Weighting the keys on a NordLead 2

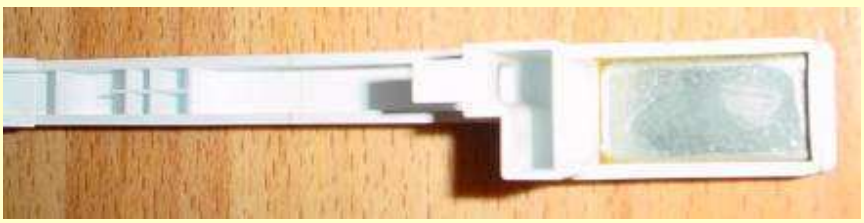
by *Ricard Wanderlöf*

The Clavia Nord Lead 2 is a wonderful synthesizer, however, the keyboard mechanism used remains something to be desired. It is very lightweight, with no weighting at all to the keys, making it difficult to play, especially considering the keyboard after all is touch sensitive.

I initially thought of replacing the whole keyboard mechanism with a more heavily weighted mechanism. A Roland S-10 turned up cheaply on Ebay, and I've always liked the keyboard in this machine. However, closer inspection revealed that quite a lot of work would be needed to get the larger S-10 keyboard to fit inside the Nordlead (they're both four octaves, but the S-10 keys and keyboard are physically bigger than the Nord's). Not to mention the electrical rewiring of the keyboard required to suit the Nord electronics. There was the additional worry of the key dynamics not matching the Nord key velocity measurement algorithm too.

With this in mind, I decided to experiment with adding weights to the keys in order to increase their inertia. Having weighted keys is common practice in the synth industry; shown below are the key weights in the Roland S-10. (Sorry about the out-of-focus images).

S-10 black key with weight



S-10 white key with weight

The S-10 keys above weigh (including the weights) 24 grams and 28 grams, respectively. Comparing to the NordLead 2, the Nord Lead keys weigh in the region of 7 grams. So about 20 grams would bring the keys up to the same weight as the S-10. However, the S-10 is also rather heavily sprung, requiring a weight of 100-105g to fully depress a white key (and that's with weights in the keys!). The Nordlead requires a mere 85g. Another keyboard I have, the Roland ep-77 electric piano, requires 75g to depress a white key fully (key weight unknown as I have not dismantled this keyboard). So, with this in mind, and after some experimentation I decided to fit the Nordlead keys with 10g weights. Here's how I did it.

Caution first

- Opening the case of the Nordlead will probably void the warranty.
- The Nordlead contains sensitive electronics that are susceptible to static electricity. You don't need to touch anything else than the keyboard inside when performing the operation, but be careful just in case. If you fry your

Nord, don't blame me.

- Switch off the machine before opening it. There's mains voltage inside. If you get fried yourself, don't blame me.
- Lead is not considered environmentally friendly. Nevertheless it is still widely used in car batteries, weights for fishing and tyre balancing and is also a major component in solder used for electronic ciruits. Don't throw left over pieces of lead into the garbage bin, dispose of them properly, and wash your hands after handling the lead weights, just to be on the safe side.

Performing the operation

The weights I chose were self adhesive tyre balancing weights. They are normally used to balance car and motorcycle wheels. They come in strips of 60g, each strip consisting of 8 'blocklets' of four 10g and four 5g weights each. (Another variant comes in pieces of 7g, I have not tried those but they should work just as well).

I purchased the box of weights at a local tyre fitting shop; they looked strangely at me when I wanted to buy 50 weights (normally only one or two are needed per wheel), but probably decided 'this sounds so crazy it must be true', and sold me a whole box, even though they normally don't sell complete boxes of weights to customers. I got a good price so I decided not to try and haggle and took the whole box even though it was more than I needed.

3 kilograms of self adhesive weights

The idea is to cut the strips of lead into individual 'blocklets', and use the 10g weights for the keys. The 5g weights will be left over, or they can be paired to use as 10g weights. I opted to use solely 10g weights and save the 5g weights in case I wanted to add more weight to the keys later.

But I'm getting ahead of the story here, first the Nordlead has to be opened, then the lead strips cut into 'blocklets' before they can be mounted in the keys.

By the way, note how the logo of the lead manufacturing firm is a sinewave! Very apt for this application I must say.

Strip of lead 'blocklets' along with two Nordlead keys with 10g lead blocklets mounted. 5g left over blocklets at rear.

Opening the Nordlead is not difficult.

Remove the four black screws along the back, the two frontmost screws on each side (the two rear screws on each side should be left where they are as they form the hinge for the top cover), and finally the two large black screws on the underside of the machine (one is under the bend/mod assembly, the other is just behind the center of the keyboard). All screws are identical in size. (The 8 small screws underneath the keyboard hold the keyboard in place; there's no need to remove them).

After removing the screws, carefully swing up the red cover. It will open to about 50 or 60 degrees, don't force it beyond this point.

