



The Eagle CO2 Ejection System

"For all practical purposes, acceleration immune, regardless of mounting orientation!"

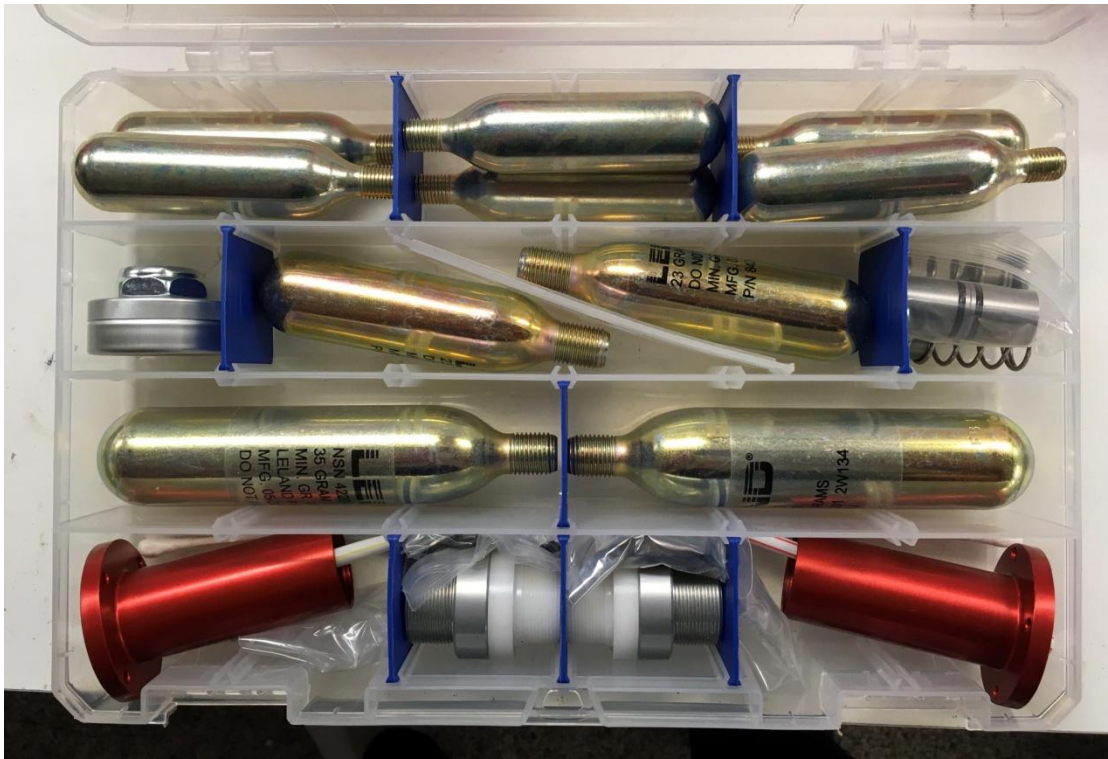
Features:

Precision Machined Aluminum & Stainless Steel Construction
Works with ANY 3/8" or 1/2" threaded CO2 cartridge (5/8" adapter sold separately)
Acceleration immune regardless of orientation
Exhausts out the end so it can be completely housed **INSIDE** the avionics bay
Lightweight- about 4 oz without CO2
Works with BP or BP substitute
Works in a complete vacuum & in the deep cold of Space
Lifetime Tech Support & Lifetime Unconditional Warranty

Parts List:

Precision Machined Aluminum Housing
3/8" & 1/2" Cartridge Adaptors (5/8" Available)
Dual Charge Cup
E-match Potting Putty & O-ring seals
Puncture Piston Assembly
Assembly Lube (Works the best of anything I have found)
Extra O-rings
Powder Measure Vials
Six 16gm CO2 ctgs, Two 23gm CO2 ctgs & Two 35gm CO2 ctgs

In short, everything you need for an acceleration immune CO2 ejection system that works in the extreme cold and pure vacuum of space!



