

X-clometer assembly quick reference guide

In addition to the detailed assembly instructions, consider the following as a quick reference that includes photos of each major step. It is important to follow these steps in order, such as adding the solder paste to the back numbers and lines before gluing on the back plate, and adding solder paste to the front alignment circle and adding the steel ball before gluing on the front plate.

1. There are several options to attach the device to the cassette including a magnet (if this works on your portable cassettes or one could be added) a 3D printed clip or a metal clip on the back. **See figure 1.**
2. Upon completion of the 3D printing, you will have three pieces, the main body, a front and a back plate (four if you elect for the rotating clip option on the top). **Figure 2.**
3. Apply the lead based solder paste in the recesses including curvilinear line and hash marks associated with numerical quantification on the back of the main device body as shown in **Figure 3**
 - a. Solder paste comes loaded in a syringe that includes a blunt needle that allows for one to “inject” the paste into the crevices of numbers and lines. It can also be applied on top of the numbers and float it in by rolling or scraping a flat piece across the surface.
 - b. Wipe off excess on the surface above crevices with a small cloth.

Figure 1a Print option allowing either metallic clip addition or magnet.

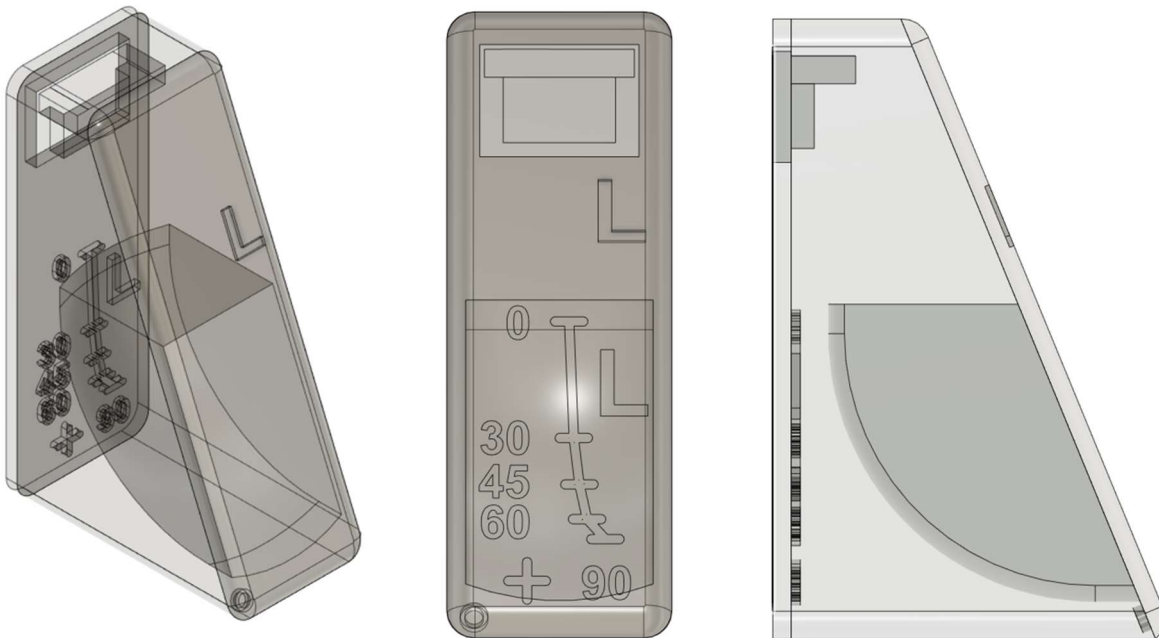


Fig 1b. Left image: Front plate (“L” for left marker). Right image: back cover with a rectangular hole for clip or magnet option.

