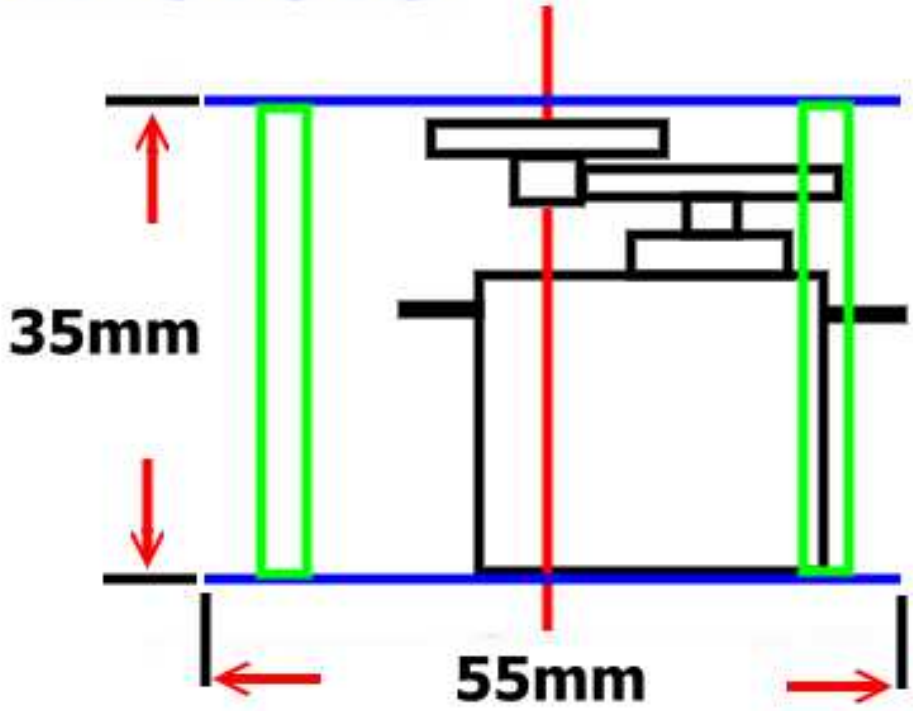
Pololu



Making Gauges For Use In Prosim With The POLOLU Maestro Card

So I got thinking about this and decided to try out an experiment by making one. How hard can it be? Just needs the right materials and some accuracy in manufacture.

All Gauges are servo driven irrespective of what card is being used to control them. Micro servos are very cheap and you do not need a high torque model just to drive a needle, so this may be an economical solution to getting some life into your overhead. Cost per gauge, I estimate at about 12 euros…. Man that's cheap :o)

I decided to use some 2mm 'Plexiglass' because it is easily cut to size and works well (and because I already had it). And being clear, it will not block backlighting. Good start.

I made a cardboard base plate first to experiment with sizes and positioning before disappearing into the workshop, a man on a mission……

