Brembo rear brake disassembly, revisited

1. Preamble

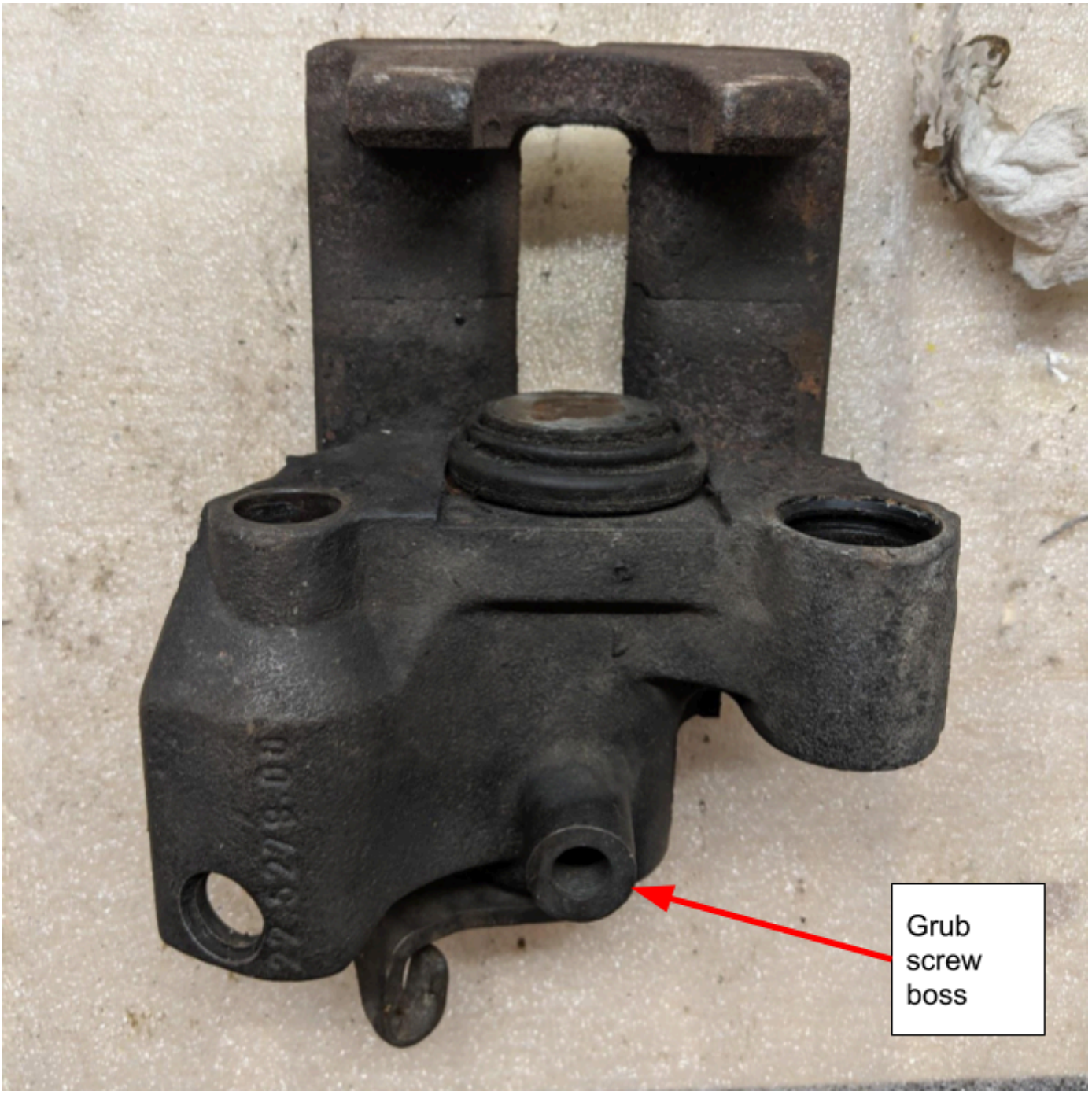
The current state-of-the-art information on how to disassemble, refurb, and reassemble a rear VX220 or Elise S2 caliper is coming from the SELOC forum :
https://wiki.seloc.org/a/How_to_Rebuild_a_Brembo_Caliper
I took upon myself to completely refurb a pair of rear calipers for my VX220 and I found a couple things that could be added to this process.

2. The fearsome grub screw

The piston assembly of the rear brake calipers features a complicated handbrake compensation system. The external lever actuates a rotating plate with bearing balls (4) which clutches in, and pushes out a threaded rod (1) propping out the piston when the handbrake lever is pulled. When the handbrake is released, the lever plate unclutches the rod (1) and is wound back by the external spiral spring.The internal threaded rod is pulled back in by another internal spring (2) pushing an unpictured circlip. The adjuster mechanism has a threaded ring (3) inside the piston that rotates a tiny bit when the piston is being pulled in, not completely retracting it in and therefore adjusting its “neutral” position along the rod (1).

