TD-2

Tether and Release Device

"The tether and release device that makes all others ever made, OBSOLETE!"

Features:

Can stand over 2000# initial shock load
Can release with over 1500# still attached!
Can work at extreme altitudes!
Precision Machined Construction!
Compact size: 3.75" OAL x 1.06 max width
About 100 grams
Completely Exhaustless!

Parts List:

Housings & Cap with threaded pin
SS Ring Pin
Dual Charge Cup (With o-rings & Putty Sealant)
Push Piston/Seal
Ball Retainer
Ball Bearings (With extras)
Return Spring
Replacement O-rings
Small punch for Charge Cup disassembly
Small Screwdriver, Cotton Swabs & TR Assembly Lube

TD-2 Tether and Release Device Kit

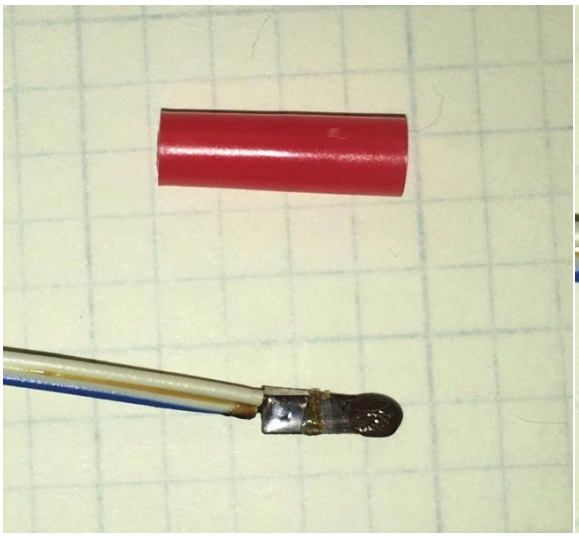
8-8-22 Updated User Instructions

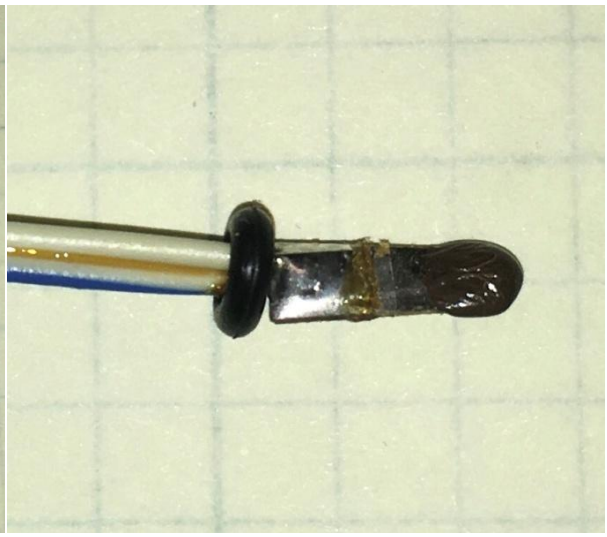
Note: These instructions are written for "rocketry folks" and it is assumed that all directions will be closely followed. If you are not a "rocket" guy or gal or you do not feel that you can follow these directions exactly, **please do not use this device!**

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





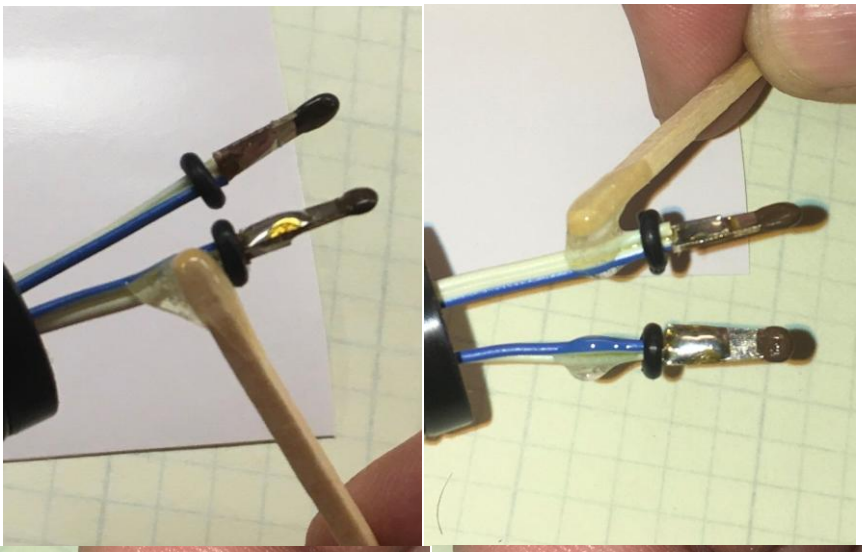
Step 2 - Sealing the E-Match in the Charge Cup