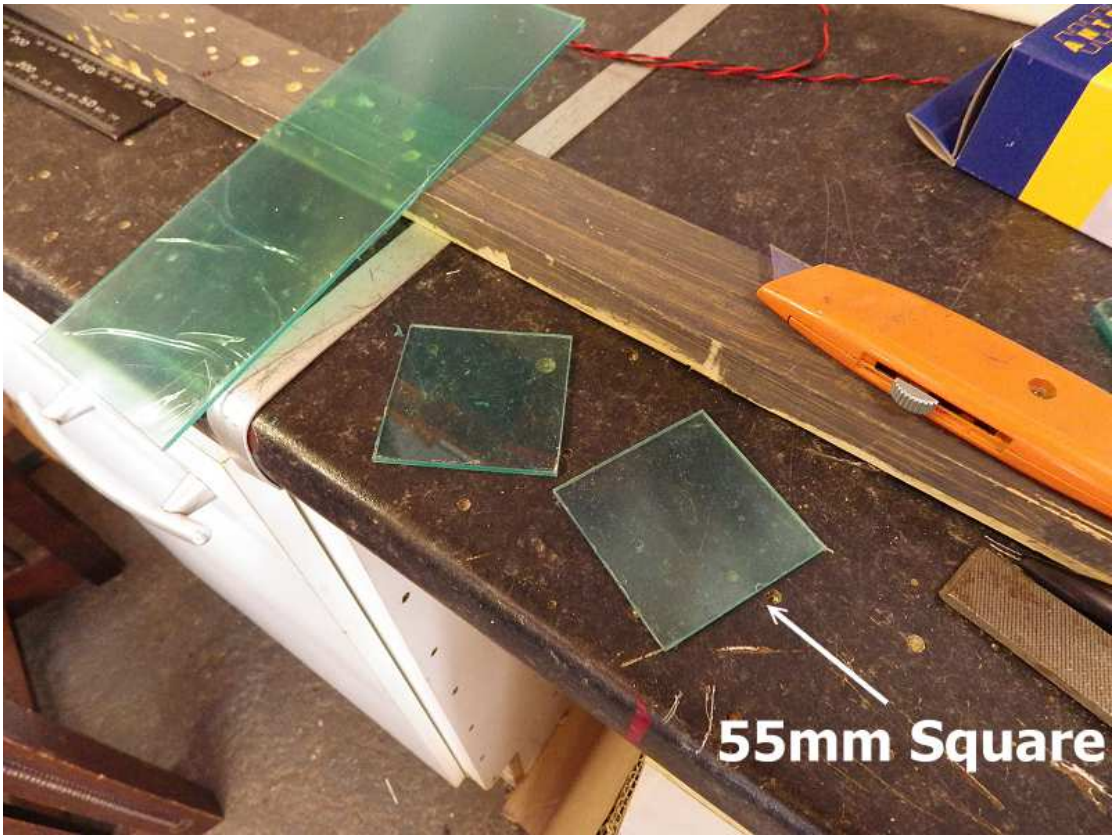


Fig.1

First of all I measured across the dummy gauges in my overhead and noticed I had differing amounts of space around the gauge cutouts. So, I elected to use the dimension of the smallest amount of space which was for the Fuel Temp (because of the Fuel & Spar Valve annunciators getting in the way).

This dictated that I would cut the front, back plates and gauge glass at 55mm.

Working with Plexiglass is so easy. All you need to do is mark up your dimension and using a 'straight edge', run a craft knife a few times along the line to be cut. Then by placing the scored line over the edge of a piece of wood, by applying sharp downward pressure, the Plexiglass will break along the scored line. You can clean up any rough edges using a normal file. Most Plexiglass comes with a protective plastic film on it to prevent scratching. Just remove it.

You now have 3 pieces cut at the dimension you decide to use, in my case 55mm. So one will be the back and one will be the front. Place the gauge glass plate somewhere safe, you don't need it right now. How you fix the gauge into your overhead will be dependant on whose overhead you have, that's your call.

Take one of the pieces and mark out the centre as shown in Fig.2. The centre will be where the centre spindle will run. You can also mark out the holes at this time for the standoffs.

What I actually did was to clamp the two plates together, drill the first hole for the standoffs about 8-9mm in from the corner, place a 3mm nut and bolt thru before drilling the diagonal hole for the second standoff. Placing a 3mm nut and bolt in that hole, I proceeded to drill the remaining two holes. You don't have to be 'hyper accurate' here because these standoffs only keep the plates apart.

At this time you may also want to drill the hole for the centre spindle. My shaft is 2mm, so I used a 2.25mm drill.

