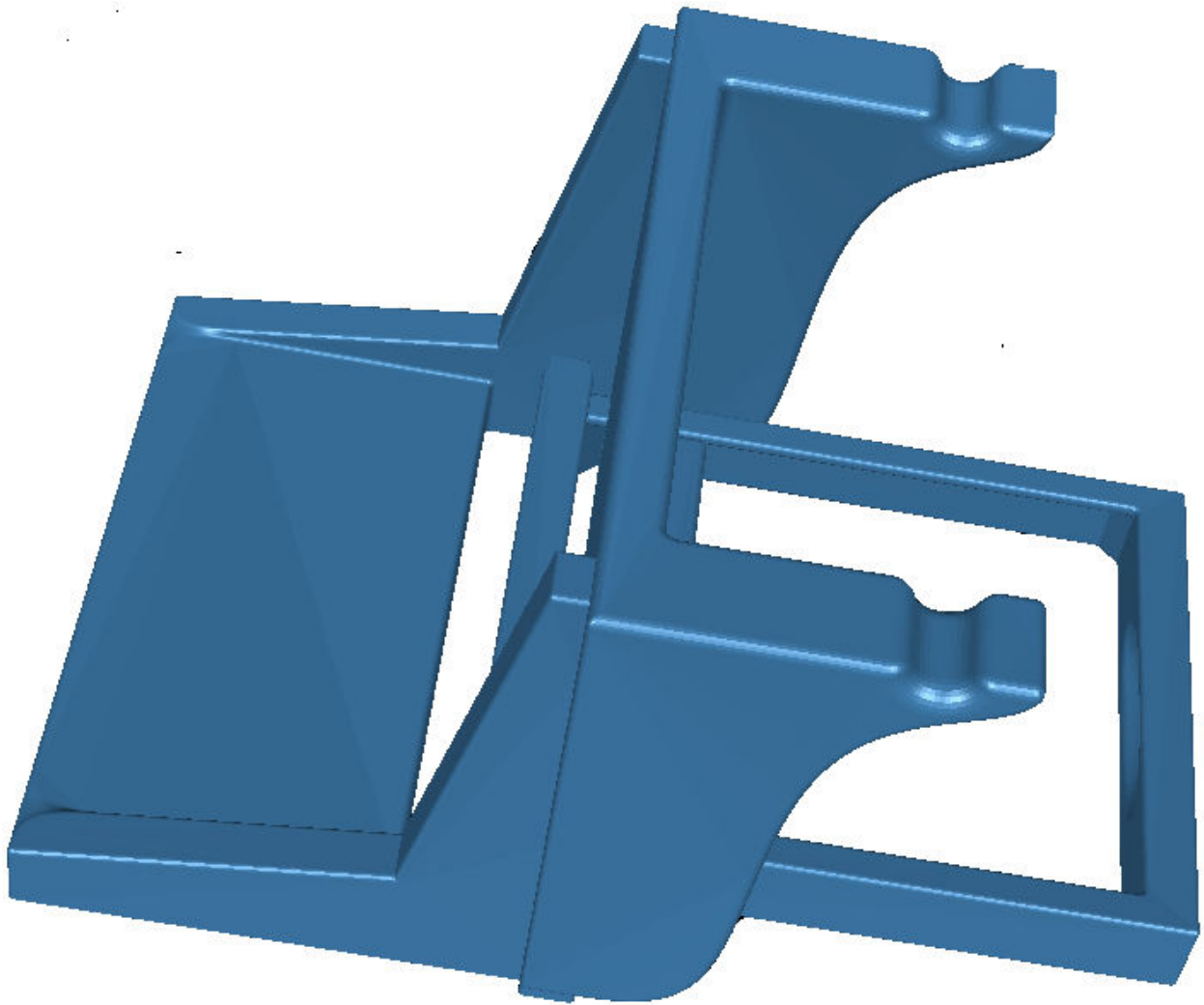


PTA3K User Guide

C. Furman, 30 OCT 23



The PTA3K is a printable device consisting of four parts that will need to be assembled before use. It's purpose is simple – for those struggling to accomplish the “ring and chain” physics trick, this is a way to see the physics in action without the requirement for great manual dexterity.

Printing Instructions

All four of the required parts have already been oriented properly for printing in the provided .STL files (note that the print orientation is NOT the same as the final assembly orientation for 3 of them!). Insert the four component STL files into your slicer program (you can probably fit all four on the print bed at the same time, if you arrange them properly, even on a small format printer), keeping the orientation as it is. The model is designed to be printed out of PLA, although if you are able to keep the dimensional tolerances tight enough and avoid warping, there is no reason it could not be printed with other materials such as PETG, ABS, Nylon, etc. The PLA settings used during testing were: Support: All, Layer Thickness: 0.2mm (or up to half of whatever nozzle diameter you have – course/fast print quality is OK

for this project); 20% infill. Adjust as needed for your printer – the important thing is that the parts are not warped and that the dimensions are as accurate as possible. Note that you may need to sand some of the parts a little bit where they snap together if they sag, have rough surface features (i.e. printing zits), or simply do not fit together as easily as you'd like. They are just held together by friction, so don't over-do the sanding!

Assembly instructions

The "Stand" component is already in its final orientation as printed; the other three parts must be rotated.