Double Eagle CO2 Ejection Kit

5-5-23 Updated User Instructions

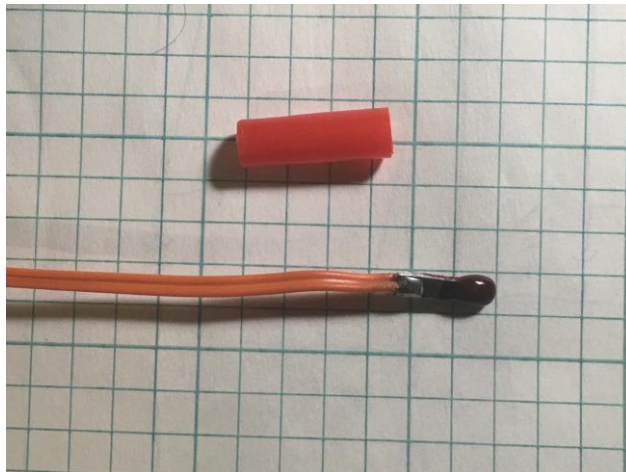
Note: These instructions are written for "rocketry folks" and it is assumed that all directions will be closely followed. If you are not a "rocket" guy or gal or you do not feel that you can follow these directions exactly, **please do not use this device!**

Step 1 - Prepare the E-match & Charge Cup

Using the supplied lube, thoroughly lube the Dual Charge Cup
(**Hint:** Don't be stingy with the lube and do not substitute other lubes!)



Remove the protective plastic cover from the e-match
Slide one of the small black o-rings over the wire and up to the e-match head



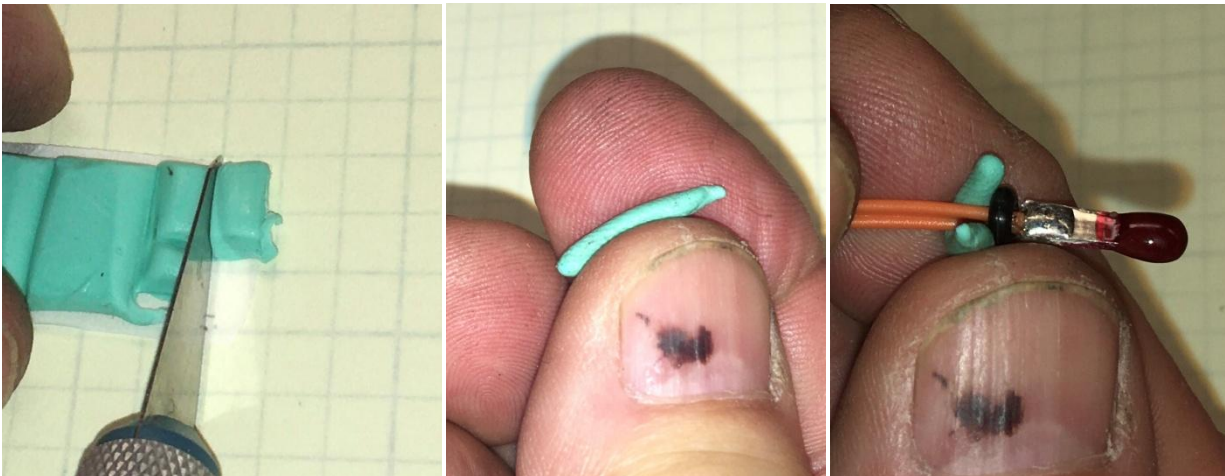
Step 2 - Sealing the E-Match in the Charge Cup

Sealing the burning pyro gasses inside every Tinder Rocketry device is **very important**. Gasses that are allowed to escape are gasses that do not do the work they were designed to do.

Traditionally, e-matches have been "potted" or sealed in charge cups using epoxy. More recently, new and significantly better methods have been developed and by far the best method for various reasons, is the "Putty Sealing Method". **The Putty Sealing Method is the ONLY method of sealing/potting the e-match that is recommended by Tinder Rocketry and as a result the only method that will be described here.**