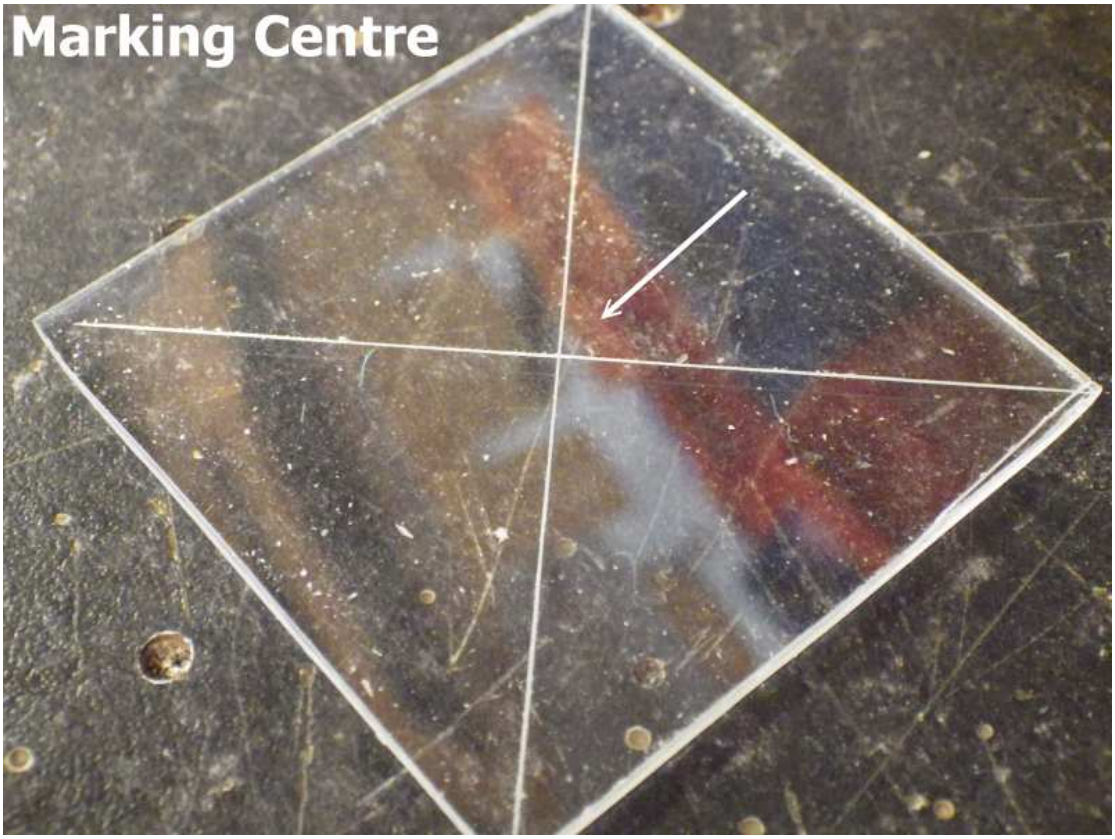


Fig.2

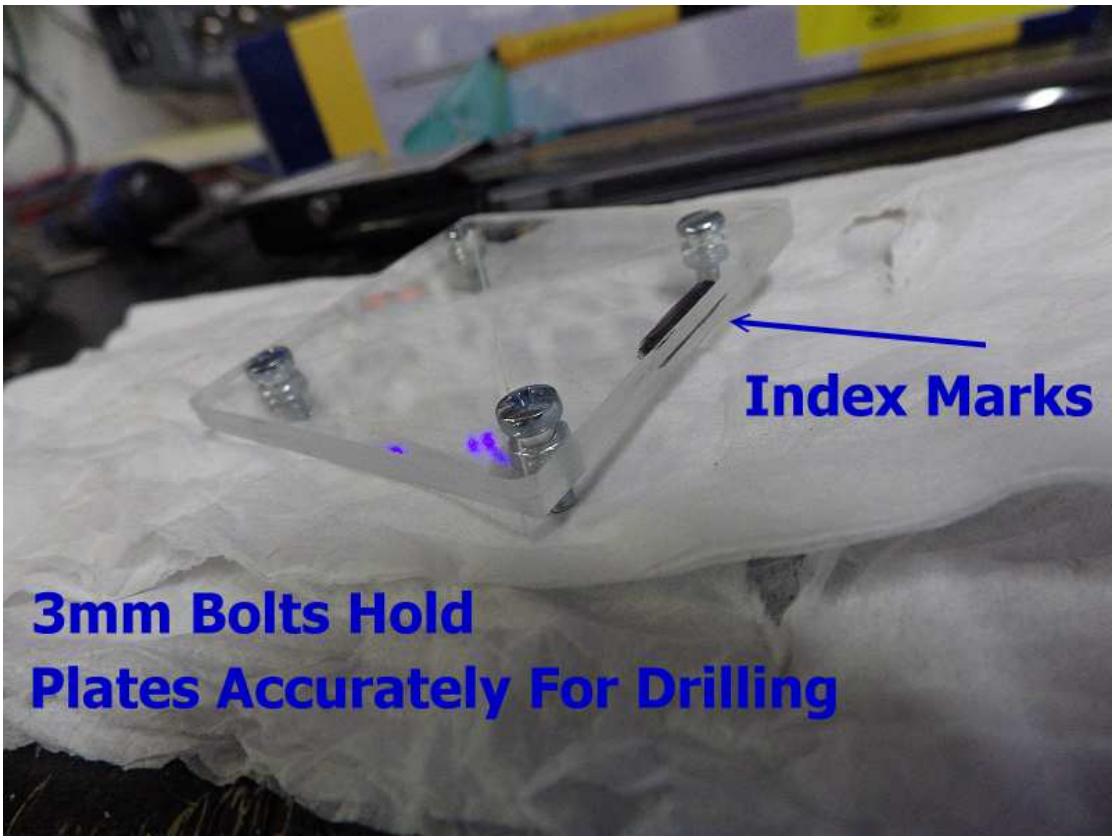


Fig.3

You will also notice that I have marked one edge on each plate with an Index Mark (see Fig.3). This is so when I am assembling/dis-assembling, I