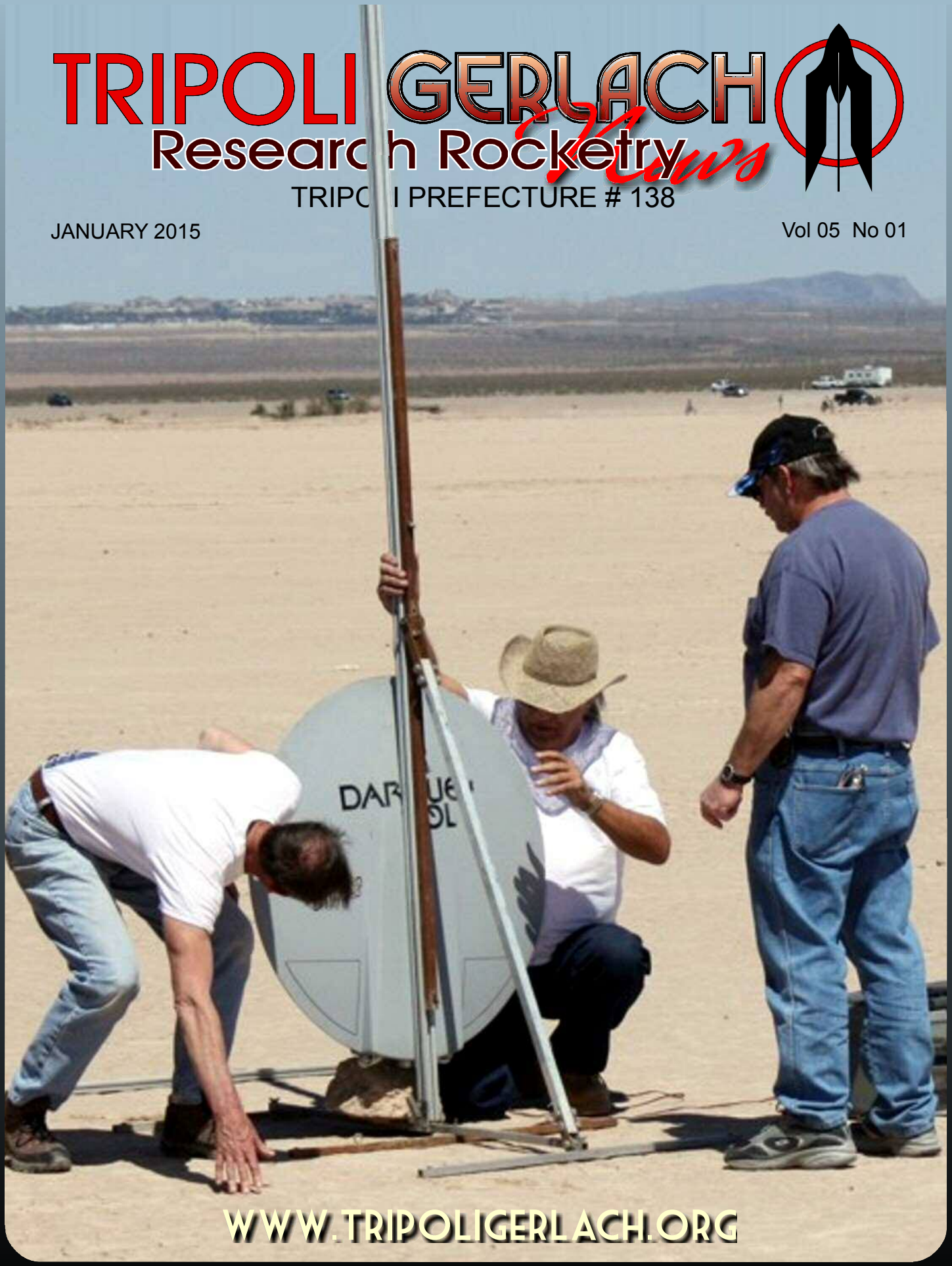

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TRIPOLI PREFECTURE #138

January 2015 Vol. 05 No. 01

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

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.

Our Executive Officers are;

Paul Holmes (566)
PrefectPlano, TX
paulholm@att.net

Tom Blazanin (003)
Secretary
Valencia, PA
shadow@pghmail.com

Dave Rose (7126)
Treasurer
N. Huntingdon, PA
drose191@comcast.net

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 Probably the most unique rocket project ever was Tom Blazanin's DARQUE SOL, a rocket powered Flying Saucer.

DARQUE SOL is featured this month as is its inspiration the USAF PYE WACKET Lenticular Defense Missile. See Pages 8 and 11.

MAGAZINE STAFF

EDITOR & LAYOUT:
Tom Blazanin

CONTRIBUTING STAFF:
Chris Pearson
Gerald Muex, Jr

OFFICE:
Tripoli Gerlach
748 Galloway Drive
Valencia, PA 16059

THE EDITOR

Well here's another 24 page issue. As stated we will run 20 pages unless we get stuff that warrants the addition of 4 more pages. With this issue we could have extended the page count but we have to leave some stuff for the next issue!

The big story is the rocket powered Flying Saucer project of Tom Blazanin. It begins on page 8. While it is an older project it warrants publication in this, the first issue of *TRIPOLI GERLACH NEWS* for 2015. It might prove very interesting to most - almost an Odd Rock that makes sense.

Another feature is High Rock Canyon. Most of us who attend launches at Black Rock have heard about the place but only a few ever venture there. A group of our members packed up and head out there to see just what it is. Very interesting but think twice before just jaunting out there. Story is on page 4.

Several members have voiced project articles they wanted to finish and submit. To those wishing to send in their articles we say please do. If they're unpolished we can handle that. A lot of people have something they've experienced or want to put out to the public.

Remember we'll take just about anything High Power or Research. No Model Rocket stuff please

DISCLAIMER

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EDITORIAL

It's a New Year for us. For a Prefecture in a town where no members live; we are doing fine.

We enter the new year with a new Prefect. Paul Holmes of Plano TX takes Gary Rosenfield's place. Dave Rose remains as Treasurer and a reluctant Tom Blazanin is our Secretary. With Paul in the Prefect seat we're sure Tom will be busy as usual. Our new Executive Committee consists of:

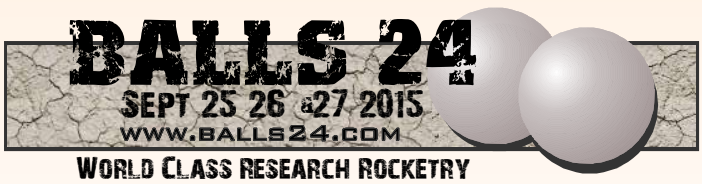
Paul Holmes - Prefect
Tom Blazanin - Secretary
Dave Rose - Treasurer

We also end the year with the completion of our KATE Project. Actually the KATE Project is ongoing with member Vern Knowles offering a nice discount to Tripoli Gerlach members purchasing KATE Transmitters and Receivers from him.

At the September 2014 meeting we finalized things with the purchase of the Prefecture's Receiver and eight members purchasing KATE Transmitters. (Deb Koloms already broke her's real bad. Vern said he couldn't fix it).

At the September 2014 meeting the members voted to purchase a second Receive so we'll have one on the East Coast, which Dave Rose attends to, and one on the West Coast. The Executive Committee, after much debate, has named Gerald Meux Jr keeper of the West Coast Receiver. Vern Knowles stated that he would cover launches in Northern California, Nevada NV Colorado with his personal Receiver.

Tripoli Gerlach Members having KATE Transmitter should contact any of these fellows if they wish access to a Prefecture Receiver use at a launch.



With the new year we get the dates for BALLS 24. Mark Clark has made it official. September 25, 26 & 27, 2015 are the BALLS 24 dates. Already Bruno's Hotel is booked with people wishing to enjoy the Hotel's Camping Experience/ While the hotel is booked there are several apartments and trailers open for occupancy but act quick. Like the hotel rooms they will fill up too.

You can visit the BALLS 24 website to check things out and register by going to:

www.balls24.com

With the BALLS 24 dates set our HAMSTER DANCE launch is set. September 24th, 2015 is the HAMSTER DANCE 5 date. The location will be the same as the canceled HAMSTER DANCE 4 site. One mile out from the 3 Mile Entrance.

