TRIPOLI GERLACH Research Rocketry News

TRIPOLI PREFECTURE # 138

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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 Large Group Projects are common place at Black Rock. Here some members of Tripoli Gerlach make final connections on a P class Rocket before hauling it out to the Launch Tower.

Team Wok is a great part of the hobby.

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NEW MEMBER

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BoD CANDIDATE

Tripoli Gerlach member Gerald Muex Jr has stepped up to the batter's box and annouced his candidacy for a seat on Tripoli's Board of Directors. His resume can be viewed on WWW.TRIPOLI.ORG and look at:

ABOUT
LEADERSHIP
ELECTIONS

You will find Gerald's resume there as well as the other candidates.

Not being bias but we should all vote for our fellow "Gerlachian at Heart"!

DISCLAIMER

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TOM BLAZANIN

It is always time for a change, and an organization such as National Tripoli needs change to grow, evolve and survive. The Tripoli Rocketry Association, Inc was founded on change. A change was need from a system that grew stagnant with its ways. One that seemed to settle into a dull routine provider that refused to recognize change and to leaders who kept the power and future in a small clan of people who thought their way was best. After years and years of closed eyes and ears they realized, maybe too late, that change is unavoidable.

Tripoli has always faced change. Its leaders have recognized the horizon and have attempted to adjust, as time presented new directions. By so doing they have kept the hobby and sport of High Power and Research Rocketry on the leading edge and have provided its members with an open environment to pursue their rocketry interests as best as legally possible.

Yet there is one area Tripoli may be falling short on and it does not relate to rocketry itself. The Tripoli leaders do their best for the best interest of the members but this short coming may not be because of them but because of the members themselves. Seems the leaders are doing such a good job the members are becoming complacent in taking part of the running of their organization.

All Tripoli BoD Members are getting "old". Even they admit things could use a good change. This change is getting "younger" members (20s to 40s + or -) to run for the BoD. Our National Organization has many good potential candidates very capable of handling a seat on the BoD. It seems many look at the existing BoD Members and are intimidated by their background and record. This is NOT a thing to look at if one feels they might consider running. Yes it takes some dedication and it does seem to involve some work but what good things don't.

This year we have two Board Members stepping down and they will not make another run for their seat. This leaves two openings that could well go unchallenged for new people interested in helping the organization and fellow members.

There are tons of members who would make great BoD members. Our current President Stu Barrett was told way back that he should run for the BoD and even that someday he'd be National President but because the current BoD, at the time, was doing so well he felt he didn't have a chance. Look where he is today.

Many new candidates may say to themselves, "I can't fill those shoes". Several of the last National Presidents have stated that they felt it would be hard to fill the previous Presidents shoes. Nobody has to fill any shoes. You are you, and this is what National needs: YOU.

We have two items to look at. Members running for the BoD are to be encouraged to do so by their friends. You don't need experience just a sincere consideration to run to attempt to help the organization grow and develop.

The other item to address is the voting members. With three open seats we have six experienced seats still active. Voting members should consider on taking a chance on new "young" people to bring in fresh ideas.

Tripoli Gerlach member Gerald Muex Jr has stepped forward. As a member of our Prefecture he deserves our support. In addition he is a prime example of what I speak of. He is enthusiast and active in his rocketry activities and by my standards, being really old, he is just what Tripoli needs for our future to continue growing.

Times are constantly changing and we can not afford to coast along with the same thinking year after year. Let's keep Tripoli active, fresh and worthwhile.

Editorial space is available to all Tripoli Gerlach members who have a point of interest they would like to promote or air. Please keep it non-vindictive and of interest to fellow Tripoli Gerlach members regarding Rocketry, Black Rock and/or the Tripoli Rocketry Association, Inc.

GERLACH BREAK DOWN

This article is in no way meant to scare or discourage new people from experiencing Black Rock. It is important that new people, and some relatively new people, read it and be aware.

BREAKING DOWN IN GERLACH

Those of us who are long time Black Rock enthusiasts have learned, often the hard way, the importance of a good vehicle. This doesn't mean if you are going off road for desert trekking, it means just going to Gerlach.

Every year coming off the Playa, we see the same thing over and over. Someone is always stranded in Gerlach waiting for auto repairs. We see it every year. People waiting for water pumps, radiators, fuel pumps, coils, tires, transmissions, the list goes on.

They wait for parts to arrive from Reno which takes 1-3 days. They wait for the tow trucks to arrive. Due to the fact that other people have broken down as well, the tow trucks are so busy that a wait for a tow of 24-48 hours is not uncommon. Seriously, AAA has been heard quoting people that the tow truck would arrive sometime in the next 10 hours, but they will not guarantee it. During that time, the car owner has to wait by their car awaiting a tow truck. Since most cellular phones do not work in Gerlach, you have no choice but to wait. If the tow truck never arrives, your only choice is to wait for one to arrive.

In reality, you do have a choice. Renting a car in Reno should provide a worry free trek. Taking your own vehicle requires common sense - don't take a Junker!

You can choose to do routine maintenance to your car before you leave for a Black Rock launch. You can choose to have a mechanic look over your car. You can choose to stop by a tire store and have them look over the tires on your car and your trailer. Or you can end up stranded on the side of the road for a few days. It's your choice.

CHECK YOUR TIRES

Our advice comes from years of helping ourselves and other people out of jams during and after an event. Most of them were caused by the failure to prepare in advance. This is written in hopes that you will not suffer the same fate.

In one year we experienced no less than five flat tires on four different vehicles. Some of these could have been alleviated if time had been taken the time to look at the tires and realized that they needed replaced before leaving home. New tires would be a cost that might be hard to justify before leaving for a BALLS launch, but when you factor in the cost of replacing blown tires on the road, it becomes very cheap to have new tires installed at home where you have a selection to choose from, instead of being stuck at Bruno's looking at other used tires!

Bruno's Service Station has very qualified mechanics, however a mechanic without parts can be frustrating

TUNE UP YOUR CAR

One of the easiest ways to catch problems is to have your car tuned up before you leave home. A professional mechanic can look over your car for any possible serious problems that could leave you stranded on the side of the road. Worn belts, hoses, radiators and water pumps all have tell-tale signs that they are about to fail. A new water pump can be as low as $15 if you do it yourself or a bit more for a mechanic. Cecil at Bruno's Shell Station will be $150 for the same pump, if he feels like he has time to fix it. You will not be his only customer.

The other advantage of a tuned car is that it will get better gas mileage. Seeing how the average person leaving home and heading to Gerlach is about to drive around 1500 miles, this is really worth doing.