The “dreaded” grub screw is necessary in this assembly to ensure that the threaded rod (1) only slides, and does not rotate along with the level ball clutch plate (4). For this effect the threaded rod features a notch in which the grub screw makes a stop.

The grub screw is unusual : it features a 4.5mm hexagonal imprint (most people have either 4mm or 5mm Allen keys, not 4.5mm), and can be stuck with rust in the boss shown below.



The first thing to do to make sure not to have issues with it, is to **fill the boss with rust-penetrating fluid** and leave it to soak for at least 24 hours. You do NOT want to strip this screw, or you are in for a world of pain.
Also check if the thread in the boss looks damaged or not. If it does, gently run a tap above the screw to help it when it will get out.
DO NOT APPLY HEAT to this area. As can be seen above, the ball bearings are held in the clutch plate by a think plastic part. It WILL be damaged by excessive heat applied to this area.
Make sure you have the correct Allen key size (4.5mm) before trying to remove the grub screw. DO NOT USE BALL HEAD ALLEN KEYS, THEY WILL ROUND THE IMPRINT IN THE SCREW.

Then, go put a candle in your local church/synagogue/mosque/pastafarian temple and attempt to remove the screw. A bit of force may be necessary.

IF IT DOESN'T BUDGE, you may have to cut the boss down, and try to drill the screw out… or use whatever your favorite screw extraction method is. You can re-lathe a screw out of an M10x1.0 normal flat point grub screw at your favourite local machinist, the dimensions are in the SELOC instructions.
You can also proceed with some of the disassembly with the grub screw stuck in, and try to unstick it from the inside of the caliper later.

IF IT BUDGES, welcome to the glub of the Chosen Ones. However don't get over-excited, and don't remove it completely yet.

3. Strip the outsides

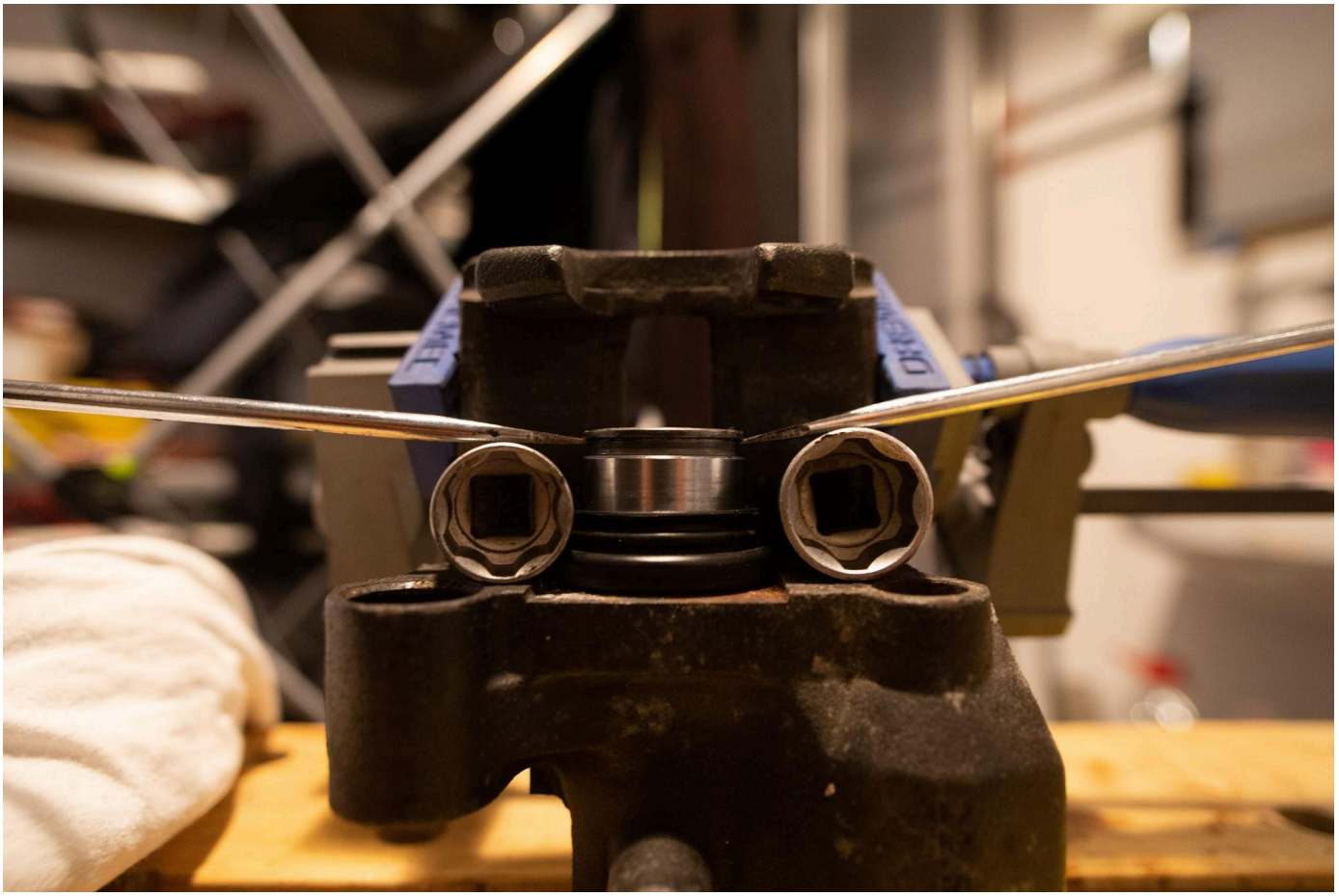
Whatever the status on the grub screw ends up being, strip the outside of the caliper of everything, and make sure to bag the parts that look re-usable. Don't lose the handbrake lever. If you have the Elise-Parts refurb bag, you may want to keep some of the stuff that is not normally included, like the external spring.
Here are some pictures to get you inspired :