You can visit the HAMSTER DANCE website and read all about the little launch that could. You can register while you're there but turn your volume down. They play their music loud!

www.hamsterdancelaunch.com

HIGH ROCK CANYON

Visiting Black Rock you don't stay long before you heard about High Rock Canyon. Friends of Black Rock High Rock have captured its name. The inscribed rocks along Guru Road were inspired by High rock Canyon Petroglyphs. When asking the locals for a scenic place of interest to see they immediately recommend High Rock Canyon. It is obvious they haven't visited it.

A trip up High Rock Canyon is an adventure to say the least. Several Tripoli Gerlach members made the trek in 2014. While most of the time they're prepared for most anything Black Rock has to offer, the run up High Rock Canyon tested them. It's not known if it was the end of the season or if it is always like this but it pushed our vehicles and enthusiasm.

While it is beautiful and scenic the road was pulled right out of hell and strung through the canyon.

The High Rock Canyon is the federal land in northwestern Nevada, under the Bureau of Land Management-BLM management and protection, and the ten Wilderness Areas within it. Defined as a recreational area it is often used by off roaders and bicyclist. Photographers find it a fantastic venue for recording nature and the environment. For us it was like a daylight nightmare for 20 miles of bad road.

High Rock Canyon Wilderness remains unaltered from the days when John C. Fremont first mapped it. There is a lot of scenic wonder to see but again the road is murder. You absolutely need a 4wd vehicle and we're not talking an family SUV. Larry Benek had his JEEP Rubicon and Deb had her Ford Expedition. Larry had no problem but life was very interesting for the Expedition.

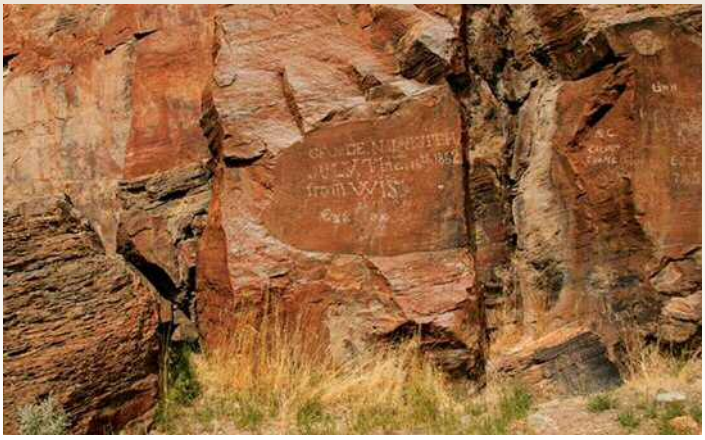
Access to High Rock Canyon is a dirt road on Rt34 about 55 miles north of Gerlach. The in road is relatively good until you arrive at the southern gate to High Rock Canyon. The road then becomes more challenging.

Scenery is very rugged yet inviting.. The walls form on each side and photo opts abound. One such place is a very popular scene of three cliffs, almost the icon of High Rock Canyon.

While most people stop to grab a photo or two; a little time spend looking will reveal a neat cave we've christened Deb's Cave. It's also known as the Post Office for some reason.

Above: Deb Koloms in her namesake cave beneath the three cliffs.
Below: Dave Rose emerged from said cave, something you'll never see again - maybe.

The history of High Rock is quite literally written on the walls of the canyon. Petroglyphs can be found from early occupants. These are said to have been the inspiration for Guru Road outside Gerlach.



The going continues with some places in the road requiring the piling of rocks to make clearance a bit more sociable.

Don't even think about taking the family car. And this isn't even the rough part yet.

During the year 1849, it is estimated that 10,000 wagons passed between the canyon walls.

Traveling through High Rock Canyon takes time. Yet the time is spent mostly on traversing the rough dirt trail. With better preparation the time could have been better spent enjoying the wonderful surroundings. It is hard to imagine people doing this in covered wagons.

Even with all the roughing it there are still signs of people passing through and civilization. Even with overnight accommodations such as The Little Hilton.

Throughout the wilds of Black Rock one can find overnight housing, be it a timber lean-to, a block walled structure or a galvanized structure such as the Little Hilton. It doesn't make a difference when one is stranded in foul weather. - Any cover in a storm.

Below: Jim Callahan & Dave Rose enjoy a break in the relaxing Little Hilton Lobby. The rescue has meeger supplies, a few chairs and a table and no beds. Its rating is one star above Brunos.

No one knows who built The Little Hilton; it could be a hunter's retreat, an old homestead structure or something built by trekkers such as us. The front is galvanized metal but the rear is deteriorated wood. At any rate it is a neat place to refresh from the Black Rock sun. One can see its isolation by the photo below.

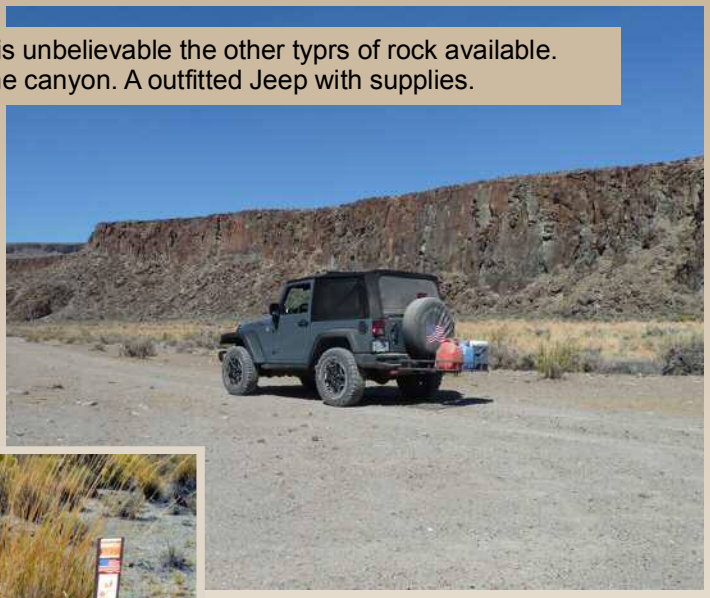
Believe it or not there is a "road" running through the canyon through this meadow. Much of High Rock Canyon resembles this; Sage brush and rocks.

Two examples of the roads to be traveled. As stated before; do not take the family car. We were not able to get photos of the bad stuff as we were too busy trying "save or lives" Off roader will love this place.

If The Little Hilton was a surprise for us imagine us

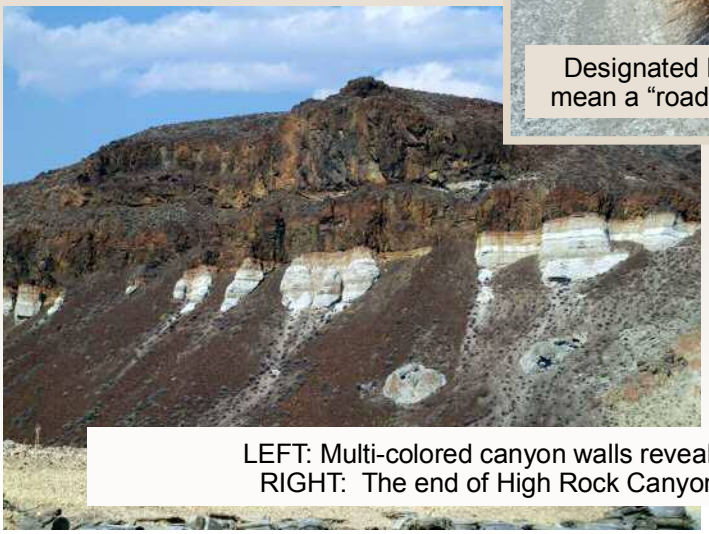
finding a Garage! It is all that remains of the Fox Homestead of 1915. The Homestead Act of 1909 encouraged settlement in less desirable and more arid locations. A number of homesteaders, including Thomas Fox, filed on some prime bottom-land in High Rock and Pole Canyons. The settlers built homes and out buildings, fenced off fields, harvested naturally growing hay and began grazing livestock. The Fox Homestead at the mouth of Yellow Rock Canyon included a small house along with this garage which actually house an Essex Automobile. Today the Garage is all the remains of the homestead.