know exactly which sides match up.

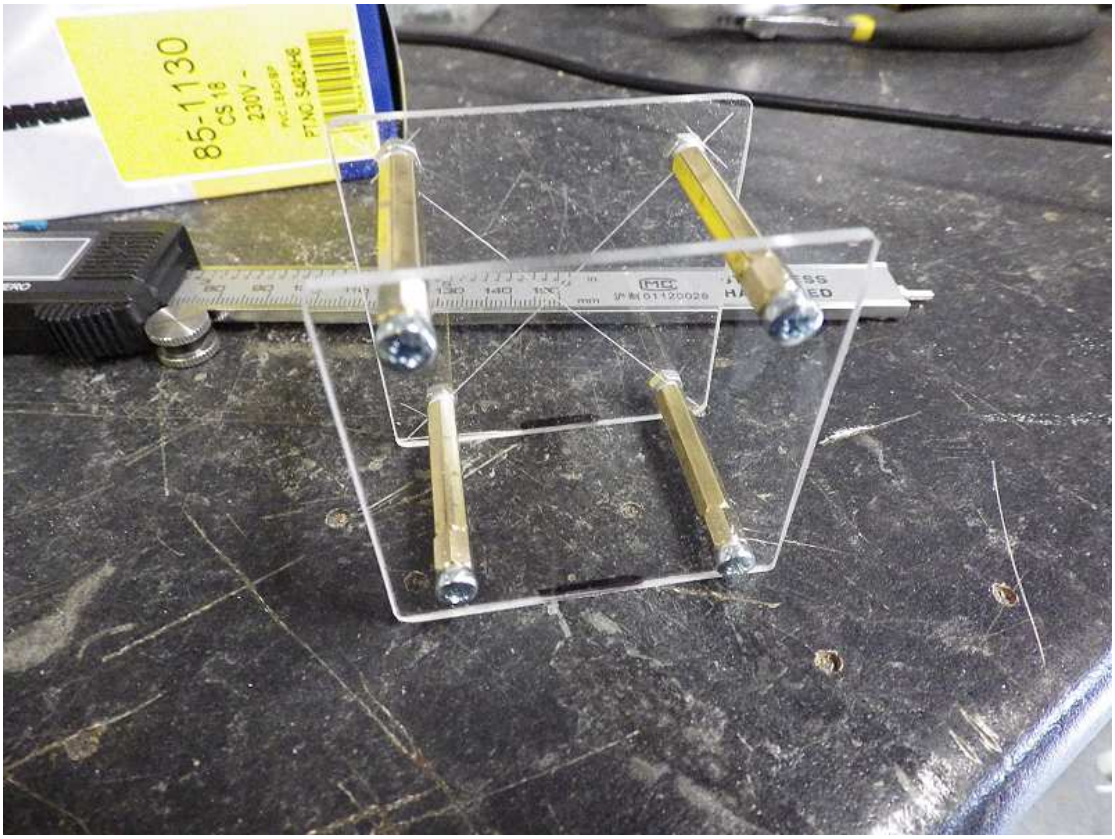


Fig.4

In Fig.4, this is what we have. This is the frame that will house the servo, gears and backlight if you decide to include that. Notice the Index Marks