Sealing the gasses in every Tinder Rocketry device **is very important**. Traditionally e-matches have been "potted" or sealed in charge cups using epoxy. More recently, two new and significantly better methods have been developed.
All three sealing methods are outlined below and you are strongly encouraged to read through ALL of the sealing methods AND cleaning instructions before choosing a sealing method!

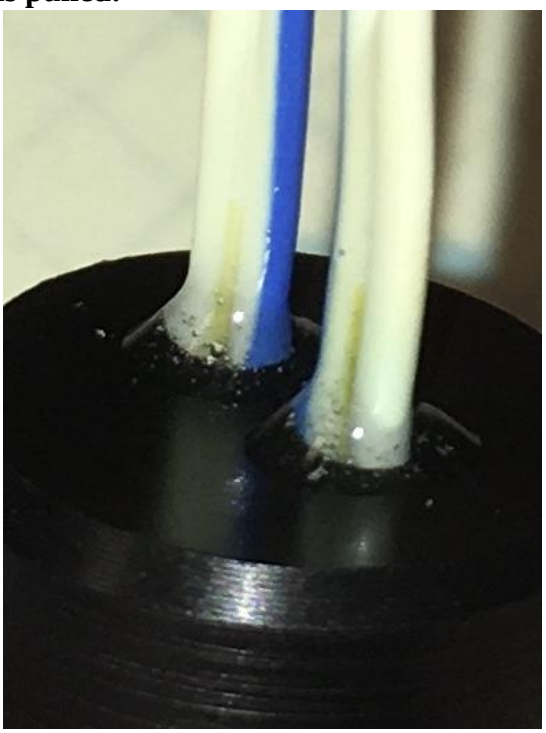
Traditional Epoxy Sealing Method

Prepare the e-matches with o-rings and lube the Charge Cup as outlined in **Step 1 on page two**.
Add a dab of quick set epoxy to the wire on <u>both sides</u> of the o-ring
Pull the e-match wire so that the e-match is entirely inside the Charge Cup.
(Note: If you cannot do this you probably have epoxy residue left inside the Charge Cup from previous use. Remove the e-match and see below under cleaning as to how to remove this epoxy residue)

Note: Don't be shy about using a fair bit of epoxy and put it on BOTH sides (Not shown) of the o-ring



Use Q-tip to wipe any excess epoxy and set aside, **hanging from the wire,** to cure overnight.
IMPORTANT: Make certain that you use enough epoxy so that it oozes out the wire hole when the wire is pulled!

Important: make certain that you allow even this quick set epoxy to fully cure overnight! Failure to allow full cure of the epoxy or failure to use epoxy at all, will result in this device spitting hot burning particles of pyrogen out the back and will reduce the pushing power of the pyrogen, possibly reducing the force to the point of the device failing to release. While a failure to release has <u>never happened</u> in all of the testing that has been done, it could.

Note: The holes in the Charge Cups are intentionally drilled a little tight to aid in sealing, especially for the epoxy sealing method. It has been noted that there is a slight variation of the thickness of the insulation on some e-matches that can make it more difficult to get these e-match wires started. In some cases, the stripped wire needs to be started buy being pulled by pliers. Once started they are easily pulled into the Charge Cup.

Be assured that I am working on another Charge Cup variation for all Tinder Rocketry devices that will make starting e-match wires and cleanup a bit easier, but for now, we have pliers...

While sealing e-matches with epoxy is simple and effective, the down side is that the epoxy must fully cure before use, making the device a once per day proposition...which brings us to a second method of sealing the device...

