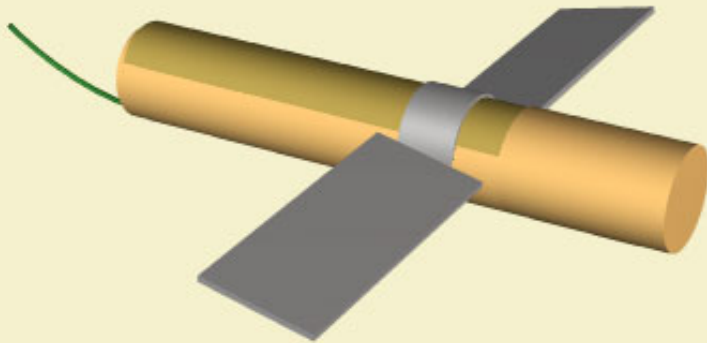


**Build This...****3/4" I.D. Buzz Bomb****Summary:**

Buzz bombs are a type of tourbillion that contain a single port at one end, making them easier to produce and with a longer burn time than the traditional four port tourbillions. A variety of effects can be charged into the heading of buzz bombs, with the most common being report headings. The project described here uses a glitter gerb rammed into the end, which ignites at the same time as the tourbillion lifts, creating a nice dome of glitter. Since it is not possible to create glittering drivers strong enough to lift a buzz bomb or even a four port tourbillion, this device may leave knowledgeable pyro observers a bit puzzled.

**Formula:** [3/4" I.D. Vertical Driver](#), [Winokur Silver Gerb 'C'](#)

**Materials:**

- ▶ (1) 40" long x 7-1/2" wide strip manila paper
- ▶ (1) 7-1/2" long x 7-1/2" wide 30 lb kraft
- ▶ Bentonite + 30% grog or ground ceramic chips 40-50m
- ▶ White glue + water 50/50
- ▶ Thin black match
- ▶ Foil tape
- ▶ Hot glue
- ▶ Aluminum flashing

**Tools:**

- ▶ 3/4" taper head rammer
- ▶ 3/4" flat head rammer
- ▶ brass mallet or ramming machine
- ▶ 3/4" ramming base
- ▶ 3/4" case former
- ▶ Scissors
- ▶ Hot glue gun
- ▶ Hammer & nail

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[Clay Rocket Nozzles](#)

**Tool Tip:**

[Maltese Driver Ramming Tool](#)

**Autopsy:**

[8" Scatter Star Shell](#)

**Class C Corner:**

[Alien Resurrection](#)





## 3/4" I.D. Tourbillion...

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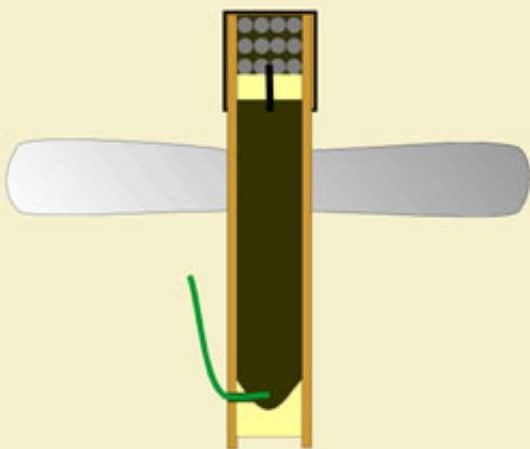


Figure 1: Internal view of a buzz bomb with star burst header.

### Introduction

The Buzz Bomb is a modern version of the traditional tourbillion which has been simplified to use only a single exhaust hole. The device was actually invented in America and then later copied by the Chinese with items such as the Sunflower, Plane Flying at Night and many others.

There are two primary innovations in the buzz bomb design: the use of a conical end plug to prevent exhaust hole erosion and the use of propeller like wings to convert some of the rotary motion into upward thrust. The exhaust hole is drilled through the side of the casing toward the bottom, as seen in Figure 1. The hole must go through the clay plug as shown, which prevents the fire from burning the hole out and causing continually weaker thrust over time.

