TRIPOLI GERLACH Research Rocketry News

TRIPOLI PREFECTURE # 138

SEPTEMBER 2012

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WWW.TRIPOLIGERLACH.ORG

TRIPOLI GERLACH Research Rocketry
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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 qualified Tripoli Members having a Level 2 certification or higher.

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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 Bill Good of Cincinnati, Ohio stands next to his upscaled Estes Satellite Interceptor.

We visit Bill's Shop on Page 15.

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NEW MEMBERS

We've picked up three new member and welcome them to the klan. You can find more information on our MEMBERS page of our WebSite.

Karl Baumann
kbaumann@aerotech-rocketry.com

Bob Shoner
bob.schoner@gmail.com

William Walby
wfwalby@ucdavis.edu

2ND ANNUAL MEETING

Our Second Annual Member's Meeting is set for September 21st, 2012 in Bruno's WayBack Room. Festivities will begin at 7pm with a Member's FREE Spaghetti Dinner. Wine will be available at the tables however other drinks are on you from the bar.

Please contact Tom and let him know you plan to attend so we can have an accurte count for Skeekie. Also people on special diets let Tom know as well.

Our Executive Committee elections will take place at this time so if you wish to run for an Office, again contact Tom.

This meeting will be important as we will begin the LDRS 32 process. And we need input and volunteers.

Dues for 2013 will also be gladly accepted at this meeting.

We are open to input and suggestions and look forward to seeing all of you there.

DEADLINES

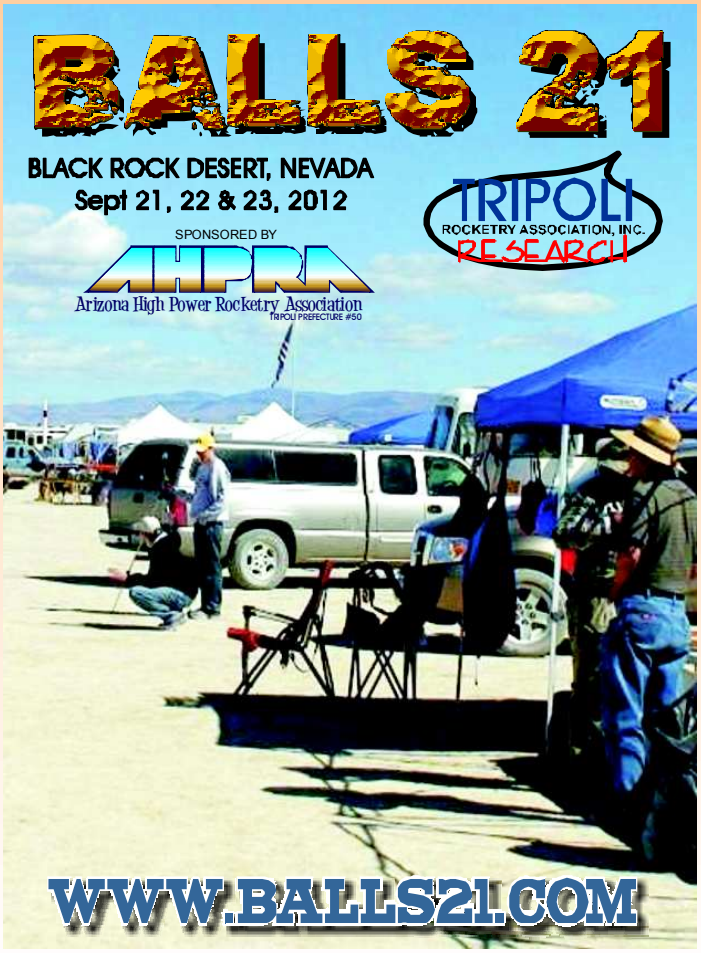
It's September and the deadlines are upon us. The first is do you have your projects ready for the upcoming Black Rock launches!

BALLS 21 begins September 21st. The BALLS registration deadline is September 17th. This means they must be received by AHPRA by that date, NOT postmarked on that date. To register at the launch site will cost you $20 more! Do it now.

Our little HAMSTER DANCE II has a registration deadline as well. September 13th, 2012. This also means received by the 13th, NOT postmarked.

In both instances people receiving these registrations will be leaving for Black Rock and will not receive mail after those dates.

The last deadline of interest to Tripoli Gerlach members is for our Annual Member's Meeting set for September 21st, 2012. We need to know who plans to attend so we can give Skeekie our count for the free Spaghetti Dinner at our meeting. Please E-mail TOM with your confirmation that you'll be there. We need to inform Skeekie by September17th.



LDRS32
BLACK ROCK, NEVADA
July 14 - 18, 2013

It's Official. The Tripoli BoD has awarded LDRS-32 to Tripoli Gerlach and it will be held at Black Rock, July 14th thru the 18th of 2013.

Work on the event has begun in ernest to arrange for a Black Rock Experience for those who have never been here. And for those who are regulars it should be a great experience as well.

The LDRS 32 WebSite is under construction and will be released to the public on January 1st, 2013. An official LDRS 32 Committee has been formed and volunteers are being collected.

Several LDRS events have already been conducted at Black Rock in the past and with the current size of our national membership this one will definitely surpass all others.

Look for more information soon and watch for the WebSite announcement.

A COMPUTATIONAL, KNOWLEDGE ENGINE

WolframAlpha

Forget BING, ASK, YAHOO etc, Now you have a way to answer questions, do math, instantly get facts, create plots, calculate anything, convert units, access scientific data and statistics, get help with homework, have a great tool in the shop — and much more.

