

# REPAIRING A VACUMATIC FILLING UNIT

*I know this will sound like I'm trying to sell you my own tools. You bet I am! I've been working on pens since 1986 and along the way finding the most sensible tools to use for this application. Many of these tools have been custom made for use in pen repair. So the following tools can be found on the PENTOOLING website.*

## Disassembly

The first thing to do is to get the filling unit out of the pen. There are several tools available here to do that, the differences being how often you will use it and how much doing this is worth to you taking into account the value of the pen(s) you are working on. The things to consider affecting your choice are comfort, ease of use and cost.

Vacumatic filling units come in two (outside) thread sizes:

- 1) Standard/Deb(utant)/Demi  
and
- 2) Oversized/ Maxima.

And on the inside, there are three thread sizes, but that doesn't affect filling unit removal.

On the Pentooling website, In the "**Tools for Parker Bodies and Filling Units**" menu item under the "**Tools**" tab, See these items:



ITEM # BRASS VAC TOOL



**ITEM # D5, DOUBLE SIZED VAC TOOL:**



**ITEM #8674,**

**STANDARD SIZED FILLING UNIT REMOVAL TOOL.** *Also see item #L13454, which is for Oversized filling unit removal.*



**ITEM #8674**

The above thread clamps and collets (AKA Vac Tools) include basic blocks of brass that fit both sizes as well as three palm-grip devices similar to those designed by Parker for use in the Parker factory and

used by its trained repairmen in the field which each fit one size, and there is one tool that is palm grip and fits both sizes that we provide.

You don't want to grip the end of the filling unit with one of these tools and just turn it out; this can result in cracked barrels, especially the grey barrels. I don't know why, but grey ones seem to get stuck more often and are more brittle than other colors. Something to do with the dyes they put in the grey plastic, I speculate.

So first, you want to try to get a little bit of water to penetrate the threads and lubricate them if possible. It helps if this lubricating fluid is slippery, too. It turns out that a few minutes with the filling unit end of the barrel in a low power ultrasonic cleaner (about 35 to 65 watts – **ITEMs PT3305 & #DIGITAL ULTRA**) using a detergent/water solution can usually do this plus the ultrasonic activity will also loosen up old caked on gunk that freezes the threads.



After taking it out of that bath, get rid of as much water as will easily come out of the pen and warm it up using a heater that goes no higher than 200 degrees F. You don't need to get the whole pen up to this temperature, but rotate the pen in an airflow at this temperature for a minute or so, and keep the pen moving. **DON'T PUT A PEN IN THE HEATER AND WALK AWAY OR TURN YOUR BACK ON IT.** Keep the opposite end of the pen in your hand and rotating while the end of the pen you want heated is in the warm air. Don't put your fingers in the heat. And whatever you do, **DON'T USE A HEAT GUN!!!** I know they are "controllable", but people say the same about a Pit Bull. Heat guns are adjustable to very high temperatures which can destroy a pen in a matter of seconds. There are much safer, more civilized heaters for pens out there (See Item 44070, Pen Disassembly Heater, under menu items TOOLS / PEN WARMERS). Also shown below:



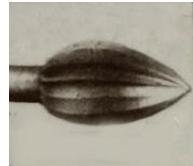
Now you should be able to PATIENTLY turn the filling unit out. If it's still so hard that you think something might break, put it back in the ultrasonic cleaner for a few more minutes and repeat the above process. It will eventually come out.

#### **How to get the little pellet that used to be part of the diaphragm out of the filling unit**

*Method 1: Boring a hole in the ball and extraction with a pick*

*Note that there are two types of sockets for holding the pellet at the end of the diaphragm in the filling unit. There are hard rubber sockets, which are more common, and there are aluminum sockets. The hard rubber ones are very fragile, so be patient and proceed cautiously when working on these.*