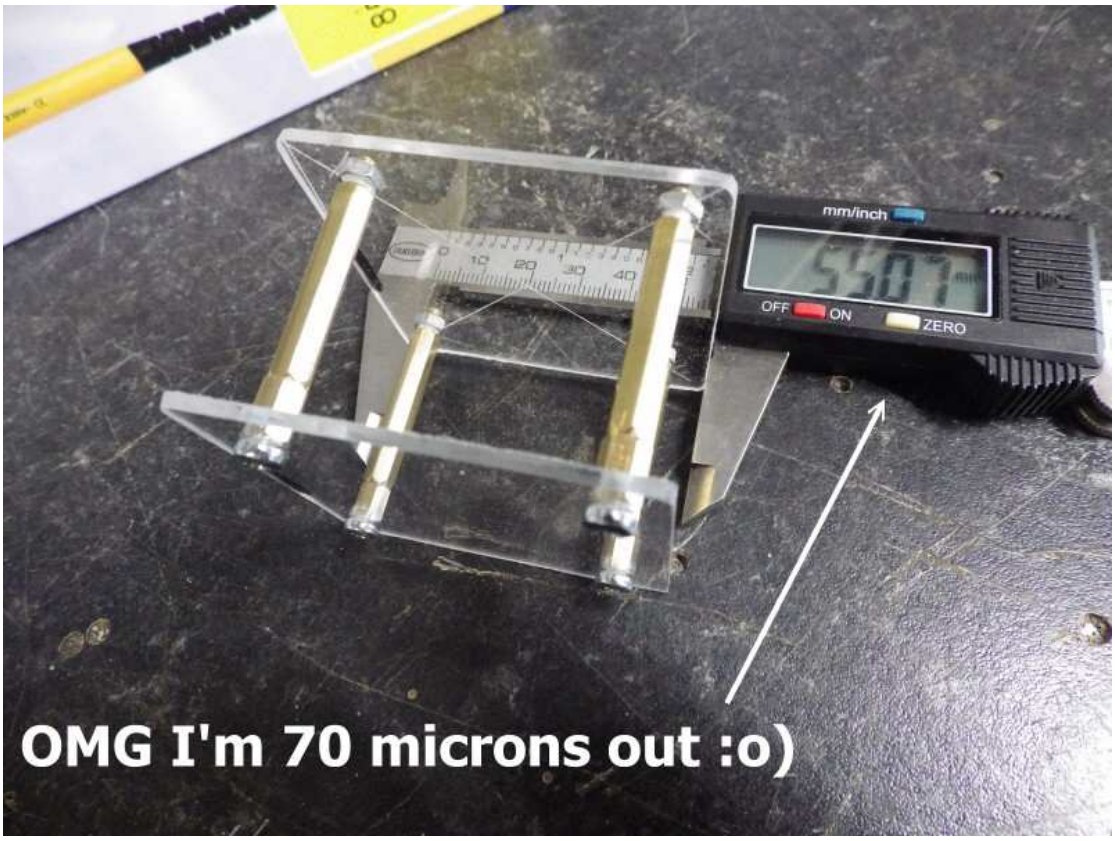
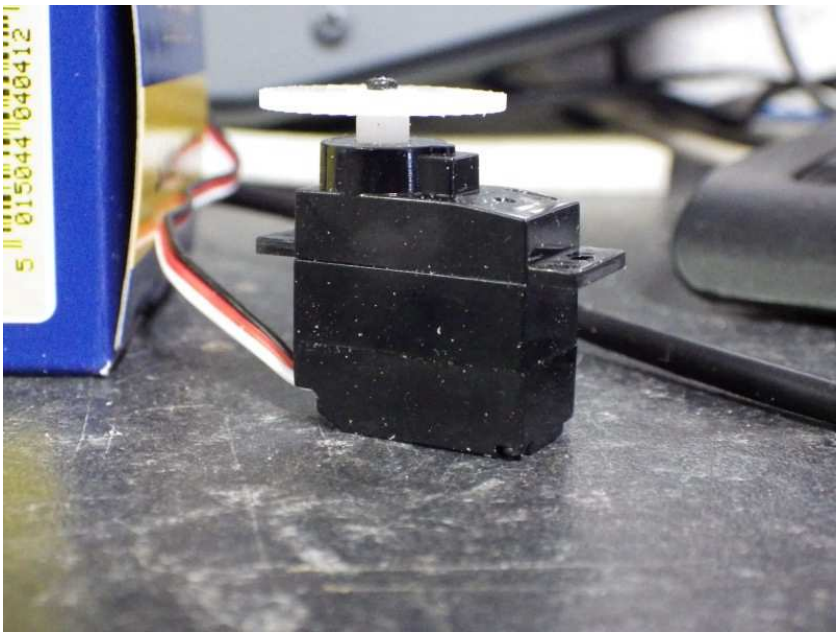