Hot Glue Sealing Method

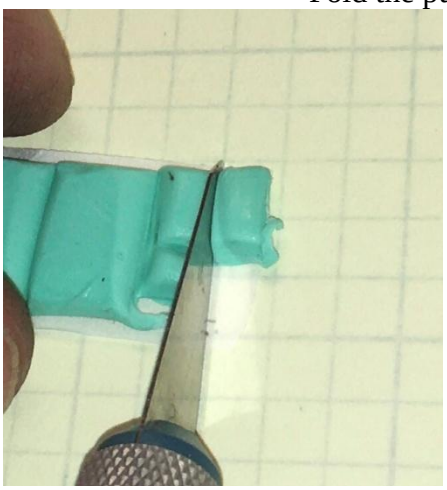
Prepare the e-matches with o-rings and lube the Charge Cup as outlined in **Step 1 on page two**.
Add a dab of hot glue to the wire on **both sides** of the o-rings.
Pull the e-match wires so that the e-matches are entirely inside the Charge Cup.
Note: The glue gun must be up to temp before use. The hot glue must be applied and the e-matches seated in the Charge Cup fairly quickly, as the hot glue will want to cool and set, making pulling the e-matches entirely into the Charge Cup difficult. That said, this method is both simple, quick and does seal very well.

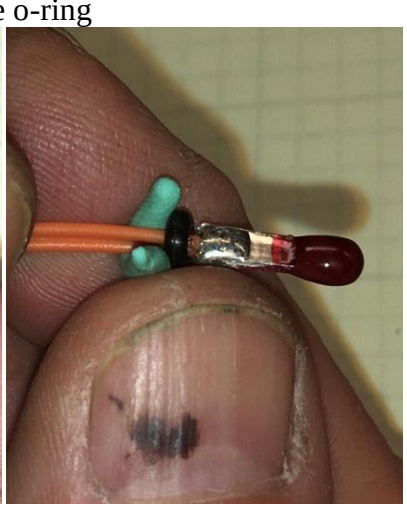


Sealing the e-match in the Charge Cup using hot glue is easy, fast and seals very well. The only known down side is that at a launch, it is often not so simple to find the 120 VAC that most glue guns like to run on. Which leads us to yet another method of sealing the e-match inside the Charge Cup...

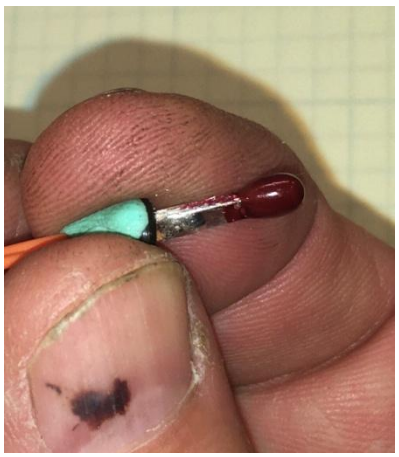
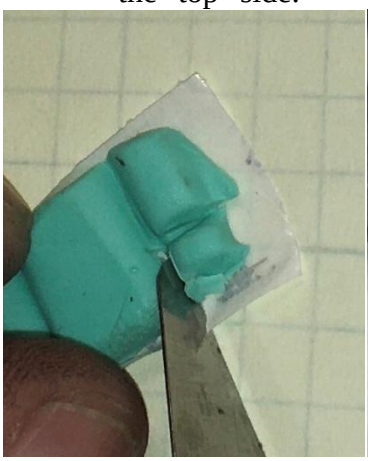
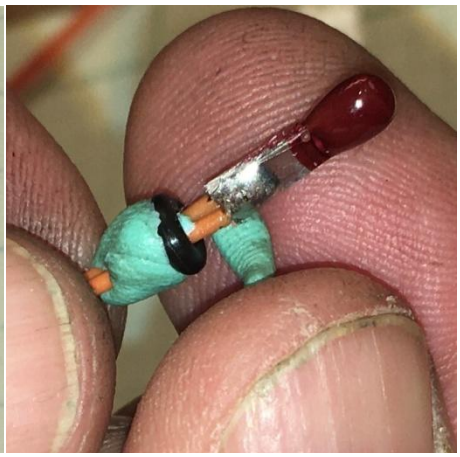
Poster Putty/Mounting Putty
AKA: Putty Sealing Method

Prepare the e-matches with o-rings and lube the Charge Cup as outlined in **Step 1 on page two.**
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



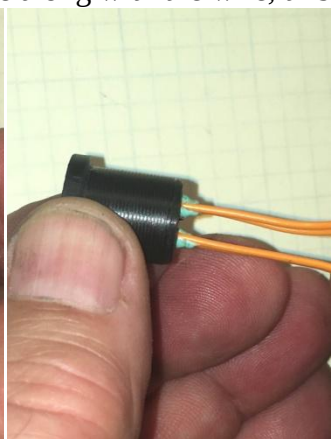


"Roll" the putty covered wire/o-ring in your fingers
Cut one of those quarter sections in half, roll in your fingers and apply it to the top side of the o-ring
Note: To achieve the best seal, first slide the o-ring "down" about 1/8" or so before adding the putty to the "top" side.