While trying to calculate ballistic formulas, or just in a search for answers, Tripoli Gerlach member Oliver Schubert discovered a great knowledge source called WolframAlpha. He's not the first to come across it but he is very active in telling the world about it.

WolframAlpha is not a search engine, nor is it a "wikipedia" type source. It does do simple and major calculations. It does provide a massive amount of information on just about anything you ask. But it is not like anything you've encountered on the internet before.

YOU ask your questions in simple plain language and Wolfram Alpha responds with more information than you could ever expect. Doing math problems are a breeze. Calculating complex formulas are a breeze. Want to know about Ammonium Perchlorate? Simply enter "Ammonium Perchlorate".

Wolfram Alpha returns Chemical Names and Formulas, Basic Properties, Thermaldynamic Properties, Chemical Identifiers, NFPA Labels, Safety Properties and Toxicity Properties.

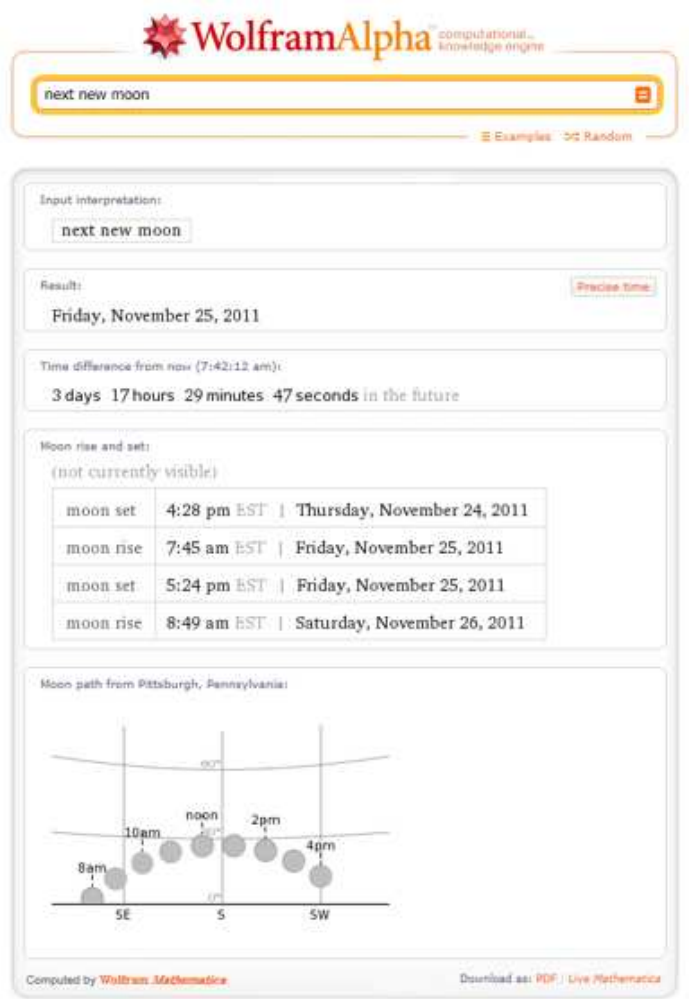
Enter "300grams = pounds" and WolframAlpha not only returns the answer it provides you with Additional Conversions, Comparisons as Mass, Interpretations, and Corresponding Quantities such as Weight *w* of a Body and Volume *v* of Water.

Enter your first name and you will get information on US Births, a History of US Births, Estimated Current US Population, Estimated Current Age Distribution and even alternative versions of your name.

Type in "next new moon" and you'll get results as shown in the image to the right.

Virtually anything you can ask verbally will be answered, whether a querie or an equation.

Anyone doing Rocket Motor designing or propellant mixing, or for that matter anyone with the slightest bit of intelligence will find WolframAlpha an essential tool and an excellent source of information, knowledge and answers.



Whether you use a MAC or a PC WolframAlpha will work great. There are several add-ons and widgets to choose from to have WolframAlpha always at you fingertips on you computer.

Visit their site and discover a new way of getting answers to anything you can ask.

WWW.WOLFRAMALPHA.COM

MOTOR OR ENGINES – IT'S MOTORS

WILL THE CONTROVERSY EVER END?

About 98% of people who get into the hobby of rocketry start out with a small cardboard kit usually made by a company called Estes. Their literature and instructions talk about using ENGINES to propel these creations skyward. From that day on the little cylindrical devices have been referred to as ENGINES.

In reality these little round devices are actually MOTORS, but because the kit manufacturer states they are ENGINES – they stay ENGINES. This is reinforced by the organization overseeing Model Rocketry stating they are ENGINES as well. Both point to the Rocket God G.Harry Stein as the source of the word usage. The fact of the matter is ENGINES came from one Orville Carlyle who is responsible for the creation of these little cardboard cylinders of power as a means of propulsion for his first cardboard Rocket Kits. Orville didn't know better.

Then entered G.Harry Stine, who did know better. G.Harry saw the future of these Model Rockets and, without getting into a history of Model Rocketry, moved on to form an organization to promote and over see this new hobby.

In a personal discussion with him he stated he continued to use the word ENGINE mainly because it sounded more technical. Real Rockets (liquid fueled) used ENGINES and it made the hobby sound more "big time". This was used to hype kids into a science and technical hobby. Besides, according to G.Harry Stine, "Everyone knows they do the same thing."

According to all the big books you find:

en·gine [**en**-juh n] - noun
Any mechanical contrivance designed for converting energy, especially heat energy, into mechanical energy or power to produce mechanical work, force and motion. A machine using moving parts and having no latent source of energy.