Fig.5

Fig.6

OK, in Fig.6 are the servo with the drive gear screwed to it's hub (I used a small drop of 'Superglue' when I screwed it up so it would remain fixed). There is also the centre shaft with the trailing gear, we will be using the smaller gear driven by the servo to rotate the gauge needle.

These gears are easily available off ebay, just do a search for Model Gears. They are very cheap. I think I paid about 5 euros for a bag full (about 20 gears of various sizes and some shafts).



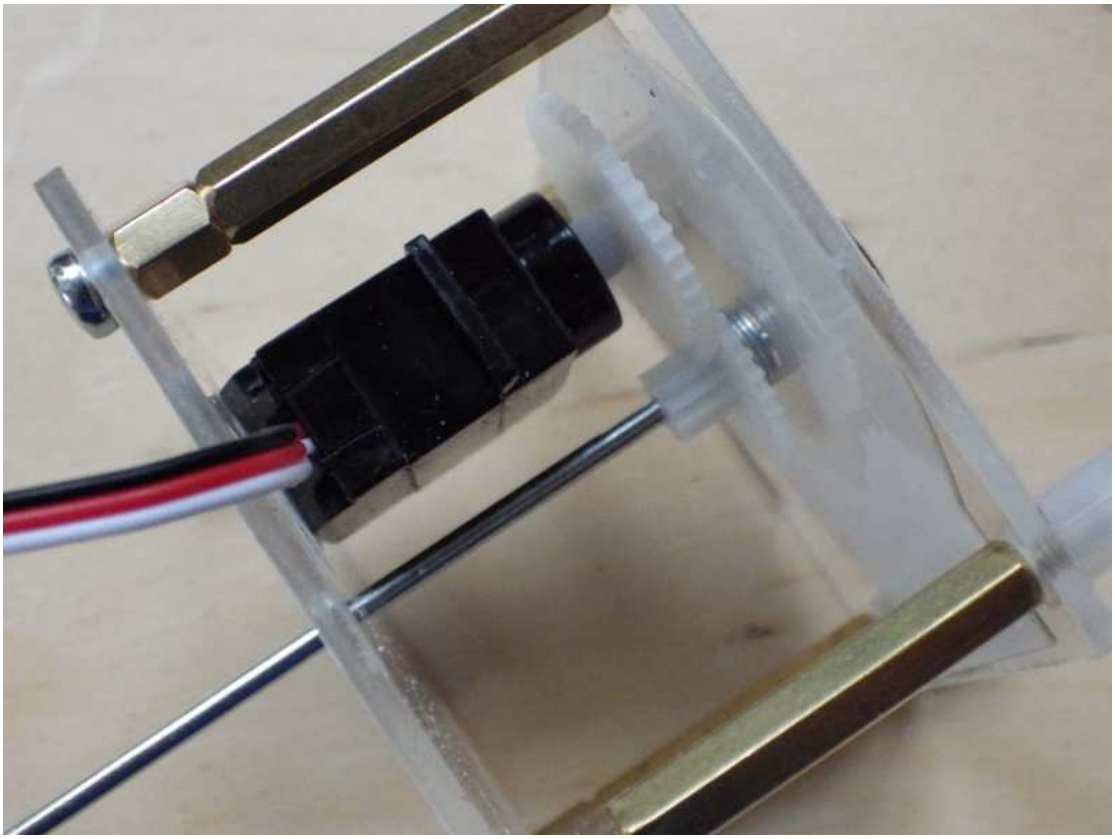


Fig.7

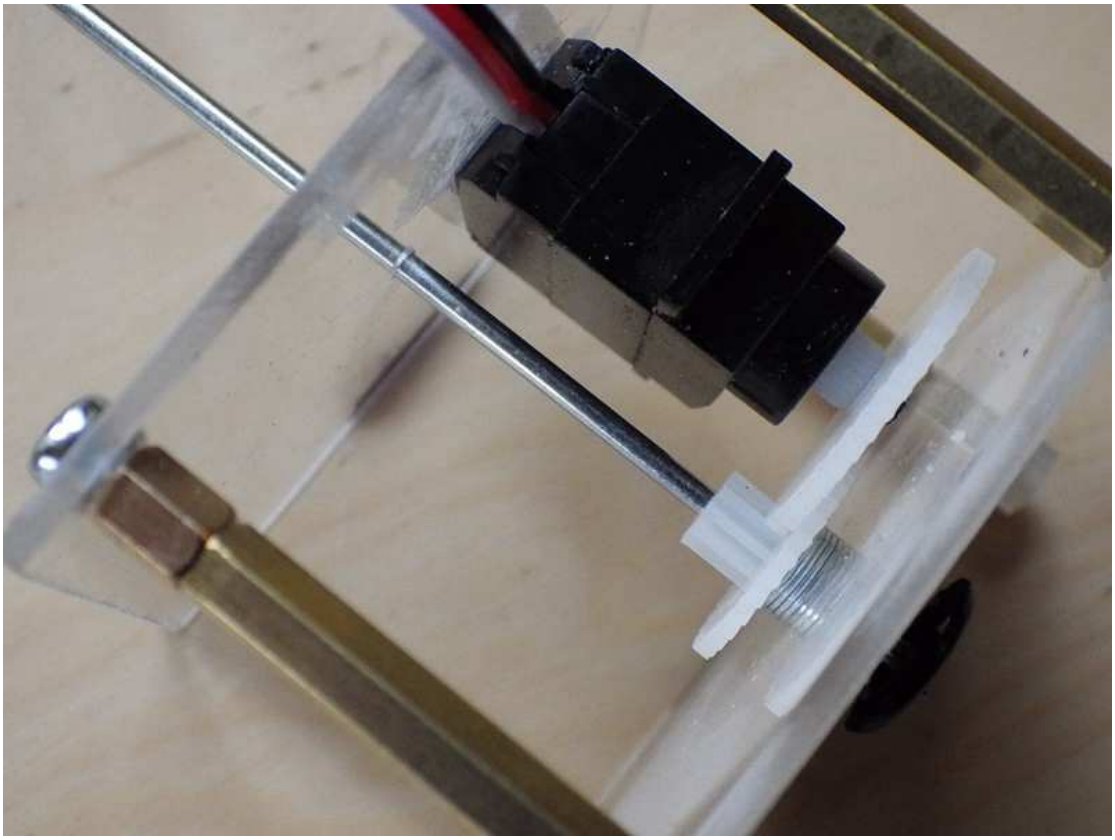


Fig.8

Fig.7 & Fig.8 show the assembled gauge. Basically the 2mm centre shaft is running in the 2.25mm holes drilled in the front and back plates. On the shaft is the trailing gear that is being driven by the servo. The height of my servo with the gear attached is 29mm, so I have placed some 2.5mm washers on the shaft ahead of the trailing gear to stop the shaft from floating backwards and forwards. I still have a small amount of float which is about .5 to .75mm so I have no 'binding'.
So, how have I fixed the servo in place…. Easy ! Well what started out as a trial run, turned into a production run. I needed a fast and effective way to hold the servo in place without having to spend hours drilling and filing out a precise cutout for the servo. I simply used superglue to hold the servo onto the back plate in a position where the two gears met. The bond will be rapid (about 30 seconds) and very strong. Please remember we are only driving a needle here and not raising the Titanic :o)