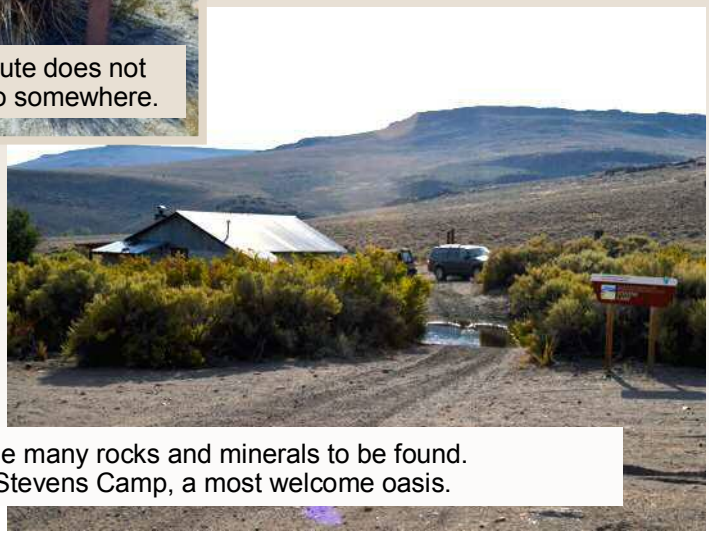
LEFT: While the canyon walls are mainly Basalt it is unbelievable the other typrs of rock available.
RIGHT: The perfect vehicle for traversing the canyon. A outfitted Jeep with supplies.



There is so much to see traveling through High Rock Canyon. But make sure you have an SUV, 4WD vehicle or an Essex. No matter what you use think about going first!

Designated Route does not mean a “road” to somewhere.





LEFT: Multi-colored canyon walls reveal the many rocks and minerals to be found.
RIGHT: The end of High Rock Canyon: Stevens Camp, a most welcome oasis.

PYE WACKET
LENTICULAR DEFENSE MISSILE
Tom Blazanin

While serving at Edwards AFB, in Southern California between mid-1961 to December 1964, I had several opportunities to observe unique situations. One such opportunity was to work on the XB-70 Valkyrie Bomber. Because of cost overruns and the unforeseen success of ICBM technology, in the late 1950s, the B-70 project transitioned into the XB-70 research program shortly after President Kennedy took office in 1961.

While talking with other personnel working on the Valkyrie's early morning pre-flights I became privy to numerous items about the original B-70 aircraft that the public was not made aware of at the time. Some of these things are probably still unknown to the public.

One of these items was supposedly a unique air-to-air missile that was to be proprietary to the Valkyrie's operational defense system. At the time, I tried to gather as much information as I could about this unique missile, however, back then one never pushed for information that did not directly affect their assigned job. While I never saw the missile I was able to collect enough information to form a picture of something that, if mentioned to the outside world, would be dismissed as fantasy.

Pye Wacket was the first and, with today's conspiracy community, I doubt the last, Lenticular Rocket Powered Missile. In simple words a rocket powered flying saucer.

While surfing the Internet, I came across some actual documentation and pictures of the Pye Wacket missile. I became fixated with the concept based on hearing about it years ago and now actually seeing that it did exist, or at least was tested for feasibility with some success. It was enough success for me to warrant deeper thinking about the possibility of building and flying an actual full size version of the design concept.

Due to the lack of intelligence resources on the Pye Wacket project; the dead end searches and that to this date all legitimate documented media coverage of UFO and lenticular aircraft, be they Russian, German, French or American entities, have no mention of Pye Wacket, nor even mention of a lenticular defense missile, it is my conclusion the concept of a hypersonic circular vehicle exists under cover. Like many technologies developed by the government a little information was leaked at the time of concept, and left to run amok. A test flight film is identified and documented in libraries but no film has ever been seen.

PYE WACKET
LENTICULAR DEFENSE MISSILE

The Pye Wacket, being a disc shaped missile and having technology probably still under secrecy, lends itself to the world of speculation. Extracting information and data from original sources proves disheartening. All information contained on this page is vague, to say the least however, it is based on data from the original participants in the Pye Wacket Project at different stages of project development. Several sources are gleaned and their information varies because of these developmental stages and original parties involved. This slightly conflicting data still presents the known Pye Wacket information as best as possible to date.

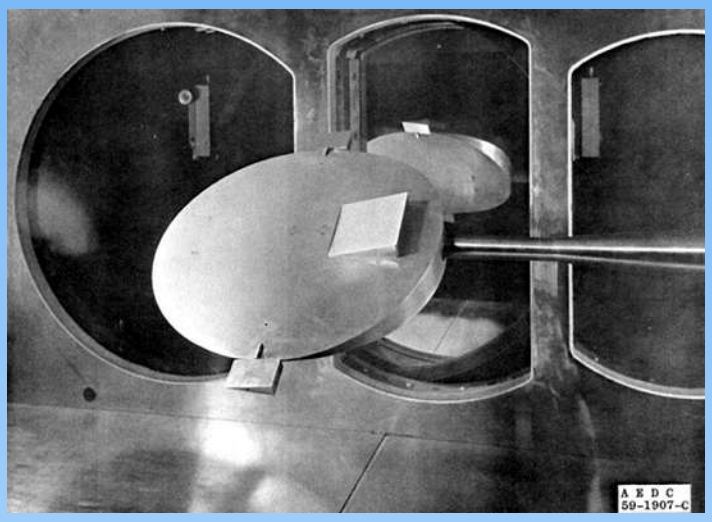
When the B-70 Valkyrie Mach 3 bomber was developed in the late 1950s, the U.S. Air Force was faced with the

problem of how to defend it against existing and future soviet air-defense weapons. It was expected that the B-70's high operating speed and altitude would not make it immune to nuclear-tipped surface-to-air and air-to-air missiles. The proposed solution was the DAMS (Defensive Anti-Missile System).

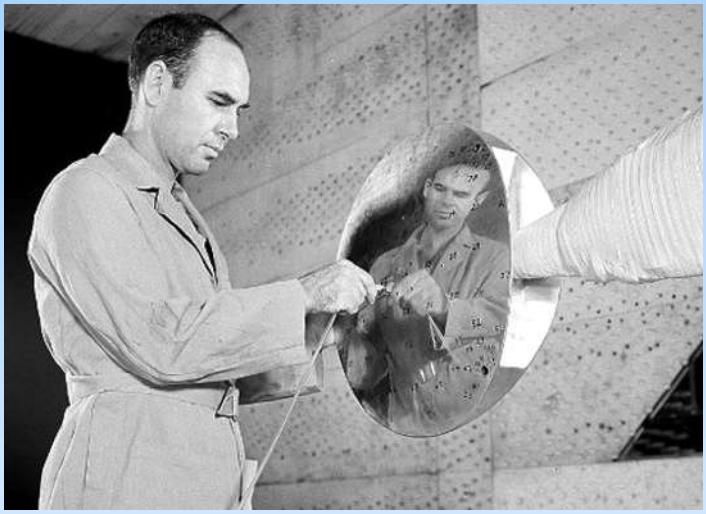
The DAMS would have to use an extremely fast and maneuverable missile to intercept fighters and missiles approaching at relative speeds of up to Mach 7 (as could be the case for a head-on attack). And, as if that were not complicated enough, it was necessary that the missile could transition instantaneously (for example to right angle) in any direction to strike the attacking missile. This missile had to be able to operate with accelerations ranging between 60 G. and 250 G.! The development of this missile was also justified by a reason even more secret: the interception and destruction of UFOs! Indeed, the US Air Force regarded the UFOs as a real threat for the safety of the United States.

One possible solution was a radical missile design developed under project Pye Wacket in 1957. The Pye Wacket missile was a basically circular flying disc formally called the Lenticular Defense Missile (LDM). This shape showed high supersonic stability and lift even at extreme angles of attack, and its evenly distributed mass made the needed super-agility possible. The LDM was originally designed and studied by the Air Proving Ground Center at Eglin AFB and the Arnold Engineering Development Center (AEDC). In June 1959, Convair received a contract to continue development.

