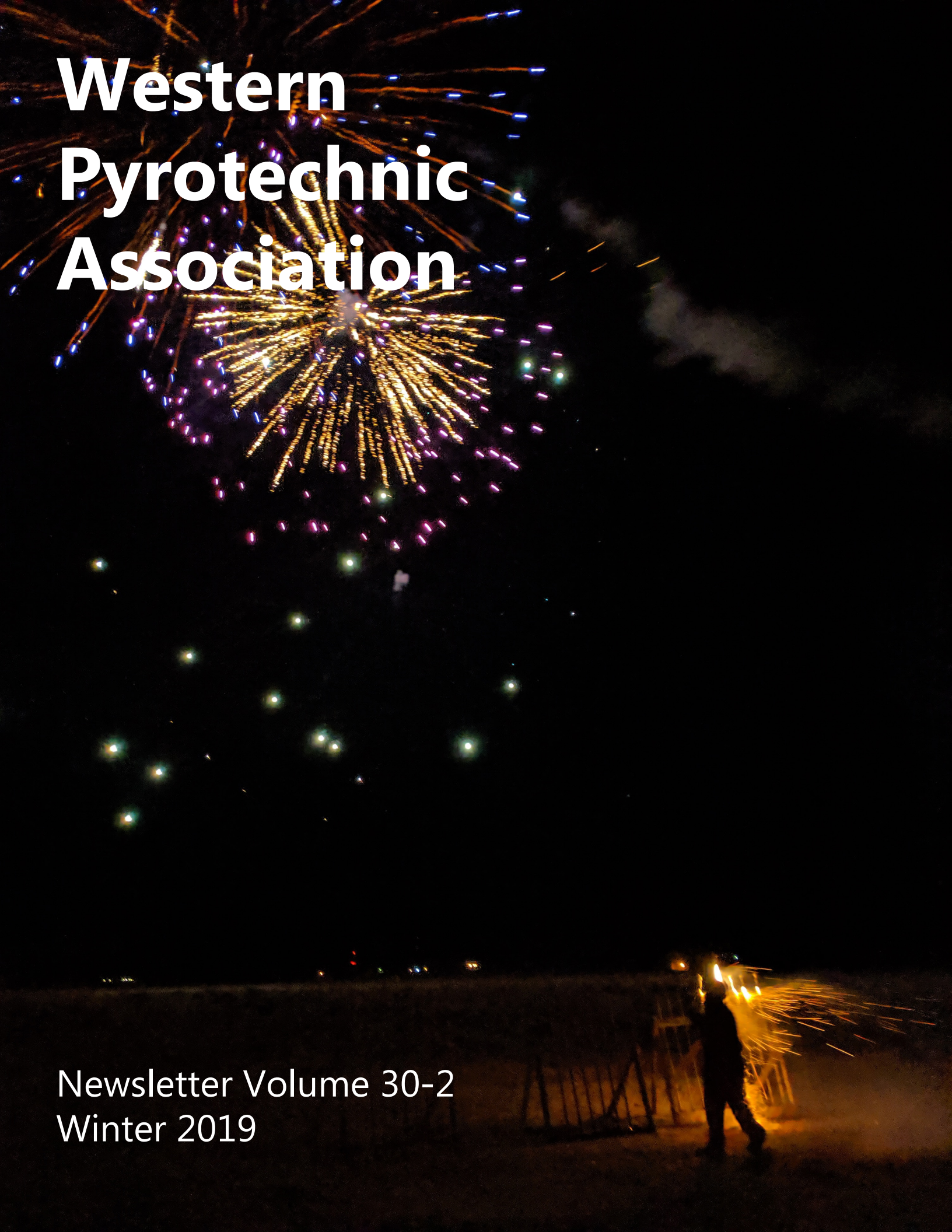


Western Pyrotechnic Association

Newsletter Volume 30-2
Winter 2019

Western Pyrotechnic Association

Newsletter - Winter Edition, 2019

Contents

Ernie took some time away from manufacturing to BBQ some meat for the Do It Afterglow dinner.

From the President

Greg Dandurand

Happy Thanksgiving! We are entering the holiday season and that means the biggest holiday is around the corner. Of course I am talking about Western Winter Blast. This years theme of "Ignite the Night" promises an epic time. Please look for all the registration details in the mail. Your event organizers and staff are hard at work now to present a safe and fun event.

This year there are board positions up for election, I am stepping away after nine total years serving as Vice President and for the last two years as President. Our club is all volunteer and we need people to step up and help us keep things running. While we are all united by fireworks, everyone has a skill set in their day jobs that can help with the club. All the staff positions at our events need back-ups. All staff members are willing to mentor anyone who wants to help. Even if you only chair an area for one or two years, it gives the person coming off shift a chance to recharge their batteries.

The PIT crew is coming back again and needs support from everyone. If you have your kids in PIT, please remember that it is not a baby-sitting service and we need all parents to be actively involved with their children.

Unfortunately, a charter member of the WPA was tragically killed. Tom DeWille passed away in Alabama. His contributions to the club and the proximate pyro industry will always be remembered. He was a pioneer in the area of indoor concert pyro and worked with some of the biggest names in Rock-n-Roll. Please keep his family in your thoughts.