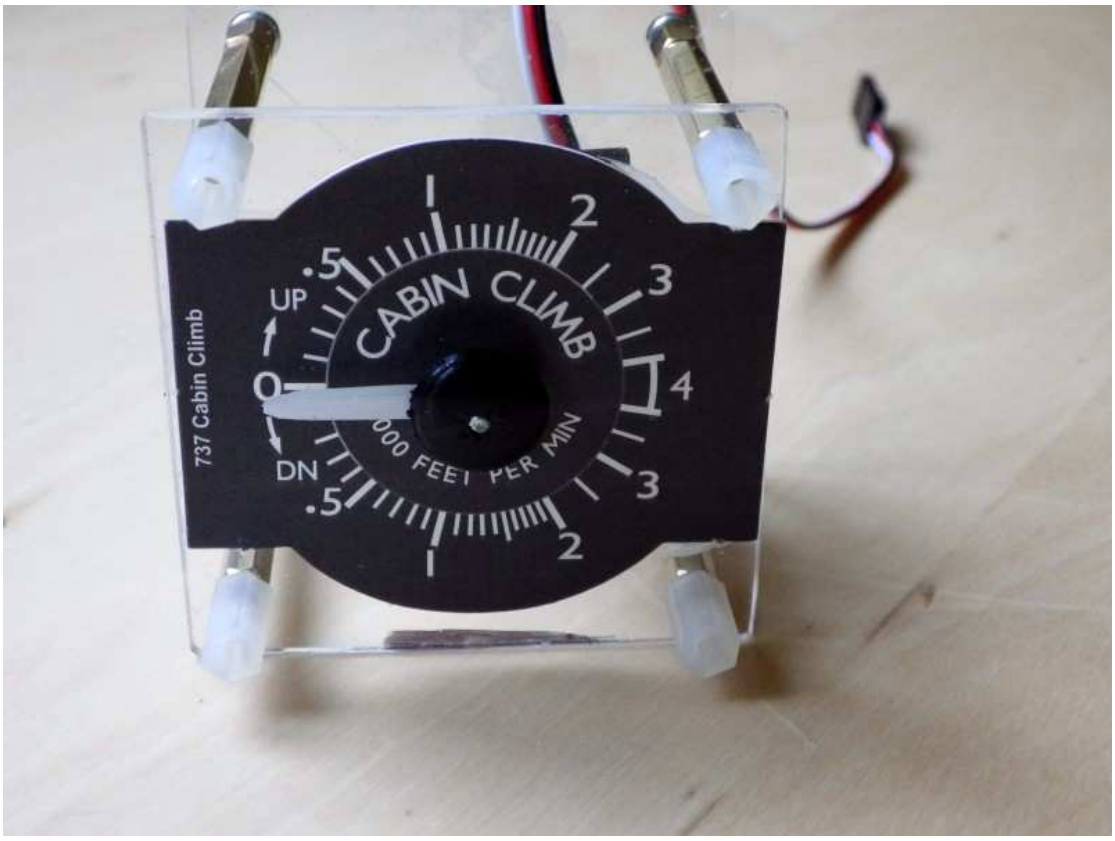


Fig.10

Fig.10 shows one of the completed gauges. I now have an EGT, Cabin Climb, Fuel Temp and Cabin Temp Gauges. I still have to look at the Dual Needle Gauges, but I already have a plan in place using some 3mm brass tube and the 2mm shaft.
Ok, what about the faceplates for the gauges. Well I just happened to have some old Simkits faceplates which I used. But Engravity have a full set of Forward Overhead Gauge Decals in the Downloads section of their website or I'm sure you can find some online.
The needle I have hand filed to shape from a piece of scrap Plexiglass and sprayed white on the rear side. Once I had set the range of the servo in the POLOLU Control Centre, I just centred the servo and set the needle where I wanted it and fixed it in place with a spot of 'superglue'.
For the black centre hub, I have used a plastic cap normally used to put onto cross head screws for a cosmetic finish. Simply file off the moulded portion on the back, drill a 2mm hole in it and fix in place. A spot of black paint on the shaft will finish the job.
To prevent light leak, I'm going to paint the clear Plexiglass around the faceplate black and when the gauge glass is in position I'll fill the gap between it and the front plate with black modellers clay.

I will fit the gauges using two opposing screws into the standoffs like top right and bottom left or vice versa.
These gauges will be driven by the POLOLU Maestro 12 channel card, but there's no reason why you cant control them with other controllers like Opencockpits for example.

They are cheap at about 12 euros a gauge and very fast to make. I guess taking your time, it is only going to take you a couple of hours. And if you are making several, then production line techniques come into play and you save even more time.

I'm very pleased with the end result. Economical, smooth running and follow the Prosim gauges exactly.

Finally please remember this is not intended as a definitive 'How To', if you have a better way to do it, tell me, don't keep it to yourself :o)

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