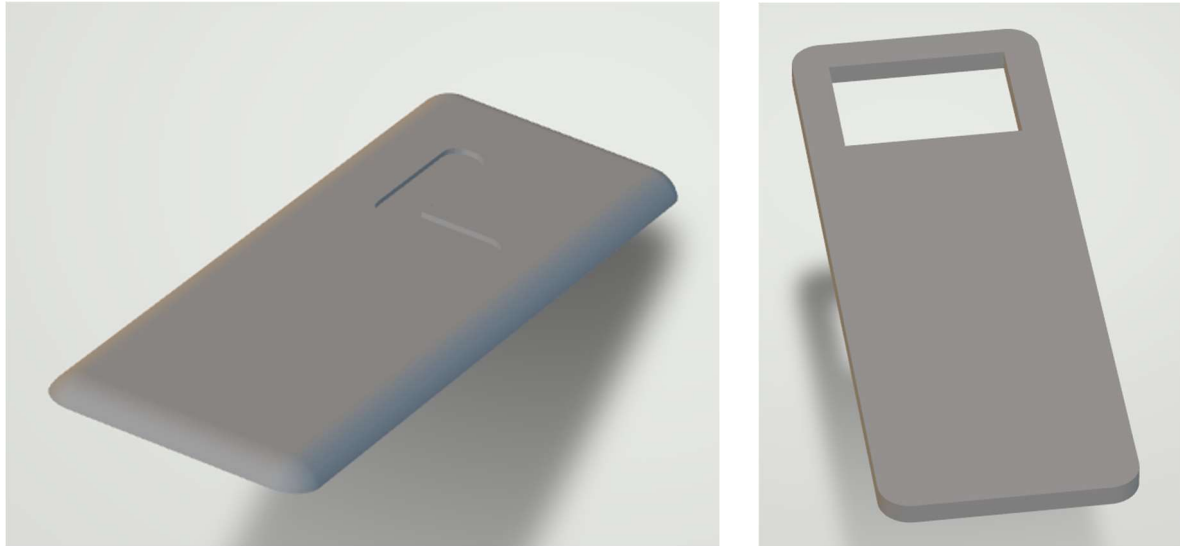


Fig 2 demonstrates how the 3D printed vs metallic clip option (for hanging onto the cassette) fits into the back opening (see fig 1) of x-clometer. When gluing the 3D printed clip, depth can vary based on your cassette thickness. It could also be made tighter or looser by stretching or shrinking that length.

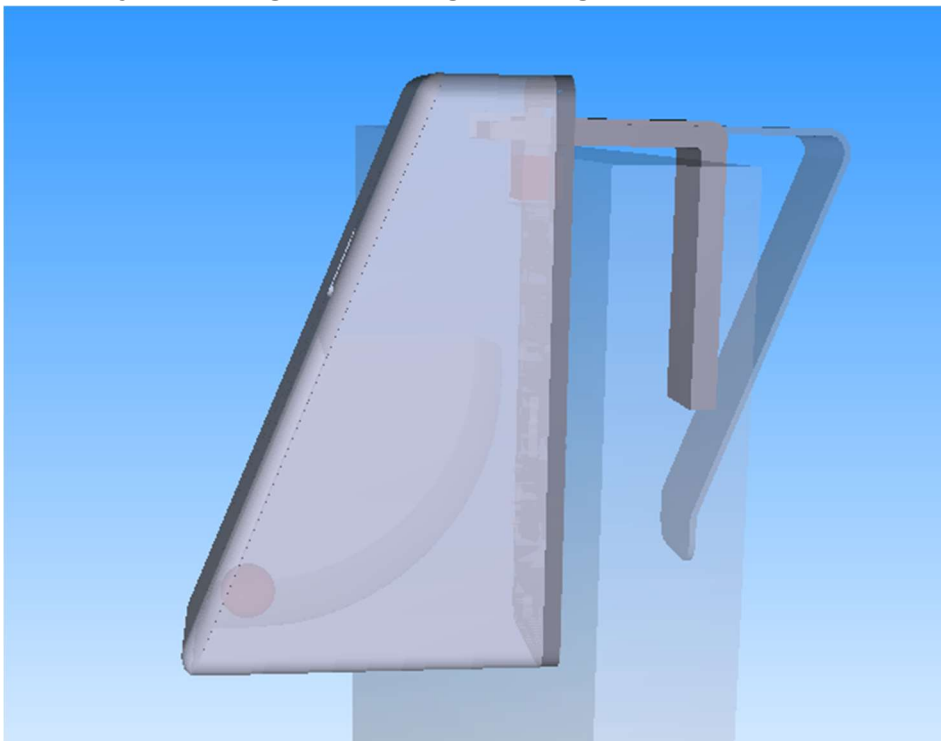
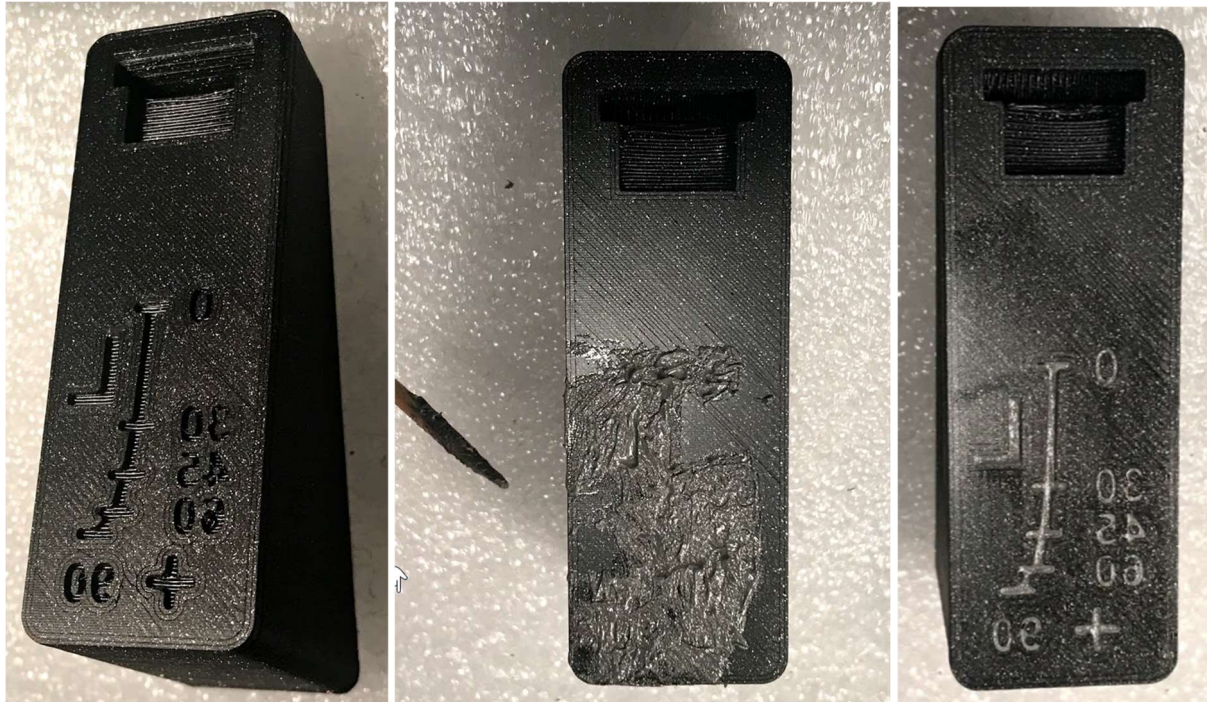