Thank you all for your support these last few years. I am not going away, I just need a break from the rough-and-tumble world of the board.

What do you call something that quacks and walks with a limp? Me. (think about it).

Pyro Shack(tm)

Buy stuff for yourself and contribute to the WPA
Next Winter Blast, make sure to stop into the vendor tent and buy some WPA branded merchandise. All sales are handled by Pyro Shack(tm). The Pyro Shack(tm) is an arm of the WPA that performs charitable fundraising services by means of selling t-shirts, hooded sweatshirts, and hats to raise funds for pyrotechnics education. The pyrotechnics education happens through the seminars, demonstrations, manufacturing, and public displays at Western Winter Blast.

Memorial Show

The WPA lost friends and pyros this year. If you are interested in helping memorialize a WPA member who passed this year, contact Dave X before WWB. He needs volunteers to organize, setup and shoot a show that will be on Thursday night.

The show runs on donations of time, money and product - give help however you can.

Financial update

When the board decided to choose three long term strategic goals in the spring of '18, understanding and fixing the financial issues were the first priority. It wouldn't have been possible without a huge effort from a number of people. A special thank you is needed for Dorris, Jane, Dan, Dennis and Amanda.

Back in October, after having financial statements for the first time in a few years, the Board met specifically to review the situation.

Key outcomes for the meeting

» Understanding our tax exempt status
» Profit and Loss statements (P&L) for the club operations
» P&L for each event
» Where do we go from here?
» How do we communicate the findings to the members?
» What can we look at next from a cost perspective?

Understanding our tax exempt (not for profit) status

Club taxes were not filed between 2014 and 2018, and we lost our tax exempt status. In April 2019 we filed all missing years and are current with the IRS, including filings for Fiscal Year 2019 (FY2019).

In November of '19, our status was reinstated.

Because we didn't file, the IRS will have us on a 3-year watch list. This means the IRS will flag us if we are late with a filing or try to do something we are not supposed to do. Taxes and the tax exempt status is still a number one priority every meeting going forward, regardless of who is on the Board. Future Board members must stay on top of the financials, and information must be passed from outgoing members to incoming members.

Profit and Loss statements (P&L) for the club operations and events

Editor's note: The details of the P&L statement are for members only. That information is on the mailing list and the WPA website.

So what is our plan of action?

» Review the costs for Do It, and make it self sustaining. We want to do this without raising registration fees if possible.
» Review the policies for event staff expenses, and keep them to a minimum - as well as having consistency between events and from year to year.
» Review seminar comps (hotels and meals). We understand that the WPA is the best in the industry at providing seminars. This is important and something we should all be proud of - this Club puts on top-notch, world-class seminars.
» Review the seasonality of revenue/expenses for the Club. At any given time of the year, we should know how much cash we have, and how much cash we need to keep going.

The reality is that we are spending more than we are bringing in. There will be cuts in expenses, and

not everybody is going to like them all. There will be increased fees, but we are doing our best to make them fair and reasonable.

As you can see, the Club and the Board have a long way to go in getting a better handle on understanding and fixing our financial issues. The work that has been done to date is essential to getting us this far, and for allowing us to move forward. We are making progress.

Elections

After 9 years on the WPA Board, Greg Dandurand is stepping down. Greg ran for the VP position in 2011 and served under Pete Wood, Lynden King, Steve Wilson and Chuck Erickson. In 2018, Greg successfully ran for the Big Chair.

Give a big thank you to Greg next time you see him. You can find him in the orange vest, running the safety crew for WWB and Do It.

We'll need a new President. In addition, the positions of VP of Communications and Treasurer will be voted on.

The position of VP and Secretary will be open for election in 2021.

So, who's running?

To be fair to all, I am publishing all announcements that I am aware of.

I understand that Dorris is running for treasurer again, but did not submit a statement for publication.

We feel that continuity is extremely important at this point with the Board. We've gone a long way towards fixing the financial problems, but having some of the same eyes on things is crucial. Because we're on the IRS watchlist (and probably a few others...) we cannot afford any slips in our financial dealings. In order for that to happen, we have a plan.

» Kevin Mather is running for President.
» Tackett Austin will try and fill Kevin's vacancy in the VP position.
» Lonny Ross is stepping up, and will run for the VP of Communications.

We'll have the continuity we desperately need, and will get Lonny onboard as well. Hopefully we can continue to bring in new blood as the veteran board members move up, then out.

We hope to have the support of Board members, event staff and club members.
Kevin, Lonny & Tackett

Making Rocket Batteries for the 1997 Winter Blast Public Display

By Kurt Medlin

This article was originally published in 2005 in the Western Pyrotechnic Association Newsletter. This version (2019) has been slightly revised, but is materially the same as originally published in 2005.