GET AAA

For only $85 a year, you can get all of the maps you want and up to 150 miles of free towing. The cost of towing a car runs about $3.50 a mile and since Reno is 107± miles from Gerlach, it's really cost effective as well. You can also get towing coverage with most cellular phone plans. The cost is about $3.00 a month and is worth doing if you do any traveling.

In the end, the choice is yours. We do not wish to panic people into getting a car tuned up before you leave. You have enough stress to consider before heading off to LDRS or BALLS, or where ever. However, if you are looking for ways to have a stress-free journey, we recommend you start with the car. You will never regret it.

A lot of this can be avoided by renting an SUV in Reno!

PLANET X

As we travel back and forth between Gerlach and the Playa we pass a sign stating “Planet eXit” This is many things to many people. Bruno claims its, "Hippies making "pot"! Well it's not the end of the world, nor the boarding station for the Mother Ship. And after all these years Bruno's English still isn't the greatest! What Planet eXit is all about is a unique story in the middle of nowhere.

Rachel and John Bogard have created their comfortable niche in the world here at the foot of the Granite Mountain between Smoke Creek and Gerlach.They can do their own thing in a creative air at their own pace. Originally from Berkeley, CA. (thus "hippies"!) they came to Gerlach for the wide open spaces and make pottery (thus we get "pot" out of Bruno - we really gotta teach him to talk better!!)

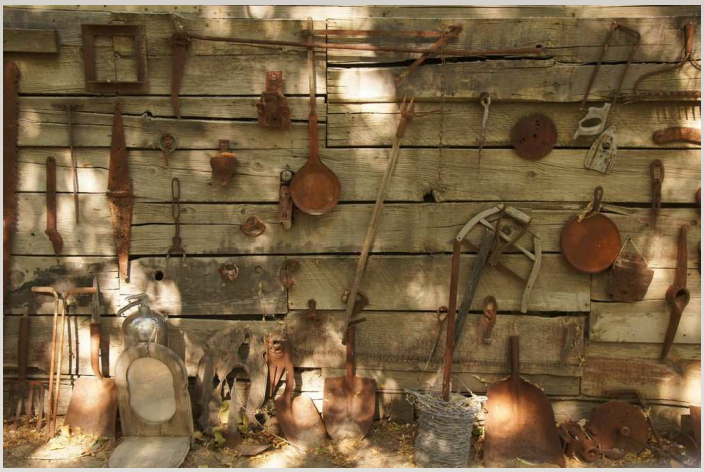
John has crafted pottery since 1969 and has studied with the renowned Al Johnsen at the University of California, Santa Cruz. John's wife, Rachel, was a veterinarian before making the journey to Planet X. Their gallery offers an impressive array of pottery, including fine porcelain pieces, stoneware and raku.

The area is described as a Ghost Town come to Life.

This original homestead was built out of railroad ties in 1932. It stays cool in the summer and warm in the winter. It is rustic, extremely quiet and very comfortable. There are lots of springs and trees that are home to many species of birds. Completely off the power grid Planet X is self contained running off solar panels and propane tanks Even though in the desert water is abundant.

Relaxing and completely laid back.

Anyway a visit to Planet X is a refreshing break in your Black Rock venture. A laid back easy going place of business. The "stores" are filled with unique, creative, and original pottery work of all types. The folks Rachael and John Bogard, are super friendly and the craftsmanship and variety is very distinctive. We bought some items then were able to just sit and hang out with Rachael and John for a breath of free nature living.



Living in the desert presents great opportunities to explore and the Bogards do a lot of that. Their place is a mired collection of the old West, a virtual walk in the past.

While the outside scenery is rustic, crude and artful the interiors of all the compound structures are unbelievably modern. - This ain't Kansas anymore!

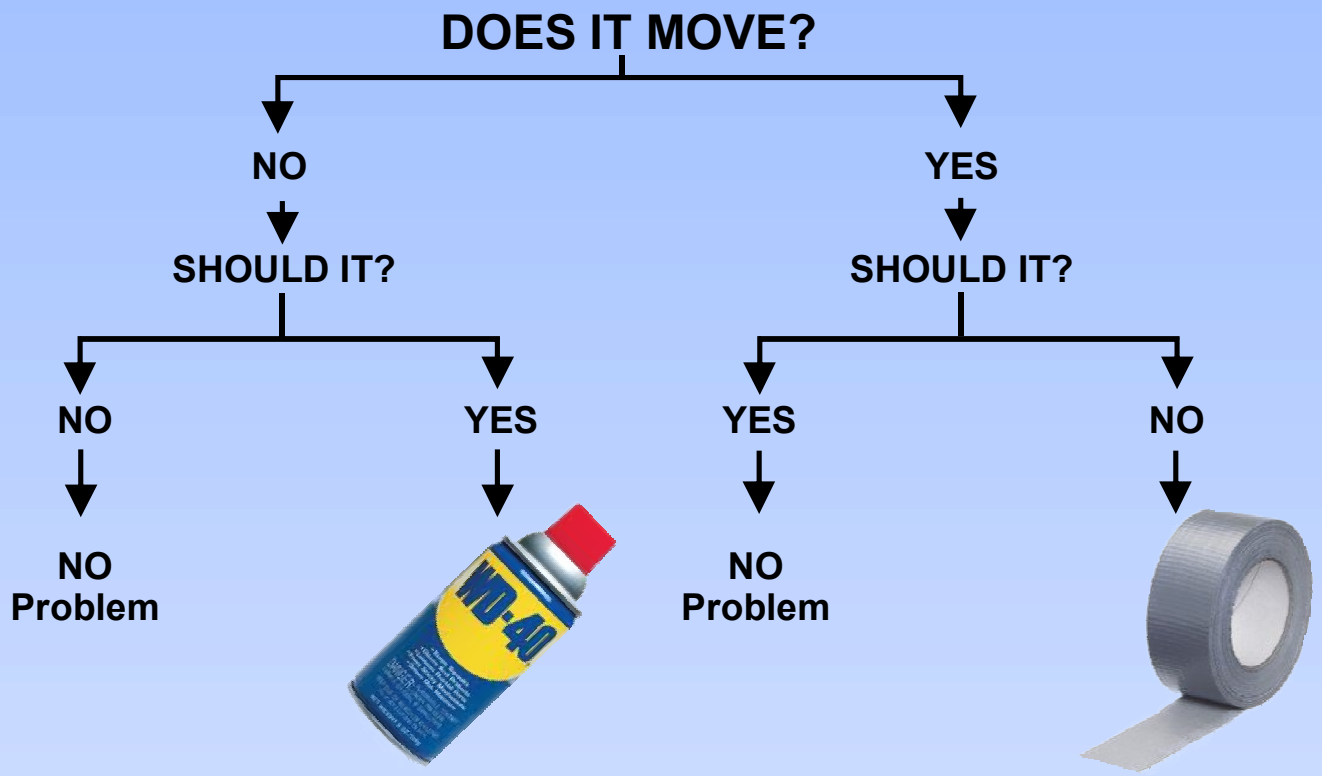
The Bogards are always open to friends and visitors. They turn unknown visitors into immediate friends and their hospitality is awesome.. One can spend a nice afternoon going from gallery to gallery exploring their handy work.