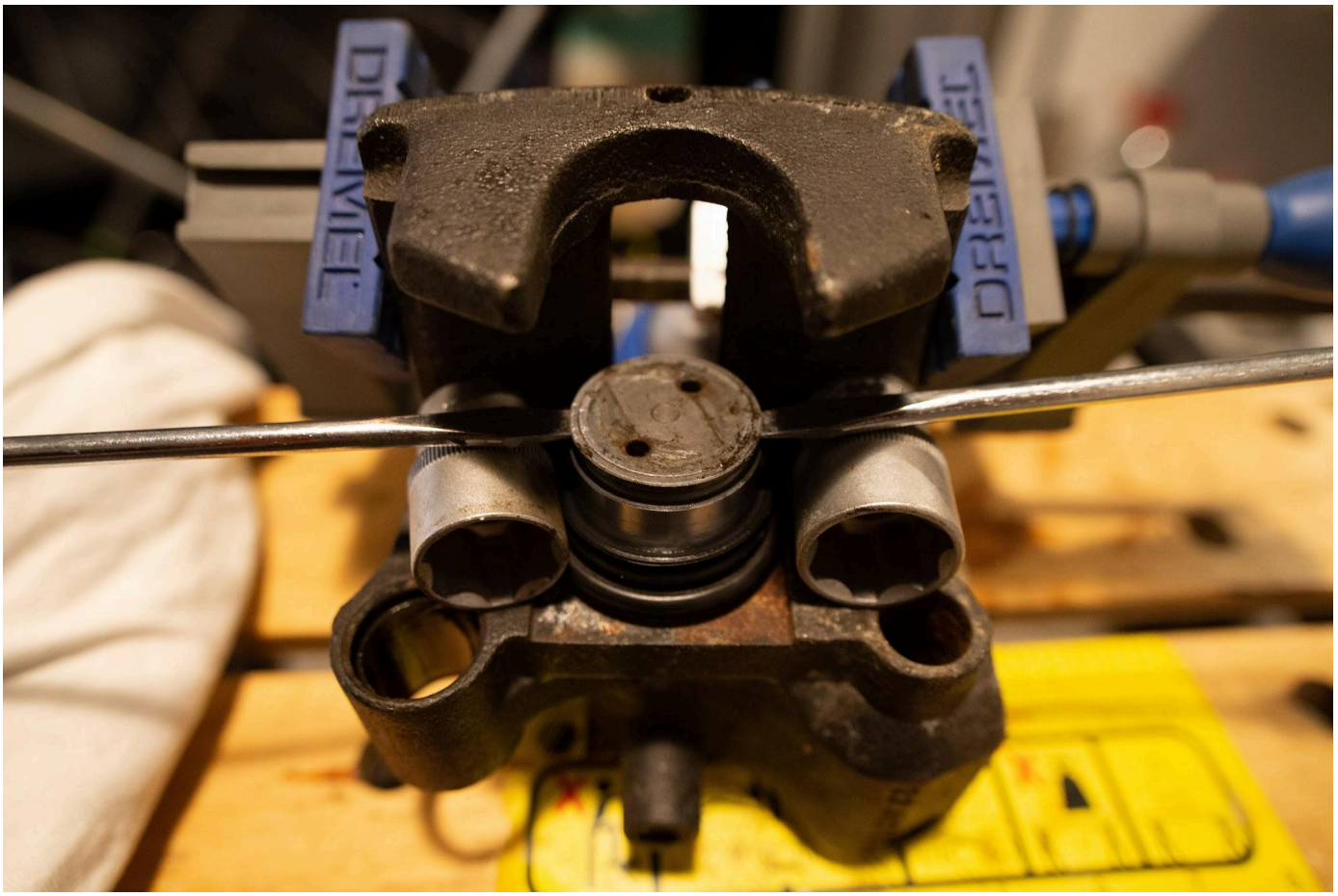
After battling with nipples, sliders and rubber sleeves, you should be just left with the piston sort of poking out of its hole. **STILL DO NOT REMOVE THE GRUB SCREW.**