THIS IS A ROCKET ENGINE

mo·tor [**moh**-ter] – noun
A device that uses latent energy, such as electrical or chemical, to impart motion. A contrivance conveying an impulse that results, or tends to result, in motion. An electric motor, or a solid rocket motor, converts another latent form of energy from some natural source within into mechanical energy to produce motion in order to utilize it in driving machinery.

ROCKET MOTORS LOOK LIKE THIS

With these words defined it is obvious the old Rocket Gods are still wrong to this day.

To this day one can define the Hobby Rocket "Scientist" from the Serious Research Rocket Person by word usage. Those people using the word ENGINE will argue to their last breath there is no difference between the two words. After all didn't Stein say they both do the same thing?

To the majority of Research Rocket people they find those continuing to use the word ENGINE in reference to their MOTORs are not really with it. Argue all you want those persons making their own Solid Propellant devices are not Mechanics building ENGINES, they're Scientist making MOTORS.

Even Estes, one of the "original" perpetrators, now labels their propellant devices as a MODEL ROCKET ENGINE/MOTOR. I guess they're still not sure!

EAGLEVILLE

The majority of people who travel to Gerlach approach the town from the south. Nixon is the last "big" town before the run up Rt 447 to the Gerlach/Empire neighborhood.

Often people wonder what is north of Gerlach?

A scenic and interesting drive north on Rt447 takes you across the state line to the country of California.

Over the border and about 75 miles north of Gerlach you arrive in the extremely quite town of Eagleville, CA.

This is downtown Eagleville. No joke, this is the town.

It is a nice, quiet town where it's past seems to have been it's highpoint. The only thing left is a post office, a graveyard and a few buildings that could have been storefronts at one time, but now look very closed.

Despite its look Eagleville is not dead. It just has a wide main street. This is because just about all of the building seem to be located away from the street. It comes across as having the widest main street of anywhere. This is because the berm of the road is every bit as wide ads the road itself. Driving through you get the feeling you could just stop your car in the middle of the road and get out to walk around!

Coming from the Gerlach area looking east you will see the Lower Alkali and the Middle Alkali Lakes, two large lakes sometimes dry part of the year. Travel another 15 miles north and you hit the metropolis of Cedarville - another story unto itself!

Eagleville has nothing to offer as a claim to fame other than it is there. Maybe the fact that it is quiet might be the reason people are there. Either that or their cars broke down and they stayed waiting for parts!

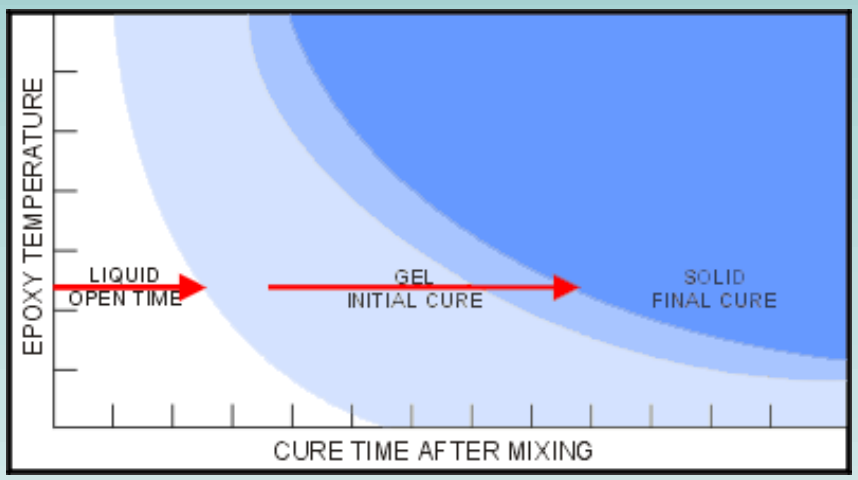
All of Eagleville is old fashion from its architecture to its people, Surprisingly most of Eagleville is really maintained well and clean as if there is something there. Maybe Eagleville is in the Twilight Zone!

The white line in the bottom photo is not the centerline - it's the berm of the road. You can see why the town is so wide!

EPOXY INTRODUCTION

EPOXY'S CURE STAGES

Mixing epoxy resin and hardener begins a chemical reaction that transforms the combined liquid ingredients to a solid. The time it takes for this transformation is the cure time. As it cures, the epoxy passes from the liquid state, through a gel state, before it reaches a solid state as shown in the chart.



As it cures, mixed epoxy pass from a liquid state, through a gel state, to a solid state

1. Liquid-Open time. Open time (also working time or wet lay-up time) is the portion of the cure time, after mixing, that the resin/hardener mixture remains a liquid and is workable and suitable for application. All assembly and clamping should take place during the open time to assure a dependable bond.

2. Gel-Initial cure The mixture passes into an initial cure phase (also called the green stage) when it begins to gel or "kick-off." The epoxy is no longer workable and will no longer feel tacky. During this do not disturb stage it progresses from a soft gel consistency to the firmness of hard rubber. You will be able to dent it with your thumbnail.

Because the mixture is only partially cured, a new application of epoxy will still chemically link with it, so the surface may still be bonded to or recoated without special preparation. However, this ability diminishes as the mixture approaches final cure.

3. Solid-Final cure The epoxy mixture has cured to a solid state and can be dry sanded and shaped. You should not be able to dent it with your thumbnail. At this point the epoxy has reached about 90% of its ultimate strength, so clamps can be removed. It will continue to cure over the next several days at room temperature.