They also have a rental property they make available to anyone interested in staying for awhile. The rates are very reasonable and the two bedroom home is immaculate

The Rental House at Planet X is available year round for anyone interested in staying. Set in a rustic rural desert environment it is a serene and relaxing get away. Whether exploring the desert, taking art classes , flying rockets or just a calm and soothing get away visit their rental webpage at:

http://www.vrbo.com/252208

ENGINEERING FLOWCHART



Use WD-40 To:

1. Lube a shovel. Spray WD-40 on a shovel, spading fork, hoe or garden trowel. The soil slides right off—especially helpful when digging in clay.

2. Clean tile. The spray removes spilled mascara, nail polish, paint and scuff marks from tile floors, and also help you wipe away grime from the grout lines. Clean up with soapy water.

3. Scrub stains from stainless steel sinks.

4. Unstick gum. A squirt makes it easier to pull gum out of carpet and even hair. It's better than cutting out the gum and leaving patchy carpet or a bad haircut.

5. Soften leather. Oil can help break in a stiff leather tool belt.

6. Free stuck LEGOs. Your kids will thank you.

7. Erase crayon. When crayon ends up on toys, flooring, furniture, painted walls, wallpaper, windows, doors, and television screens. Spray on WD-40 and wipe it off.

8. Prevent flowerpots from sticking when stacked together.

9. Get rid of rust. Spray and rub away rust from circular saw and hacksaw blades. It can also clean blades of tar and other gunk.

10. Remove goo. Unstick gooey residue from price tags, duct tape, and stickers.

But Don't Spray It On:

1. Door hinges. Sure, WD-40 will stop the squeaking, but it also attracts dust and dirt. Over time, you'll end up with ugly black streaks on your hinges

2. Bike chains. WD-40 can cause dirt and dust to stick to a chain. Use bike-specific lubricants, which typically contain Teflon.

3. Paintball guns. WD-40 can melt the seals in the guns.

4. Locks. The spray can prematurely wear down the internal mechanisms, especially in the pin tumbler locks, in door locks and padlocks. Go for graphite powder.

5. iPods and iPads. WD-40 won't repair the Home button on these devices. In fact, the spray can cause the plastic to break down on the cover, and if some gets inside the electronics, it can damage plastic parts inside.

TWO PIECE MOLD METHOD FOR MAKING NOSE CONES

MAKING THE PLUG

When you desire to make more than one of the same nose cone design, using the 2 piece mold system is the answer. To start you first need a plug. This is the object you wish to make a mold of. In our case we are using a wooden nosecone made of poplar. Poplar is a stable semi-hard type of wood with good close grain and it can be sanded, sealed and finished to a clean crisp shape. What you see in the plug is what your will have as a finished product when it's over. Other materials can be used but it is so much easier to turn a desired shape on a wood lathe. Making a nose cone of fiberglass wrapped around Styrofoam is redundant, although it can be desirable at times, and using a metal plug is just too expenses.

To begin you need to glue pieces of wood together to form a solid block of material needed to turn to shape. Surfaces that butt together need to be clean and smooth. A water based wood glue is used, much like Elmer's Glue or a TiteBond. The pieces need to be clamped together and let to set for 24 hours before un-clamping. The block then needs to be squared to a size just larger than needed. It is best to bevel the four edges before placing the part on a lathe, otherwise sometimes things can get exciting!

You can now mount the block of wood onto the lathe and begin shaping. A decent nose cone can be shaped by eye/hand, however it is best to make a template of the finished curve you desire the nose cone to be. Most good wood lathes can accommodate a tracing pattern of some type and can handle a trace cutter without much problem. The photo shows The block of poplar mounted on the lathe. The tracing template can be seen directly below; and the first cuts stepped to reduce cutting work.

Notice also the nose cone shoulder is already trimmed and a piece of body tube is used to size the outside diameter of the cone. With the shape step cut the shoulder is actually the first part worked as it sets the base for everything else.

Once the shoulder is finalized a final adjustment of the cutter on the template is preformed to make sure all is aligned for finishing. The cutting tool follows the template and, thanks to the step cuts, short work is made taking it to final shape. You will notice the tip still holds a relatively healthy part of wood. This assures the piece holds true and does not wobble out of round. Care must be taken from this point on as removing too much from this tip will throw the whole piece out of balance and even off the lathe. If this happens your work is shot, and someone's hurt.

It is best to opt, once you've reached a point, to finish sanding the whole piece and obtain a really clean, sharp, smooth finish while the part is spinning. Wax can now be rubbed onto the piece to seal the wood, also while it is spinning. This helps attain a good hard glossy finish. Use a good wax with no additives, Pure Carnuba wax is preferred. Do not use solvent based sealers as it will possibly expand the piece out of

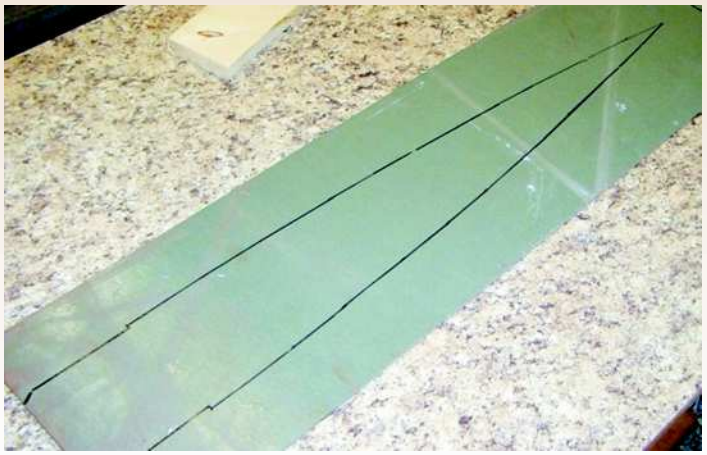
correct dimension and it could cause adhesion problems in the mold process.

