This is a rough, and by no means full description of the making of a simple and quick, yet interesting piece of fireworks.

Film Canisters:

As with almost every fireworks item, people have their favorite materials and methods. My favorite film canister is the black HDPE type of canister, the type that KODAK film arrives in. What I think is the most important part is the lid. It should, in my opinion, be of the type that "squeezes" the rim of the canister between one inner and one outer part of the lid. Here in Norway, these lids are black.

I have also tried a new FUJI type of canister. They are transparent, and their lids are more like a plug that does not overlap with the rim from the outside. When gluing these lids with hot glue, you get a weak seal, causing a bad break.

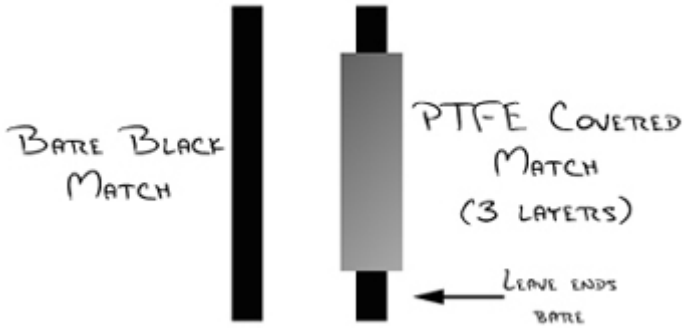
As in all other types of shells, uniform strength is important. But carefully designing a shell using a powerful break in a flash bag is often a way of eliminating the effect of a weak joint. So don't lose hope if you are stuck with hundreds of FUJI type canisters. They might work fine with the appropriate design of the shell.

Time Fuse:

The fuse used in these shells is perhaps the biggest difference from the ordinary shells. A conventional time fuse might work fine, but it is not necessary, and the work of cutting and priming these fuses is a waste of good pyro time. But still, the fuse has to be reliable and easy to make. Visco could perhaps be used, but it is not always easy to get.

So to avoid these problems, the film canister shell uses a special type of black match. Instead of cotton, acryl string is used. I got my acryl string at a knitting store, and if you can choose between several types, pick the thickest. Then black match is made the usual way, being sure to squeeze all the air out of the fuse, to avoid any air holes through the fuse. Dusting the finished fuse is not necessary.

When the black match is dry, it can be cut into pieces 2 to 2.5 cm long. Then the middle part of the fuse is wrapped with Teflon tape, also known as PTFE tape. The length of wrapping determines the timing of the shell, and has to be adjusted to the burning speed of the black match. 1.5 to 2 cm is a good starting point. Just be sure that there is at least 2 to 3 mm of match on each end that is not wrapped in tape, or a dud is on its way!



Is the fuse reliable?

Of course, if you make a lousy black match, the fuse is not as good as it could and should be. But as far as I've seen, it is at least as good as you could expect commercial time fuse to be.

Inserting the fuse

Depending on the diameter of your fuse, the quickest and easiest thing to do is to get some kind of punching device to punch a hole in the lid of the canister. But as the lid is soft, anything that can make a hole is usable. However, punching gives the best hole. Then the fuse is simply just glued into the hole using hot glue, applying glue to both sides of the lid.

Shell Contents

Well, this is where every pyro has to use his own imagination. Colored stars, tailed stars, strobes, anything will do. Now you have a way to get rid of your small batches of stars, or testing small batches of stars, not having to wait for the 3" shells to dry. Just remember, small shells require small stars. You are on your own here. Just let the imagination flow free and undisturbed.

If you attempt to use flash, go ahead! The shell has space for 30+ grams of flash, but you might want to sacrifice some of it for some layers of Kraft paper on the inside walls of the shell. The film canister is not strong enough to get the full potential out of the flash. Depending on your flash however, it is a quick way to get a salute in a hurry (don't make them if you are in a hurry!), and added titanium or zirconium makes the shell noteworthy.

Burst

As in all other types of shells, the burst makes the difference between a lousy shell and a good shell (not the whole truth, but a lot of it). And as we all have a favorite burst, often depending on the type of stars, size and effect wanted, I will not tell you I have found the best solution, because I haven't. I will tell you what works for me.