Fig 2. Photos of assembly starting with adding solder paste to numbers and markers on the back of the x-clometer main body.



Left photo shows the x-clometer body back exposing the numerical and curvilinear recesses where the solder paste is to be injected.

The middle photo shows the solder paste after application (with help of a toothpick) into the recesses with excess on surrounding surfaces. Be sure to push the solder into the grooves as this is more important than trying to carefully remain in the recess since it is easy to scrape/wipe away the excess (and will not show up on x-ray in our experience).

The right photo demonstrates the paste in the recesses following scraping away. It is okay to have a few gaps such as seen here in the “90” as even a little paste in the groove is displayed adequately on x-ray. Once filled in as shown, glue the backplate (the one with a matching rectangular hole) over, minimizing glue mixing into the solder depressions.

After backplate is glued on, add a tiny amount of solder paste to the front alignment circle as in left photo in fig 2b.. Then place the steel ball in the passageway before gluing on the front plate (the one with the L or R recession) as shown on the right photo (completed device). The L in on the front plate was filled in with the silver Sharpie oil-Based paint marker, fine point to resemble lead that technologists are used to associating with lead markers.

Figure 2b. Photos showing steel ball inserted and solder past added to front alignment circle (left photo) before gluing front cover on (as shown in the right photo on a cassette)



Additional materials (also see complete assembly instructions and bill of materials).

- Hardened Bearing-Quality 440C **Stainless Steel Ball**, 1/4" Diameter 9529K15. Available [HERE](#)
- PAXCOO 30 Packs **Tablecloth Clips** Stainless Steel Table Cover Clamps. Available [HERE](#)
- MG Chemicals 4860P 63/37 No Clean, **Leaded Solder Paste**, 35 g (1.2 oz) Pneumatic Dispenser (Complete with Plunger & Dispensing Tip). Available [HERE](#)
- Glue Devcon 90225 Duco **Plastic and Model Cement**. available [HERE](#)
- Sharpie ® **oil-based paint marker**, fine point in Silver available [HERE](#)

Any questions, comments or suggestions, please email Dr. Folio: Les.Folio@nih.gov or folio47@gmail.com