Poster Putty/Mounting Putty AKA: Putty Sealing Method

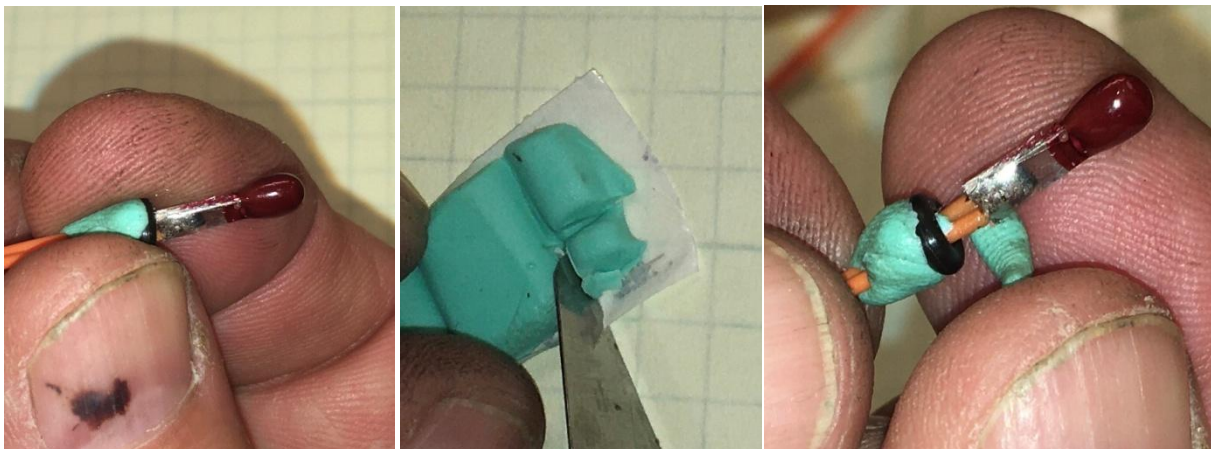
With a hobby knife cut one of the "squares" into quarter sections
Remove one of those quarter sections and roll it in your fingers
Fold the putty around the wire below the o-ring



"Roll" the putty covered wire/o-ring in your fingers

Cut another one of those quarter sections, roll in your fingers and apply it to the top side of the o-ring

Note: For best results, first slide the o-ring "down" about 1/8" or so before adding the putty to the "top" side.



Roll the whole thing in your fingers so that you have putty completely encircling the wire on both sides of the o-ring.

Insert the putty prepared e-matches into the lubed Charge Cup

Gently pull the e-match wires until the e-match heads are just below the deck of the charge cup

Note: You may have to tug on and wiggle the wire while tugging to get it seated properly, this is ok.

You may very likely see the putty ooze through the wire hole along with the wire, this too is ok.



The Putty Method of sealing the e-match has been tested at room temp, well below 0 F and well over 140 F and it has been found to seal very well every time!

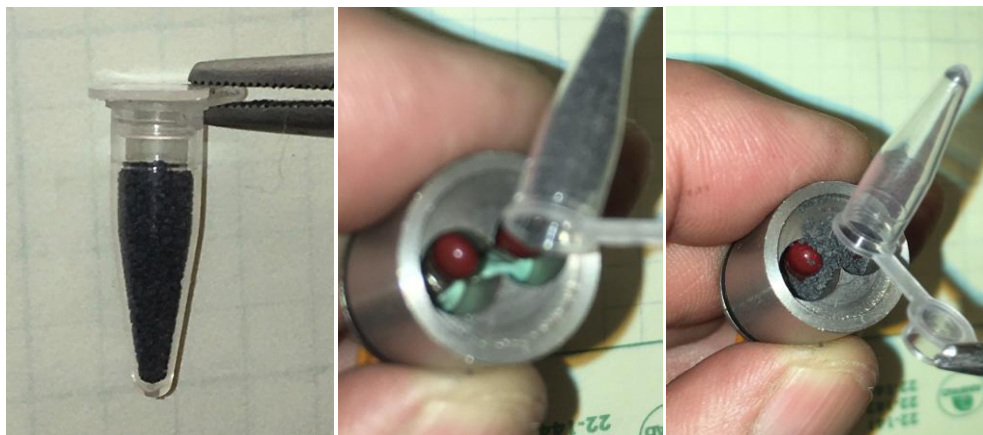
Because of the excellent sealing, easy setup, fast disassembly and cleaning, and as said before. this is the preferred method of sealing e-matches in ALL Tinder Rocketry devices!

This poster/mounting putty can be found on Amazon, at your local hardware store or for your convenience, on the "Support Parts" page on the Tinder Rocketry website.