4. The piston poppin’

Get a good cuppa, this is going to make you queezy.
Start by either pumping the handbrake lever in and out, or by using your favourite piston “unwinder” tool, to make the piston protrude approximately 2-3cm above the internal face of the caliper, like so :

Make sure to peel back the ~~foreskin~~ boot to reveal the shoulder at the top of the piston. At this stage, different techniques exist, but all aim at the same thing : popping the C-clip that holds the piston on the aforementioned threaded rod.
To this intent, I used a pair of sockets (17 and 18mm), and two big flat screwdrivers.
PLEASE BE CAREFUL AT THAT STAGE, there is nothing worse than stabbing yourself with a greasy flat screwdriver. Well actually, there is worse, but that’s not the point.
It is also VERY EASY at this stage to scratch the piston. If you do not have replacements from Elise Parts, be extra careful.
Set the caliper up in some form of vice. You can tell I am not poor because I use a flimsy, expensive DREMEL vice to hold it from the back side. As you can also see, I found there is a slightly different way to set the jaws of the vice to prevent the sockets from slipping and rocketing across my laundry room.
Position the sockets (or whatever you use, could be a stack of pennies) to act as pivot points for the screwdrivers. Your socket height must be close to the length of piston you wound out (adjust back in or out as necessary using the piston winder) to minimize slippage and stabbage/swearage.
To prevent the piston flying off or getting damaged, you can use a rag or an old t-shirt as pictured to “catch it” as it will pop out. I took pictures without the rag for illustration purposes.