With all of this done it is time to finish the tip. It is best, and easiest, to remove the piece from the lathe and cut the tip leaving plenty of length for finish. Then hand sand the tip to a point. If care and attention is taken you can actually create a tip no one will question. After fine hand sanding, apply lots of wax to the tip area as you did with the rest.

You should now have a solid stable plug ready to make a mold from.

MAKING THE MOLD

Once the nose cone plug is ready you need to trace it out on a sheet of G-10 fiberglass. This will form the first half of the mold. Setting the plug in a secure position on the G-10 sheet begin to trace ticks around the cones outline using a small square. Get as many points as you can. It makes it easier to draw the cut line.



With the outline of the nose cone accurately traced and drawn you now cut out the inside for the nose cone plug to fit into. It is best to use a band saw for this. You also need a special blade made specifically for cutting composite material. Any other type of blade will be destroyed within one minute. Bi-metal band saw blades and even carbide blades will wipe out in no time. This special diamond grit blade will cut like butter and last a long long time. There are two types: Continuous Grit and Notched Grit. Buy the Notched Grit which looks like this.

While cutting out the G-10 fit the wooden plug in to see the fit is correct. Make adjustments as required.

Fit the plug into the G-10 sheet cut to shape. Some sanding and adjusting may need to take place but you should end up with the plug recessed half way down as shown in the photo to the right. You will need to secure blocks on the underside to hold the setup level. Duct tape on the underside will hold the sheet and plug secure enough for glass work.

There are four screws that hold the risers underneath. These are covered with ping pong balls cut in half

forming registration points used when the two mold halves are united.

With the ping pong halves epoxied in place begin to wax the plug and G-10 sheet - a lot. Any "flaws" between the plug and cut out can be filled solid with wax to keep resin from running through. It also makes for a cleaner fitting mold. Pure Carnauba wax is best. Do not use car wax, furniture wax, and the likes as they usually contain additives. Pure Carnauba is just that, pure. Your mold will release much easier with it.

With the set up waxed and ready, brush on Epoxy Resin. You can add some color to the resin, but it is not necessary. Almost let the resin flow from the brush to the surface and do not brush over the wax placed between the plug and sheet. Let the resin flow, so it will not damage your wax fill placed in any gaps. It is best to let this brush coat kick off before placing fiberglass cloth. This will ensure the wax filler is not destroyed by any brush work pressure applied to the cloth.

Fiberglass cloth is then layered on. Usually two layers of G-10 cloth is laid then let to cure. Since we're not using a gel coat, which is usually done with polyester resin, and we're making this mold out of epoxy, make sure there are no air bubbles. Usually the first layer of glass is a bit over saturated to insure a good solid first coat. After it is cured the next two layers are added. This continues until we have a thickness of a quarter inch. We want the mold to be solid and sturdy since we will be making many parts out of it.

With the last layer of cloth laid on; six "leg" standoffs were epoxied onto the top as shown. These will hold the mold steady when open and laying up parts.

After 24 hours of curing the unit is flipped over and the base, now on top, is separated from the mold half. The

plug remains in the new mold half (very important) so as not to disturb position for laying up the second half of the mold.

The next photo shows the G-10 sheet base to the left used to support the plug during lay up and the completed half mold, right, still holding the nose cone plug. Note the ping pong ball halves and their depressions in the mold half. The second mold half will conform with these and form the mold registrations.

The first half mold is now ready for prep. The edges are block sanded to eliminate pesky glass needles, and to even things out. The recesses from the ping pong balls are smoothed out some using fine sandpaper. This will help during production. The space between the plug and the mold is cleaned as best as can be considering their proximation to the finish plug.

Now the unit is waxed again, just as done before. A very tiny fillet is formed with wax where the plug meets the mold. This is just to make a clean area between the two pieces. Too big of a fillet will give you a major seam to be sanded on the finished piece. The smaller that seam

the easier to finish the nose cone for paint.

The first half mold took eight layers of 10oz cloth and the second half mold will get the same. Repeat the same process laying two layers of cloth at a time and let cure between laying more cloth. This will assure the glass does not "heat" up and cause wrinkles or flaws in the mold.

With the second half laid up, eight "leg" standoffs are placed the same as the first half. Before separating the mold drill eight ¼" holes, four on each side and evenly spaced, to accept fasteners for holding the mold, when making the part inside, for curing and to keep the mold to tight shape.

Once separated block sand the mold edges, as before, and fine sand the edges on both mold halves where the plug used to be. The mold is now ready to make a part.

MAKING THE PART

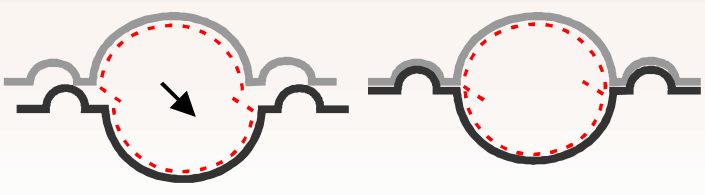
Thoroughly wax both mold halves using pure wax. Wax the entire mold, not just the depressions where the nose cone will lay up. A gel coat can be applied though not required. A gel coat is used to insure all nooks & crannies are covered and must be let to set up before lay up begins. Gel coat hardens from the inside out which means it will cure where it touches the mold and is cut off from the air supply. Where it is exposed to air it will cure but maintain a tacky feeling. Gel coat is usually used with polyester resins

.

There are two types of lay ups: polyester and epoxy. A polyester lay up uses polyester resin with MEK (methal ethal ketone) as the curative. Epoxy uses its standard Epoxy Hardener usually in a 5:1 mixture. If making an Epoxy nose cone some coloring agent can be added to the resin and brushed onto the mold like a Gel coat. The next photo shows the two mold halves with colored epoxy brushed in. Again you do not need this colored coating but it is best in all instances to brush a base coat of epoxy or polyester into the molds. Now it is ready for the cloth

A piece of 10oz cloth is laid in place even with the edge closest to the worker. The far side edge has the cloth extended up and over the mold. Next a layer of fiberglass mat is cut and placed over the 10oz cloth. It to matches the cloth alignment except the far side edge does not extend quite as much. Using a brush, or roller, work out any air bubbles that might be present and make sure all the cloth is lying flat inside the mold

The two mold halves are now mated together carefully aligning both molds even end to end but with the extended cloth sides over the open area of the opposite mold half. As the molds are closed the ping pong ball bumps will allow the extended cloth to ride into the open area of the opposite mold and when the whole



thing is closed both edges will have an overlap. This is demonstrated best in the last diagram.