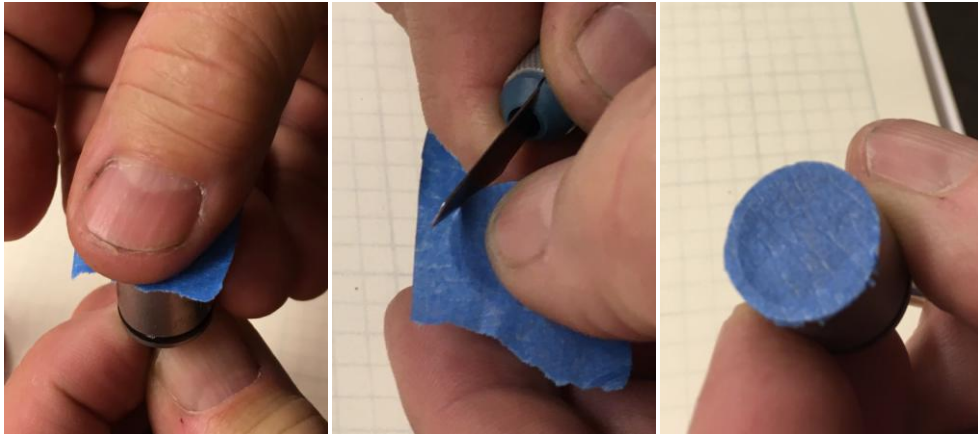
Step 3 - Adding Pyro Powder to the Charge Cup

Fill one of the supplied Powder Measure Vials "to the line" with 3F or 4F black powder or BP substitute in the 3F or pistol granulation (Such as **Triple Seven or Pyrodex P ONLY!**). It is ok to "tap" the powder down a bit to settle the powder to get a good measure in the vial. Do not add extra powder. You may find it convenient to fill the vials ahead of time and close the lid for later use.

Carefully add the pyro powder to the prepped charge cup and again,
DO NOT ADD EXTRA POWDER!



Cover the pyro powder with blue painters tape (3m brand recommended)
Carefully use a hobby knife to trim the excess tape.



VERY IMPORTANT Note:

Do not ever use smokeless powder in this device! (Or any Tinder Rocketry device for that matter)
Use black powder (3F or 4F) or black powder substitutes such as Triple Seven or Pyrodex P
ONLY!

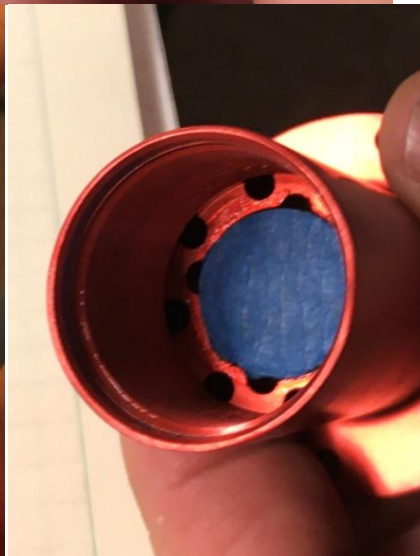
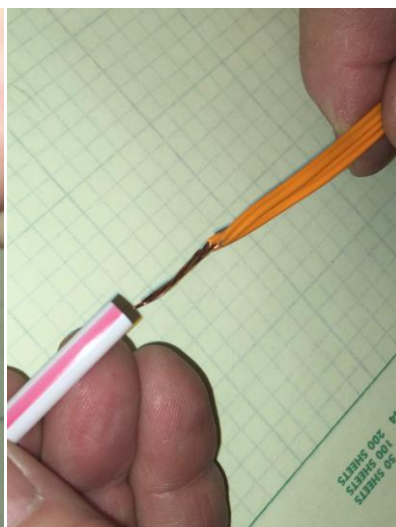
The powder from a "disassembled bullet" is NOT black powder! The powder from a "disassembled fire cracker" is NOT black powder!

**THE USE OF ANY OTHER PYRO POWDER OTHER THAN WHAT IS LISTED HERE
WILL LIKELY DAMAGE THE DEVICE AND COULD CAUSE PERSONAL AND SEVERE
BODILY INJURY!**

(I tell you this because I have had a few customers that felt that they did not need to follow directions and have used "Other" powders and have had "bad results"!)