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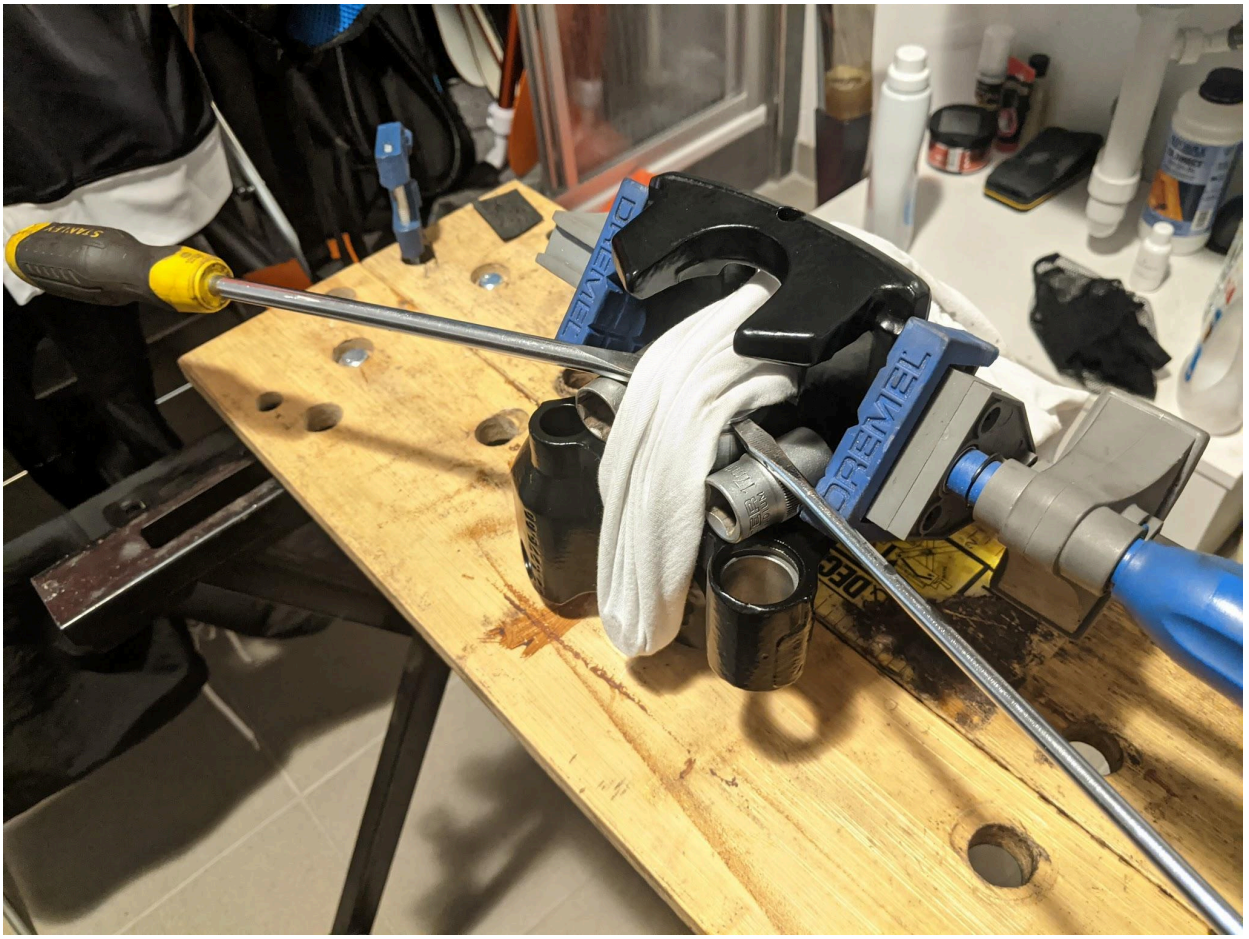
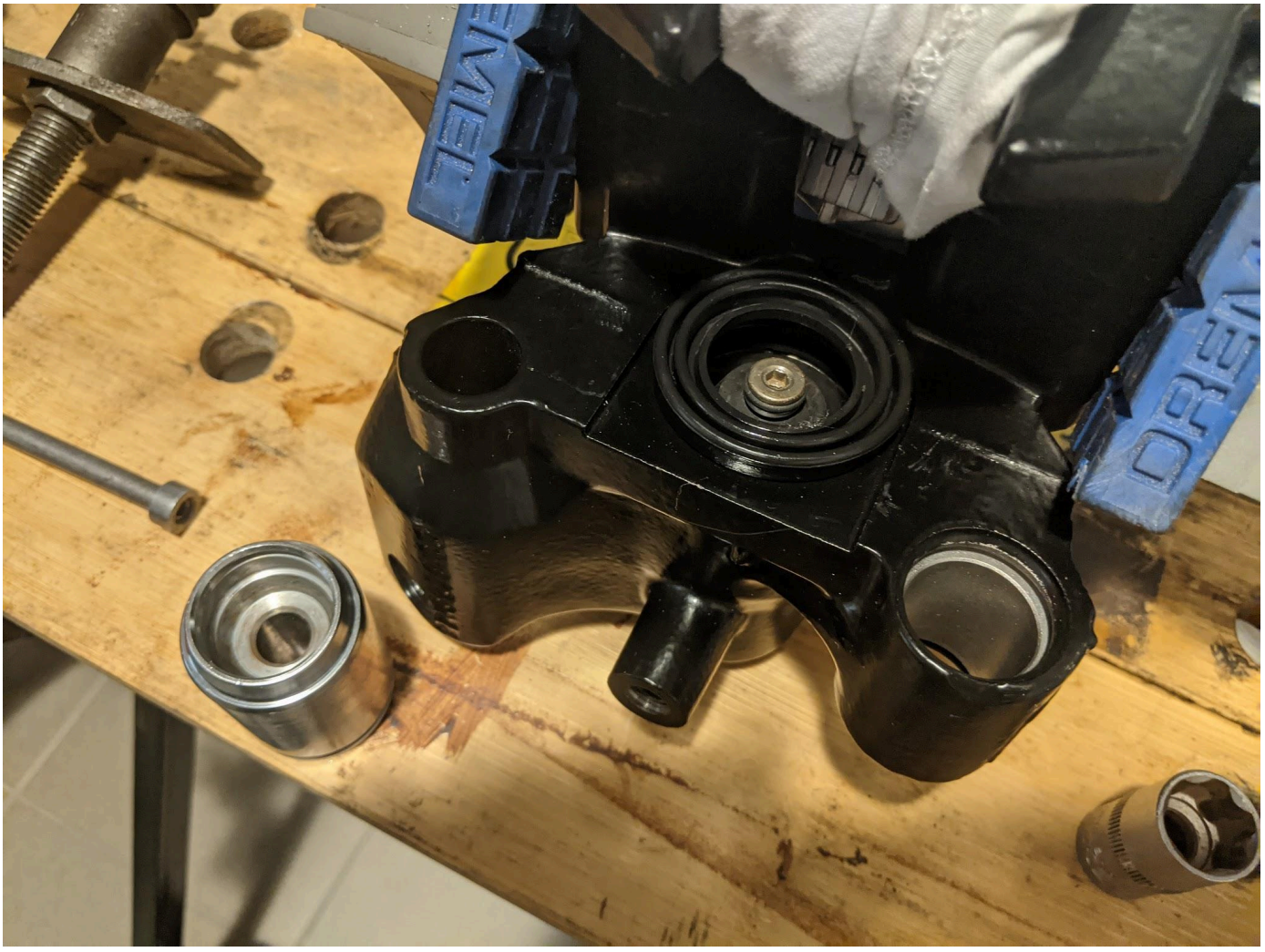