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 Charge Cup
Gently pull the e-match wire until the e-match head is about flush with the mouth of the cap
Note: <u>You may have to tug on and wiggle the wire while tugging to get it seated properly, this is ok.</u>
You may also 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, at about 0 F and over 140 F and it has been found to seal very well <u>every time</u> in this device!
Because of the excellent sealing, easy setup, fast disassembly and cleaning, this is my preferred method of sealing e-matches in ALL Tinder Rocketry devices!

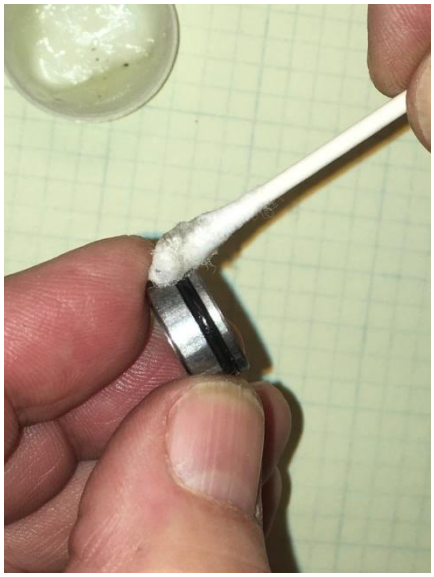
This poster/mounting putty can be found on Amazon or at your local hardware store.
(A small amount is now included in all Tinder Rocketry kits!)

VERY IMPORTANT Note:
Do not use ANY additional pyro powder in this device!
The pyrogen that is on the e-matches is all of the pyrogen that is needed to activate this device!!

Step 3 - Prepare the Ball Retainer Assembly

Wipe a bit of the supplied lube into the Ball Retainer with Q-tip or little finger. Make sure the entire inside perimeter is covered with this lube.
Make sure that there is a thin o-ring on the Charge Cup and lube it.
Insert the wires from the prepared Charge Cup assembly through the large opening of the Ball Retainer.
With your thumb, press the Charge Cup into the Ball Retainer just enough so that the bottom of the Charge Cup is even with the bottom of the Ball Retainer.
At this point, DO NOT COMPLETELY SEAT THE CHARGE CUP!

Lube the Push Piston o-ring with Q-tip or finger.
Place the **flat side of the Push piston flat against the Charge Cup** and press both until **completely seated** in the Ball Retainer.
Set aside the entire Ball Retainer Assembly.



Step 3 - Assemble the device

Lightly lube the inside of the Housing
Insert the Ring Pin <u>all the way</u> into the housing. (Expect a somewhat snug fit)
The Ring Pin will be sticking up on the inside of the Housing.

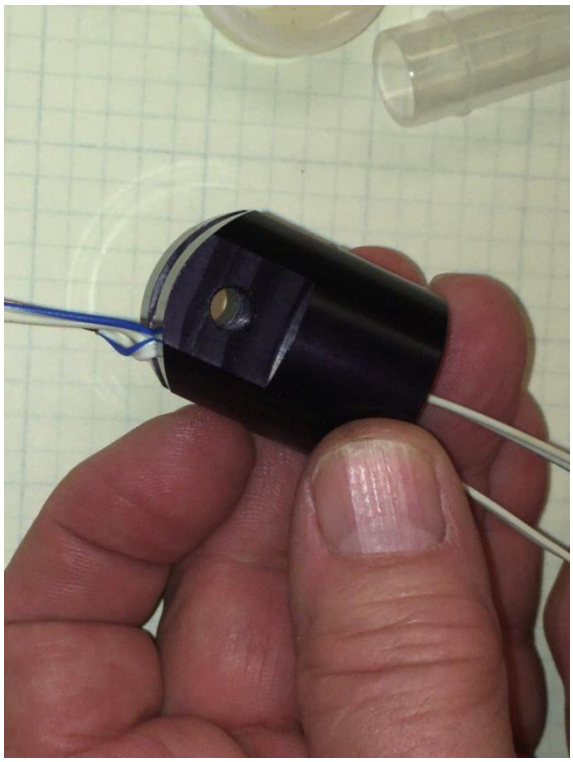


<u>Count EXACTLY 7 Ball Bearings</u>. Your kit comes with extras.
Easy way to do this is to hold the bearing container sideways in your hand.
Make sure there are **7 and only 7** bearings in the container then dump them into the Housing with the Ring Pin held in place.