The 3/4" I.D. size shown here is actually unusually large for a buzz bomb, with 3/8" and 1/2" I.D.s being more common and easier to produce. The design is the same regardless of size, however, and the 3/8" size would be a good starting point for beginners. The fuel for the 3/8" size is simply ball milled meal with optional 5% metal dust added for different effects. The casing for a 3/8" I.D/ buzz bomb should be 3" to 4" long with a minimum wall thickness of 1/8".

The larger size shown here was chosen as a companion project to go with the Maltese Driver Rammer described [here](#). The case, end plug formula and fuel is exactly the same as that used for the horizontal girandola drivers described in that article. This way you can use one machine to produce two distinctly different types of effects.

### The Tube

The first step to constructing a buzz bomb is to make or find a suitable tube that is strong enough to hold the high internal pressures and withstand the long burn time without burning through. The tube used here was made from three strips of manila file folder paper that total 40" in length. Two 14-1/2" strips plus an 11" strip that measure 7-1/2" wide were glued on one side using a mixture of water and white glue in a 50/50 ratio, then rolled around a 3/4" O.D. rod. A final two turns of 7-1/2" long x 7-1/2" wide 30 lb kraft is used to finish the casing. This will produce a final casing that is 7-1/2" long x 1-1/8" O. D. The rammer used to roll these casings was slightly over-sized in order to account for the tube ID shrinking as it dries. Both the rolling rod and the rammer were cut from the same bar in order to insure a matched size, then the diameter was increased on the rolling rod by wrapping three turns of thin plastic packing tape in parallel bands.



Figure 2: The tapered rammer, key to preventing exhaust hole erosion.



Figure 3: Passfire from ignition point to end burning color pot.

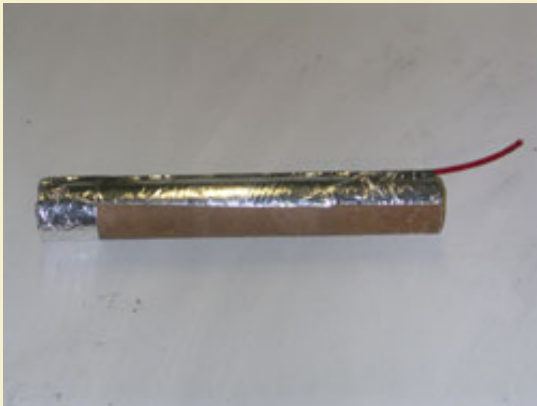


Figure 4: Foil taped used to protect passfire match.

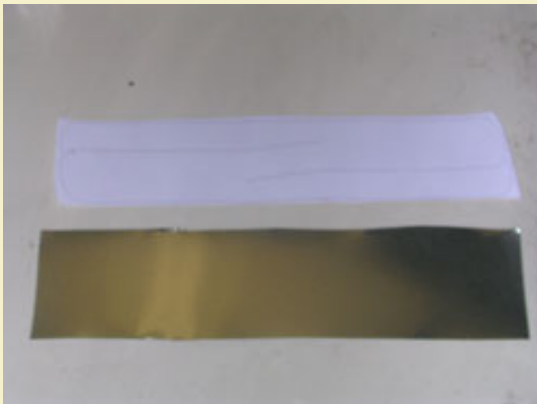


Figure 5: Aluminum sheet with wing template.

### The Plug

Next you will need to create a special rammer to drive the bottom plug, which has a tapered end as shown in Figure 2. The exact angle is not important, just sand the end of a wooden dowel rod on a belt sander until it looks about like Figure 2. An aluminum rammer turned on a lathe would be even better if you are setup for doing that.