Original author's note when published in 2005:

This article was originally written in 1997 a few months after Winter Blast VIII. For one reason or other, I never got around to preparing the pictures and submitting it. Having recently discovered it collecting dust in the corner of my hard drive, I thought I would finish it up and present it for your amusement. –KCM

For last year's Winter Blast Public display*, Steve Wilson asked if I could make two, 10-rocket batteries of black powder rockets to use during the "Rocket's red glare" section of the Star Bangled Banner. Steve specifically requested three things regarding the effect:

*Actually Winter Blast VIII (1997)

1. The heads should go off as the rockets are still ascending, or at least before the rockets start to veer over
2. The heads should break hard, like a shell
3. The breaks should be of bright red stars (preferably metal fuel such as magnesium), that burn out quickly

Although this article is primarily intended to be about the construction of the heads, I will also discuss the approach I took to achieve the other artistic goals.

The Rocket Motors

After some more discussion with Steve it was decided that one pound rockets would be a good size for the effect he desired. For the rocket composition, I chose my standard one pound mix:

Potassium Nitrate	60%
Charcoal (air float)	10
Charcoal (80-mesh)	20
Sulfur	10

I sometimes substitute 2-5% of the 80-mesh charcoal with 36 mesh charcoal. This mix is similar to what a lot of people use in the one pound size, and I make no great claims for originality. It has plenty of power for the size heading I used and it creates a nice tail, although much depends on the particle size of the potassium nitrate, the origin of the charcoal and the mixing techniques. Regarding the specific batch used for these rockets, the chemicals and mixing were as follows:

K-Power fertilized grade potassium nitrate was ball milled with cab-o-sil to pass a minimum100 mesh screen, but the actual particle size was probably in the 120-160 (100 mesh is the finest screen I have and it easily passed through). The air float and 80 mesh charcoals were the type commercially available in 50 lb. sacks and is said to be made from, "mixed hardwoods." The sulfur was fine commercial grade that appeared to be in the 100-200 mesh range.

Mixing was accomplished by first passing the sulfur and then the nitrate through a 40 mesh sieve on to a piece of 50 lb. Kraft paper. Then the charcoals were weighed out and placed on top of the nitrate and sulfur without being passed through the sieve. The mix was then blended by hand briefly and then passed together through the 40 mesh screen four times. I then added 6% water, kneaded it in thoroughly, and granulated it through window screen onto a piece of Kraft paper to dry. The damp granulation step was done primarily to keep the dust to a minimum during the pressing of the motors, but it also has the effect of speeding the mix up a bit as well as slightly enhancing the spark tail. Once it was thoroughly dry the rockets were pressed.

The rocket motors were pressed on a 2-ton arbor press using as much pressure my father could exert with is 6 foot, 190 pound frame! Yes, I had my 66-year-old father press all the motors. My father has been my pyro-accomplice since I was about 10 years old and we're still at it together.*
*Roy Medlin passed away in March of 2003.

Achieving the first artistic goal of having the rocket break before veering over was a matter of adjusting the increment of comp pressed above the spindle, since this is the increment that separates the trust producing cavity portion of the motor from the heading. This increment of comp above the spindle does not produce any meaningful thrust and basically functions as a time delay allowing the rocket to coast up to (or past) its zenith before burning through a hole in the top clay plug to light the heading.

Conventional wisdom holds that the solid increment of powder pressed above the spindle should not be less that the tube's internal diameter, or ID in height (3/4" in this case for 1 lb rockets). Both the power of the motor and the weight of the heading both affect the coasting time before the rockets starts to veer over, but one ID is a good place to start timing-wise.

One method of getting the rocket to burst before its zenith is to simply matter of making this increment of comp above the spindle one ID high, or maybe something less than that. However, lessening the solid increment is a tricky proposition - this increment also serves the important function of preventing the heading from being ignited immediately at take off. If this increment above the spindle is too thin, the rocket will "blow-through" at take off, meaning the increment of comp above the spindle was not thick enough to prevent the fire from the cavity portion of the motor from blowing right through into the heading at, or soon after, take off.

I could have also adjusted the power of the rocket composition to be more powerful to make sure the rocket was still coasting upwards when the heads went off, but I have always liked my rockets to break before veering over, so I knew from previous experience that a ¾" ID increment of comp above the spindle backed by an increment of clay at least one ID thick would give me the timing I wanted without the danger of blow-through at take off.

The Stars

Although I have made magnesium based stars in the past, I do not used them extensively, tending towards either resin fueled colors stars, or stars with only a few percent metal such as the Veline color system. While a complete discussion of the trials I went through to find a red mag star I was happy with is beyond the scope of this article, suffice it to say I remembered why I don't often bother using Parlon bound stars if I can avoid it! (Such a gooey mess…)

Out of convenience, I ended up using the magnalium mixture below and a more 'convenient' non-aqueous binder than Parlon and acetone. With straight magnesium it would have been a more pure

red, but that would have meant getting into dichromate coatings and messier non-aqueous binders. It's still a very red star, and for this purpose, it ended up fitting the bill nicely.