With the two halves mated secure the mold together with clamps or bolts to make sure you have a good tight mating. This will assure a round nose cone and keep resin from flowing out between the two molds.

Using a roller tool, usually with an extended handle, reach down into the mold through the open shoulder end and roll the overlaps down to bond with the cloth placed at the mold edge. With practice you can get this to lay nice and smooth. Once satisfied with this set the mated mold nose down to cure. This will allow excess resin to flow to the nose tip and puddle into a good solid tip.

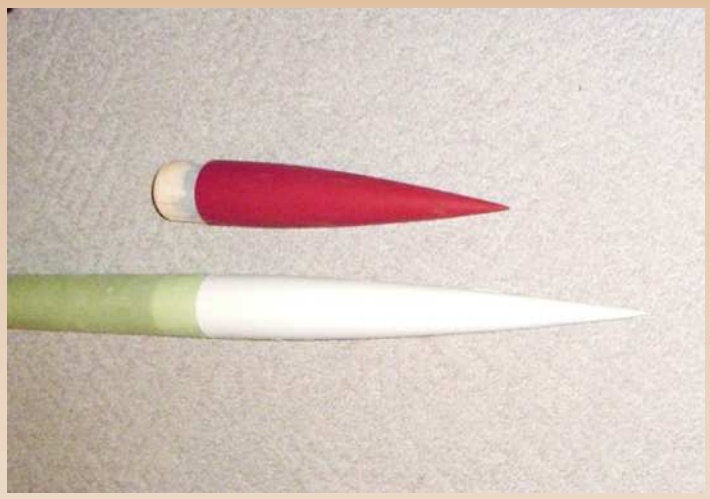
Once this is started to cure you can trim cut the excess cloth sticking out the open shoulder end. Do not do this too soon as you will disturb the setting resin - too late and it won't trim easily!

If desired more cloth, or mat, can be added in wetted strips place down the inside and then rolled to insure full bonding to the existing cloth already inside. Let set and cure at least 12 hours before opening the mold

.

The mold should release easily, provided you waxed it good enough. The finished part will have some flashing present but this should be of no concern since it should be about the thickness of cellophane. You should have sturdy walls with no bubbles or blisters, provided you rolled the insides properly. With minor prep sanding and a lacquer wipe down you should be ready for primer.

While a seven caliber nose cone, made here, is not very efficient at high speeds, (neither is a five caliber), it does look really spiffy. This nose cone was designed to look spiffy, which it does compared to a standard 5 caliber Nose Cone.



SIMPLE MILLING

Tripoli Gerlach member Les Derkovitz, of Pioche, Nevada, has been converting all of his standard Motor Mandrels over to aluminum. This was a simple task using his metal lathe. But then he needed a Cruciform Mandrel, some call it a Finocyl, made of aluminum.

He realized he would need a Milling Machine to do this and that was something he did not have. The closest he'd have access to was in Las Vegas.

He did have a Router Table and with a little ingenuity came up with a solution to his problem.

The photo on the left shows his solution. An adjustable aluminum gate on the router table is used as a guide. A square of aluminum cut precisely to the diameter of the mandrel is bolted to the end of the machined round to keep it square. And a milling bit with a shank able to fit the router was all it took.

INTRODUCING PROPEP 3

ProPep traces back to the mid 1980's and a group of people at Martin Marietta in Orlando, Florida. It was a state of the art DOS program with very little documentation. Its database, PEPCODE.DAF, had its last official update on September 29th, 1986 by John Cummingham. Since that time there have been a multitude of undocumented update versions.

In the early 1990's Art Lekstutis, of New York, created a Graphical Interface to make it easier for the average user to run. GUIPEP ran in Windows as a frontend for the "original" PROPEP. The current version, 0.04 alpha, is dated November 17, 1996. Art has ceased any further evolution of GUIPEP.

In 2012 NASSA member Dave Cooper, after completing NASSA's TC LOGGER USB Data Acquisition Project, wanted to create a program that would characterize Propellant fired on the TC LOGGER System. ProPep was required for the calculation of some pertinent data required for the characterization process.

PROPEP 3 was begun to convert the original DOS based PROPEP to a true windows based program which would easily install and run on all the Windows based systems from Windows XP to Windows 7 (32 and 64 bit) and hopefully beyond.

Once the initial DOS based PROPEP, written in FORTRAN, was converted to •Net, NASSA members began to ask that other things be added to aid in the characterization of propellants. This included calculation of the values of a and n from BATES grain test burns and the ability to create a file which could be read by BURNSIM to directly input the propellant information into the program.

PROPEP 3 contains the process of the original ProPep and will actualyl provide a ProPep Report the same as the original ProPep. While this Report is an exact duplicate of the original hard to understand report, and of value to only the most versed propellant scientist, it is not really needed by the user and remains only to provide data, as of the original, on the propellant formulation.

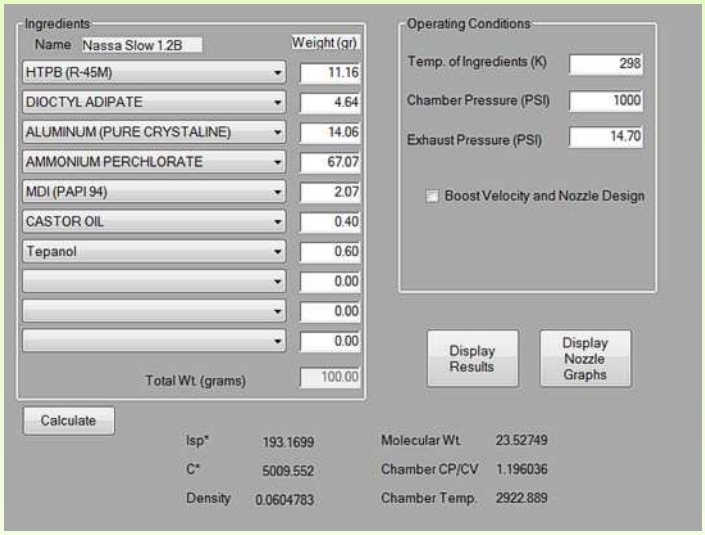
PROPEP 3 was designed to read TC LOGGER Files however if you collected your propellant data using another system you have the option to manually enter that data and receive the same end results.