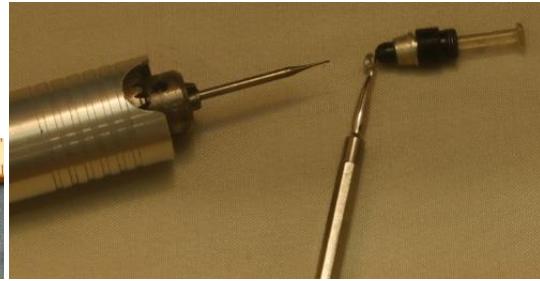
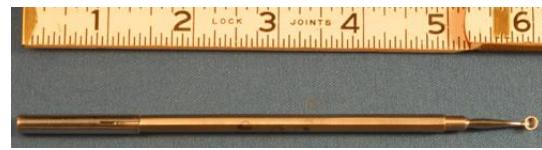
Hopefully the little pellet that's inside the socket is still "frozen" in position so that you can drill a small hole in it without it rolling around while you are trying to pin it down. If it IS rolling around, your job will be a little trickier. You want to bore a small hole in the ball so you can gently and delicately try to pull it out with a pick. Don't try the old trick where you get a needle red hot and try to spear the ball. There are much easier, safer, saner ways to do this. You can use a tiny thing called a Bud Burr in a rotating hand tool. (Item # **BUD BURR** is perfect for this. It's under menu item **Tools for Parker Bodies and Filling Units.**)



#BUD BURR

It's called a Bud because it's shaped like a sphere but it has a point on the front end and a shaft connected to the back of it that will fit into a 3/32" mandrel on a rotary tool or into a chuck on a flex shaft rotary tool. This pointed end will help you nail that little pellet down so you can gently bore a hole through it. You don't want too big of a hole because you want the pick used in the next step to be able to fit into it (just the tip of the pick) snugly. Also, if you make the hole too big, inserting the pick may cause the ball to fragment, making things a little more difficult. If you're new at this, there is a drill guide available on the end of tool D15 to shield the hard rubber. You will need a third hand, such as a small vice, to hold the filling unit while you use your other two hands to work the rotary tool and the drill guide. D15 will also help you turn the new diaphragm (the rubber inverted 'Sac') inside out and install the pellet into the pellet retainer (more on this later).

Tool #D15



The next step is to use a pick to get the pellet out. Again, lubricate with water and/or an ultrasonic cleaner and soften things up with some heat to reduce the chances of breaking the hard rubber socket. Lubrication and heat will make the pellet easier to get out of an aluminum socket also.

If you're new at this, you probably want to use the circular cross section end of **ITEM #HT-UG**. It's a little less likely to do damage than the end with a triangular cross section on the tip, but once you get the hang of it, you'll like the triangular cross section; it's easier to grip the pellet to rotate it.

#HT-UG



(And if you are partial to either type (Round cross section or triangular cross section), there are tools available with either a round cross section on both ends (**HT-G**), or both sides with a triangular cross section (**HT-U**)).

The triangular one is a little more useful, but only in the right hands. If you're not good with tools or just beginning, use the round cross section pick. The triangular one grips the pellet much better, and the pellet will be more likely to rotate with the pick to ease it out. But the sharp edges of the triangular cross section can do damage to the hard rubber socket if you're not real careful.

So now you want to GENTLY push the pick into the hole you've put in the pellet and try to loosen the pellet by rotating it to free it up from the rest of the dried-out diaphragm remnants sticking to it. Make sure you're still warm and lubricated in there and try to pry the freed-up pellet through the opening in the socket. Do this gently and try not to contact the lip of the socket with the pick if the socket is hard rubber. If the socket is aluminum, it's OK to try to gently pluck the pellet out by prying against the edge of the socket lip.

Once you have the pellet out, go back into the socket with the pick and GENTLY clean the rest of the rubber diaphragm remnants out of the cavity so you have enough room to insert a new ball/diaphragm. **ITEM # WHEEL BURR** works well for this in a rotary tool, or, use one of the curved picks.



**Method 2:** If you're good at this, try using tiny Spatulas / Spoons

There are tiny spatulas and spoons that will fit into the socket while the ball is still in there so you can work on GENTLY scooping or coaxing the ball out. Remember, the goal is still to get the ball out without destroying the socket. As a successful pen repairman that makes his living doing this once sarcastically said to me while holding one of his favorite tools , "This is as good a tool as I've seen for destroying a pen". The point being, if you don't have the experience and are not really good with tools, you can slip-up while using a normally very versatile tool that will give the right hand a pleasing advantage.

Here's a rundown of the spatulas / spoons that I have available and descriptions of their applications for removing vacumatic pellets. These are in the website listings in the **Tools for Parker Bodies and Filling Units** page or the **Picks** page on the PENTOOLING website:

**ITEM # HT-BC** is a combination spoon shaped tool that has a tiny spoon on one side (C size) for removing pellets from hard rubber pellet retainers and on the other side it has a larger spoon (B size) suited for removing pellets from aluminum pellet retainers. Spoon widths = 0.061" and 0.076".