View inside the housing while holding the Ring Pin in place.
Gently tap on the housing until the ball bearings are seated around the perimeter of the Ring Pin.
NOTE: Even though it seems like there is room for more ball bearings, <u>DO NOT ADD MORE!</u>
While holding the Ring Pin, insert the prepped Ball Retainer assembly.

Push the Ball Retainer assembly until it stops.
Slip the spring over the wires and down on to the Ball Retainer assembly.


Remove the Link Pin from the Cap and thread the e-match wires through the opening and slot. While still holding the Ring Pin and Housing, slide the Cap to the Housing and screw the cap on just a little more than snug. Note: There is no need to over tighten as it will not work loose during flight!




Hold the device in both hands.
Gently pull on the ring.
You will hear and feel the device "click". The Ring Pin is now locked in place and cannot be removed without firing or disassembling the device.
Your TD-2 is ready for use!
You may choose to test it now or fly it a month from now, it does not matter as the e-matches are sealed from the outside air.


A word about e-matches...

I have THOROUGHLY tested this device to be certain it will function using a SINGLE standard e-match, knowing that you the user of this device, will **NEVER** fly this thing using any less that two e-matches. If you have read the instructions up to this point, (You are rocket guys and gals so I know you have) you know that this device uses ONLY the pyrogen that is on the e-matches for activation and nothing more. The pyrogen that is contained on a single standard e-match is all of the pyrogen that is needed to reliably activate this device! This said, the second e-match acts as redundancy. Because of the Charge Cup design, if either e-match goes off, the other will go off as well.

Update: May 21st, 2022

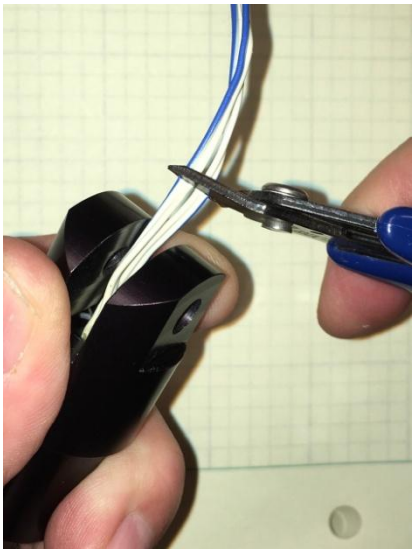
Up to this point I have recommended only the use of "standard e-matches" in the new TD-2. The TD-2 was designed to use standard e-matches including the "J-Tek" and Chinese equivalent e-matches. I had concern that the MJG Firewire initiator might not have enough pyro to reliably actuate the device. This device has now been tested using a SINGLE Firewire initiator. I figure if the device will work with one initiator then it will surely work with two. This test was repeated for verification.
I am happy to report that the MJG Firewire initiator IS recommended for use in this device!

After use Disassembly & Cleaning

Step 1 Disassemble the device

Before you attempt to disassemble this device it is STRONGLY recommended that you retrieve the Ring Pin and re-insert it into the device! If you fail to do this, your risk of dumping the bearings on the ground increases tremendously! Please do yourself a favor and re-insert the ring pin into the device!

Hold the device in a way that you can hold the Ring Pin and the device in the same hand at the same time.
Clip the wires somewhere near the bottom of the device.



Unscrew and remove the Cap.
Grab the clipped wires and remove the Ball Retainer Assembly from the housing.


Locate a small container for safely dumping the Ball Bearings.
(If you have young children or grandchildren, you are probably familiar with "Snack-Pack" pudding.
Empty Snack-Pack pudding containers are handy for this)
Dump the bearing into the container and set aside.