Strontium Nitrate	50%
Potassium Perchlorate	10
Saran	15
Magnalium (200-400)	15
Hexamine	5
Shellac	5

The stars were mixed using a 40 mesh screen and bound with 18% denatured alcohol (the 5% shellac in the formula acting as the binder). Pumped stars 5/16" in size were made using a star plate to get a quick and even burnout. I used Veline's "Super prime" to prime them after they were dry:

Potassium Perchlorate	55%
Charcoal (air float)	20
Wood meal (-70 mesh)	6
Red Iron Oxide	5
Magnalium (200 mesh)	5
Potassium Dichromate	5
Dextrin	4

The stars were primed by placing them in a stainless steel bowl, lightly misting them with water, and sprinkling on the prime while rolling the stars in the bowl.

The Rocket Headings

The request was for the rocket heads to break hard, like shells. I tend to favor the Italian school of shell building, so naturally I decided to make small cylindrical shells for the rocket heads.

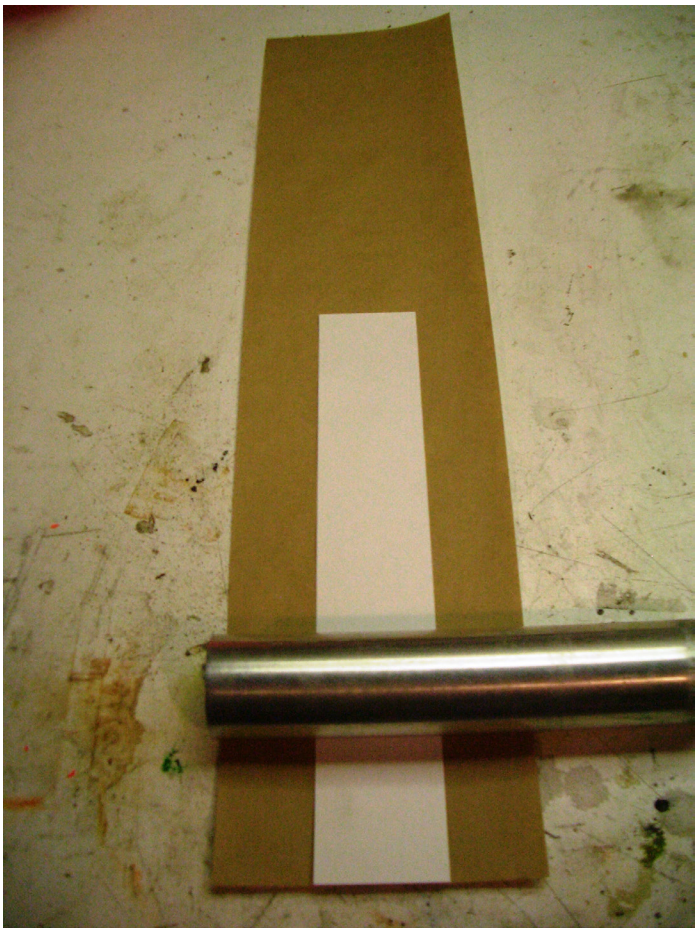
The approach I took was a variation on the Italian-style shell inserts used in shell-of-shells called "pupadelles." The variation was to replace the time fuse normally used in pupadelles with a small tube that had a piece of black match running through it (that way it would light at the end of the rocket's flight without any additional delay.). The basic technique can be found described in detail in the second part of the Fulcanelli article on cylinder shell building that appeared in Pyrotechnica XI.*

*For those of you not familiar with the two part Fulcanelli article that appeared in Pyrotechnica IX and XI, Traditional Cylinder Shell Construction, it is the most complete description of the Italian school of cylindrical shell building to be found in the English language. I highly recommend it for anyone interested in learning the fundamentals, as well as some advanced techniques of this style.

I decided to use a 1-5/8" diameter case former to roll the pupadelle casings. This is an odd sized former for pupadelles that I had around for no particular purpose other than Steve Majdali gave it to me! At any rate, it seemed to be a good size for this application: slightly bigger than a standard pupadelle, insuring a full break, but small enough to only hold about half the weight a one pound rocket can carry, thus insuring the rocket would still be ascending when the heading broke. I decided to set the finished (inside) length of the case at 2½ inches. (From this point forward I shall refer to the pupadelle as a shell since technically it is no longer a true pupadelle).

Each shell casing was rolled from one strip of 40 lb Kraft paper 5 1/2" wide by 21" long, with the grain running the 5" direction, and one strip of 125 lb tagboard 2 1/2" wide by 10 1/2" long, with the grain running the 2 1/2" direction. These lengths resulted in four turns of Kraft paper and two turns of tagboard when rolled around the 1 5/8" diameter former.

To roll the casings, a tagboard strip was centered on top of a Kraft strip with the edges aligned together on one end (figure one and two). Starting with the end where the two edges are aligned, the two strips are rolled together around the former and pasted on the outside edge with white glue.