At this stage, **THE POPPIN BEGINS.**

Gently push down on the screwdrivers. You should feel at first a springy response, caused by the internal threaded rod spring compressing. Push down a little bit more and you will clearly hear and feel the piston pop out of the threaded rod. It should end up looking a bit like this :



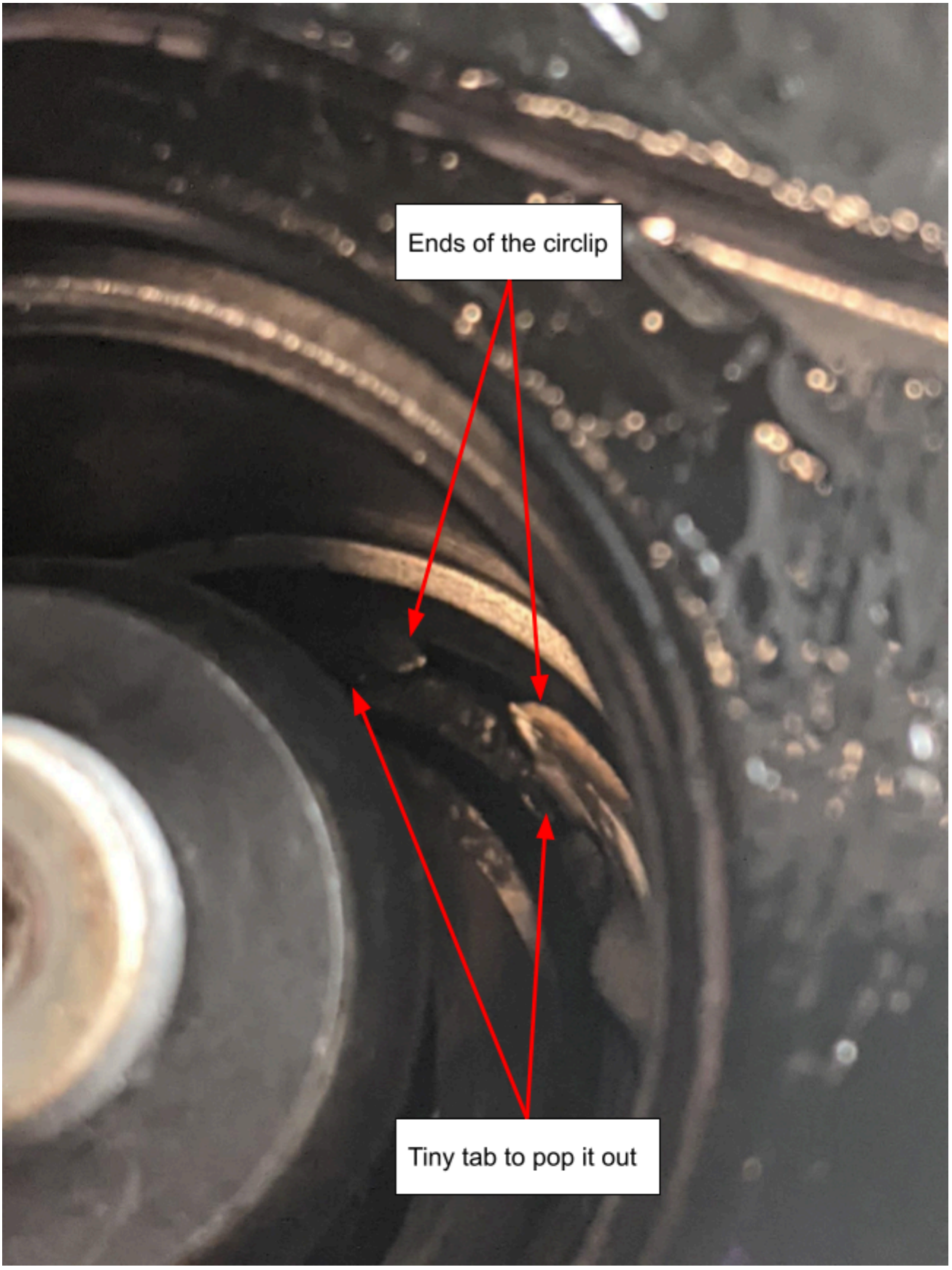
Don’t forget to remove the dust boot at this stage.

If you can, remove the grub screw and bag it not to lose it, at this stage.