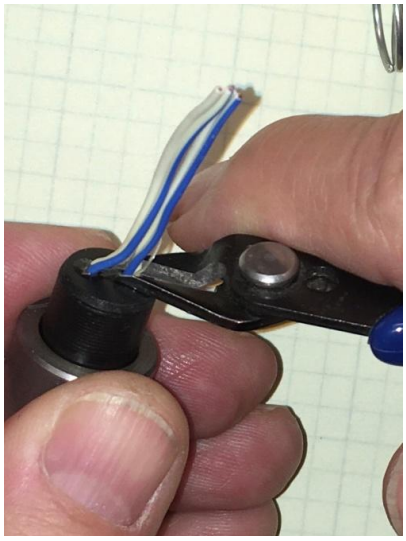
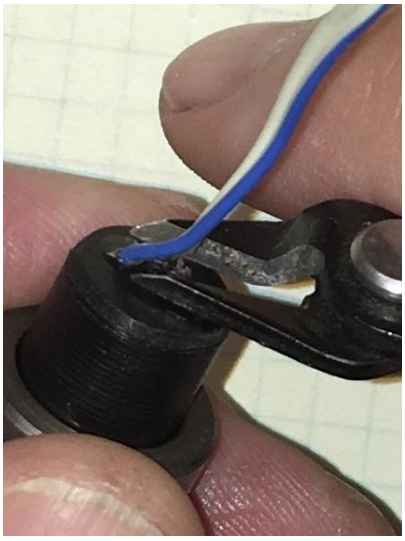

After use Disassembly & Cleaning

The method you used for sealing the e-match in the Charge Cup will determine the method and difficulty of removing the spent e-match. Choose from the list below and skip to that section:

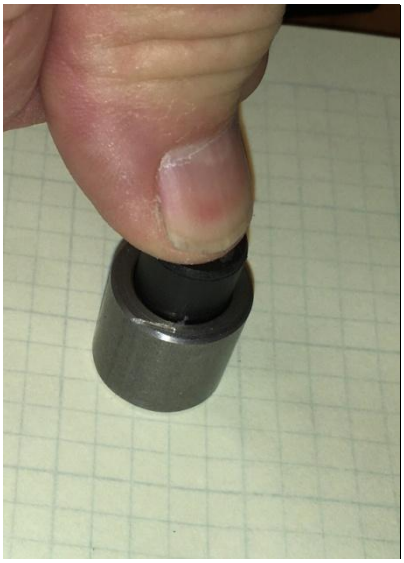
Step 1-E if you sealed the Charge Cup in the traditional manner, with **E**poxy
Step 1-HG if you sealed the Charge Cup with **H**ot **G**lue
Step 1-P if you sealed the Charge Cup with **P**utty

Step 1-E & HG Disassemble/Remove Spent E-match

(Use these instructions if you if you sealed the Charge Cup with Epoxy or with Hot Glue.)
Clip the e-match wire as close to the surface of the Charge Cup as possible.
Using a sharp side cutter (Such as the Xuron 2175 Maxi-Shear Flush Cutter on Amazon) is advised.

Press on the Charge Cup while holding the Ball Retainer
If this proves to be difficult, place the Ball Retainer on a flat surface while pressing the Charge Cup.