A new application of epoxy will no longer chemically link to it, so the surface of the epoxy *must be properly prepared and sanded* before recoating to achieve a good mechanical, secondary bond.

UNDERSTANDING CURE TIMES

Open time and cure time govern much of the activity of building and repairing with epoxy. Open time dictates the time available for mixing, application, smoothing, shaping, assembly and clamping. Cure time dictates how long you must wait before removing clamps, or before you can sand or go on to the next step in the project. Two factors determine an epoxy mixture's open time and overall cure time - *hardener cure speed* and *epoxy temperature*.

HARDENER SPEED

Each hardener has an ideal temperature cure range. At any given temperature, each resin/hardener combination will go through the same cure stages, but at different rates. Select the hardener that gives you adequate working time for the job you are doing at the temperature and conditions you are working under. The product guide and container labels describe hardener pot lives and cure times.

Pot life is a term used to compare the cure speeds of different hardeners. It is the amount of time a specific mass of mixed resin and hardener remains a liquid at a specific temperature. (A 100g-mass mixture in a standard container, at 72°F). Because pot life is a measure of the cure speed of a specific contained mass (volume) of epoxy rather than a thin film, a hardener's pot life is much shorter than its open time.

EPOXY TEMPERATURE

The warmer the temperature of curing epoxy, the faster it cures, as seen in the chart above. The temperature of curing epoxy is determined by the ambient temperature plus the exothermic heat generated by its cure.

Ambient temperature is the temperature of the air or material in contact with the epoxy. Air temperature is most often the ambient temperature unless the epoxy is applied to a surface with a different temperature. Generally, epoxy cures faster when the air temperature is warmer.

Exothermic heat is produced by the chemical reaction

that cures epoxy. The amount of heat produced depends on the thickness or exposed surface area of mixed epoxy. In a thicker mass, more heat is retained, causing a faster reaction and more heat. The mixing container's shape and the mixed quantity have a great affect on this exothermic reaction. A contained mass of curing epoxy (8 fl. oz. or more) in a plastic mixing cup can quickly generate enough heat to melt the cup and burn your skin. However, if the same quantity is spread into a thin layer, exothermic heat is dissipated, and the epoxy's cure time is determined by the ambient temperature. The thinner the layer of curing epoxy, the less it is affected by exothermic heat, and the slower it cures.

CONTROLLING CURE TIME

In warm conditions use a slower hardener, if possible. Mix smaller batches that can be used up quickly, or pour the epoxy mixture into a container with greater surface area (a roller pan, for example), thereby allowing exothermic heat to dissipate and extending open time. The sooner the mixture is transferred or applied (after thorough mixing), the more of the mixture's useful open time will be available for coating, lay-up or assembly.

In cool conditions use a faster hardener, or use supplemental heat to raise the epoxy temperature above the hardener's minimum recommended application temperature. Use a hot air gun, heat lamp or other heat source to warm the resin and hardener before mixing or after the epoxy is applied. At room temperature, supplemental heat is useful when a quicker cure is desired.

CAUTION! Heating epoxy that has not gelled will lower its viscosity, allowing the epoxy to run or sag more easily on vertical surfaces. In addition, heating epoxy applied to a porous substrate (softwood or low-density core material) may cause the substrate to "out-gas" and form bubbles in the epoxy coating. To avoid out-gassing, wait until the epoxy coating has gelled before warming it. Never heat mixed epoxy in a liquid state over 120°F (49°C).

Regardless of what steps are taken to control the cure time, thorough planning of the application and assembly will allow you to make maximum use of epoxy's open time and cure time.

This article was extracted from the WEST SYSTEM WebSite. WEST SYSTEM Epoxies have proved to be the best all around adhesive for High Power Rocketry applications. Visit their WebSite at:

WWW.WESTSYSTEM.COM

FRACTIONS TO DECIMALS

Fractions always screw up a good thing. Below is a chart of Fractions to Decimal Values, which is a most handy "tool". There is however a simple and handy way to arrive at a Decimal Value of a Fraction using a calculator, or your mind if you're really really smart.

Take the fraction 37/64. Simply divide 37 by 64 to get .578125. Check it with the chart below. Take any fraction and divide the smaller number by the larger number and the result is the Decimal Value - amazing! Try 5/16: divide 5 by 16 and get .3125.

FRACTION	DECIMAL VALUE	FRACTION	DECIMAL VALUE	FRACTION	DECIMAL VALUE	FRACTION	DECIMAL VALUE
1/64	0.015625	17/64	0.265265	33/64	0.515625	49/64	0.765625
1.32	0.03125	9/32	0.28125	17/32	0.53125	25/32	0.78125
3.64	0.046875	19/64	0.296875	35/64	0.546875	51/64	0.796875
1/16	0.0625	5/16	0.3125	9/16	0.5625	13/16	0.8125
5/64	0.078125	21/64	0.328125	37/64	0.578125	53/64	0.828125
3/32	0.09375	11/32	0.34375	19/32	0.59375	27/32	0.84375
7/64	0.109375	23/64	0.359375	39/64	0.609375	55/64	0.859375
1/8	0.125	3/8	0.375	5/8	0.625	7/8	0.875
9/64	0.140625	25/64	0.390625	41/64	0.640625	57/64	0.890625
5/32	0.15625	13/32	0.40625	21/32	0.65625	29/32	0.90625
11/64	0.171875	27/64	0.421875	43/64	0.671875	59/64	0.921875
3/16	0.1875	7/16	0.4375	11/16	0.6875	15/16	0.9375
13/64	0.203125	29/64	0.453125	45/64	0.703125	61/64	0.953125
7/32	0.21875	15/32	0.46875	23/32	0.71875	31/32	0.96875
13/64	0.203125	31/64	0.484375	47/64	0.734375	63/64	0.984375
1/4	0.25	1/2	0.5	3/4	0.75	64/64	1.000

USING CALIPERS

There are basically two types of Calipers. The first has a round analog bezel dial with a swivel needle arm that reads out dimensions as the Caliper is operated.