This is a high pressure driver, so you will need to use a strong end plug. The addition of a granular material such as grog or ground up ceramic shards in the 25 to 40 mesh range should be added to bentonite in a ratio of 1:3 for making the bottom plug. The top plug can be just plain old bentonite.

Start by pounding 3/4 TBSP of 1:3 grog/clay into the bottom of the tube using 10 to 12 solid hits on the tapered rammer with a brass mallet. Using rubber or plastic type mallets is inadequate and will result in blown plugs, so use a good solid non-sparking metal mallet. The plug can be rammed flush with the end of the case, but it is better if you make a small ramming base with about 1/4" of a nipple to insert the case onto. This will give your plug a better lock-in and also holds the case on center if you will be loading it using the driver ramming tool.

Important: immediately after the plug is rammed, use the rammer to measure where the bottom of the plug sits so that you can mark your drilling hole. The hole needs to be about 1/16" above where the bottom of the conical cavity sits inside the tube, so it is important to measure and mark this spot on the outside of the tube so that you know exactly where it is. If you are consistent with your clay measurement and ramming force, then the hole will tend to be in the same place every time, but it is good to mark it just to be sure.

### The Fuel

After the plug is rammed and marked, the fuel is charged in 1/2 TBSP increments, either by hand ramming or by using the Maltese ramming tool to considerably speed up the process. Granulating the fuel by dampening 20% with water and running through a window screen will make it much easier to work with when hand ramming, and is a necessary step when using the Maltese rammer.

The stopping point for your fuel charge will depend on the header effect you want. A final 1/2 TBSP of clay is used to plug the end, which will usually need a 1/8" passfire hole drilled through it.

The exhaust hole is now drilled at the mark you made on the side of the casing. A 3/16" hole will work well, but you may also be able to get away with an 11/64th hole to produce a little bit stronger thrust. If you blow a plug or pop the tube, drop back to the larger hole.

Because of the ceramic material in the plug, you don't want to use power when drilling through it. Drill through the case wall until you hit the clay, then turn the power off and hand twist the bit the rest of the way into the powder core.

### The Header

The traditional buzz bomb heading is a report, hence the "bomb" following the "buzz." This can be made by filling about an inch of

empty tube space above the end plug with flash, then closing with a wad of paper followed by hot glue. An alternate method is to insert a small hand-rolled salute into the cavity and gluing it in place, although this is a bit more work to create the same effect. In both cases you will need to drill a passfire hole through the clay end plug and insert a stick of black match into it.

This 3/4" size device actually has enough room inside the tube to load a respectable amount of small stars if you would rather make a color heading. Figure 1 shows such a heading of stars, which really don't even need a burst charge because the centrifugal force of the spinning tube will throw them out. So just leave out the burst charge and cram as many stars as you can fit into the tube!

Another type of experimental heading, which I have not worked the bugs out of yet at the time of this writing, is to charge the top portion of the tube with an alternate effect like a glitter or color pot that ignites at the same time as the buzz bomb takes flight. A stick of black match is run from the ignition point up to the top of the case as seen in Figure 3, which is then enclosed with a long piece of foil tape so that both ends ignite instantly. The idea is to have rising effects that are not easy to produce with the driver fuel, such as color, glitter, color changes and other seldom seen effects. However, some of the problems that plague this method result from the high RPMs of the spinning tube either blowing out the fire or throwing it from the tube so that the flame front is lost and the effect stops burning during flight. This paragraph will be updated when this problem is solved.

### The Wing

The original buzz bomb featured a plastic wing, while the Chinese adaptations use a paper wing. Paper wings are easy enough to produce, but they tend to be too flimsy in larger sizes such as this device. I have opted for an aluminum wing that is made using the same pattern the Chinese developed for their paper wings. It can be produced by using your computer to print this [wing template](#) pattern onto a sheet of Avery 8.5 x 11 full page size adhesive label, which will give you three patterns per sheet. You can also use an image editing program to scale this template for different size buzz bombs. You may need to scale the image anyway even for this project if it doesn't print to the correct size. Trying to get images to print at the correct size on different printers can be problematic. The distance between the wing tips measured across the length of the paper should be about 9-7/8" when scaled correctly.