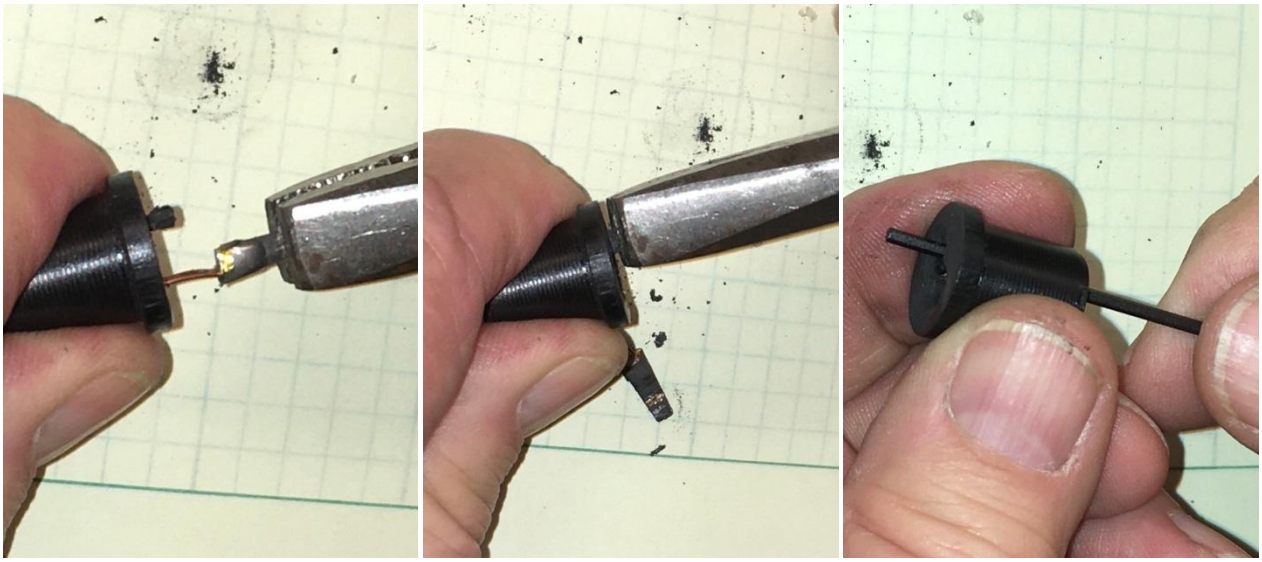

Check to see if the sealing o-ring is still on the Charge Cup, likely it is still inside the Ball Retainer.
Note: There are replacement o-rings in case you lose one, they never wear out.


Use the supplied punch to free the spent e-match, o-ring and sealant
If you sealed the Charge Cup with Hot Glue, simply hold the Charge cup in one hand and the supplied punch in the other.
Center the punch on the clipped wires and push the wires as far as they will go.


If you sealed the Charge cup with epoxy, you will likely need to first place the Charge Cup on a flat surface
Then Center the punch on the clipped wires


Now **Tap <u>gently</u>** with small lightweight hammer to gain movement of the spent e-match.
Once you gain movement of the spent e-match, STOP POUNDING!
(Otherwise you will damage the Charge Cup)
The design of the punch will only allow some movement of the spent e-match and is not intended to completely push the o-ring out.
Use the punch to push until you reach the tapered portion of the punch

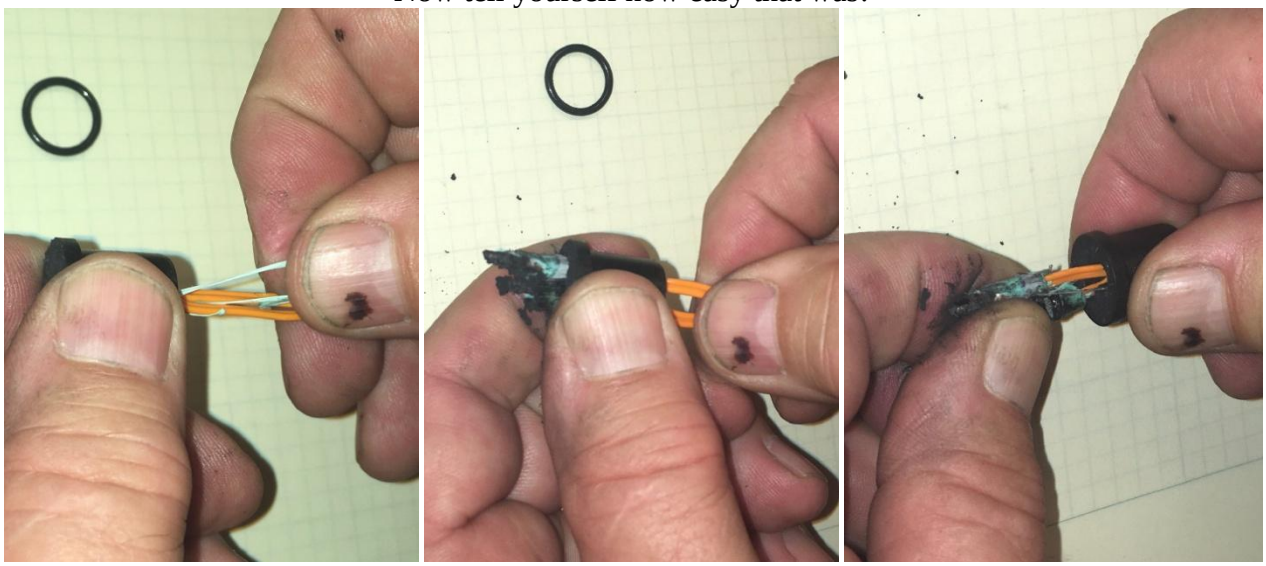

Next, you will need pliers or hemostats to grab the protruding spent e-match
If the Charge Cup was well lubed as instructed prior to loading, the e-match, o-ring and epoxy will all come out together and entirely with relative ease.
Sometimes the e-matches are stubborn and come out in pieces and need to be pushed out.
An Allen wrench or a piece of 12ga solid wire works well for this.