INSTALLATION

To install the program run the setup.exe program. Once the program is installed you should find a new Icon on the desktop and a new item in the program list. The default location for all the program files is in your computers My Documents/PROPEP 3. This location was chosen to comply with the new windows security rules which were introduced with Vista and Windows 7.

THIS IS WHERE IT ALL STARTS

When PROPEP 3 opens you are viewing the main page, the Propellant Information Tab, which has an area to enter your propellant recipe. Across the top you will see four tabs: Propellant Formulation, Grain Information, Test Burns and Compute A & N. You will see six values near the bottom of the page which should all be reading zeros. On the left hand of the screen is a boxed area called Operating Conditions; the values here are set at default settings which are general. These can be changed once you know what you're doing. You will also see three buttons on the page: Calculate, Display Results and Display Nozzle Graphs. (Not Shown here but each is addressed)



Enter your Propellant Formula by clicking on the down arrow box of each Ingredient window. This will drop a selection of chemicals from the built-in data base. Select a chemical for that box then add the recipe weight in grams in the smaller box to the right.

This list of chemicals is created from the PEPCODED.DAF file in the My Documents /PROPEP3 directory. This file is identical to the original PROPEP file so if you have your own 'favorite' PEPCODED.DAF file you can easily replaced the one

supplied with yours.

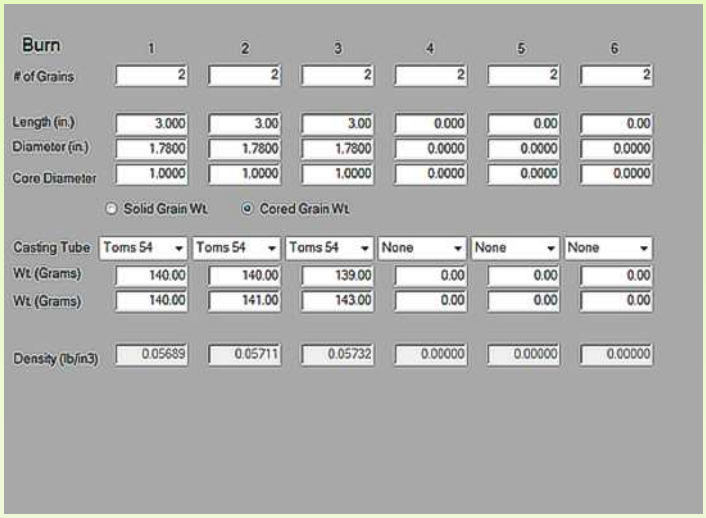
Up to 10 ingredients can currently be selected. To remove an ingredient simply select the ingredient to be removed and select the blank item at the top of the Drop Down list.

Once all the ingredients are added press the Calculate button and PROPEP 3 calculations will be run. The six values at the bottom of the page will populate.

To see the detailed results, press the Display Results button and a ProPep Report will be displayed. Users of the old ProPep will recognize this report and be able to utilize it as they would normally. The beauty of ProPep 3 is while this is available it is not required you understand it or use it, the program does that.

GRAIN INFORMATION Tab

This screen is used to define the grains for each test burn. A max of 6 burns can be entered. A minimum of 2 grains should be entered to allow for calculation of the A and N values.



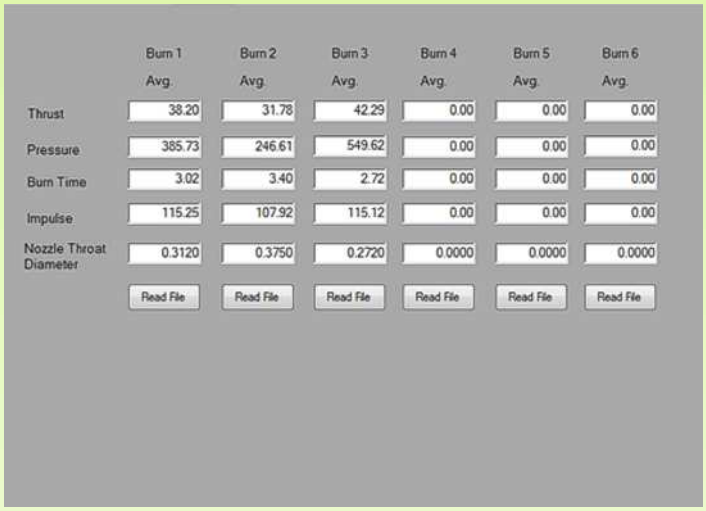
Enter the number of Grains for each test motor. Enter the individual Grain Length, Diameter and Core Diameter, then select either Solid Grain Wt or Cored Grain Wt.

Next select the Casting Tube used from the dropdown menu.

NOTE: Casting tubes can be defined by selecting OPTIONS/ Casting Tube from the top menu. A window will open displaying all previously defined casting tubes and their weights. To define a new one select an empty line and enter an identifying name, make it easy to identify, and then enter its weight per inch in grams. The hit SAVE.

Now that casting tube is available in the Casting tube dropdown box. The program will now remove the Casting tube weights from the total grain weight to calculate Propellant density.
IF you have already subtracted the casting tube weight from your entered grain weights select NONE in the Casting Tube drop down box.

Once density is calculated you should go back to the Propellant Tab and double check against the Propellant Density computed there. They should be relatively close. If they are grossly different there seems to be a problem. Double check your work. You may have entered information incorrectly or you have a formulation problem, or even a mixing problem, that you need to research and address.



TEST BURN Tab

There a two ways to enter data on this screen. If you have run your test burns on the TC LOGGER–USB system, then you can press the Read File button under the appropriate column to locate and select the LOGGER file for that burn. The default directory should be located, under normal conditions, in your computer's My Documents/TCLUSB

The second method, if you did not used TC LOGGER-USB to collect your data, is to simply enter the values by hand into each of the boxes from data you have collect with other acquisition software. No adjustment of burn time is calculated if the values are entered manually