Step 4 - Prepare the Housing

- With the supplied lube, use Q-tip to thoroughly lube the inside of the housing
- Insert wires from Charge Cup into supplied plastic straw to help in feeding wires through housing
- Lube around the Charge Cup o-ring with supplied lube
- Insert plastic straw covered wires into housing
- Pull Charge cup into housing
- Push with finger until the charge cup is just below the deck (A bit further than shown in last picture)



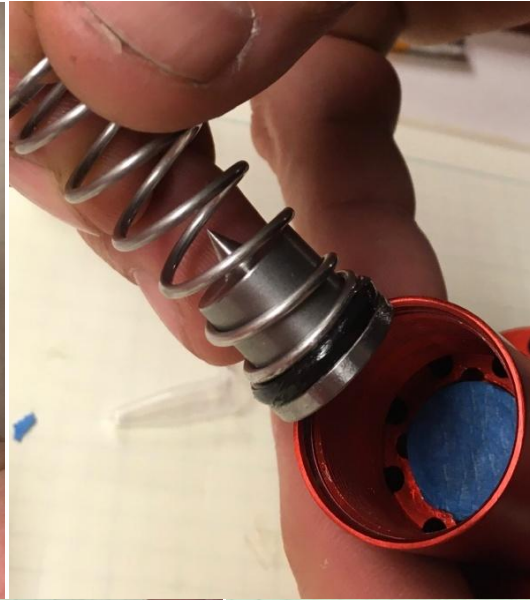
Step 5 - Finish preparing the Housing

Lube the Puncture Piston as shown

Insert Puncture Piston Assembly into housing

Press with both thumbs until the spring is level with the mouth, the spring will partly compress and still be sticking out of the housing when you release it.

Choose the proper cartridge adaptor for the CO2 ctg you will be using, lube the cartridge adaptor just a little before first use and place it so the spring is in the recessed groove on the bottom of the adapter



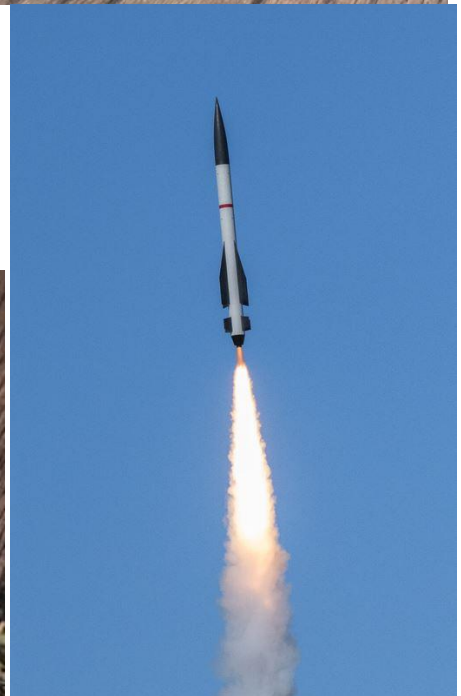
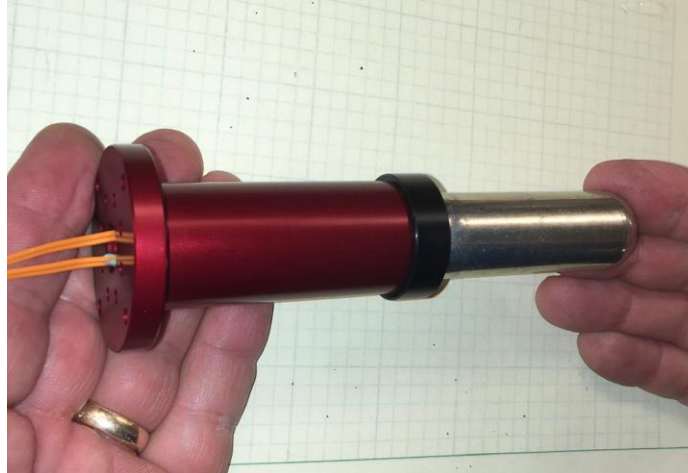
Thread the cartridge adaptor into the housing while pushing against the spring pressure.
Be careful not to cross thread while screwing the adaptor all the way until it is seated.
Do not over tighten!
Check to verify that the charge cup is seated all the way into the housing



Put just a little lube on the CO2 ctg before installing it in the cartridge adaptor
Gently screw the CO2 ctg all the way into the adaptor while being careful not to cross thread.
Make snug but do not over tighten!



Step 6 - The device is ready to be mounted (If it is not already!)



Setup and first flight - John Woody of Texas!