During 1959 and 1960, Convair's studies and wind-tunnel tests at the AEDC evaluated various disc cross sections and control devices, the latter including several kinds of flaps, vanes, and other moving surfaces. These proved inadequate to control the vehicle as instantaneously as required at high Mach velocities. In the end, a wedge-shaped airframe cross section and a gas generated reaction control system with six thrusters (4x pitch/roll, 2x yaw) was deemed the best solution. The design of the first Pye Wacket test vehicle was a disc with a diameter of 1.5 m (5 ft), a maximum thickness of about 30 cm (12 in) and a gross weight of 190 kg (425 lb). It was to be powered by three Thiokol M58A2 solid-fueled rocket motors (the same model as in early AIM-4 Falcon missiles). It was planned to launch these vehicles from a rail launcher mounted on a rocket sled in 1960. It has been reported that some flight tests were actually conducted in 1960 at Mesa Flats near St George, Utah, but while this is documented it is unconfirmed.

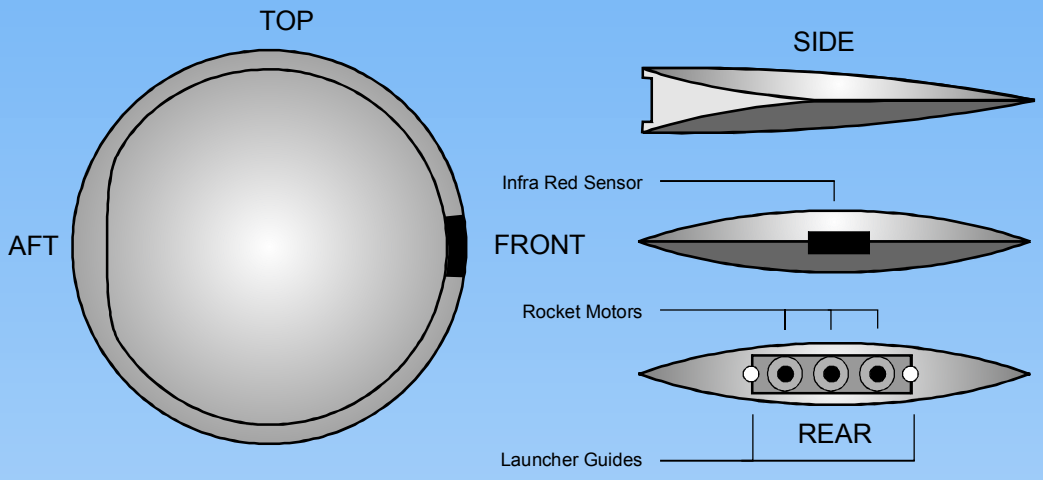


Above is the original concept, with outside control surfaces, in a wind tunnel test.
Below is representative model of the final concept in wind tunnel tes.



Thanks to its symmetric shape (which was, however, compromised in Convair's wedge-shaped design), the operational LDM was to be launched from the B-70 in any direction directly towards the target. For mid-course guidance, the Pye Wacket would have used targeting information given to it before launch by the B-70's fire-control system, and terminal guidance would have been provided by an infrared seeker in the missile's "nose". The characteristics of the LDM apparently evolved somewhat over time, and a USAF report from the later phase of the program describes it as being 1.8 m (70 in) in diameter, 23 cm (9 in) deep and weighing 230 kg (510 lb). Two solid-fueled rocket motors of 45.4 kN (10200 lb) thrust propelled the missile to a speed of Mach 6.5, and maximum range was about 133 km (72 nm). However, sources attributes these characteristics to an earlier design stage.

The "PYE WACKET" Lenticular Defense Missile



The prototype of the missile, built out of magnesium, had a 1.53 meter (5ft) diameter and a maximum thickness of approximately 40 cm (about 16"). Some reports state that it used three (3) of the Falcon derived motors for actual ground testing however, this is not confirmed.

The control of the missile was ensured by six gas thrusters, using a binary fuel, injected by nitrogen under pressure. These six thrusters, each delivering 250 kilos of thrust, made it possible for the missile to accelerate in all the directions required, in a quasi instantaneous way. The first real flight test of the Pye Wacket missile took place at the end of 1960 at Hurricane Mesa in Utah.

It can be assumed that the Pye Wacket project was terminated in the 1960/61 time frame. At that time, actual use of defensive air-to-air missiles by the B-70 had been cancelled as the B-70 program itself was cancelled. In any way, the electronics of the time would not have made it possible to finalize a system of detection, and guidance, able to intercept an unfavorable missile at speeds of Mach 6.5

.

My intention, with the help of some close friends was to build and fly a full size vehicle based on the Pye Wacket concept. Research to this end proved daunting and the realization of a Pye Wacket vehicle was out of the question. In fact a Lenticular vehicle of any type set, to operate at subsonic speeds, was almost impossible. But with research, both in the case of the Pye Wacket and my own theories, the idea evolved with me until I felt I could build a lenticular vehicle that did not rotate, with minimal control surfaces, no actual rudder and rocket powered.

DARQUE SOL WAS CONCEIVED

DARQUE SOL (Dark Sun) a Black Disc in the sky.

SPECIFICATIONS

Data for Pye Wacket
(proposed operational configuration)

DIAMETER 1.8m • 70 inches
DEPTH 23cm • 9 inches
WEIGHT 230kg • 510 lbs
SPEED Mach 6.5+
RANGE 133km • 72 nautical miles
PROPULSION 2 solid fuel rockets 45.4kN • 10,200 lbs
WARHEAD 25 kilos High Explosive

While DARQUE SOL is the brainchild of one single person it was a collective Group Project of talented individuals. Based on the Pye Wacket missile concept its primary goal is to achieve controlled flight of a rocket powered lenticular air vehicle without the use of rotation, magnets or magic! Unlike Pye Wacket, designed for SuperSonic and HyperSonic operation, DARQUE SOL is not intended to transition but to remain SubSonic in flight.

Base research concluded that a vehicle configured as shown in the Pye Wacket section would NOT archive any type of acceptable flight in sub-sonic environment. However the Project moves forward keeping the same values as originally set; to achieve directed powered flight of a lenticular rocket.

COMING IN THE MARCH 2015 ISSUE:

The lost HAMSTER DANCE 4 Article. Member Chris Pearson, of Cleveland, has come up with an article, complete with photos, of last September's event.

Be sure not to miss the next exciting issue.

PROJECT DARQUE SOL

When building a Flying Saucer the first thought that comes to mind, naturally, is how to make it fly? Electro Anti-Gravity systems head the list, but we have no captured alien vehicles to back engineer and not enough funds to develop our own.

The next logical system is a "frisbee" drive. This is to set the disc into rotation, or at least part of the disc into rotation, and use impeller blades to "screw" upward raising the vehicle. Then we would need to develop a stabilization system to place the disc into useful altitudes for course changes and directions.

Then there is always renting a helicopter and attaching a string from the copter to the disc to move it around!

Our project will be rocket powered and, based on the Pye Wacket concept, will use the fixed body shape to attain aerodynamic lift, or "fake" aerodynamic lift. While the Pye Wacket points to a vehicle extremely acceptable to SuperSonic and HyperSonic activity, our DARQUE SOL will be a SubSonic vehicle. As such it will be dependant on thrust and atmospheric density to effect lift and control surfaces to effect command

.

Two test vehicles were decided upon: for testing FGG-1 and FGG-2. These were named after Professor Francis G. Graham, Physics Instructor, founder of the Tripoli Rocketry Association and hard proponent of using smaller versions to test larger concepts.

Research with some models and intelligent discussion with professional engineers and designers, and talks with people having experienced with RC fabrication and flying knowledge. Several actual computer simulations, using the simple and standard ROCKSIM software were conducted to establish some stability and flight requirements. At sub-sonic speeds the disk concept is not a viable aircraft. At super-sonic speed the disk is light years ahead of “normal” aircraft design. (This is already inferred in previously collected Pye Wacket data.) A disk configuration CAN fly at sub-sonic speed. A slightly modified version of the FGG-1 proves the best all around configuration. (No large stabilizer fins required!) Its symmetrical cross section is more advantageous than the asymmetrical cross section of the FGG-2.