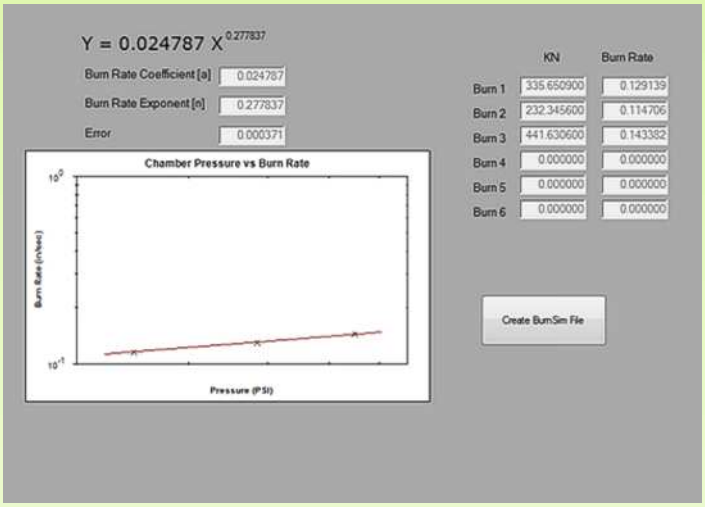
If you use TC LOGGER Files you should have already used the Selected Area Analysis function in the TC LOGGER software to select the Plateau region of the curve. This is all explained in the TC LOGGER documentation If the burn file has this selected data PROPEP 3 will recalculate the burn time from the Impulse and Selected Average Thrust and provide optimum data for the burn.

If you have not pre selected the Plateau Region for that burn in TC LOGGER a warning will pop up. You can go into TC LOGGER and perform the task and resave the file or ignore the warning.

If you have not selected this plateau area then the overall average thrust and burn time will be used.

NOTE: The motor in Burn 1 must coincide with the information for Motor 1 in the Grain Information Tab. The same applies for Burn 2, Burn 3, etc.

COMPUTE A&N Tab
Once all information is entered in the first three tabs selecting the Compute A & N Tab will produce data. All data is grayed as they cannot be edited, these are RESULTS.



A chart is shown for Chamber Pressure vs Burn Rate. A least squares approximation line is then calculated and drawn on the graph. The a and n values are computed from the line and displayed. If the error of the line is too large (look in the ERROR Window, it should not be >0.009) then a warning message is displayed on the screen. This probably means that one or more of the test burns is suspect and should be rerun.

If you right click on the chart a dropdown menu will appear where you can Copy, Save Image As, Page Set Up, Print or Show Burn Points. Show Burn Points will produce point data for that point selected. Which burn that specific point is for can be found by comparing information against the Burn Rate information on the right.

BURNSIM FILE
With everything finalized you can create a BurnSim file by simply clicking the Create BurnSim File Button. It will send you into the normal Window's Save File window where you can select the folder you wish to save it in and the name of the BurnSim BSX file. A file is then created which can be read by BurnSim and will include the Propellant Name entered on the Propellant Formulation tab, actual Avg. Propellant density, Molecular Wt., Chamber CP/CP, a, n, and Avg. ISP* computed from the burns.

PROPEP3 is FREE
You can download it from the TC LOGGER USB WebSite at: **www.tclogger.com.** When you get there just select PROPEP3 from the menu.

SIR WILLIAM CONGREVE

1772 - 1828

He was son of Lt. General Sir William Congreve, 1st Baronet, the Comptroller of the Royal Laboratories at the Royal Arsenal and raised in Kent, England. He was educated at Newcomes school in Hackney, Wolverhampton Grammar School and Singlewell School in Kent. He then studied law at Trinity College, Cambridge, graduating BA in 1793 and MA in 1796.

In 1803 he was a volunteer in the London and Westminster light horse, and was a London businessman who published a polemical newspaper, the Royal Standard and Political Register, which was tory, pro-government and anti-Cobbett. Following a damaging libel action against it in 1804, Congreve withdrew from publishing and applied himself to inventing. Rocketry was being developed in several countries and Congreve in 1804, at his own expense, began experimenting with rockets at Woolwich.

In 1814 he succeeded his father as second Baronet Congreve. In 1818 he was returned as Member of Parliament for Plymouth, a seat he held until his death. In later years he became a businessman and was chairman of the Equitable Loan Bank, director of the Arigna Iron and Coal Company, the Palladium Insurance Company and the Peruvian Mining Company. After a major fraud case against him in 1826, he fled to France, where he was taken seriously ill.

He died in Toulouse, France in 1828 and was buried there. He had married in December 1824, at Wessel, Prussia, Isabella Carvalho (or Charlotte), a young woman of Portuguese descent and widow of Henry Nisbett McEnvoy. They had two sons and a daughter.

Congreve is said to have been inspired to work on iron-cased gunpowder rockets for use by the British military from prototypes developed by the Irish Nationalist Robert Emmet for use during Emmet's 1803 Rebellion (though Congreve would subsequently omit the inspiration of Emmet and claimed many of Emmet's innovations as his own). However the Congreve rockets were based on the designs of the Mysorean rocket artillery made from iron tubes. The mysorean rockets were used by the armies of Tipu Sultan and his father, Hyder Ali, rulers of the kingdom of Mysore in India. Together they had defeated the British East India Company during the Battle of Pollilur in 1781, primarily through their utilization of Mysorean rocket artillery (Cushoon).

Safety Distances were not defined in the early days!

Congreve first demonstrated solid fuel rockets at the Royal Arsenal in 1805. He considered his work sufficiently advanced to engage in two Royal Navy attacks on the French fleet at Boulogne, France, one that year and one the next. Parliament authorized Congreve to form two rocket companies for the army in 1809. Congreve subsequently commanded one of these at the Battle of Leipzig in 1813.

Congreve rockets were used for the remainder of the Napoleonic Wars, as well as the War of 1812 -- the "rockets' red glare" in the American national anthem describes their firing at Fort McHenry during the latter conflict. They remained in the arsenal of the United Kingdom until the 1850s. Congreve was awarded the

An Iron Congreve's Rocket Warhead

honorary rank of Lieutenant colonel in 1811 and was often referred to as "Colonel Congreve."

He was elected a Fellow of the Royal Society in March, 1811. He organized the impressive firework displays in London for the peace of 1814 and for the coronation of George IV in 1821.