(Picture of John's **MadCow AGM 58** being flown with K-700 was taken by **Harry Spears**)

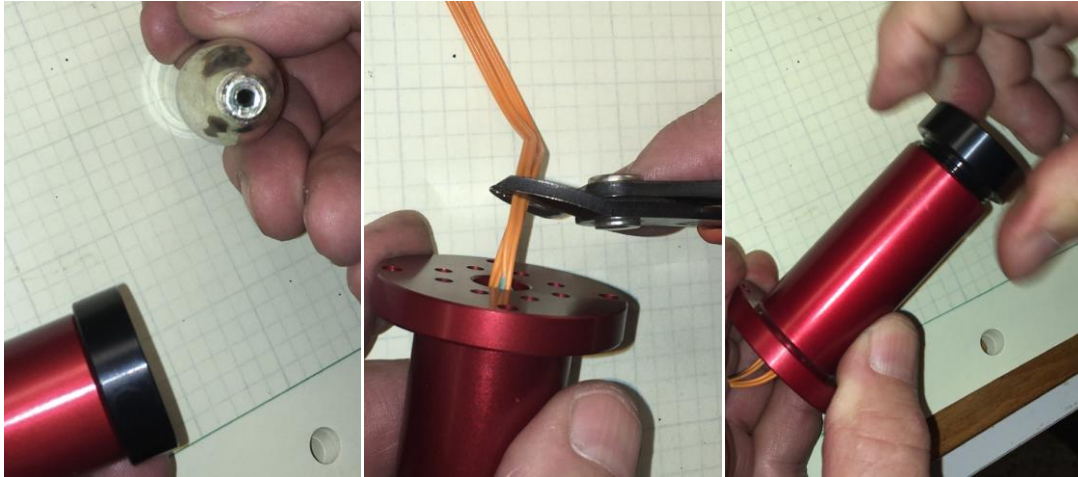
After use Disassembly & Cleaning

Step 1- Disassemble

Remove spent CO2 cartridge and examine
CO2 cartridge should have puncture hole of about .100" (2.5mm)

Clip wire to about 1 inch from the base

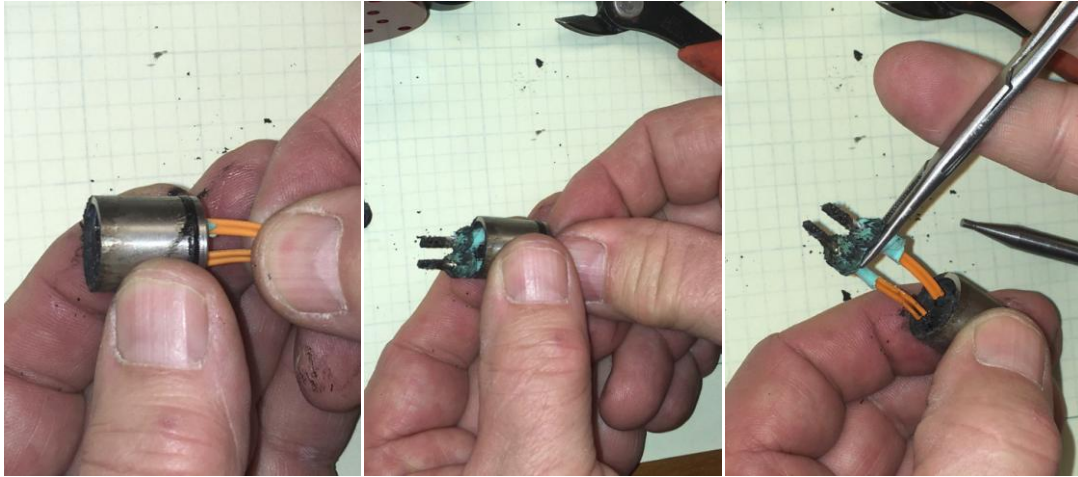
Unscrew adaptor cap from the housing



Use a wood dowel, pencil or even the included punch to gently press out the Charge Cup and the Puncture Piston Assembly from the Housing



With your fingers, push the spent e-matches out of the Dual Charge Cup
With needle nosed pliers (So you don't get your fingers nasty) pull out the spent e-matches



Step 3 - Thoroughly Clean

With soapy hot water and an old toothbrush clean all parts (Not shown - I think you know how to do that!)

Dry with paper towel then air dry completely before re-use.



Choosing the Right CO2 Cartridge for your Rocket

"Make everything as simple as possible, but not simpler."

This is a quote from a really smart guy with bad hair, Albert Einstein.