The second type of Caliper is shown above. The round analog bezel dial is replaced with a "modern" digital read out. Old timers claim the analog is better, newbies only use the digital. Getting either person to use the other can prove frustrating. But it all comes down to what you learned with.

USING A CALIPER

A caliper has two jaws, one fixed, the other Sliding. Move the sliding jaw by pressing your thumb on the bump on the bottom. Many calipers also have a knurled wheel that makes moving the jaw easier. An electronic digital caliper has some buttons on the readout. One of them turns the caliper on; one sets the caliper to zero; and one switches from inches to millimeters. The precise location of each button and how it is labeled varies from model to model. Yours might have additional buttons.

FIRST STEP

Before you take a reading—and I mean before you take every reading—close the caliper and make sure the reading is 0.000. If not, do this:

1. Open the jaws about three quarters of an inch. Then use the thumb of your free hand to wipe off the mating surfaces of the jaws.

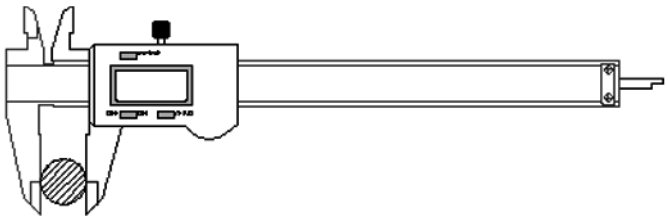
2. Close the caliper again. On an electronic digital caliper, if the reading is not 0.000, press the zero button so that it does read 0.000. To zero a dial caliper, rotate the bezel so that the needle points to 0.

FOUR BASIC READINGS

Your caliper can take four kinds of readings: outside, inside, depth, and step. Any caliper, whether it is a vernier caliper, dial caliper, or electronic digital caliper, can take these measurements. Let's take a look at how you take each of those readings.

Outside Measurement

Outside measurements are the most basic you can do with a caliper. Slide the jaws open, place the caliper over the object to be measured, and slide the jaws until they contact the workpiece. Read the measurement.

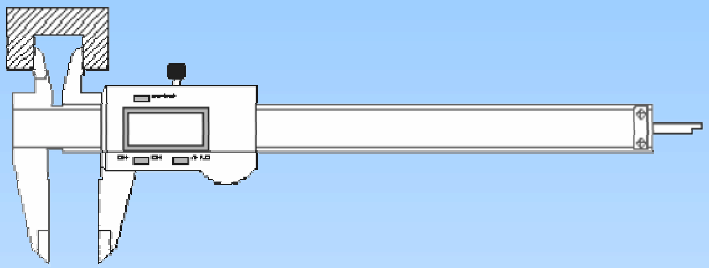


It's easy, but if you don't do it correctly the measurement will not be accurate. If the calipers are not straight (that is, perpendicular to the workpiece) the measurement will not be accurate. Likewise, if there is dirt on the jaws or the workpiece the measurement will not be accurate.

Inside Measurement

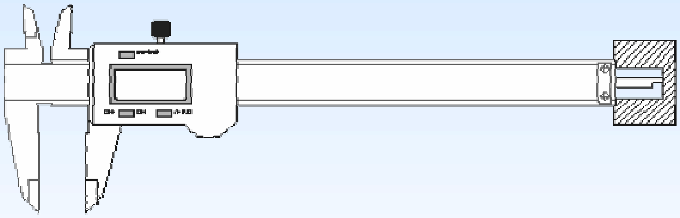
The smaller jaws on the top of the caliper are used for inside measurements. Slide the caliper closed, place the inside-measuring jaws into the space to be measured, and slide the jaws apart as far as they will go. Read the measurement.

It's a little harder to keep things lined up correctly when you



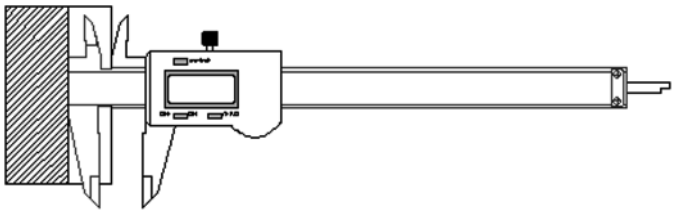
are taking an inside measurement. Be sure that the calipers are not cocked, or you will not get an accurate measurement.

Depth Measurement
As you open the caliper the depth blade extends out of the far end. Use this blade to take depth measurements. Press the machined end of the caliper against top of the hole you want to measure. Open the caliper until the depth blade contacts the bottom of the hole. Read the measurement.



It can be tricky keeping the caliper straight over the hole, especially if only one side of the caliper is resting on the workpiece.

Step Measurement
Step measurement is the hidden use of a caliper. Many instructions skip this important use. But once you know about it, you will find many uses for step measurement.