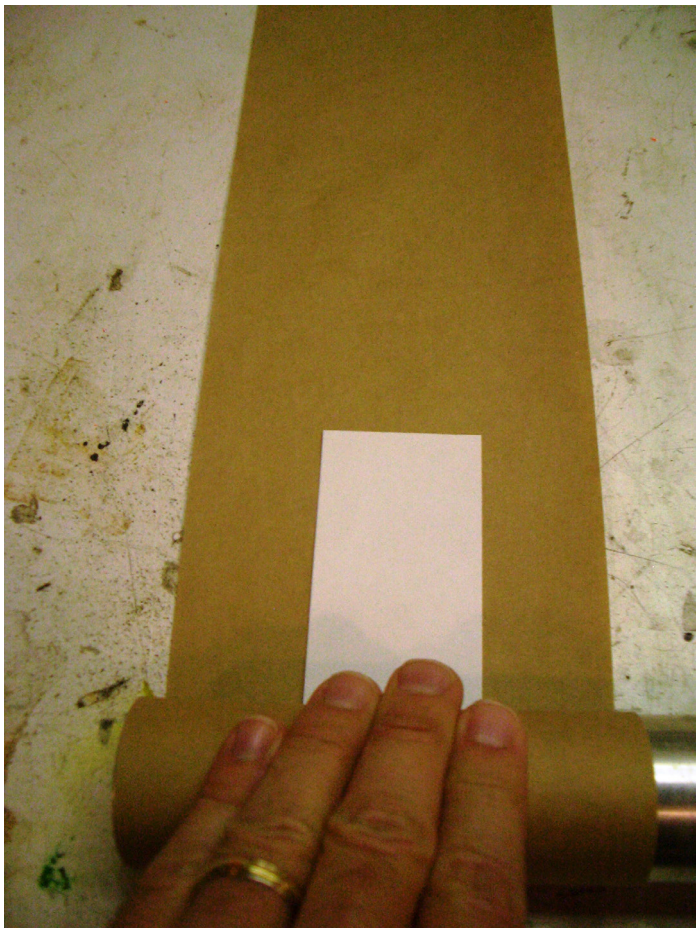


Figure 1 and 2
Kurt demonstrates the rolling process

The case was then slid up over the end of the former so that the edge of the tag board was flush with the end of the former, with the Kraft overhanging by approximately 1 1/2 inches. The overhanging end was then closed using a triangle fold. The triangle fold was made by first pushing one side of the overhanging Kraft inward and all the way down against the end of the former (figure 3). Then the edges of the overhanging Kraft were pinched inward and the overhang Kraft bent over the end of the former. I then placed a dab of glue under this outer fold and rapped the end of the former on the workbench to consolidate the folds. This outer fold has a somewhat triangle-like appearance, hence the name, "triangle fold".

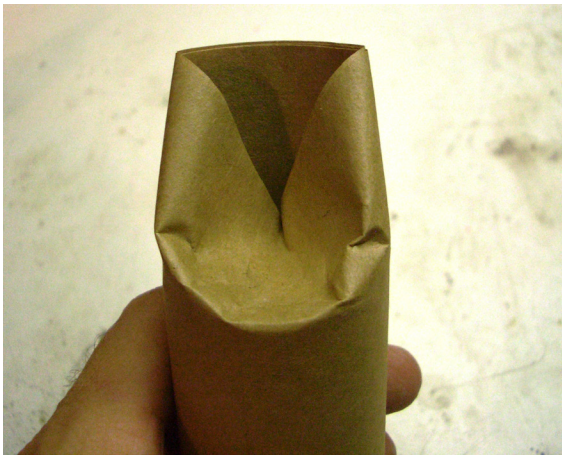


Figure 3
The triangle fold

When done correctly, the result is a neatly formed, flat set of folds as shown in figure 4. Before removing the case from the former, I used an awl with a 1/4" shank to make a hole in the center of the triangle fold (the end of the case former has a hole in the center to facilitate this step). Figure 5 shows the triangle fold with a hole punched through the center.

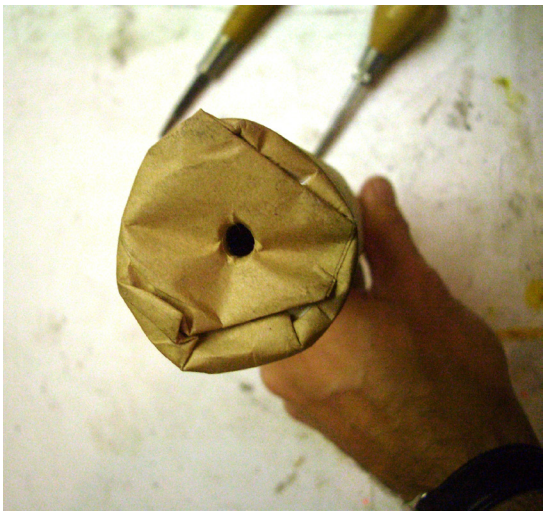


Figure 4 and 5
Don't forget the dab of glue under the flap

The little tube that goes in this hole is there to protect the piece of black match that will communicate the fire from the rocket motor to the contents of the shell. I rolled this little tube myself using a 3/16 inch rod and a strip of heavy Kraft (70 lb) 1" wide by 6" long (the grain running the 1" direction), pasted on one side with wheat paste. It was important that this tube be fairly thick and strong for its size because this tube was used to tie string against when the shell was "spiked" (more about that step later). The tube was pushed through the hole so half was inside the case and half outside, and then secured with a bead of white glue. At this point the case was removed from the former and a piece of high quality eight ply black match about two inches long was slid into the tube so that 1/2 inch was on the outside and the remaining 1 1/2 inch was on the inside (figure 6).