- 1) Start by flipped the "Slider" component over 180 degrees so that the "lip" on the side rails is at the top – it was printed upside-down to reduce the amount of support needed.
- 2) Then, orient the "Holder" component so that the hooks are at the top and the holes for the slider are at the bottom. Next, slide the two legs of the slider through the holes from the hook side so that they come out through the flat side of the holder. Note that it is a snug fit, so be careful to advance each leg just a little bit at a time, keeping them relatively even, so that you don't break them off.
- 3) Once the tips are sticking out the back of the holder, attach the "Pusher" plate to those tips by inserting them into the sockets on the plate. It does not matter if the plate is upside-down – both rail sockets are identical. The tips of the rails fit in about 3mm and are held in place by friction; sand as needed to fit them together, but don't go so far as to make them loose in the sockets.
- 4) Once the slider tray is assembled, exercise it a few times to gently wear in moving parts by pressing the front of the slider tray until the rails are all the way through the holder, then pressing the back of the pusher plate until it touches the back of the holder. You have more stroke at this stage than you will once the stand is attached, so cycle it a few times to make sure it is moving freely and smoothly.
- 5) Finally, with the pusher plate against the back of the holder, attach the stand to the holder by starting the upper corners and then "rolling" the stand downward until the tips of the studs are "started" along the full length. With the front of the stand and the back of the holder parallel to one another, grasp both sides and press them simultaneously until the studs are fully seated. If there remains a small gap, that's no problem. Note that the sockets are 2mm longer on the vertical axis than the studs. This is to accommodate "sag" on the lower surface of the studs, but depending on the print quality, you may still need to sand the bottom surface of those studs to make them fit properly.
- 6) The device is now fully assembled! If it is correctly assembled, the stand should be rigidly attached to the holder, the slider should be rigidly attached to the pusher plate, and the tray assembly should move freely over the now short travel between the open and latched positions.

Operating Instructions

To perform the trick using this apparatus, you need to load the trick components into it properly, position the device properly, and then simply press the pusher plate forward to release the ring. Here's how:

- 1) **Load the Ring:** Open the tray fully (i.e. move it forward until the pusher plate touches the back of the holder – note that you should never pull on the tray; always move it by pushing on either the front or the plate. Place the ring inside the tray area, and press the tray “closed” to hold it in place. Note that when properly positioned, the ring should be trapped between the contoured indentations in the front of the holder and inside surface of the slider, and the slider should be closed as far as it will go without excessive force. The device should, at this time, be supporting the full weight of the ring without the ring touching the tabletop directly.
- 2) **Position the device:** With the ring already loaded into the tray and the slider in the “closed” position, you should be able to place the device gently at the edge of a desk or tabletop in such a way that the entire tray and holder portions are sticking out beyond the edge of the table surface and only the stand portion of the device is still in contact with the table top. Hold it down by placing a finger or two on the flat rear portion of the stand to keep it steady.
- 3) **Load the chain:** Look down from above to confirm that nothing will interfere with the path of the ring as it drops, and then feed one end of the chain loop through the center of the ring, just as if you were doing the trick by hand. Loop the top end of the chain around the outside of both hooks, just as you would loop it over your fingers for the manual version of the trick.
- 4) **Perform the trick:** It is critical that you **WAIT FOR THE CHAIN TO STOP SWINGING** – it must be settled and hanging down straight without movement or there is a good chance this will misfire! Verify that the device is positioned correctly so that the ring won't hit the side of the table or any other object on its way down and that the chain is steady. With pressure applied downward on the rear part of the stand to keep the device firmly in place, press the pusher plate forward in a smooth, steady motion until it touches the back of the holder. This should release the ring, and if you've got it all set up correctly, it should not hit the floor!

Notes and Troubleshooting

If you are having trouble assembling the device or just want to know how it should look when fully assembled, there is one additional STL file that is a model of all four pieces already put together. Beware – this is NOT meant to be printed as-is; if you do that, you will get a beautiful static model that has no purposes whatsoever because all four parts will be bonded together. It is included only so that you have a 3D model you can view in whatever software you like (including just placing into your slicer, as if you were going to print it) to see how the thing should look once it is fully assembled.

With the variations in print quality and materials, it is not uncommon that some of the parts may not fit perfectly, but fortunately, this device isn't extremely sensitive to minor variations, so it will very likely

work just fine anyway; if not, sand and adjust as needed – that’s the fun part about 3D printing stuff, right? The most common fit problem is the bottom part of the stand studs sagging due to inadequate support or other such printing issues. If they do not fit properly into the sockets on the back of the holder, just sand them a little bit (or grind them flat with a rotary tool) to make them fit properly. Note that the stand and holder are held together by friction alone, so the fit should be snug – don’t sand any more than absolutely necessary to get them to make up fully. The same goes for the slider rails fitting into the pusher plate – it is a friction fit, so sand if you must to make them fit, but only as much as necessary. IF you have difficulties with any of the connections being too loose, just put them together and add a drop of super-glue to fix them in place – just be careful not to glue the tray to the holder/stand assembly!

This device was designed as an engineering aid for those who struggle to perform the trick by hand. It is intended for fun, so as long as you’re not using it for profit (or any other such malicious purpose), you are free to distribute / print / reverse-engineer and improve as much as you’d like!

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