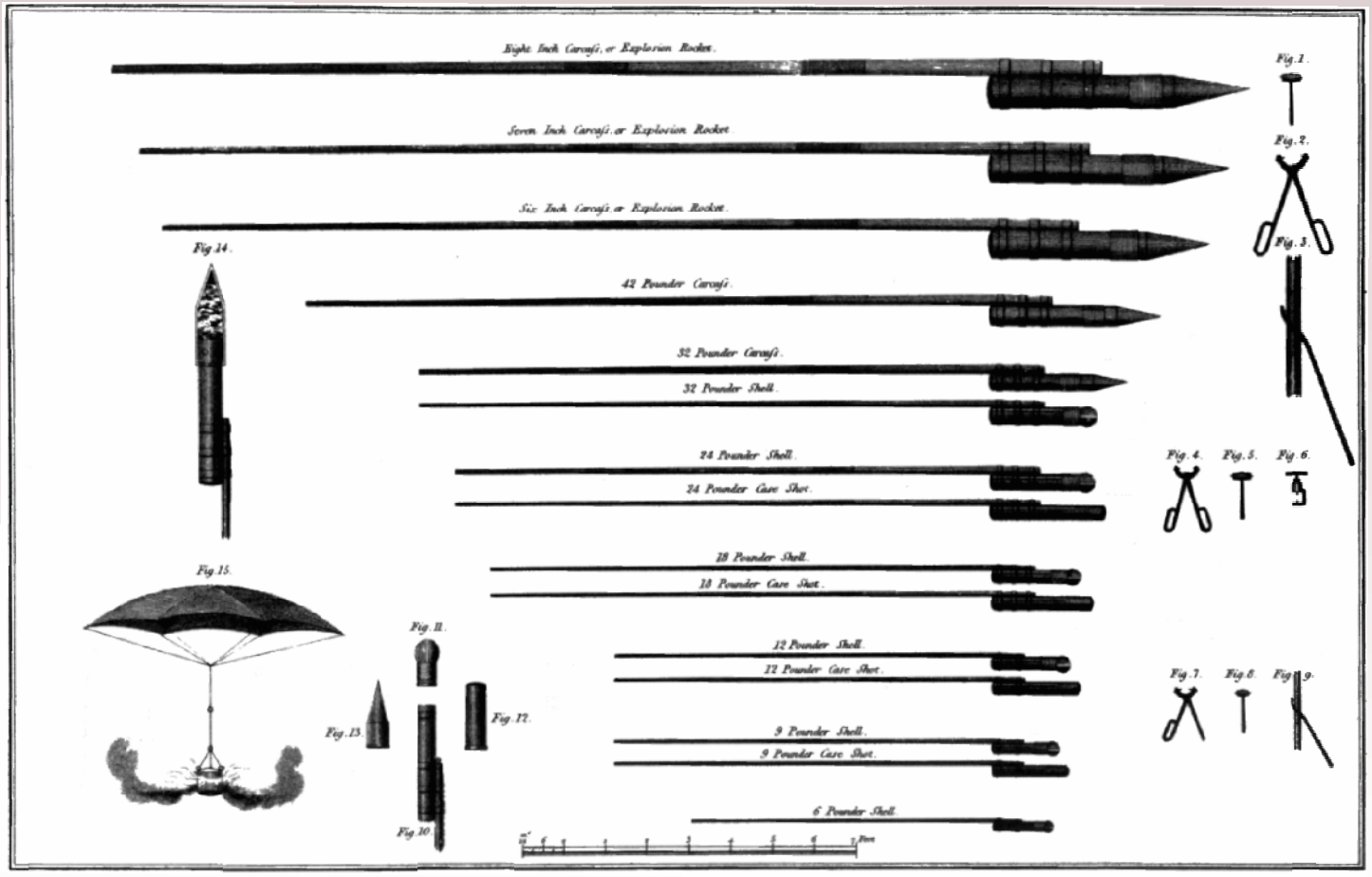
OTHER INVENTIONS

Besides his rockets, Congreve was a prolific (if indifferently successful) inventor for the remainder of his life. Congreve invented a gun-recoil mounting, a time-fuze, a rocket parachute attachment, a hydropneumatic canal lock and sluice (1813), a perpetual motion machine, a process of colour printing (1821) which was widely used in Germany, a new form of steam engine, and a method of consuming smoke (which was applied at the Royal Laboratory). He also took out patents for a clock in which time was measured by a ball rolling along a zig-zag track on an inclined plane; for protecting buildings against fire; inlaying and combining metals; unforgeable bank note paper; a method of killing whales by means of rockets; improvements in the manufacture of gunpowder; stereotype plates; fireworks; and gas meters. Congreve was named as comptroller of the Royal Laboratory at Woolwich from 1814 until his death.

The Congreve Rocket was a British military weapon designed and developed by Sir William Congreve in 1804.

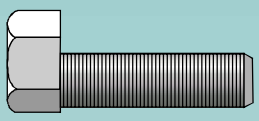
The rocket was developed by the British Royal Arsenal following the experiences of the Second, Third and Fourth Mysore Wars. The wars fought between the British East India Company and the kingdom of Mysore in India made use of rockets as a weapon. After the wars, several Mysore rockets were sent to England, and from 1801, William Congreve set on a research and development programme at the Arsenal's laboratory. The Royal Arsenal's first demonstration of solid fuel rockets was in 1805. The rockets were used effectively during the Napoleonic Wars and the War of 1812.

A collection of various size Congreve Rockets along with fabricating tools and a Parachute Design



SPECIALS

HEX CAP SCREWS

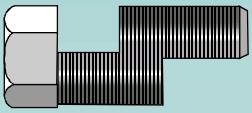


MST 12001

FOR HOLES TOO CLOSE TO THE EDGE
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE

HEX CAP SCREWS

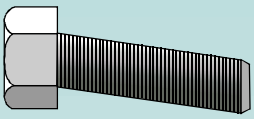


MST 12002

FOR HOLES THAT DON'T LINE UP
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE

HEX CAP SCREWS

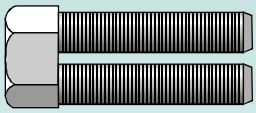


MST 12003

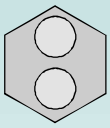
FOR HOLES THAT AREN'T DRILLED STRAIGHT
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE

HEX CAP SCREWS



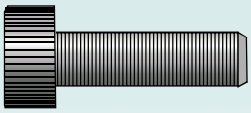
MST 12004



FOR DOUBLE DRILLED HOLES
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE

HEX CAP SCREWS

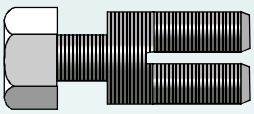


MST 12005

SERRATED HEAD FOR VICE GRIP TORQUING
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE

HEX CAP SCREWS

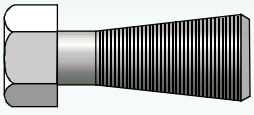


MST 12006

FOR HOLES REDRILLED THAT STILL DON'T LINE UP
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE

HEX CAP SCREWS



MST 12007

FOR TAPERED HOLES
MATERIAL: UNOBTAINIUM
FINISH: PLAIN

SIZE RANGE
INQUIRE