Figure 6
Passfire tube with black match

The case was then placed open end up on a work surface that had a hole to accommodate the tube and match protruding from the other end. The case was then filled approximately 1/3 full with the red stars and then approximately 1/2 teaspoon of -8 +16 mesh "hot" polverone*. 4FA or 1g grade commercial grain powder could also be used. The case was then gently bounced up and down to settle the stars and polverone into a compact configuration.

*My "hot" polverone, it was made with willow charcoal that had been ball milled with the sulfur until it was the consistency of talc. After mixing the ball milled willow charcoal/sulfur mixture with fine mesh potassium nitrate and an additional 3% dextrin, 20% water was kneaded in and the mix granulated through an 8 mesh screen. Once dry, it was re-screened through the 8 mesh to break up the lumps and the fines sifted out through window screen. The resulting polverone was very close to

commercial quality black powder and worked quite well in this application. More stars and polverone were added to the case and consolidated in the same manner until the they came up to the level of the tag board as shown in figure 7. After lightly tamping the full case with a flat end of a 1 1/4" dowel to even out the contents, the overhanging Kraft was closed using a triangle fold and glue as before. The folds were consolidated with the 1 1/4" dowel producing the same result in figure 4.

Figure 7
Fill the case

Figure 8
Spiked shell

The finished shells were then "spiked" (wound with string) using one strand of 8-ply cotton string that had been rubbed with wheat paste. The shells could have been spiked with dry string, but experience has shown me that pasted string does produce a better result and is worth the (minor) extra effort required to treat the string with paste. To spike the shells, first the outside end of the string was tied to the little fuse tube with a clove hitch. Then eight vertical passes of string were laid evenly around each shell as follows: First the string was wound around once, and then turned 90 degrees around the fuse tube and wound all the way around again so that there were four evenly spaced vertical windings. Then the string was brought around the fuse tube again and laid evenly between the first four windings. This was repeated until there were eight vertical windings.

The horizontal windings were done by bringing the string back down over the side wall to the bottom of the shell in a spiral fashion. After making one complete turn around the bottom, the string was then wound around and up the circumference of the shell in a spiral patter forming little squares with the vertical windings (figure 8). Once at the top, the string was tied off with a reverse loop pulled tight against the spiking horse, and the excess string cut off.

The whole process of spiking is easier to actually do than describe, but hopefully the picture of the end result will help make it clear. As an aside on the role of spiking a shell of this design, its function is to provide strength to the otherwise flimsy walls of the shell casing, and is the reason these little shells broke hard with just black powder mixed in amongst the stars.

At this point, the shells were essentially finished once the pasted string had dried.

Finishing the Rockets

The finished shells were attached to the rocket motors using hot glue as shown in figure 9. Since these shells were not going to be fired from a mortar, there was no need to cover them in pasted paper to prevent the hot gasses of a lift charge from getting through the casing. However, once the hot glue had cooled, I did past two turns of 40 lb Kraft around each head, smoothing the overhanging paper over the top of the head and around the bottom where the head meets the rocket motor (figure 10). This last step was done as much for aesthetic reasons as it was to provide a measure of insurance that the heads would stay firmly attached, although the smoother surface of the heads may have also aided in the aerodynamics of the rockets' flight.

The rockets were launched from racks electrically by placing an electric match half way up the rocket core and securing the wires to the rack such that the match was held in the proper place.

The foregoing instructions may seem like a lot of effort to go through to get such a simple effect, but to me the reward in making a firework has always been in the process of working with basic materials such as paper, string paste and powder to shape them into instruments that produce beauty in light and sound. In my experience, the effect of a well constructed firework is always worth the effort.

Figure 9
Shell attached with hot glue.

Figure 10
Covered with paper, ready to light.

Do It 2019

Once again, we had a great time at Do It. Other than a cold Wednesday night, the weather was nice. The shells were big, the food was good, the friends were there and we had some new faces.

Santa and his helper loading the rocket line.

Photos by Dean "Gonzo da Greek" Gonzalez

Dean's first ever girandola was a great success.

Builders like Ward and Mike kept the skies lit up.

Bill was kept in his cage most of the event.

New member Matt was experimenting with colors in liquid fuel.

Impromptu birthday party at El Cap

As usual, Tommy was helping to keep the big guns full.

Greg thinking about the day he can relax and enjoy the event again.

If all the rockets go straight up, Bill might fall asleep at the line.

Wanda and Mike taking a WASP break.

The Garrett-dola was one of the best I've seen.

Better Charcoal

by Charley Wilson

Retort Charcoal

The third or more reprint of an article simply titled "charcoal" appeared in the December, 2018 AFN[1]. This methodology will not produce charcoal of the best quality for black powder or for many fireworks applications. The main issues are the ash content and oxidation caused by partially burning the material to produce heat for pyrolysis. This is also wasteful of the wood or other material to be converted, not to mention the air pollution from smoke.

The author of the article states that many other fireworks writers, including Ronald Lancaster, agree that willow is the best starting material for the charcoal. Lancaster in fact mentions "willow, alder and dogwood"[2], but which willow and which alder[3] are not divulged, and the dogwood referred to is actually alder buckthorn *Frangula Alnus*[4], *not* the flowering dogwood *Cornus Florida* found in the U.S.