5. Threaded rod unclipping

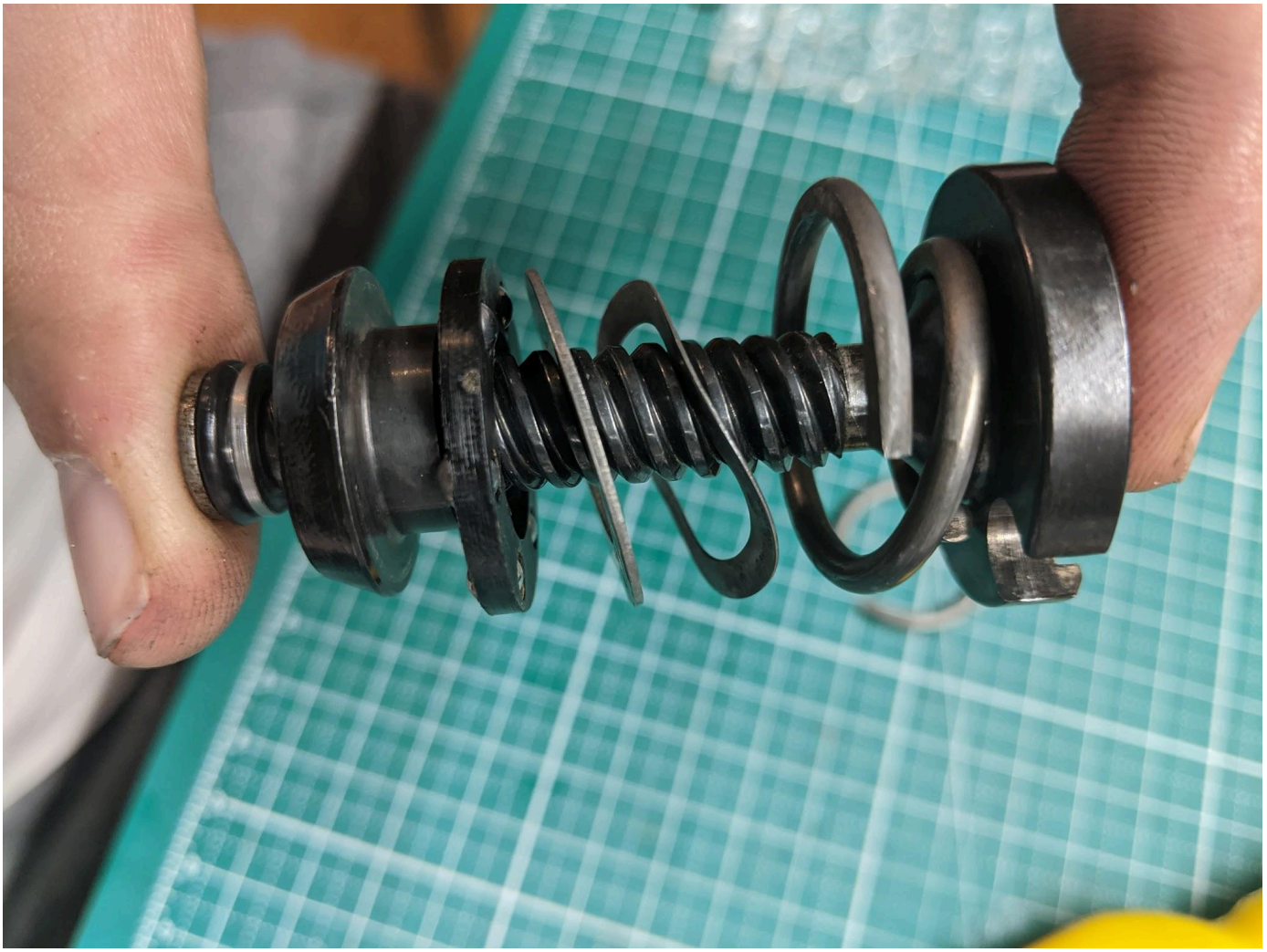
After returning from the hospital to repair the hand you stabbed with the flat screwdriver, have a stronger cuppa. Stuff is about to get delicate.
The internal spring on the threaded rod is kept slightly (a lot) compressed by a circlip that fits in a gorge inside the piston bore, quite far in.
CONTRARY TO THE SELOC INSTRUCTIONS, I do not recommend at all even attempting to remove the tiny screw at the end of the threaded rod. You would be returning to a world a pain if you tried.
Down the piston bore, you may have trouble seeing it, but you can see that the circlip is sitting tight with some tiny tabs pointing up and out. You may to move some of the threaded rod washers out of the way to notice the tiny tabs. See the pictures below.

Look at those freaking tiny tabs



The best method I could find was to carefully insert a medium flat screwdriver in between the wall of the bore and the tabs on the circlip (starting with the one near the extremities of the “C”) and to gently rotate the screwdriver. Repeat on the other extremity and then on the other tiny tabs, gently. It helps in this scenario to push on the threaded rod end back, like a joystick, away from the open end of the circlip. This will encourage it to pop out of its gorge. Once it goes you should be able to extract the complete threaded rod assembly easily, as shown below.

