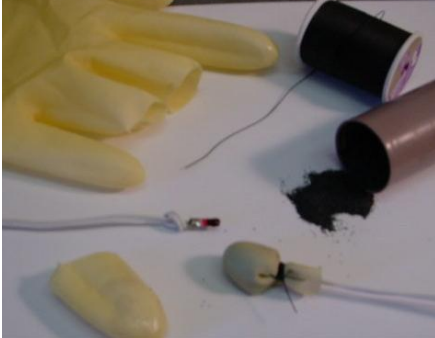


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## High Altitude Deployment (tests)

As you go to higher altitudes the air is colder and the pressure is less. This has an effect on how the BP/charges react. If you want a better discription of it you can go to Rouse Tech CO2 ejection [www.aeroconsystems.com/RTM/index.htm](http://www.aeroconsystems.com/RTM/index.htm) This system has worked on up to 45,000 foot on John Rockdale's TRA record setting flight. Why don't I get a Rouse Tech? I'm cheap, and don't have room in the rocket for one. Also, I want to see if I can get BP to work. So at what altitude should you start to worry about your BP ejection charges not working? I'm not sure, but I hear it's in the neighborhood of 20,000 feet. I have a rocket (Speedy Gonzales) that has flown to just under 20,000 (19,862) a few times and I have not had a problem with my current method of BP deployment.



What I currently use for BP ejection charges is a Davey Fire 28B e-match with a knot tied in the end. The tip of a finger from a medical glove. Pour your BP into the finger tip, insert the e-match and tie it off with sewing thread. I have used this method with out any problems with up to 3 grams of BP up to almost 20,000 feet.

So what happens to my normal BP ejection charge at a simulated altitude of 40,000 foot? The e-match fired and some of the black powder lit. About half of the BP was scattered and un-burned. I have heard that one flyer that flies to high altitudes use "normal" BP charges but uses 6-7 times his normal amount. I can see that this might work..you scatter half of it and the other half burns. I'd rather not take the chance of making up some really healthy charges and hoping that enough of it burns. So how can you get BP to work? It seems that you need to contain the BP long enough for all of it to burn before the ejection holder lets loose. This sounds easy but in reality you would be making an M-80 or worse for ejection charges and hoping that they did not produce to much shrapnel. So what could you use to allow the BP to completly burn and not have any shrapnel? The ejection holder would have to expand as the gasses where produced and the release it with no shrapnel.

So what did we actually test? First our test chamber was 6"PVC pipe with a cap slipped onto the bottom. The top was another PVC cap that had the electrical conection in it. Below the cap was a plastic cup to catch the scattered BP and to see if there was any shrapnel. This was hooked up to a vacuum pump and we were able to draw it down to -25 inches of mercury which is about 43,000 feet (simulated)

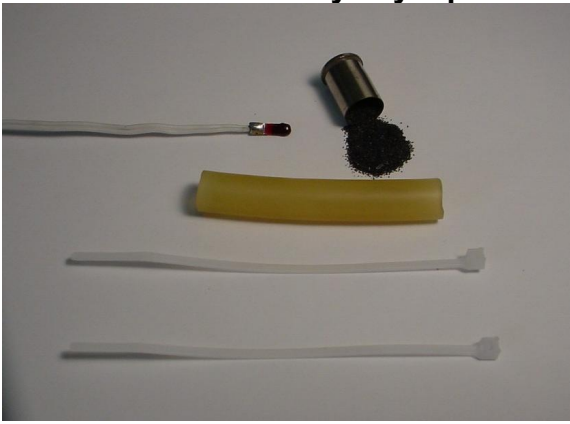
This was strapped to a forklift and a moving blanket placed over it..we were not trying to get the cap to blow off the 6" PVC..we just wanted to see how much of the BP we could get to burn.



The first BP charges to be tested were like my normal charges..we used igniterman igniters (to save our e-matches) They had two layers of medical glove finger tips, instead on the normal one. They were then wrapped with tape in an attempt to contain is a bit longer. There was no shrapnel but only about half the BP burned. The other half was scattered.



So what worked? They say a picture is worth a thousand words...