Step 1-P Disassemble/Remove Spent E-match

(Use these instructions if you if you sealed the cap with **Putty**)

Remove the Charge Cup from the Ball Retainer **without** further clipping the wires.
With your fingers, peel back and remove any putty that is on the wires.
Grab the wire with your finger and push it out
Pull the remaining wire out with pliers or your fingers.
Now tell yourself how easy that was!



FWIW, this "Putty" method of sealing is the only method I ever use any more. Turnaround time is less that 10min from firing to the next firing and for me, because I am testing these things, this 10 minute turnaround time INCLUDES setting up to take video of the device firing!

Step 3 Cleaning

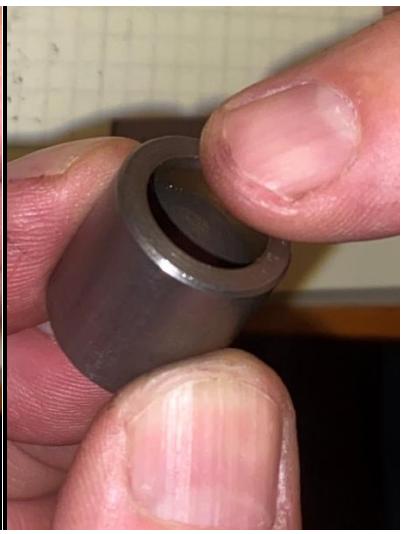
Note about cleaning: Please do not over clean this device and if you do, you MUST re-apply the lube as instructed below to all of the inner steel parts or you risk the possibility of RUST! The supplied lube is very persistent and is hard to totally remove and as a result the inner steel parts will not rust if these cleaning instructions are followed!

Scrape the bottom of the Push Piston Seal, wipe clean & wipe with a thin layer of lube inside & out.

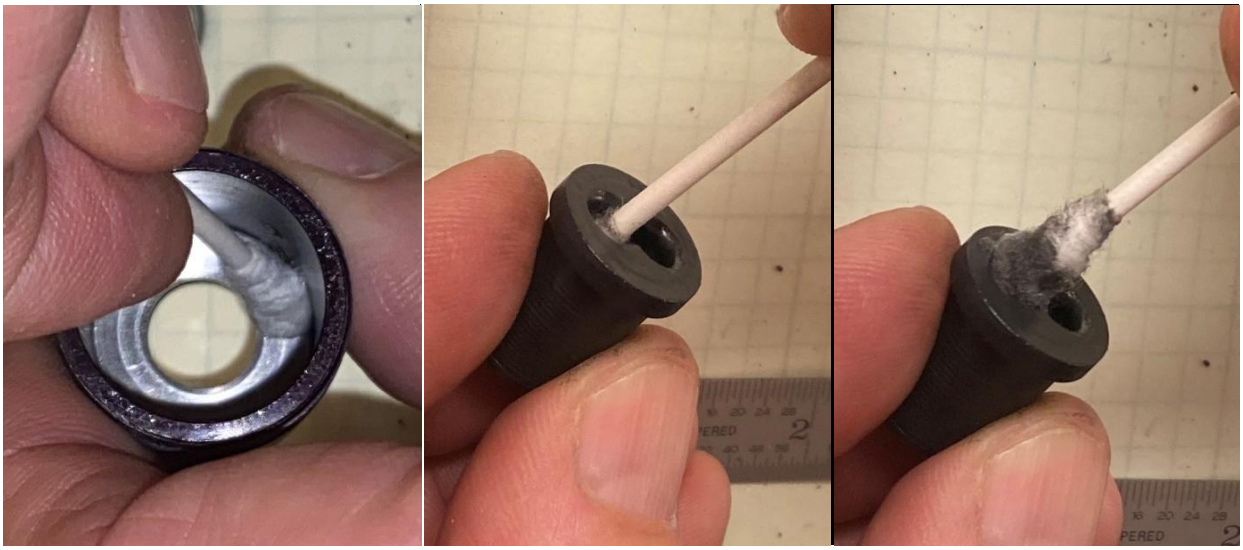


Add lube to Q-tip to twice wipe the inside of the Bearing Retainer.
Use Q-tip or finger to wipe lube on the outside of the Bearing Retainer.





With Q-tip, wipe lube on the inside of the Housing to include the very bottom.
Use lubed Q-tip to twice clean the Charge Cup. The 1st time the Q-tip will be dirty.



Lube and re-install the o-ring on the Charge Cup
Remember that while replacement o-rings are provided in case of loss, they do not wear out and should be re-used!

Your TD-2 can either be put back into the kit box or re-loaded now for the next time!

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