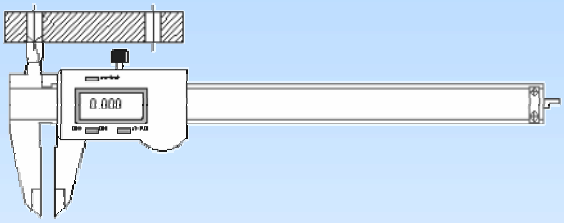
Open the caliper slightly. Place the sliding jaw on the upper step of the workpiece, then open the caliper until the fixed jaw contacts the lower step. Read the measurement.

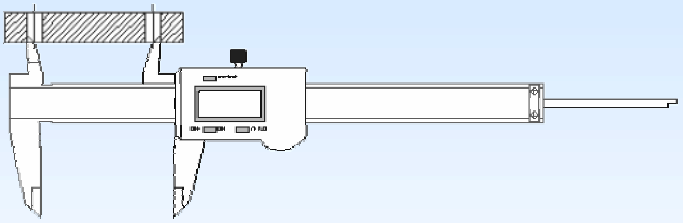
Compound Measurements
Because you can zero an electronic digital caliper at any point, you can use it to do some of the arithmetic required for compound measurements.

Center Distance
Use this procedure to measure the center distance between two holes of equal diameter.

1. Use the inside jaws to measure the diameter of one of the holes. Before you remove the caliper from the hole, press the button to zero the caliper while it is set to the diameter of the hole.

2. Still using the inside jaws, measure the distance between the far surfaces of the two holes. The caliper reading is the distance between centers of the two holes.

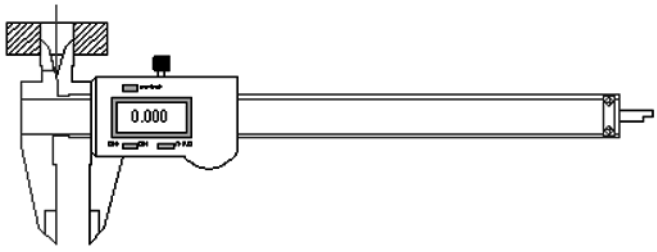


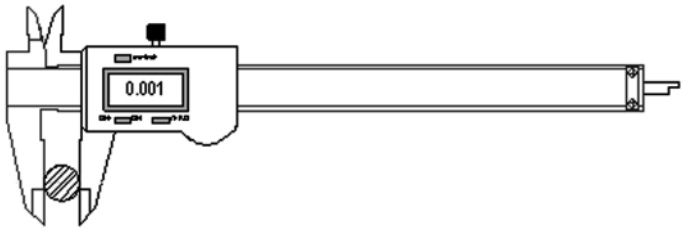


Be sure to use the same (inside) jaws for both measurements. And remember that this works only if the holes are the same size.

Comparing A Hole To A Shaft
Need to make a shaft or pin to fit an existing hole? Or are you boring a cylinder to fit a piston? You can use your electronic caliper to read the size difference directly.

1. Use the inside jaws to measure the diameter of the hole. Before you remove the caliper from the hole, press the button to zero the caliper while it is set to the diameter of the hole.





2. Use the outside jaws to measure the shaft. A positive reading (no minus sign displayed) shows that the shaft is

larger than the hole. A negative reading (the minus sign appears to the left of the digits) shows that the shaft is smaller than the hole and will fit.

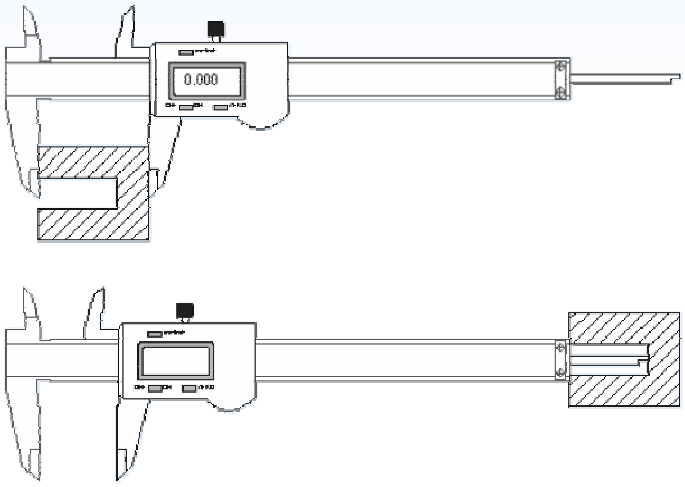
The caliper shows you how much material you need to remove, from either the shaft or the hole, to make them fit.

Remaining Thickness

When you need to put a hole in a workpiece that does not go through, you might want to know how much material remains between the bottom of the hole and the other side of the workpiece. Your electronic caliper can display this distance for you.

Use the outside jaws to measure the total thickness of the workpiece. Before you remove the caliper from the workpiece, press the button to zero the caliper while it is set to the thickness of the workpiece.

Now use the depth blade to measure the depth of the hole. The caliper reading (shown as a negative number) is the remaining thickness between the bottom of the hole and the other side of the workpiece.



The Original BATMOBILE

In our last exciting issue we showed you Cleveland's Ron Heitman and his Theme Park ROCKET Cars. Ron also owns another ROCKET Car, very rare and unique.

Unknown to many people the Batmobile of the TV series was NOT the original custom vehicle the Masked Crusader owned. The first real custom Batmobile appeared in the 1954 BATMAN Serial. This spiffy car is a trivia enthusiasts dream. Ron found the car through a trail of auto urban legends and traced it down to a farm in the mid-west where the 1954 movie was filmed. Apparently the film company left without paying the farmer for the using his property, which contained the "bat cave", so the farmer pulled the car into his barn and held it until his bill was paid. Ron found the car where it sat under hay and farm equipment unmoved for over 45 years! After haggling with the farmer Ron paid the film companies unpaid bill, which was quite small compared to the value of the car, and hauled it home.