In the U.S., the variety of willow used is black willow, native to this country and not found in Europe or England. Alder buckthorn is not native to the U.S. Note that alder buckthorn and alder are not related species. The author of the AFN article asserts that "Charcoal made of pine, the most easily obtained wood in the U.S., is viewed with disgust…"[5]. However, pine charcoal finds specific uses in Japan, Shimizu states that "pine charcoal produces the most pretty fire dust of all."[6] In this author's experience, ponderosa pine charcoal can also make a fast black powder. During the civil war, cottonwood charcoal was used by the Dixie powder works, finding that it was just as good as willow (more on this later).

Shimizu states that "Industrially on a large scale charcoal is manufactured by dry distillation in an iron vessel."[7] No details of that process are given, but one must assume that the charcoal produced from such a process is that which is (or was) used for the manufacture of black powder in Japan.

Dr. Shimizu next describes a process similar to that which is described in the AFN article, using an outdoor oven covered with wet clay on straw mats. For some fireworks purposes, higher ash content in the charcoal may in fact be preferable[8]. Note that Dr. Shimizu does not describe using the charcoal made by this process for making black powder. One must infer that the black powder he used was industrially made.

Dry distillation or destructive distillation of carbonaceous material is used to make charcoal for black powder in the U.S. and elsewhere. In this retort method, no extra air is allowed into the distillation process and no actual burning of the wood or other starting material is allowed. The ash content is thus

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[1] JD American Fireworks News ,December, 2018

[2] Lancaster, R. 1992 Fireworks Principles and Practice 2nd Edition, Chemical Publishing Company, New York, p. 39

[3] Possibly Black Alder, *Alnus Glutinosa* which is native to Europe.

[4] This species was classified as *Rhamnus Frangula* by Linnaeus. Recent DNA studies have restored this classification by Philip Miller (1768).

[5] 1 p. 1

[6] Shimizu, T. 1988 Fireworks: The Art Science and Technique. Second Edition. Pyrotechnica Publications, Austin, Texas, U.S.A. p. 119.

[7] Ibid. p. 118

[8] See for instance Shimizu, T. 1988 "Studies on Firefly Compositions (Aluminum-Charcoal Type)." Pyrotechnica XII , pp. 7-18

minimized, and the gasses produced could be collected and used. A very good accounting of charcoal manufacture may be found online in the "History of the Confederate Powder Works" by George Washington Rains. I reproduce here that relevant part, but the whole text should be read.[9]

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Charcoal for gunpowder must be made by what is termed the
distilling process ; that is, the wood must be heated in iron retorts
to the proper degree, to have it of the best quality and free from
sand or grit. For this purpose cast iron cylinders, or retorts, six feet
long and four feet in diameter were used, placed over furnaces,
each having one end solid and the other with a movable cover ; into
these were run the slip cylinders, which contained the kiln dried
cotton wood, split up into sticks about one and a half inches in
diameter, and entirely filling it.

The slip cylinders were charged with the wood in an outside
apartment, their covers put on, then readily moved by cranes to the
retorts, into which they were pushed ; the covers of which were
then luted with clay and closely applied. The bottoms of the retorts
being perforated, permitted the escape of the vapors and gases into
the furnaces beneath, where inflaming, they supplied mainly the heat
required in the operation. In about two hours the slip cylinders
were withdrawn from the retorts and moved by the cranes over, and
lowered into the cast iron coolers beneath the floor ; these had water
from the canal circulating around them
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In addition to making high quality charcoal, the destructive distillation may be used to produce tar and other products. Wood alcohol, now known as methanol, was formerly produced by this method.[10]

Rocket men and Girandola builders in the PGI and WPA have been making high quality charcoal with the retort method for many years. [11,12] Good charcoal is essential for black powder based rockets.

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[9] See https://archive.org/stream/powderworks00rainrich/powderworks00rainrich_djvu.txt .Other versions such as PDF are available.
George W. Rains was an interesting character. Space does not permit detailing his life and contributions but the reader is invited to look at his story. https://en.wikipedia.org/wiki/George_Washington_Rains

[10] DUMESNY, P. & NOYER J.; Wood products, distillates and extracts; Pub: Scott, Greenwood & Son, 1908.
[11] Lichtenwalter, G. 1995 "Charcoal" American Fireworks News, 162:3

You are thinking about manufacturing, but . . .

By Bill Ryan

The beauty of the Western Pyrotechnic Association is that there is something for everyone. Do you want to see spectacular shows? Winter Blast has you covered. You want to teach your children to shoot class C, visit the class C tent, get what you want, then go to the C line and have fun. You want to try shooting class B, order product, under the club's license, from a class B vendor and visit the B line. You want to make your own, well that looks like a scary big step. It really is not! Let me put you at ease.

You do not know how to make fireworks and do not want to look like a fool, hurt yourself, or others. These are valid concerns. Remember, everyone in manufacturing started from there, and we remember those feelings. The club's manufacturers are a friendly group of people who are passionate about their hobby and have a strong desire to share their passion for manufacturing. We are pushers of fireworks and want to help you get started.