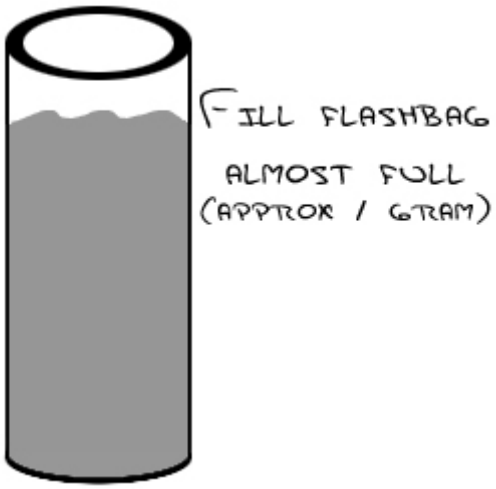
Due to the small size of the shell and the relatively weak walls, a powerful burst is necessary if you want a good spread. And I did, so I used flash burst. What flash to use is your own choice. I have tried both perchlorate flash using dark German Al, and a milder nitrate based flash using a slower Al. They will both work if the correct amount of flash is used.

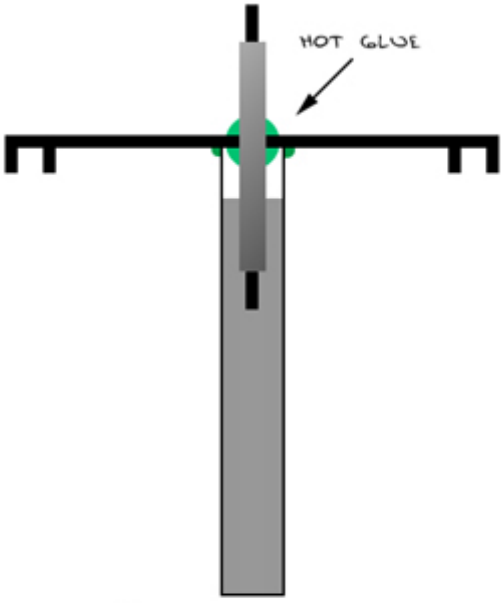
I guess that whistle mix is possible to use, and if a milder burst is wanted, H3 or BP might give the desired effect. What I do know is that by using a powerful break, the weak joint between by the lid is of no concern. Using a softer burst especially together with the FUJI type of film canister on the other hand, causes the lid to pop open not rupturing the canister, creating an effect not unlike the commercial rocket heading does. This can be desirable if no loud noises should be made. The more powerful burst also creates a good bang (YEAH!). So depending on your intentions, you have almost all the possibilities also found in the larger shells. The film canister is not suited for large inserts though.

Arranging the burst and stars

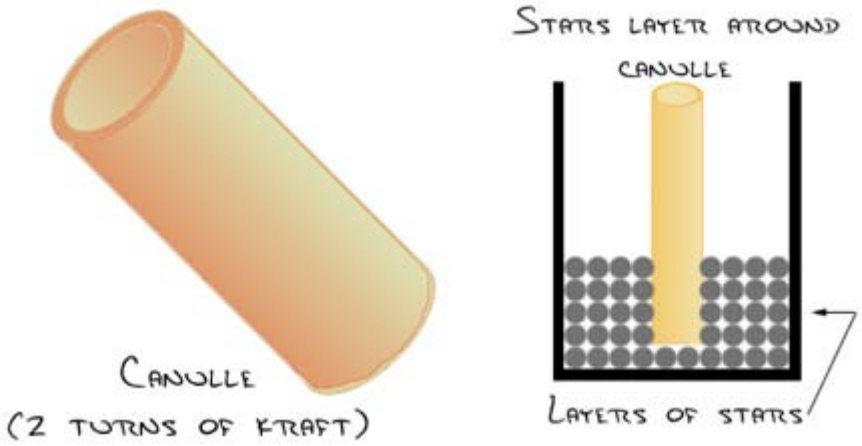
Just as with traditional shells, you have different ways of arranging the burst and the stars. The quickest method by far is to just fill the canister almost full of stars, dump in a weighed or measured amount of burst (1 gram of flash in this case), and let the flash sit loose among the stars. This method, from experience, produces a rather weak pop and not a good spreading of the stars. Using FUJI canisters, the several stars often came down unlit when the lid popped off. More flash, quicker flash, and better priming of the stars might solve the problem. This method needs improvement.