Like the TV Batmobile; this Batmobile started out life as a Lincoln. The TV car was a 1955 Lincoln Dreamcar, this one was a standard 1953 Lincoln 2 door sedan. The car was originally reworked for a service man overseas by a European Coach builder. The car was brought to the US when the serviceman came home to California. One of the movie people saw it and bought it to use in the movie. It was reworked with the addition of the bat fins on the rear and painted black. Ron's version is basically

This BatMobile has been updated with all the modern conviences and a great sound system

the same except for the 1955 Cadillac bumpers and a neon bat emblem as the grill. The overall image of the car is still expressant of the Batmobile as it appeared in the movie.

The Original car was a sedan. It was turned into a 2 passenger sportscar in Europe by removing the roof and rear seat area, installing a 53 Studebaker rear window as a windshield and completely reworking every single piece of sheet metal on the car. The interior was spartan at best. Ron added a narrowed 55 Chevy dash board and bucket seats replaced the old bench seat.

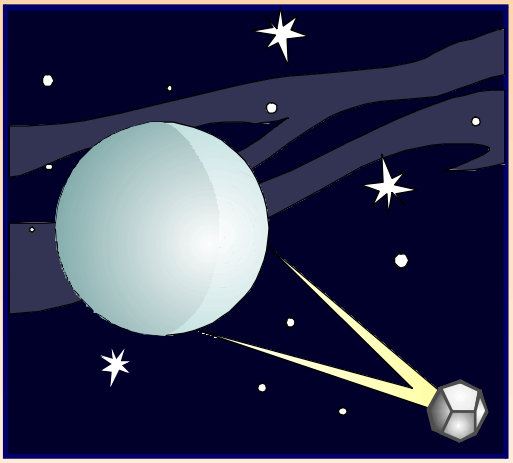
The car runs perfect and turns heads everywhere it goes. As a finishing touch Ron made the dream complete by adding the ever famous Bat Rocket to the tail as all Batmobiles have had. Imagine cruisin' at night and seeing the Bat Signal overhead. Ron dons his Bat Mask, flips the Bat Switch, and with the Bat Flame at full Bat Thrust he races off like (are you ready for this!) a Bat Out of Hell!! Some people have all the fun!!!

NATURAL ROCKET MOTORS

FRANCIS G. GRAHAM

First appearing the April 1986 *TRIPOLITAN*, Vol.1 No.2, KRYSTAL PIONEER was a light-hearted romp through the imagination. While reading somewhat tongue-in-cheek, and on the far edge, it was a report of actual lab work conducted by the author. At the time, and even today, it was received with a tilted head, but it is for real and the science is fact, not fiction!

The Creator, who set this universe up billions of years ago, may have known, in advance, there would be model rocket enthusiasts, because among the natural wonders of the world, there are natural rocket motors! They do not require Certification because they were made on Earth before there was an organization TO Certify motors, indeed, before there were people, by a motor manufacturer whose handiwork is declared, it is written, in the very heavens themselves!



I was first exposed to the possibilities of this rocket motor by an experience of Jacob Adekeye, at the University of Pittsburgh's Space Research Coordination Center. A quartz crystal was being slowly dissolved away, in hydrofluoric acid, for analysis of it's trace constituents, when, quite suddenly, the crystal started, violently, banging around the sides of the beaker, as if it had abruptly gone utterly insane.

Later, Jacob's supervisor, Professor A.J. Cohen, explained the phenomenon. Quartz crystals often contain liquid inclusions which form "negative" crystals inside them. These inclusions are formed when the quartz is formed, perhaps a hundred million years ago, and were totally enclosed by the quartz since that time. The pressure inside is from the conditions at the time of it's formation deep within the bowels of the mighty Earth, and, in any case, the inclusion pressure is far out of equilibrium with the surface air pressure. So high are the pressures that the liquid within the inclusions is more often liquid carbon dioxide, which cannot exist at pressures below 5.2 atmospheres.

When these liquid inclusions are initially pierced, the carbon dioxide liquid explosively changes, to gas, which issues out of the orifice, thus breached, at considerable velocity, providing, perhaps, as much as 10 newtons of thrust. Hence, from a dynamical point of view, they right serve as model rocket motors! Quartz crystals may be found in pegitiatites, kimberlites, geodes, and many other similar geological structures.

By luck, six small quartz crystals, with liquid inclusions, were given to me from a recently returning field tripper. I therefore fashioned a 10 gram paper model rocket to fit over one of the quartz crystals, like a finned, tall wizards cap, and christened the 16 centimeter long rocket "The Krystal Pioneer".

The next difficulty was piercing the crystal. Where shoving in a piece of nichrome wire, connecting the clips, and pressing a button suffices for the convenient products of Vernon Estes, releasing the compressed fuel embedded deep in rock crystal is a problem of at least an order of magnitude more difficult. The original circumstance of discovery, soaking in acid, would not be safe, or predictable, let alone convenient. Steel drills are not useful in hard quartz. A diamond drill is required. After I obtained a diamond tipped drill bit, I mounted the rock crystal in a vise, with the paper airframe worn atop it like a cap, and drilled resolutely into the inclusion, which took awhile. When I received any indication that the inclusion was pierced, I would, immediately release the vise.