**ITEM # HT-A:** A well defined spoon shape that works great on aluminum Vacumatic filling unit sockets and is a little tight inside a hard rubber Vacumatic socket. The filling unit ball fits right into the curvature of the spoon. Spoon width = 0.111".



**ITEM # HT-B:** A tiny curved spatula, slightly smaller in width but much thinner (flatter) than the spoon on HT-A. Works great for Aluminum Vacumatic filling unit socket pellet removal, and it's also useable on Hard rubber sockets, but HT-C is a similar shape and is better suited for the smaller hard rubber sockets and it's less likely to cause breakage in hard rubber. Again, don't get the idea that you're just going to reach in there and pluck that ball out while it's cold, dry, and tight. You need to follow the ball removing instructions above. Spoon width = 0.076".

***Here's a summary of the spoon widths:***

**HT-A** = 0.111" - good for aluminum pellet retainers.

**HT-B** = 0.076" – good for aluminum pellet retainers.

**HT-BC:** one side = 0.061" - good for hard rubber pellet retainers & the other side = 0.076" - good for aluminum pellet retainers.

Note that we offer (2) sizes of spoons for aluminum pellet retainers, **HT-A & HT-B**.

**Here's a summary of the bud burr and a wheel burr I use for removing Vacumatic pellets** (You can see photos of these above and in the listings in the **Tools for Parker Bodies and Filling Units** page on my website):

**ITEM # BUD BURR:** Bud burr with 3/32" diameter shaft (burr is much smaller diameter than the shaft). This is what you use to put a hole in the Vacumatic filling unit pellet so you can remove it with a pick.

**ITEM # WHEEL BURR:** Wheel shaped burr with a 3/32" diameter shaft (burr is much smaller diameter than the shaft). This is useful if, after getting the ball out, you have some very hardened crud left in the socket that you can't pick out without shattering the socket. Remember that you only need enough room in the socket to get a new ball surrounded by rubber into it. Don't be grinding metal while working in there.

**Here's a summary of the two picks that I recommended above for this application** (You can see photos of these in the listings above and in the **Tools for Parker Bodies and Filling Units** page or the **Picks** page on my website):

**ITEM HT-UG:** This is a combination of the round cross section curved pick on one side and the triangular cross section curved pick on the other side. Versions of the curved pick with identical ends on both sides are available also, as described below.

**ITEM # HT-G:** This is a tool with the same sized round cross section curved pick on each end. The tip is small enough to grasp the pellet by the hole bored in it with the bud burr above (**ITEM # BUD BURR**), tight enough to get a hold of the pellet and move it around, and large enough to not be too fragile – i.e., when used for this purpose, the tip of the tool is not likely to break. It is great for digging out remaining rubber diaphragm parts from the socket after the pellet is removed, too.

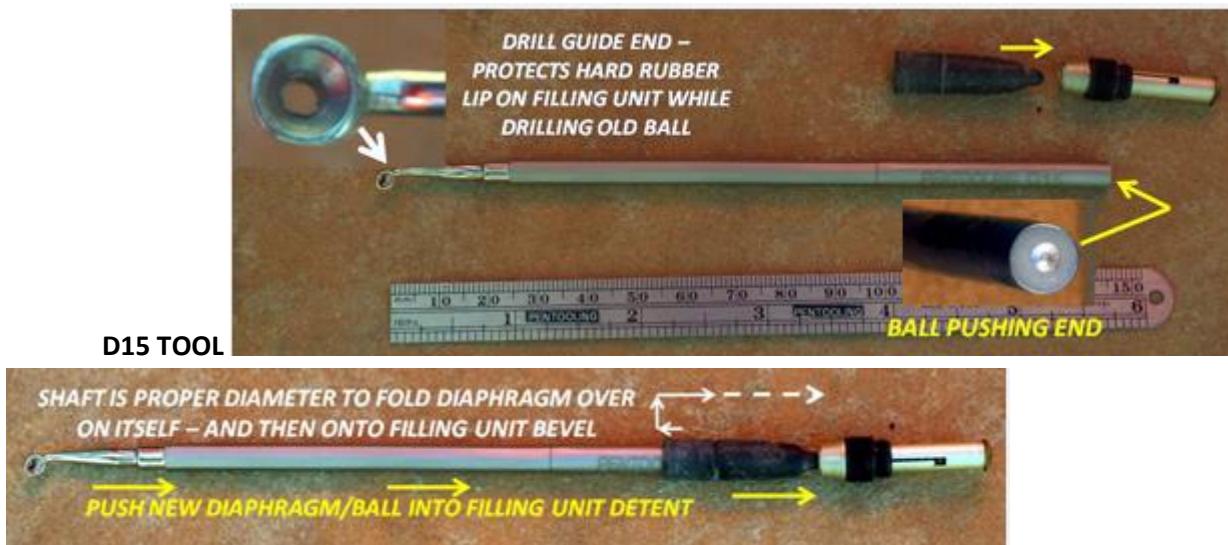
**ITEM # HT-U:** For the more advanced picker; this is a tool with the same sized triangular cross section pick on each end. The edges of the triangular cross section are very well defined and will bite into the pellet very well. The tip is small enough to grasp the pellet by the hole bored in it with the bud burr above (**ITEM # BUD BURR**), it's tight enough to get a hold of the pellet and move it around, and large enough to not be too fragile – i.e., when used for this purpose, the tip of the tool is not likely to break. Be careful when using this tool on Hard Rubber sockets, as it is good at cutting. Make sure you know your way around inside the Vacumatic sockets and feel comfortable when working in there. If you do, you'll love this pick. It is also great for digging out remaining rubber diaphragm parts from the socket after the pellet is removed.

