MODIFICATIONS TO THE SOVOL SV01 X AXIS GANTRY

Background

The method shown by Sovol for levelling the X axis gantry puts a lot of strain on all of the parts, and is not really good engineering practice. The adjustment of the wheels that run on the extrusion should only be used for removing any play in the assembly. If they are over tightened to try and level the gantry they will deform and eventually the gantry will move out of alignment again. The wheels on my SV01 were so tight from the factory that they had developed flats that prevented smooth running up and down.

This article aims to present an alternative method for setting the X axis gantry level. It has proved so successful that the gantry has required no further adjustment since the work was carried out about eight months ago.

The work does involve a certain amount of dismantling and the drilling and enlargement of some holes. The work divides into two parts: modification of the wheel adjustment on the moving up/down parts and modification to the horizontal extrusion. It is assumed that anybody carrying out this modifications is familiar with drilling and tapping holes and using hand tools in general. You carry out this modification at your own risk.

Work to be done

1. Dismantling

To carry out the work the X axis assembly needs to be removed from the machine. These instructions do not give detailed instructions but just highlight important things to be aware of. The extruder head drive belt should be removed first by slackening off the adjuster pulley on the right hand side. The belt ends can then be unhooked from the extruder. The adjusting pulley should then be completely removed to allow the complete extruder assembly to be removed.

The two lead screws need to be disconnected from the stepper motors and then removed. There are two screws that hold the horizontal aluminium extrusion to the right hand side up/down wheel assembly. Remove these two screws to separate the two parts. The adjuster wheel should be completely removed and then the up/down assembly can be removed from the machine.

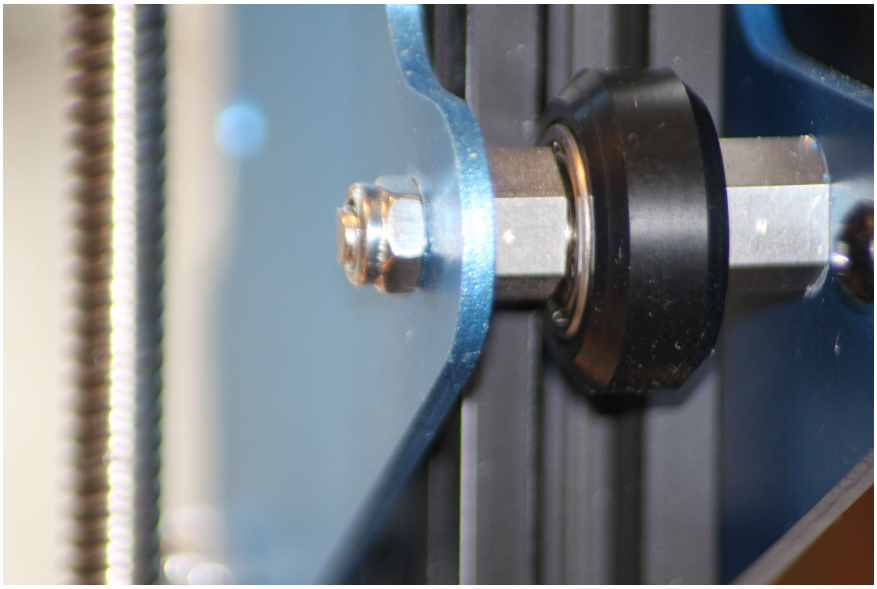
The left hand side is more difficult because the screws holding the aluminium extrusion to the up/down assembly are not accessible. The adjuster wheel needs to be removed so that the parts can be removed. After lifting off, access to the extrusion holding screws is now available and they should be removed to separate the two parts.

2. Wheel Adjustment improvement.

The adjustment wheel on each of the moving up/down assemblies is, in original form, moved in and out by an eccentric nut on one side of the wheel. Although turning the nut does move the wheel in and out it does at the same time impart a twist into the wheel because it is only moving it from one side. This means that the wheel does not sit square

into the extrusion putting some strain on the assembly. The object of the exercise is to remove all stress and strain so there is no tendency to move out of alignment. The wheel needs to move in and out squarely without twisting, and this is easily achieved by adding another eccentric nut to the other side of the wheel and adjusting both together. Identical eccentric nuts are freely available and they are a direct replacement for the plain spacer that is originally installed.