The FGG-2’s generated lift would not be conducive to flight control under rocket power. In glide mode the FGG-2 would be great in sub-sonic flight. Under full power it would want to lift causing major control problems for the pilot trying to fly it to altitude. The symmetric FGG-1 would require minimal control by the pilot during the power phase and during the slower glide phase the pilot would have complete control over the vehicle’s attitude to maintain flight

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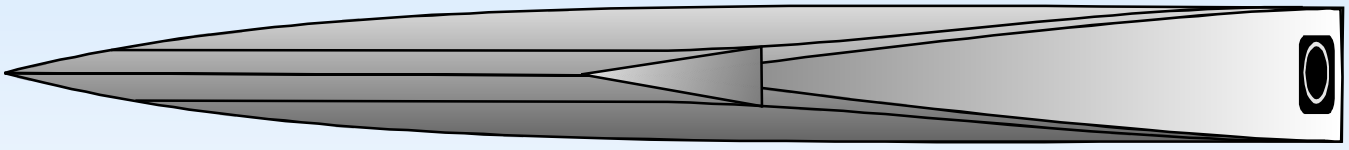
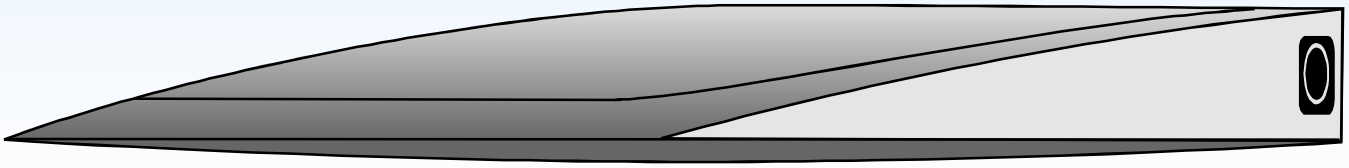
A solution for direction stability was also developed. The need for massive fins, as placed on a Mini Darque Sol cardboard test model, would not be required. The



DARQUE SOL FGG•1

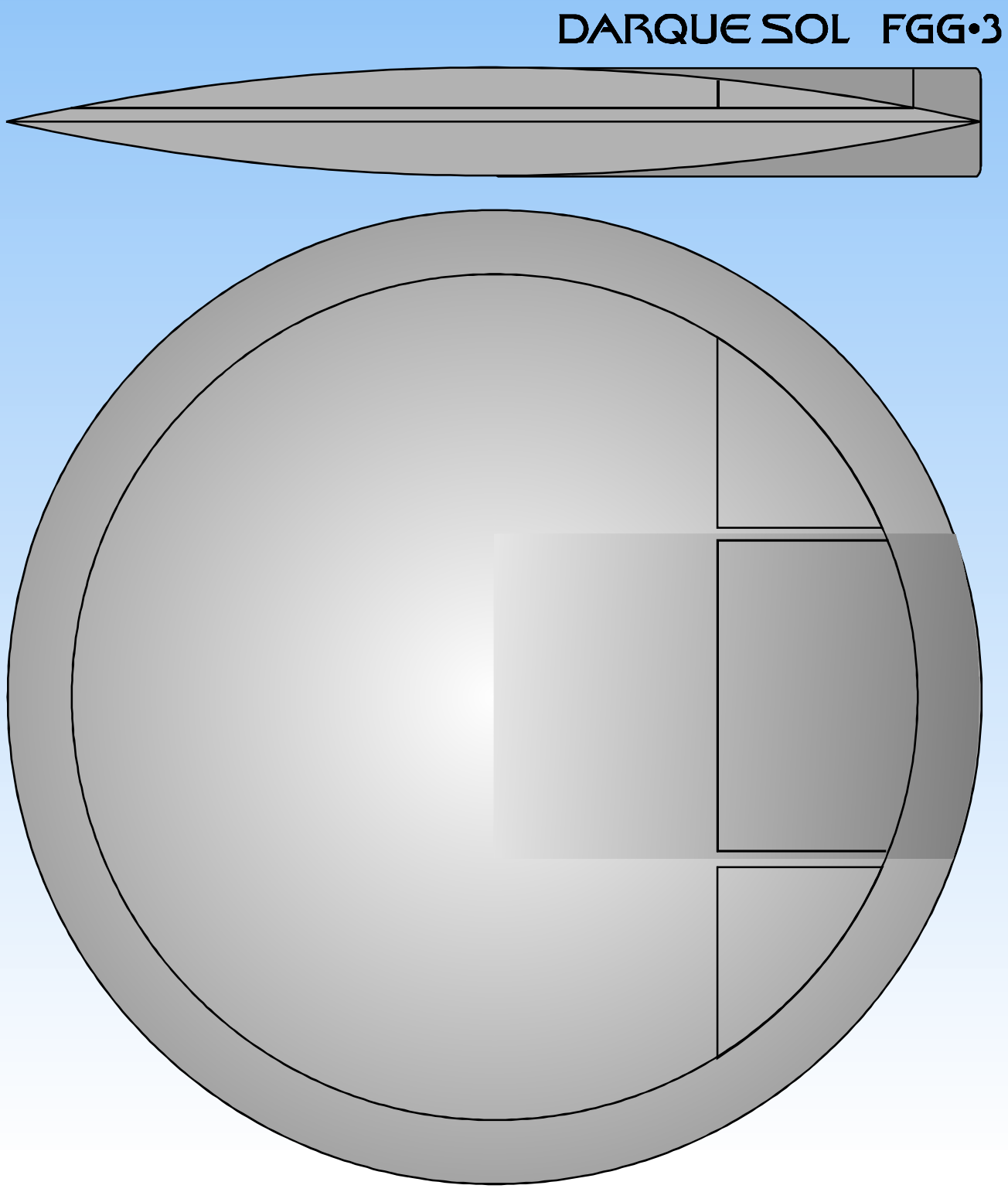


DARQUE SOL FGG•2

final vehicle configuration would maintain the circular symmetrical design and general appearance of the FGG-1, with some observable, but acceptable changes in keeping true to the concept, modifications.

Special rocket motors would need to be designed and developed. At this time no one in the non-professional rocketry community has even consider the required design. The government already uses this design in many weapons common even to public knowledge. (Maybe the public doesn't know the motor design, but they know the "missiles").

Based on the acquired knowledge collected at the Black Rock meeting I am proceeding with the construction of a near half scale version (3 ft diameter) of the DARQUE SOL. With any luck, and funds, it will be ready for testing by September 2007.



FABRICATION

THE STYROFOAM PLUG

With the new concept for sub sonic stability laid out, work began on the FGG-3, a 36" diameter version of DARQUE SOL. The first item of order was to construct a fiberglass half shell mold to produce the matched upper and lower body panels needed to create the disk shape.

A 36" circle was cut out of ½" plywood and covered with a piece of 2" thick styrofoam. The unit was then attached to a wood lathe and spun. With a block of 40 grit sandpaper the domed contour was shaped by hand until a uniform curve was achieved. A vacuum was used to catch foam dust during shaping

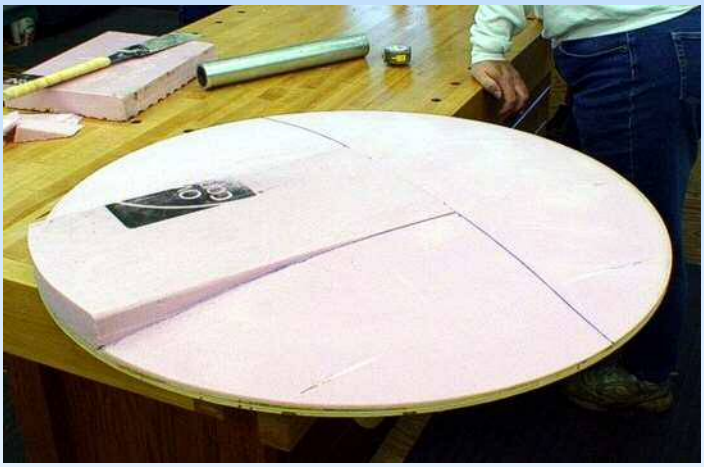
The surface curvewas worked slowly by hand until the surface became a uniform arc.