### **Installing a new diaphragm**

There are 3 sizes of diaphragms sold for vacumatics: Standard, Deb(utant) and Oversized. The Deb sized sac will work in a Deb(utant), standard, and Demi sized Vacumatic. The Standard sized diaphragm is intended for the standard sized Vac and the Oversized sac for the Oversized / Maxima Vacs. ALL 51 VACS USE THE DEB SIZE DIAPHRAGM. All three sizes need to be trimmed (shortened) to a length of 1 1/16" (that's ONE and One Sixteenth of an inch) from the tip of the ball end to the open lip, otherwise

you may have trouble fitting it into the pen and it will get tangled up in itself and won't work smoothly. This bit of info frequently does not come with the new diaphragm.

Cut the diaphragm down to 1 1/16" long (that's ONE and One Sixteenth of an inch) and then put the new diaphragm on the end of the D15 tool that has the little dimple on the end. Then start the diaphragm folding over on itself to end up with it turned inside out half way down its length so that the open end is laying on the angled flange on the filling unit.



Put another way, leaving the shaft of the D15 inside the diaphragm, try to flip the open end of the diaphragm over on itself. You don't want it to "Roll" over on itself, because the rolled up edge will keep trying to continue rolling, getting bigger and more difficult to move down the shaft of the D15 tool. So keep pushing this fold over on itself toward the aluminum chamfered ring-shaped seat that surrounds the socket on the filling unit and push it up on the seat. Don't go beyond the seat or you won't be able to screw the filling unit in. Don't use any shellac or glue on the seat; it isn't required.

Now use the dimpled end of the D15 tool to push the pellet that's inside the diaphragm into the hole in the pellet retainer. It may be necessary to stand the filling unit-D15 combination straight up on a padded surface and tap the drill guide end with a small hammer to pop the pellet into the pellet retainer. But use the hammer as a last resort and keep in mind how fragile everything you are hammering on is.

Before you put the filling unit back into the barrel, hold the diaphragm on the seat and work the pump and get all the wrinkles and folds out of the extended diaphragm so it goes up and down and folds over on itself easily. At this point you may want to put a very thin film of silicone oil or grease on the folded over edge of the diaphragm; NOT ON THE SEAT END (Again, you don't want anything on that chamfered seat except the rubber diaphragm). This silicone will let you screw (Rotate) the filling unit in

without spinning the newly mounted diaphragm off of the seat or wrinkling-up your nice folding job as it goes in.

Use the same tool to tighten the filling unit back in as you used to take it out, and try the blind cap to make sure it seats on the barrel properly, i.e., it goes all the way down indicating that you've screwed the filling unit in all the way.

Now try the pump out. Put the front of the pen in water and keep pumping until you don't see air coming out any longer. This can sometimes take 20 to 30 strokes. If no air is coming out, you may have un-seated the diaphragm as you were screwing it in, in which case you need to re-seat it and try screwing it in again. A properly repaired Vac will take in the following capacities of water or ink:

Standard sized standard nib Vac = 1.8cc

51 standard sized Vac = 1.7cc

51 & Standard nib Deb/Demi = 1.2cc

Oversized Vac = 2.4cc

Enjoy your write.