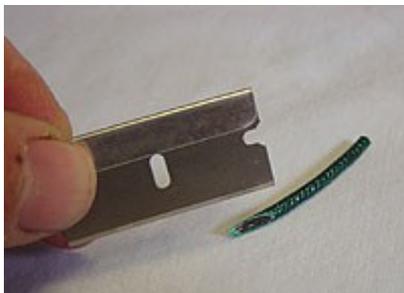


Aerial Mortars



An Aerial Mortar is basically a tiny tube that shoots a small tube projectile, called a "shell", high into the sky. The shell can contain a whistle, star, smoke bomb, or other firework effect. The shell is timed to ignite when it reaches its highest point (known as the "apogee") in the sky. The Aerial Mortar is composed of two main parts, the mortar (launch tube) and the projectile (shell).

The Shell Projectile



Take a 1-1/2" piece of Visco Fuse, and using only a razor blade, cut one end in a sharp diagonal. This is done so it will expose a larger amount of the black powder core inside the fuse and insure that it will ignite during launch. Do not cut the fuse with a scissors or similar tool. A scissors does not make a clean cut and actually crushes the powder core & closes the fuse end at the same time, making ignition much less reliable. There is no need to cut a diagonal on the other end of the fuse.



This end plug is going to be the bottom of the shell (projectile), and to make it strong enough to withstand the blast of launching it out of the mortar, we're going to use it backwards in the tube and reinforce it. Be sure to punch a hole in it for the fuse. Press the end plug in one end of the tube, and using a small stick or pencil, push the plug all the way to the other end, leaving a full 1/2" of space above it. This space is important, it will serve as

the time delay.



Insert the 1-1/2" piece of fuse (with the diagonal end sticking out) so about 1/2" is outside the shell.

Stand the tube up, and fill the empty space with Elmer's White Glue. This will have to dry at least several hours, or possibly overnight before you can continue. It is possible to use Hot Melt Glue in place of Elmer's at this point if you're impatient, then you need only to wait until the glue cools, which should be in about 15 minutes or so. It should be noted however, that we have had a few misfires using Hot Melt Glue and Elmer's is really the better choice. It's possible that under the right conditions the molten glue surrounding the fuse effects the powder core in some way. In any case, if you're just too impatient to use Elmer's, and going to use Hot Melt Glue, be sure to use a **low temperature** gun and **low temperature** glue sticks. This 1/2" thick gap that you filled with glue will serve as the time delay for the shell. Safety Fuse burns at about 3 seconds per inch, so it takes the fuse about 1.5 seconds to burn through the 1/2" thick glue plug you just made. This gives the shell time to reach its maximum altitude before the fuse burns all the way through into the Powder. You can adjust this delay by making the glue-filled gap thicker or thinner. If the projectile ignites before reaching its maximum height, make the plug thicker. If it ignites after it reaches its maximum height, and is

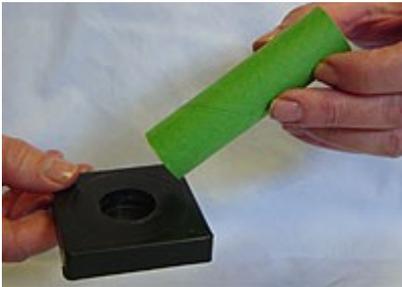
on its way back down, make the plug a bit thinner.



Set the completed shell aside to dry.



The Mortar



Fill with your favorite pyrotechnic composition

Smear some Elmer's Glue around the lip of the tube and press in the other end plug. Push the plug into the tube so there's about a 1/16" gap between the tube end and the plug edge. This is just so we've got another anchor point for more glue between the tube and plug. Smear a good quantity of glue around the rim so the end plug will be locked into place. This end of the tube must be glued with Elmer's and not with Hot Melt Glue. Since the glue layer is not very thick, it will not take that long to dry.

The Mortars for the Aerial Mortar come in 2 pieces, a small plastic base, and a heavy wall launch tube. Test fit the two pieces and see if they will fit together, if they don't, take a file and just file a bit off the edge all the way around the tube so it's possible to press it into the base.

Now take your 1/8" drill, and make a hole 3/4" from the bottom of the tube. This will be the fuse hole.

Spread some Elmer's Glue or hot glue around the indent in the base and press the tube into the base firmly. Make sure that the tube is pointing up straight from the base.



Cut a 3" piece of Visco Fuse and insert it all the way into the hole. Spread a little Elmer's around the hole to hold the fuse in place if it is loose.

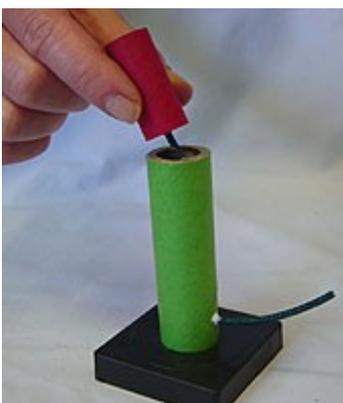


Pour in a 1/8 TEASPOON of Granulated Black Powder into the mortar.

Instructions on making Black Powder, as well as converting it into granulated Black Powder (Lift Powder) can be found by [Clicking Here](#).

You can also use commercial 2FG or 3FG Black Powder if you don't want to make your own. You **CAN NOT** substitute Flash Powder for the Granulated Black Powder. Black Powder burns slow, and even slower when it is granulated. We want to gently (but quickly) launch the projectile out of the tube and ignite the delay fuse.

If you were to use Flash Powder (in any amount) in the launch tube it would detonate and destroy the mortar, and also destroy your projectile.



Push your shell (fuse first) **all** the way down into the mortar. The shell should slide easily down into the tube, you should not have to force it. When completely dry, the completed Aerial Mortar will be ready for use.

Operation

When the fuse is lit, the Granulated Black Powder ignites, shooting the shell up into the air. At the same time, the flame from the lift charge ignites the delay fuse on the shell. When the fuse burns out, the shell ignites in the air. Remember that for every action, there is an equal & opposite

reaction. This means that the same amount of force that is shooting the projectile up in the air, is pushing back down on the mortar tube... so make sure the device is on solid, flat ground. Like everything, the Aerial Mortar may require some fine tuning. You might have to adjust the amount of Black Powder (Lift Powder) or the Time-Delay plug thickness to get the shell to ignite at the proper time. Don't even think about holding this in your hand and lighting it. It is always possible for the firework to malfunction and explode or flare up.

BE CAREFUL! - under the proper conditions, even fairly "safe" firework compositions can explode violently and cause great injury.