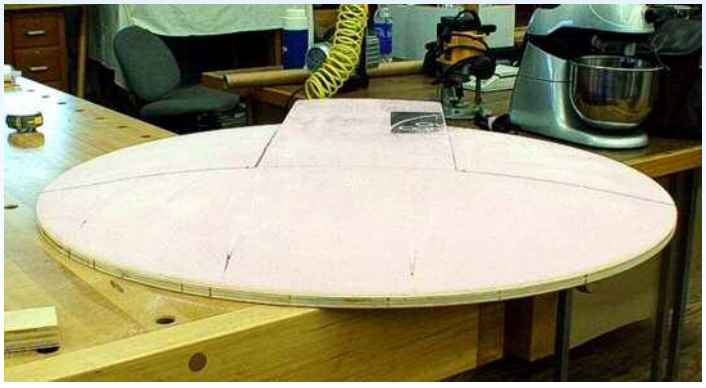
When the disk was shaped it was removed from the lathe and clamped into a work table. Measurements were taken to locate the center area to mount a 2"x12"x20" piece of squared styrofoam to shape the Motor Box. This Motor Box will act as a rudder to keep the vehicle attitude aligned with the direction of flight.

The Motor Box area was cleaned out and the block of styrofoam was glued in place. The box shape was hand sanded to conform with the shape of the disk and worked back to the square shaped form.

The final foam shape presents a true look as to what the final shape will be. Any deviation of forward attitude will be corrected by the Motor Box's ability to act as a fixed rudder and correct flight back to a forward attitude.

The line drawn across the disc shows the curve of the surface, as does the placed motor box.





MAKING THE PLUG

With the styrofoam base completed, steps were taken to finish it into the plug which would be used to make the mold. The first step was to cover the styrofoam with two layers of 10oz fiberglass cloth. This provided a sturdy base to begin "bodywork" and to smooth out the final shape.

With the excess cloth trimmed away, the entire surface was block sanded to lower any epoxy bumps. The photo below on the left shows the first skim of Bondo over the motor box. The photo below shows the completed first Bondo skim.

Above is the plug sanded and ready for primer - and then more sanding.

Finally primered and ready for paint. The blue lines show curvature. The front to rear is the center line. The cross line is the balance point necessary to achieve flight.You will notice the balance point is really far forward.

With a uniform lenticular design the raised motor box at the rear will not only house the rocket motors but act as a rudder to keep forward travel on course.

The plug was then painted black, fine sanded to a smooth shiny finish and then heavily coated with Carnauba wax for release.

THE MOLD

Eight layers of 10oz Fiberglass Cloth were applied two layers at a time. Photo below shows first layer of cloth. A total of eight layers of cloth was applied.

With all of the cloth layers finished the mold sat in the sun for a day to cure, then it sat another day inside. Releasing the mold from the plug became a problem and small wooden wedges had to be inserted around the circumference. Usually, a well waxed mold will release the part with a clean pop but this one would not give it up. Finally it did pop - big time! The mold was released from the plug and it was obvious the generated heat from curing affected the bond skim and finish paint and it stuck firm to the plug.

Once separated, the mold revealed a disaster of stuck paint due to not letting the paint cure before applying the fiberglass to make the actual mold. Not really as bad as it looks the paint residue cleaned rather easy and soon we had a good solid mold to work with as you can see by the photo below.

Below, the finished mold on the left and the first half shell made from it. To build Darque Sol we would need two half shells.

THE TEST VEHICLE

The body shells were laid up using four layers of 10oz fiberglass cloth. Unlike the mold the shells separated from the molds with a slick clean pop and required no finish work.

The two photos below show the two shells mated to form the saucer body. The saucer symmetry is easily seen and the rear shot shows, by way of the motor box, how well the two pieces line up with each other.

The two shells were then glued together and clamped to set. Once set the top shell (top right) was cut open to gain access to the interior for further epoxy around the outer inside diameter.

Below shows the three removable 54mm motor mount tubes set in place. The wood pieces are temporary weight to work with finding a working balance point. Also seen are the many tabs installed about the circumference to serve as anchor points for attaching the top skin back in place.

Below shows the top skin attached and the rear opening cut to accept the three motor mounts. This whole rear area has been reinforced as the main anchor point of the vehicle. Lines shown are speculative control surface areas which, in the final version, may not even resemble them.

The finished FGG-3 (FG2-3) Test Vehicle; painted, marked and ready for preliminary glide testing. At this point the FGG-3 weighs 12lbs, without motor or recovery equipment.

Glide tests were conducted using a long piece of bungy cord securely attached to two solid anchor points. This whole experiment failed miserably as the bungy cord could not supply the needed energy to get the saucer out of its own way.

It became obvious the only way we could get the saucer into the air is with a rocket motor. So undauntedly we carry on.

Prof. Francis Glenn Graham deduting the Lenticular Rocket Darque Sol at Black Rock, Nevada. Prof. Graham, actual founder of Tripoli, is a retired Physics Professor from Kent State University. He is also an enthusiast of unique rocket vehicle research.

To this the first Darque Sol Test Vehicle, design #3, was named after the Professor; thus the FG^2-3. **F**rancis **G**lenn **G**raham.

FLIGHT PREP

After much discussion over the failed Glide Test in Pittsburgh it was agreed that our next step should be to launch the FGG-3 under rocket power in the center motor tube and use the two outside motor tubes as recovery. This boosted launch would prove: first, we could get it off the ground and second, prove vehicle stability under powered flight.

The vehicle was taken to Black Rock for others to review and add input. Several people have been involved in the DARQUE SOL Project but one of great importance was Oliver Schubert of Las Vegas who's input to the DARQUE SOL project has been most invaluable.

A discussion at Black Rock with Oliver Schubert, Jason Smerecziak and Tom Blazanin discuss Las Vegas modifications for the FGG-3

DARQUE SOL was turned over to Oliver who took it home to Las Veages. Oliver's job was to prep the vehicle for launch. This meant to get it balanced for flight and design the recovery system.

Oliver created a computer model to be used in a flight simulator. With this we were able to find the true balance point for actual flight. The computer simulator showed the DARQU SOL would fly.

Weight would need to be added to the forward section 12.5" from the leading edge of the disk and this was accomplished with lead shot and resin.

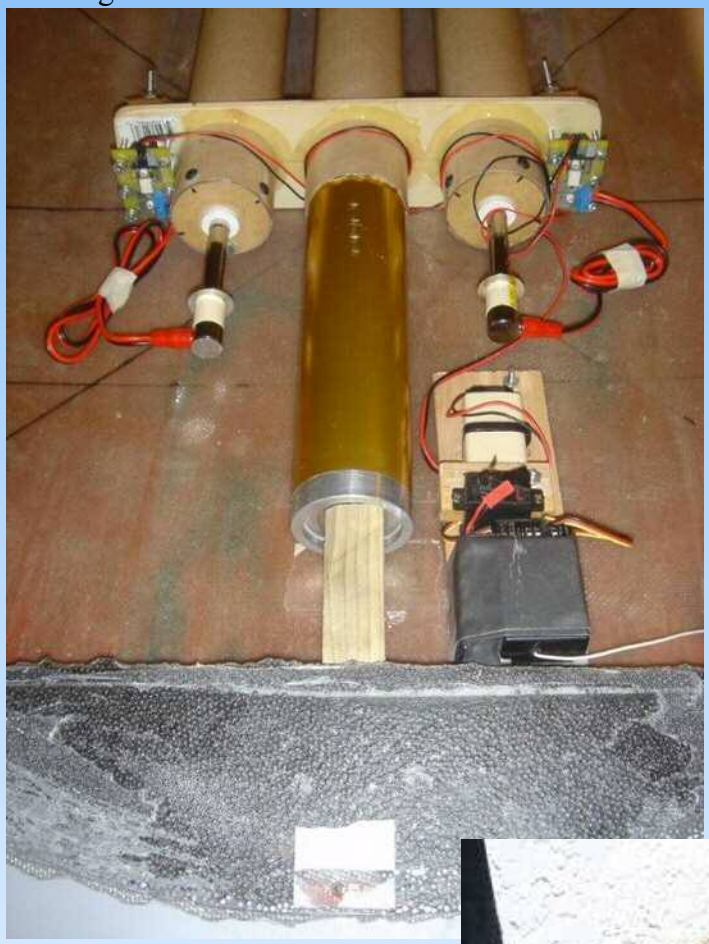
Above: Tom and Oliver at Oliver's Las Vegas shop ready the dual parachutes for ground testing.
Below: A cell from video shows the successful test firing of the dual parachutes to be used to recover the DARQUE SOL in flight.

The first item was the installation of an RC airplane receiver and switch unit. Two No Match ejection units were then installed in the outer tubes and everything was wired together.