IMPORTANT: THE MECHANISM IS HANDED FOR EACH CALIPERS, SO LABEL THEM ACCORDINGLY AND DON'T MIX AND MATCH WITH THE OTHER SIDE



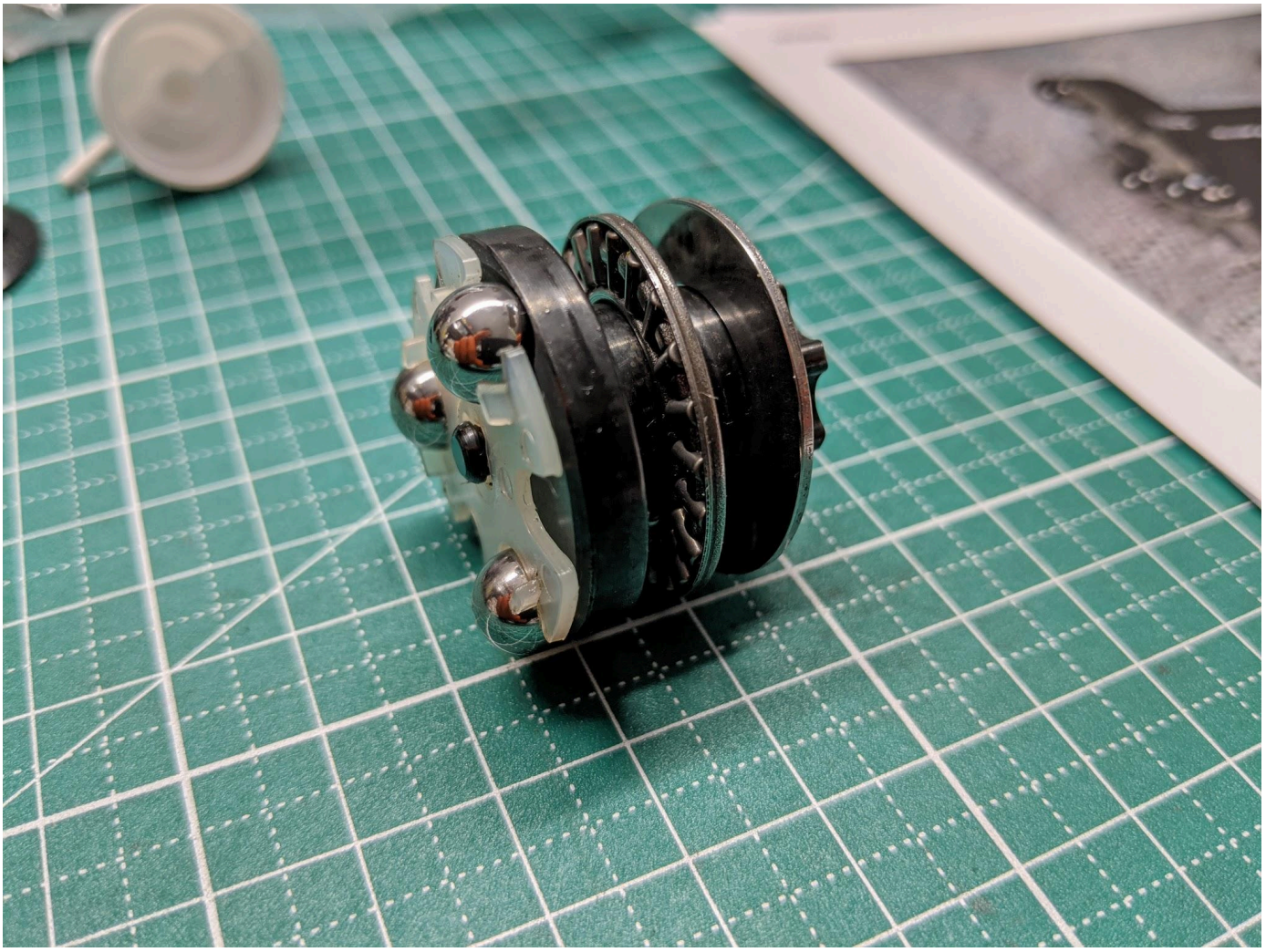
6. Return of the grub screw

If you haven’t managed to get it out (in one or many pieces, at this stage), it is possible to apply more rust-penetrating fluid from the inside, at this stage, or also to apply cold. That last one never worked for me, but I have limited skills.

7. Clutch plate

Once the grub screw has made its way out one way or another, you should be able with barely any force to push inwards the handbrake lever clutch plate thingie. It should ideally come out in three parts : the main plate part with the ball bearings, a needle bearings ring, and (sometimes stuck inside) a flat washer.

Don’t forget to also remove the piston seal, and tiny O-ring sealing the handbrake lever clutch plate !



SIMILAR TO BEFORE, THIS CLUTCH PLATE IS HANDED FOR ITS SPECIFIC CALIPER AND THREADED ROD. DON'T MIX WITH THE OTHER SIDE!
You are now pretty much done. Clean all the parts (brake cleaner is best) and get your caliper reworked (in my case matte powder-coating) and then follow the re-assembly instructions (which are not those in reverse) … which I haven't written yet, heheheh.

More pictures : https://photos.app.goo.gl/2GgyJwjte6ipe7bC6