The wing patterns are cut from the adhesive label and then fixed to a sheet of thin aluminum flashing. The label and the scrap of aluminum can be seen in Figure 5. This aluminum is so thin that you can cut it with scissors just like paper, using the fixed template sticker as a guide. Once cut out, the label is peeled off and discarded.

Next you will want to make a series of cuts half way through the thin strips next to each wing, as seen in Figure 6. These will form tabs that you fold over to lock the wing pieces together. The tube is weaved between the slots in the wing such that the wide cross pieces is on top (Figure 10) while the two thinner cross pieces are on the back side (Figure 11). This part can be tricky to describe, as you need to twist the wings while trying to bend the metal around the



Figure 6: Slotting the tabbed support wings.



Figure 7: Folding tabs down over the leading edge of the wing.



Figure 8: Punching holes through the tabs to lock them in place.

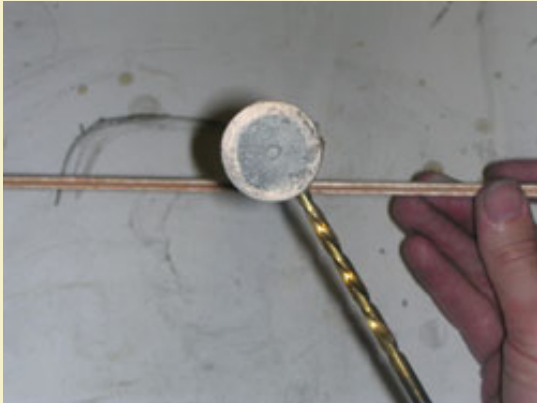


Figure 9: Proper angle of exhaust hole relative to wing plane.



Figure 10: Gluing the wing to the engine.

driver tube, keeping the flapped pieces on the back side of each wing. When everything starts to align properly, fold the tabs over to lock the back piece to the top piece, as shown in Figure 7. If you were making a paper wing, you would use glue and staples to hold these together.

The folded tabs will not stay put without "riveting" them together as seen in Figure 8. You have to hold them in place while driving a center punch or nail through each tab so that it pins it to the underlying wing. Make sure the wing is correctly wrapped around the tube before riveting them together, since they will no longer be able to slide into place after you nail them down.

The finished wing should be twisted like a propeller such that the tabbed ends are angled upward. The casing is then rotated so that the exhaust hole will spin the tube in the correct direction to give it lift. Since the wing can also be installed "upside down" relative to the images shown here, it is important to pay attention to the desired direction of rotation. For the orientation shown in Figure 10, the tube will need to spin clockwise. If your riveted edges are reversed from that in Figure 10, it will need to spin counter clockwise.

The last step is to hot glue your wing to the engine, which is done by squirting hot glue into the cracks along the edges as seen in Figure 10. Before applying the glue, the engine will need to be properly rotated so that the exhaust hole is angled down at 45 degrees to the horizon, as seen in Figure 9. This way the engine provides both spin and downward thrust to aid with flight. In fact, the buzz bomb will still fly with just a straight stick attached in place of a wing, as seen in Figure 9. However, it will not fly very high and will tend to drift sideways a considerable distance. Given that this is basically a flame throwing buzz saw flying around without a blade guard, it is very preferable that it goes straight up rather than coming after you!

### Usage

Buzz bombs are placed flat on a smooth surface with the exhaust hole facing down. They can be launched from asphalt, but usually not grass or bumpy turf that prevents them from spinning well. A good clearing is required as the flight path is often unpredictable, just like their big brother-- the girandola! 🔥



Figure 11: Bottom view of the wing.



Figure 12: The completed buzz bomb.