The two recovery tubes were modified with pistons and plugs to anchor and protect the two 60" parachutes that will recovery the vehicle. The photo below shows the successful recovery test.

With the successful test of the recovery system the internal workings were made permanent. Two of Oliver's No Match Recovery units would deploy the dual parachutes by radio control from the ground.

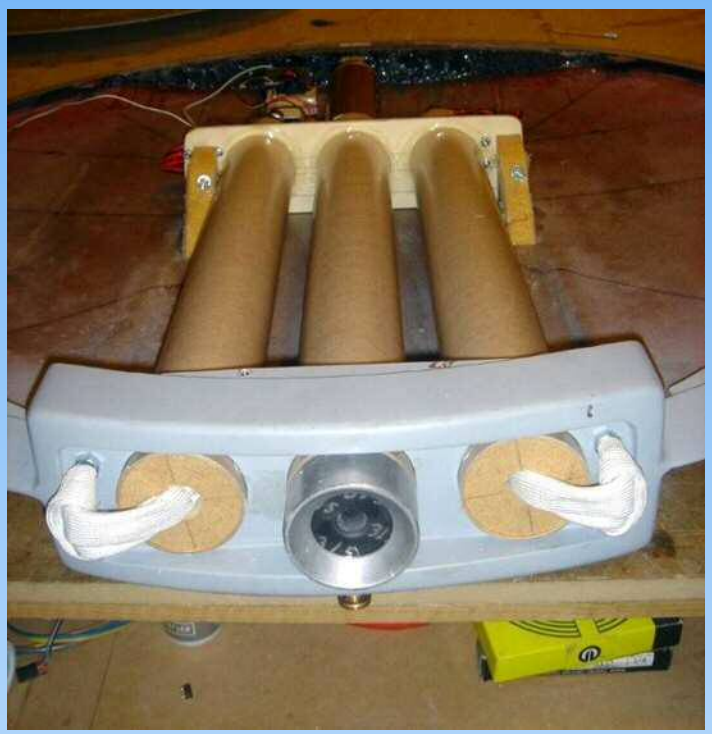
There would be no R/C control of the disc as the first flight was to be just a proof of concept flight and no control surfaces were actually in place other than lines defining them.



With all items on board the boost CG was calculated and lead shot was epoxied into the nose area of the disk to move the CG 12.5" from the front edge, well ahead of the vehicle CP.

The above photo shows the installed motor and the RC receiver to the right. The two No Match units are installed for recovery ejection. Not shown is the No Match unit used for the forward ignition of the motor.

In addition, a PicoA altimeter recorder was installed as a safety backup on the RC Recovery and also to record the Flight Data.



The top right photo shows the business end of the DARQUE SOL. The single L-780 is centered between two recovery tubes. The recovery tubes are held in place with wooden plugs held in place with shear pins.

Below the DARQUE SOL ready for flight minus the top cover. Note the lead shot at the bottom of the disc, used as flight ballast.

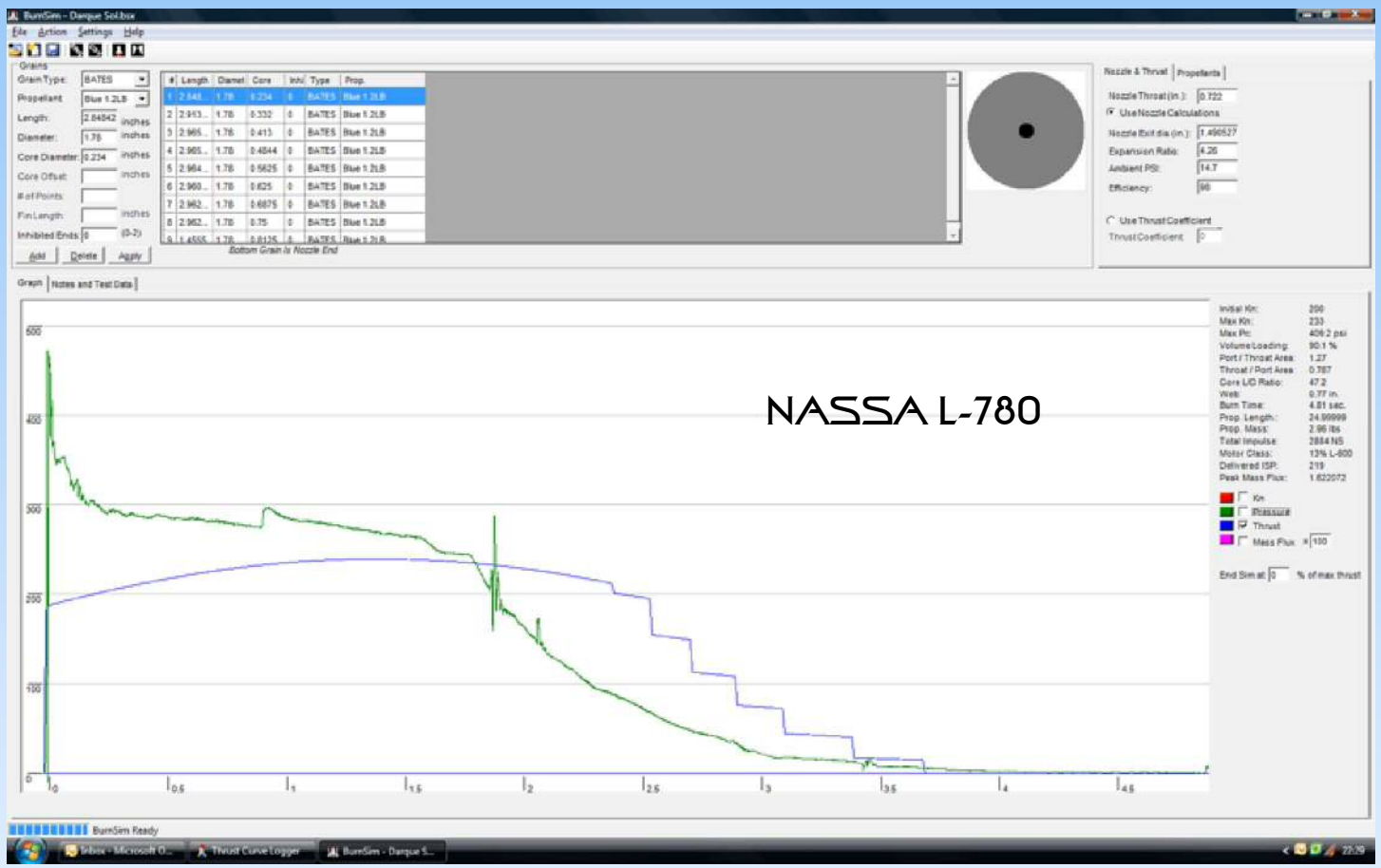
MOTOR DESIGN

The motor used in the Boost Test of the FGG-3 was designed by Oliver Schubert using NASSA BLUE 1.2LB propellant. Classified an L-780 the motor, the total propellant weight was 3.5lbs and actual burn time was 5.3 seconds.

Propellant was cast by Les Derkovitz using Oliver's specs. Below is a screen capture of the BurnSim motor design. The actual test firing is overlayed for comparision. The multiple grains with various lengths and core diameters corrects the Mass Flux of each grain and delivers optimum operation.

A NoMatch™ Head End Ignition System, being developed by Oliver, was used in both the test and actual Boost Test Launch set for April 18th in Nevada.

	BURNSIM	ACTUAL
Avg. Thrust	135 (189) lbs	120 (208) lbs
Burn Time	4.8 (3.4) sec	5.3 (3.0) sec
Total Impulse	2.884 NS (2.860) NS	2.824 NS (2.776) NS
Average Pc	Not Given	247 PSI (425) PSI



TEST FLIGHT

With everything basically finalized it came time to launch the FGG-3 under rocket power and to see if all the work accomplished thus far would help the vehicle get out of its own way. Two days before launch the team assembled to button up the test. We found we had a problem with the recovery system being that the ejection pistons were snagging the chutes and were binding shut. Another ground test of the "corrected" chute packing method showed all was well.

THE BOOST LAUNCH

On April 18th, 2009 members and friends of NASSA and the Institute for Lenticular Research set up site at El Dorado Dry Lake just SouthEast of Las Vegas, Nevada. The purpose of the gathering was to Boost Launch the FGG-3 to prove air stability under thrust and attitude in the air at sub-sonic speeds.