The other method that produces the best results is also a bit more laborious. In order to get a better spread of the stars, a small flash bag is used, which keeps the burst centered in the canister. The diameter of the flash bag is about 6 to 7 mm, so that one gram of flash could fit into the bag. The flash bag that was used was roughly 1 cm shorter than the length of the canister, so that one layer of stars would fit in the bottom of the canister. The flash bag is filled with flash and glued onto the lid, making sure to keep it straight until the hot glue gets cold.





In the meantime, the canister was filled with one layer of stars on the bottom. Then a sort of "canulle" was prepared, a paper cylinder slightly wider and shorter than the flash bag consisting of two layers of paper, and held in the middle of the film canister while the stars were filled around it. Leaving a little space for the lid on top, not filling the canister with too many stars, the canister is now ready for the final assembly.

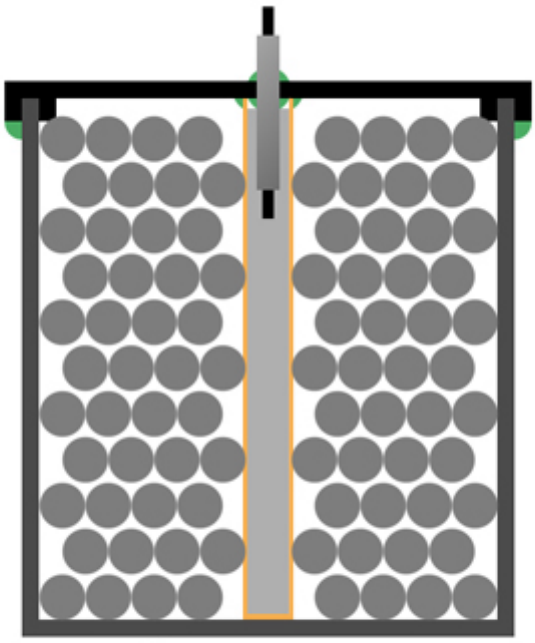


Now you take the hot glue gun, and give the lid a suitable amount of hot glue. You want the glue to touch both the inside and the outside of the canister rim. Be aware of the theoretical danger with hot glue and stars with a low ignition temperature. In practice, the glue cools down a little bit before you are able to put the lid on, and it should be safe. Also, wipe away any loose flash or BP that is stuck on the rim or any other surfaces that will come into contact with the hot glue. The stars will likely have a lower ignition temperature than most flash types, but the stars are easier to keep out of contact with the glue.

Assuming that you have a centered paper canulle of the proper diameter, putting the flash bag into the hole should be simple. Note that the canulle is not removed, and that it will act as reinforcement for the flash bag. To get reproducible results, the flash bag and canulle should be made to the same dimensions every time.

Now is the critical moment. You have to make sure that the lid gets into the correct position, and that no air bubbles penetrate from the outside to the inside of the shell. Due to the hot glue, the air trapped inside the shell, and between

the lid and the rim will often cause bubbles to form. If you want to be sure no pinholes are present, just add some glue outside along the lid when the shell has cooled. With some practice, this is not necessary. If you use the gray type of lid, you will have to keep some pressure on it until it has cooled. If all the steps went as they should, you now have a film canister shell.



The mortar

In order to launch the shell, you must have a mortar or a rocket. I will only cover the mortar for now. What you have to get is a tube of paper, steel, or preferably HDPE. The film canister shell is about 36 or 37 mm OD. You will need a mortar that has an ID just slightly larger than that of the shell's OD, and about 25 cm long. The tubes are glued into place on a piece of wood with hot glue. Ignition is through a small hole in the side of the mortar, where a piece of black match fuse is inserted. Pour 5 grams of 3Fg BP into the mortar, add the shell fuse side down, and it's now ready to go.