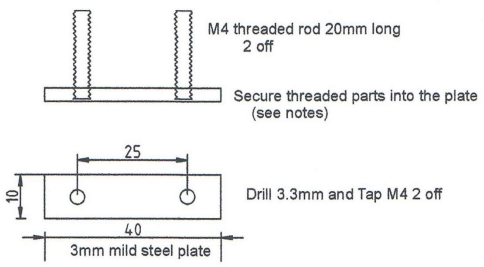
They only modification that needs to be done is enlarging the hole in the bracket to house the protrusion on the eccentric nut. This hole needs to be enlarged to 7.2mm and it is important that the enlarged hole is concentric with the original hole so the wheel shaft is kept square to the upright extrusion. The eccentric nuts need to be in alignment with one another so they are both adjusted identically. This is easily achieved by marking the nuts in identical positions. The picture shows the two nuts installed and the markings so that their positions are the same. (they were marked using an automatic centre punch)

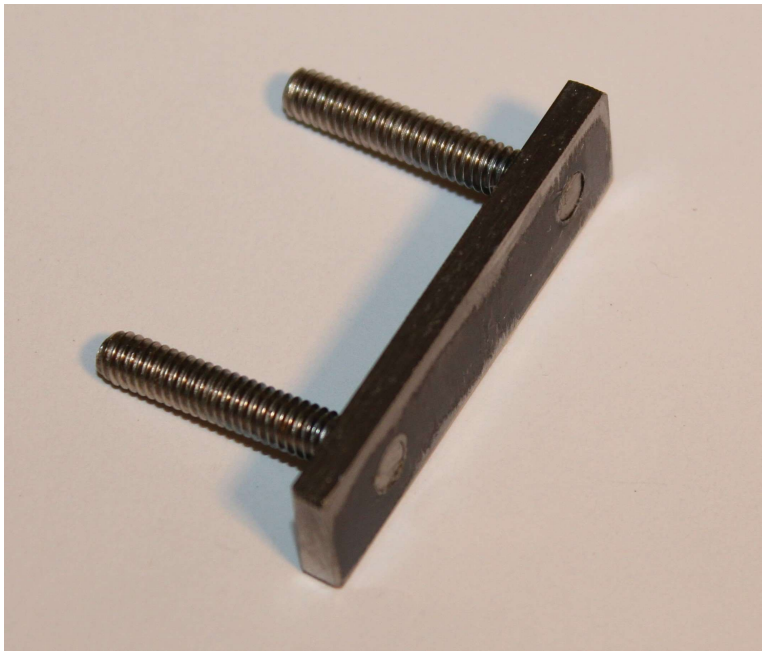


The right hand side up/down assembly can now be reinstalled on the upright extrusion and adjusted so it moves up and own smoothly without any shake or wobble. After adjustment tighten the nut on the shaft so everything is locked in place.

3. Left Hand Side Extrusion fixing screws

The object of this modification is to provide the ability to access the two screws that hold the horizontal extrusion to the up/down assembly when the machine is fully assembled. To achieve this it is necessary to make up a small plate carrying two threaded rods. The drawing below shows the suggested dimensions. Double check that the holes are actually spaced at 25mm, some models might be slightly bigger at 25.4mm (1”). Adjust the hole spacing on the plate accordingly.

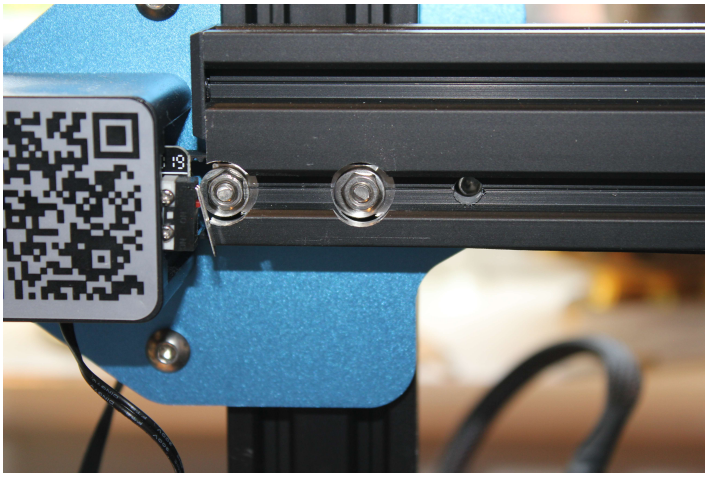




The studs need to be secured in the plate so they don’t twist. I used Loctite retaining compound but superglue would probably work as well. They could of course be silver soldered. There is very little room where the plate fits so 3mm is about the maximum thickness that should be used (there is no room for screw heads).

In my modification I used the existing fixing screw holes but doing this places one of the securing nuts very close to the X axis limit switch making it very difficult to get a spanner on the nut. It is probably a good idea to move the two holes over by about 6mm to make access much easier. If you do decide to move the holes take care not to move them over too much or the bracket will clash with the wheel shaft head.
Fit the bracket to the plate before fitting the assembly. The left hand side up/down assembly can now be reinstalled on the upright extrusion and adjusted so it moves up and down smoothly without any shake or wobble. After adjustment tighten the nut on the shaft so everything is locked in place.