This procedure was difficult and my first attempt failed as I could not release the vise in time. But with knowledge gained my second attempt was more positive. As I drilled closer to the inclusion I watch for signs within the crystal. At the right moment I released the vise and the "Krystal Pioneer" went airborne, arching across the lab and into history (at least on this planet!)

While this test marks the first such rocket in history, I doubt if more powerful inclusion systems exist in our tumultuous planet. Larger inclusions mean more energy, but also more massive crystal structures to contain them. Upscale "high power" versions may not be forthcoming, at least here on Earth.

Nonetheless, I can imagine that somewhere out there, in this vast universe, is a planet with predominantly well-differentiated felsic crystalline rocks. I can't help but feel that, even today, on that distant Krypton, intelligent beings are experimenting with monstrously enormous crystals surrounding grand inclusions of unfathomable primordial compressivity, and using them to launch, into synchronous orbit, great pyrite dodecahedral crystals to reflect their infrared laser communication signals around their globe; perhaps too, on that geologically unstable world, some crystal rocks may even be set aside to power rockets for a contingency evacuation plan.

It was nice to have a fleeting, skeetering impression of that distant vista. Build one yourself, and catch the feeling of a true "Pioneer'!

LET'S VISIT BILL GOOD(s)

Tripoli Gerlach member Bill Good works out of his Father's work shop in Chillicothe, Ohio. Oddly Bill's Dad's name is also Bill and he is also a Level 3 Tripoli member.

Both Bill's work out of a Wood Shop that would be the envy of anyone. Completely equipped to handle any wood working job it is compact yet spacious as can be seen in the photos.

Bill Sr, a retired contractor who enjoys making furniture, got into rocketry following his son's interest for the hobby.

Together they make a great team!

Bill Jr. (L) and Bill Sr. (R) stand beneath some of their past projects

While the shop is equipt to handle any project it cleans up rather well for pure rocketry activities. Just about any tool needed for anything is a hands reach away. The Goods also make the shop available to Tripoli Mid Ohio members regularly.

COMPREHENDING ENGINEERS

Comprehending Engineers I

Two engineering students were walking across campus when one said, "Where did you get such a great bike?" The second engineer replied, "Well, I was walking along yesterday minding my own business when a beautiful woman rode up on this bike. She threw the bike to the ground, took off all her clothes and said, "Take what you want." "The second engineer nodded approvingly, 'Good choice; the clothes probably wouldn't have fit."

Comprehending Engineers II

To the optimist, the glass is half full. To the pessimist, the glass is half empty. To the engineer, the glass is twice as big as it needs to be.

Comprehending Engineers III

A pastor, a doctor and an engineer were waiting one morning for a particularly slow group of golfers. The engineer fumed, "What's with these guys? We must have been waiting for 15 minutes!" The doctor chimed in, "I don't know, but I've never seen such ineptitude!" The pastor said, "Hey, here comes the greenskeeper. Let's have a word with him." "Hi George. Say, what's with that group ahead of us? They're rather slow, aren't they?" The greenskeeper replied, "Oh, yes, that's a group of blind firefighters. They lost their sight saving our clubhouse from a fire last year, so we always let them play for free anytime." The group was silent for a moment. The pastor said, "That's so sad. I think I will say a special prayer for them tonight." The doctor said, "Good idea. And I'm going to contact my ophthalmologist buddy and see if there's anything he can do for them." The engineer said, "Why can't these guys play at night?"

Comprehending Engineers IV

What is the difference between Mechanical Engineers and Civil Engineers? Mechanical Engineers build weapons, Civil Engineers build targets.

Comprehending Engineers V

The graduate with a Science degree asks, "Why does it work?" The graduate with an Engineering degree asks, "How does it work?" The graduate with an Accounting degree asks, "How much will it cost?" The graduate with an Arts degree asks, "Do you want fries with that?"

Comprehending Engineers VI

Three engineering students were gathered together discussing the possible designers of the human body. One said, "It was a mechanical engineer. Just look at all the joints." Another said, "No, it was an electrical engineer. The nervous system has many thousands of electrical connections." The last one said, "Actually it was a civil engineer. Who else would run a toxic waste pipeline through a recreational area?"

Comprehending Engineers VII

"Normal people ... believe that if it ain't broke, don't fix it. Engineers believe that if it ain't broke, it doesn't have enough features yet."

Comprehending Engineers VIII

An architect, an artist and an engineer were discussing whether it was better to spend time with the wife or a mistress. The architect said he enjoyed time with his wife, building a solid foundation for an enduring relationship. The artist said he enjoyed time with his mistress, because of the passion and mystery he found there. The engineer said, "I like both." "Both?" Engineer: "Yeah. If you have a wife and a mistress, they will each assume you are spending time with the other woman, and you can go to the lab and get some work done."

Comprehending Engineers IX

An engineer was crossing a road one day when a frog called out to him and said, "If you kiss me, I'll turn into a beautiful princess." He bent over, picked up the frog and put it in his pocket. The frog spoke up again and said, "If you kiss me and turn me back into a beautiful princess, I will stay with you for one week." The engineer took the frog out of his pocket, smiled at it and returned it to the pocket. The frog then cried out, "If you kiss me and turn me back into a princess, I'll stay with you and do ANYTHING you want." Again the engineer took the frog out, smiled at it and put it back into his pocket. Finally, the frog asked, "What is the matter? I've told you I'm a beautiful princess, that I'll stay with you for a week and do anything you want. Why won't you kiss me?" The engineer said, "Look I'm an engineer. I don't have time for a girl friend, but a talking frog..... that's cool."