Simple is good and simple is what we are going to try and do here...

Choosing the right CO2 cartridge for your rocket:

Method 1:

You may choose this method if you have flown your rocket (or you have ground tested it) and a known qty of BP has been determined for deployment. **The factor is 5. Whatever the qty of BP that you have used in your rocket, measured in GRAMS, multiply that by 5 to get the equivalent grams of CO2 needed for the same deployment pressure.**

For example: A rocket that has been flown (or ground tested) with **4 grams** of BP, would need about 20 grams (**4 gms x 5**) of CO2 to achieve the same ejection pressure. In this example you would choose either a 20 or 23 gram CO2 ctg and that would very likely work just fine, but you will still ground test!

Example #2: A rocket that has been flown (or ground tested) with **6 grams** of BP, would need about 30 grams (**6 gms x 5**) of CO2 to achieve the same ejection pressure. In this case, round up and choose the 35 gram CO2 ctg and then ground test!

Method 2:

You may choose this method if you have never flown nor tested your rocket and have no idea as to how much BP you might need for adequate deployment. I recommend that you first follow this link to the Rocketry Calculator website (<https://rocketrycalculator.com/rocketry-calculator/bp-estimator/>) where they have a very useful BP calculator and thoughts about how to determine how many grams of BP your rocket might need for BP deployment in your rocket.

Warning: Do not let your head explode with all this discussion!

Simply use this discussion to determine a STARTING POINT for your ground testing!

Once you have determined how many grams of BP that you would need to use in your rocket, use this number and go to Method 1. Then you must GROUND TEST!

There you go! The focus here is to get you to a starting point where you will then ground test this CO2 deployment system in your rocket before flight!

(Have I mentioned that you should ground test?)

A word on CO2 cartridges:

For rocketry flights using CO2 for deployment, more is OK. Unlike BP, it is really difficult to use too much CO2. Always use enough gas and **error on the high side when choosing a CO2 ejection cartridge!**

Another word on CO2 cartridges:

The 16gm 3/8" threaded CO2 cartridges supplied in the kit are fairly common and fairly easy for you to purchase either locally or through the likes of Amazon. Larger 3/8" threaded CO2 cartridges are more difficult to find and the 1/2" threaded ctgs are nearly impossible to find. Because of this you may choose to order replacement CO2 cartridges directly from Tinder Rocketry to be sure that you get CO2 cartridges that are certain to work with your Eagle CO2 Ejection System!

Some discussion on CO2 and the **Eagle** CO2 Ejection system

The Eagle is another CO2 ejection system designed and manufactured by Tinder Rocketry for parachute deployment in high powered rockets at any altitude. The Eagle, is lightweight, compact and versatile! It is designed to be easy to use and works with many CO2 cartridges ranging in size **from 8 to 85 grams!** Best of all, **the Eagle is for all practical purposes acceleration immune** regardless of mounting orientation!

Some have asked “Why would I want to use a CO2 ejection system in my rocket?” Well, there are actually two reasons you might want to consider CO2 deployment. The first and most obvious reason is that it is clean! There is virtually no BP residue left the inside of your rocket after flight! As a result of not having a large BP flame, you can do away with a lot of the flame resistant cloths that now protect you valuable parachutes! (Note: There is still a very small and very brief amount of pyro exhaust so **some parachute protection is still advised!**) If there was no other reason for going to CO2 deployment, a clean interior is more than enough motivation! However there is another reason that you might want to consider CO2 Deployment and that is high altitude flights.

It is well known that BP begins to burn inconsistently at much over 20,000’ ASL and will not even sustain a burn at over 50,000’. There have been many attempts and devices made to try and contain BP so that it will burn at high altitudes, some of them have worked, many have not.

CO2 deployment systems, such as the Eagle, The RAPTOR and The Peregrine, have a very small pyro charge that is completely sealed from the outside air (or the lack there of) and as a result, are capable of deployment at any altitude!

The Eagle has been tested after being pulled from a deep freeze then thrown in a vacuum pulling 29" Hg and have functioned flawlessly!



Final note:

This device has been specially designed and manufactured to the highest standards to do a job and do it well. I have gone to great effort to explain how to use this most excellent little device! If this device is used exactly as described, you can expect it to work 100% of the time, 100% as expected!



Contact me if you see or feel that there have been omissions or if you still have questions.

cameron@tinderrocketry.com