There is a link to the manufacturing chair on the club's web site. Contact the manufacturing chair to initiate a dialog. The main duty of the manufacturing chair is to create a safe and fun manufacturing area. A key part of this task is to safely add new manufacturers to the group. All new manufacturers will be placed with an experienced manufacturer who is making what you want to make, and is someone you should get along with. An active mentoring program is essential to safety. Remember, we have all been new to manufacturing.

You may have taken the walking tour of manufacturing and are thinking that you cannot afford all those fancy presses, ball mills, star rollers, and so on. Actually, you do not need much to start manufacturing. Start small and acquire as your interest evolves and develops. You can even partner up with someone to share equipment expenses.

You do need some basic items. The biggest expense is a pop up, which is required of all manufacturers. The good news is that the pop up can be used after the event when you want a little shade. The bad news is that the pop up has a hard life in manufacturing and should be considered an expendable item. If falling sparks do not burn holes in the canopy, the wind will eventually get the frame. Expect to get about five years of use. Do not go bigger than 10' by 10'. Larger pop ups are very prone to wind damage. Pop ups with vertical legs are easier to deal with since they can be lowered quickly to remove the canopy. You should also buy decent tent pegs to secure the pop up. The pegs that come with it tend to become steel pretzels when you try to drive them into the desert earth. You will also need light rope to help tie down the corners.

Now that the pop up is packed, what else do you need? You definitely need a table. This needs to be dedicated to manufacturing since you really do not want to serve dinner on a table coated with BP and other not so palatable items. A chair is nice to have for your comfort. You will need both masking tape and reinforced packaging tape. The narrow, ½" or ¾", is just fine. Most things need hot glue, so a hot glue gun is a very good idea. Oops, there is no power out there! No problem, get a small inverter that plugs into your vehicle's cigarette lighter. That will easily run a glue gun.

Now that the basics are covered, you need to decide what you will make. Oh yeah, you will need to get materials. The WPA web site has links to vendors. These folks are super easy to talk with and are very helpful to new manufacturers. They are in the business, in part, because they also have a passion for fireworks. It is also in their own interest to create a positive relationship with you so you will come back and buy more in the future. Most of the stuff you will purchase needs a license to buy and possess. No problem since you are at a WPA event and are using the club's licenses and permits.

The easiest thing to make, and in my opinion the most fun, are rockets. You can purchase commercial rocket motors from a vendor, such as Flying Phoenix. These are about two dollars each and are sold by the case of 50. The rockets are stick stabilized, so you need to go to a hardware store and get three-foot-long square sticks, about 5/16" on a side. These will be hot glued and taped to the

rocket motor. Now you need a header. Go to the class C tent and purchase a box of arterially shells. Remove the lift charges from the bottom, put some of the lift into the top of the rocket motor, then glue the shell onto the rocket motor. Add some tape to secure the shell tightly to the rocket. You are done. Take it to the B-Rocket line and join the crazies. The B-Rocket line is definitely the club's E-Ticket ride!

If you want to continue into bigger rockets, take the rocket building classes. You can expand your involvement by purchasing tooling, making your own fuel, making your own headers, and so on. The options are endless. Your foot is now in the door and you are manufacturing.

OK, so rockets are not your thing, let's try bag mines. These are simple and safe to build. You will need to purchase stars from a vendor, like Flying Phoenix or AM Pyro. Stars for 3" or 4" shells are a good size. You get a round 3" or 4" ball filled with stars per unit, the smallest quantity available. You can purchase individual units. One unit will yield about three bag mines. You will also need black powder lift, from Bear River powder. You will need quick match, available from Flying Phoenix. You will also need Visco fuse, available in the class C tent. The bag used is a #3 craft bag, available at a craft store. Basically, you put some lift in the bag, then stars. Run quick match into the lift, tape the bag closed around the quick match, add Visco to the free end of the quick match and you are done. Take your mine to the hand fired B line, the club's A-Ticket ride, and have fun. You really need to take the bag mine class to learn the correct way to make your mine. This was just a quick look at the steps. These are easy and quick to make.

From here, take a shell building class and the sky is the limit. Some manufacturers make their own stars. The club has the equipment available for wrapping paper shells so you do not need to purchase a WASP. You can buy hemi's from Flying Phoenix. The club will sell you WASP tape.

In the hear future there may be a limited supply of stars, quick match, and BP available from the manufacturing chair for those who decide at the last minute to try manufacturing. These supplies will be available in limited quantities for those new to manufacturing.

Your expenses will grow at the rate that you manufacturing grows. This is an unfortunate fact for any hobby.

Once you start to manufacture, your options are as numerous as the stars in the sky.

New (or existing) members
Are you interested in getting started in manufacturing?

- Look in the WWB program to find the hands on seminars. Go make some things.
- Go spend some time with Bill in manufacturing; he'll help push you in the right direction.
- Talk to your friends who are in manufacturing, and see if they'll help get you at the next event.
- Keep your eyes open for more detailed info on the mailing list.
- Go to Do It - the cheaper, manufacturing friendly event.