Jerry McKinlay (NV) Les Derkovitz (NV) Tom Blazanin (PA) Jim Callahan (PA) Oliver Schubert (NV)

LAUNCH PREP

A site was decided upon at El Dorado Dry Lake. A special Launch Rail was setup with a 5 ° angle and cameras were positioned to record the boost. Oliver Schubert would control the RC ignition and have sole decision on activating the dual recovery chutes. Typical Dry Lake winds kicked up about noon which kept the launch from proceeding. After all the preparation and work to get thus far it was decided, with all things ready, that we would launch at first opportunity when the winds died. This decision would return mixed results.

LAUNCH

With a lull in the wind we opted to launch and at 1:00pm the FGG-3 lifted skyward. Just at zero countdown winds rose however the FGG-3 headed skyward under very stable and quick boost. Weather cocking occurred which helped the vehicle head into the wind. It made a slight roll and acquired a horizontal belly down attitude at 478 feet.

Still under power it reach a speed of 190mph until burnout at which time the wind caught it again and placed it in a climb position. For a short time, without power, it "flew/glided" in a stable forward direction and as it began to lose velocity it started to descend and bank to the opposite direction. Oliver fired the recovery charges.

The deployment suffered the same problem we had back in the shop with the pistons pinching the chutes into a stop and not permitting full deployment. With the parachutes half deployed all effects became null and the vehicle fell to the ground in a near horizontal, yet sort of nose down attitude. The FGG-3, though destroyed on the ground, achieved its goal.

TEST RESULTS

The goal of the FGG-3 portion of the DARQUE SOL Project was proof of concept that a lenticular air vehicle could maintain stable attitude in sub-sonic "flight", without the use of spin, magnets or magic wires. This was most definitely shown.

The orientation of the disk remained perpendicular to the direction of flight. Despite wind conditions, had active control surfaces been present, there would have been complete control of the vehicle in boost and glide. All observers were enthusiastically positive over what they had witnessed.

The Boost Launch conducted on April 18th outside of Las Vegas, Nevada, without a doubt, proved DARQUE SOL Proof of Concept. All attending the test were in complete agreement that without wind the test would have scored a 100. What was achieved was solid confirmation that the whole design was good. It was also the opinion of all attending that had surface controls been present the FGG-3 would have been able to successfully adjusts for flight deviancies.

It was concluded the recovery tubes had expanded during previous ground tests of the Recovery Systems and the bloused chutes could not help but be pinched between the expanded cardboard tubes and the charge pistons. Future use of such a system is still acceptable provided attention is paid to this now known anomaly.

BELOW: DARQUE SOL achieving horizontal and forward attitude flight. Flight confirmation points to Phase II of the DARQUE SOL Project, that being a much larger version of the same design complete with active R/C control surfaces. Completion date unknown.

ALUMINUM PIPES & TUBES

Being into rocketry we deal with pipes and tubes, either for motor cases or airframes. When we have to order aluminum, from any material supplier, we are presented with the question: Pipes or Tubes?

What's the difference between pipe and tube? It's the way it's measured and, at times, the applications it's being used for.

Pipes are passageways.

Tubes are structural.

A pipe is generally measured by inside diameter or ID.(IE: You could roll a 2" golf ball through a 2" NOMINAL pipe.)

Tubes, on the other hand, are measured by Outside Diameter. (So your golf ball would have the same O.D. as the 2" tube.).

• Pipe is generally more rigid than tube, and is usually produced in heavier wall thicknesses.

• Pipe is specified by a nominal dimension which bears little or no resemblance to the actual dimensions of the pipe. 1" Schedule 40 pipe, for instance, has an actual OD of 1.32", a wall of 0.133", and an inner diameter of 1.049". Tube dimensions are actual dimensions.

• Pipe fittings are sized to meet pipe sizes, but not tube sizes. A 1" schedule 40 nipple will fit correctly on a 1" schedule 40 pipe, but not on a 1" OD tube.

THREE GRADES OF ALUMINUM

•6061 is a medium strength alloy used for most general-purpose applications. it is more corrosion-resistant than 2024. It is also easier to weld than 2024.

• 2024 is a high-strength alloy most often used in aerospace applications. It has a yield strength that is roughly 10 percent higher and an ultimate strength of roughly 50 percent higher than 6061.

• 6063 is often called architectural aluminum, because it's surface is smoother than others, but it's not as strong as 6061.

6061 is a precipitation hardening aluminum alloy, containing magnesium and silicon as its major alloying elements. Originally called "Alloy 61S," it was developed in 1935. It has good mechanical properties and exhibits good weldability. It is one of the most common alloys of aluminum for general purpose use.

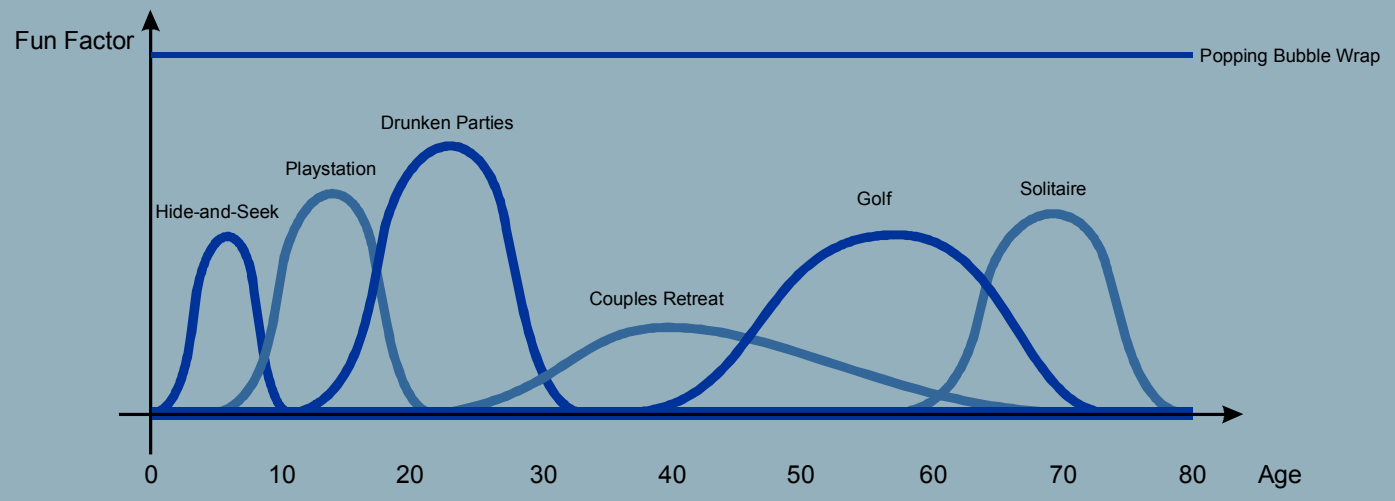
It is commonly available in pre-tempered grades such as 6061-O (annealed) and tempered grades such as 6061-T6 (solutionized and artificially aged) and 6061-T651 (solutionized, stress-relieved stretched and artificially aged).

SCHEDULE 40 vs SCHEDULE 80

Schedule 40 is the most commonly used pipe in commercial applications. Schedule 80 has a thicker wall diameter and would be used for high-pressure applications.

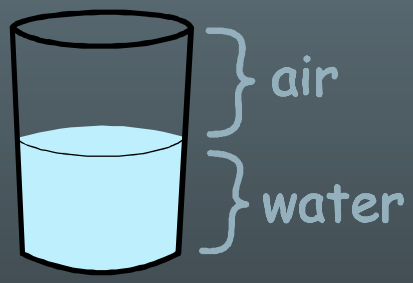
For rocket airframes schedule 40 could be used as it is less expensive. For rocket motor cases go with schedule 80 would be the better choice.

VARYING LEVELS OF ENTERTAINMENT VALUE



If the result confirms the hypotheses,
you've made a discovery.
If the result is contrary to the hypotheses,
you've made a discovery.
- Enrico Fermi

It is scientifically proven that people who have more birthdays - live longer.



Technically, the glass is always full

THE EVOLUTION OF THE WRITTEN LANGUAGE

* (After Cognitive Disintegration)