A 2 1/2" long piece of latex tubing also known as "surgical tubing", (tubing is 7/16"OD and 1/4" ID McMaster part # 5234K45) 2 small nylon tie straps, an e-match and some BP, in this case 1 gram. So how did it work? All the BP lit and there was no shrapnel! So the next step was to place a simulated air frame into the test chamber. The simulated airframe was 2" PVC pipe 10 3/4" long with end caps a 3/16" hole was drilled in it as a vent hole and also to run the e-match out of. The pressure was lowered to -25in Hg (43,000') it was held at this vacuum for about 2 minutes. At ignition both PVC caps were blown off! The next test was with a 23" long piece of PVC pipe. still using 1 gram of BP. This test blew one cap off and shattered it inside the test chamber! Conclusion: It appears that BP can be used for high altitude deployment. It appears that Surgical tubing keeps the BP contained and none is scattered (wasted) and there is no shrapnel! In addition these ejection charges are easy to make in the field. More tests to follow..

**Update Balls 13...Dewyane Doud flew a 3" min dia rocket to 29,000' with this method. His drouge compartment was 7" long and packed full (like all min dia rockets) he used 2 grams of BP to deploy his drouge..his back up charge was not needed. I flew a rocket to 25,700 that had a 4.375 dia by 9" long compartment that used 3 grams of BP for a good flight**

John, I was making up some charges for this coming weekend and figured now would be a good time to let you know what size tubing I'm using..The

stuff is 'Latek Rubber Tubing' McMaster page 97 The stuff I started playing with..that I got from the local hardware store is 7/16"OD and 1/4"ID McMaster

#5234K45. You'll need about a 3.5" long piece to make a 2 gram charge..If you plan of more BP then I would get bigger size tubing..this size tube gets a bit long with more BP..not sure if that effects it or not..why take the chance?..as for nylon ties..you'll want some fairly small ones..fresh ones..not ones that have been in your hot range box and become brittle..I'm not sure how they size these things but the ones I have say the following on the package

5.6" 1/16" - 1 1/4" bundle Tensile Strength 30 lb

I bought a couple of bigger size tubing at McMaster and made up a 3 gram charge tonight..I used some 5/8OD by 3/8 ID stuff..that is really thick I had a

hard time..had to pull the tie straps really hard to get the tube to seal..with it..If I was going to buy more tube I would go with 5/8 x 1/2 stuff (McMaster

#5234K26)..it has thinner walls. my 3 gram charge came out 2 7/8" long..it would be shorter with the thinner wall tube..you could probably go up to 4 1/2

grams with this and not be getting to awfully long. Other then that not much to it..I do tie a knot in the end of the e-match to keep it from pulling out and I try to place the match in the middle of the charge.I

hope this helps... Another thought, A buddy of mine used this method on his min dia L3 rocket. He had two seperate charge, one for each altimeter, He ended up kicking his main out at apogee. Both charges may have gone off at the same time! He is going to try one tube with two ematches. one ematch from each altimeter. One in each end of the Latx Tubing. That way who cares which one fires. The BP will burn. One bad thing is that he will not have a back-up "hail Mary" charge, in case his first one is not strong enough.

Tony, I nabbed a TRA "L" record yesterday using the surgical tubing trick. 23,304' on an L330. (54mm min dia rocket) Not a scratch on the bird! It was cold and a bit of wind, so conditions were not ideal... but all's well that ends well! Thanks for the tip, it worked splendidly-- For my project I used 1.125g of BP for the apogee deploy. It was an exceedingly tight fit, with seemingly no air to displace. But I tried 0.5g and it didn't do a thing. Didn't even break the shear pins... I then went to 1.0g and it was pretty good. I then added another 0.125g just in case there was some binding, etc. The project had 4 shear pins, all 1/16" polystyrene. I used two zip ties below the match head, and two above. The shock cord was folded accordion-style, and I fed the surgical tubing down into the middle of the folds. It was just right...(John Wilke) 5/06

**Greg Fannin was able to up the TRA L altitude record to 28,739' using the Ellis L330 motor. Greg used the above method with 2/3 of a gram of BP in his 54mm min dia rocket. 11/2006**  
**I was able to use this method at Balls 05 to an altitude of 27,500' with perfect recovery..so far so good!**

Balls 2007..I flew a 5" min dia rocket that simmed to 63K. At 52 seconds into the flight we had a drastic increase in the Walston signal. Apogee simmed at 52 seconds into flight. We had a good strong signal for several minutes and then lost it once we drove towards the signal/ The rocket is currently misplaced. I feel that the Latex charges worked as planned. Unfortunately I do not have the rocket to prove it.



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