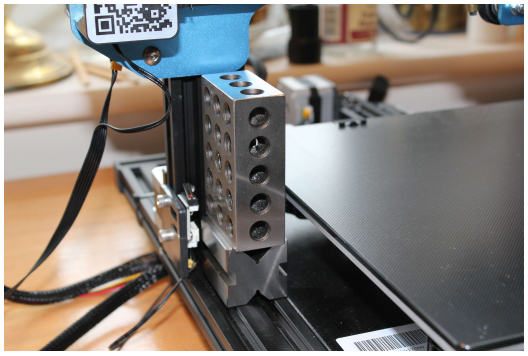
The two threaded holes in the horizontal extrusion need drilling out to 4.2mm to give clearance for the 4mm stud and a little bit of adjustment room. The extrusion will also require opening up to allow the nuts to be fitted, a counterbore bit is ideal for this operation. If you have drilled new holes in the back plate you will also need to drill new holes in the extrusion.

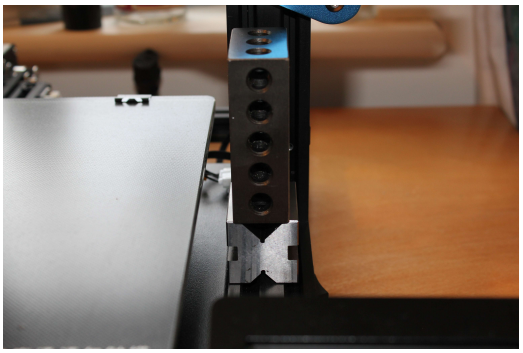


Note the hole to the left of the to enlarged holes. This allows access for an allen key to hold the shaft when tightening the nut to lock the wheel in position. It is quite small and worth increasing its size a little to make access easier. There is a matching hole on the right hand side that should also be enlarged.

4. Final Assembly

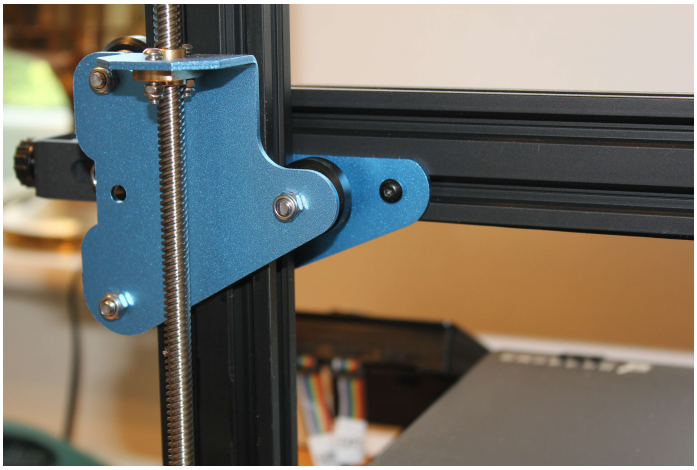
Two spacers are required to support the horizontal extrusion during assembly. They should be about 110mm high. The actual length is not critical but both should be identical.





Position the spacers as shown in the pictures and place the horizontal extrusion on top. Move the left hand side up/down assembly so that the two studs will fit through the holes in the extrusion without any straining. Fit the two nuts to hold it in place.

Move the right hand side up/down assembly so the mounting holes line up exactly with the holes in the horizontal extrusion.. This side uses the original screws that fit from the rear and screw into the extrusion.



Make sure the horizontal extrusion is sitting firmly on both spacer blocks and tighten the screws on the right hand side and the nuts on the left hand side.
Check that the complete assembly moves up and down without any wobble or shake.
With the extrusion still sitting on the spacer blocks refit the lead screws to each side ensuring that they are not strained at all. Leave the brass lead screw nut fixings slightly loose to allow for any vertical misalignment in the lead screws themselves.
Refit the extruder head and its drive belt.

Any further minor adjustment of the horizontal extrusion is easily made by loosening just the two nuts and two screws without disturbing the adjustment of the up/down assemblies.

The bed should obviously re levelled after all this work is completed.

You should on completion of this work end up with a gantry that remains level and does not require frequent adjustment.

At the time I did the work I did not anticipate documenting it, but it has been so successful that I have decided to share it. Unfortunately I did not take very many pictures when I did it so this article is not a complete step by step detail that a complete novice can follow. I hope that there is enough information for more experienced people to tackle the work. I am happy to answer any questions that anybody might have.