Nordlead opened, some keys removed and weights fitted

(The large pink thing with the bloated blue fountain pen image on it is my RAM card which I left inserted while the machine was open)

In order to remove the keys, the key return springs must be removed. The springs are removed by lifting them at the top using a pair of pliers (or even fingers), easing the spring back and then down to dislodge it. Don't loose the springs, they're an odd shape and you'd probably need a replacement from the keyboard manufacturer.

I'm not sure if the white and black keys use different springs, I don't think so since the springs are mounted differently on the two types of key, which should cause the required difference in tension. Nevertheless I kept the 'white' and 'black' springs separate.

After removing the springs, gently nudge the keys forward, while lifting them up. The white keys must be removed before the black keys.

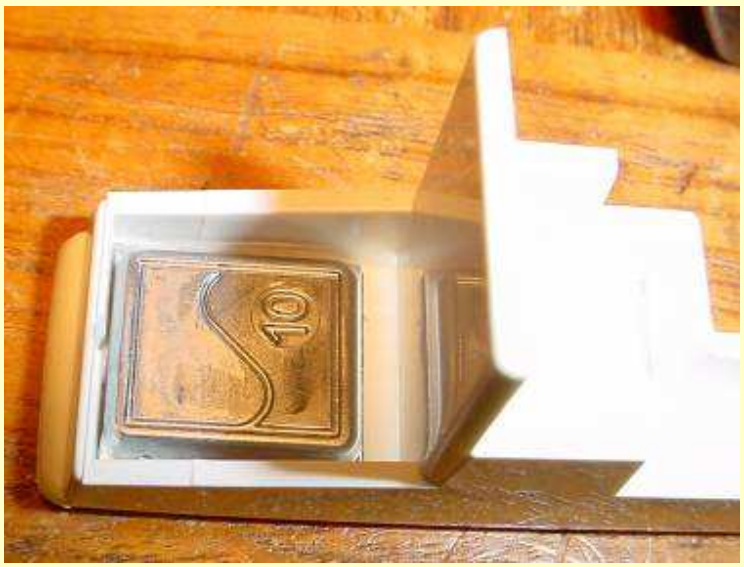
Removing a key spring

The strips of weights must be cut down using ordinary pliers. Lead is a soft material, and will not do any harm to the pliers.

Cutting the strips into blocklets

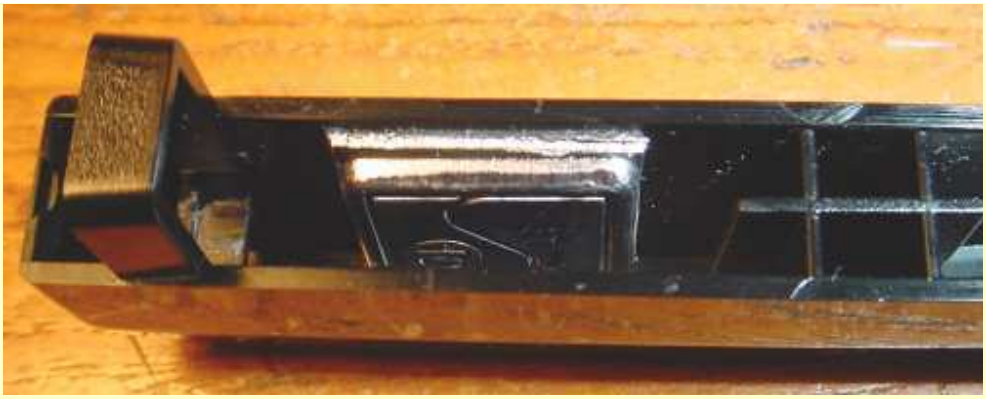
The weights in the white keys are mounted as far forward as possible, in the cavity underneath the front of the key. It may be necessary to trim a millimeter or so off the side of the weight in order to make it fit. After peeling off the protective backing, press the weight hard onto the key.

I cleaned the area where the weight was going to sit with methylated spirits in order to remove any grease. I also cleaned the rest of the key while I was at it. However, be careful not to remove the silicon grease around the area which mates against the rubber damper on the keyboard chassis though. The grease keeps the keys from squeeking and stops the rubber dampers from drying out.



White key with weight in place

The weights in the black keys have to be mounted sideways as there is no other way to fit them. Mount them about 5mm behind the hook that grips the rubber damper, or the key might be hard to refit. Again, give the weight a good press so that it sits properly. A screwdriver is handy for this unless you've got *very* thin fingers.



Black key with weight in place

And that's about it. I did about half an octave at a time to make the work less tedious. After fitting the lead weights, remount the keys and the key springs, and play the machine as a test run before complete reassembly. When reassembling the case it's easiest to start with the screws on the underside as they mate with brackets coming down from the top cover, and may require some jiggling to get into place properly.

Results

Well, the keyboard definitely feels better. Touch response is smoother, and it is harder to accidentally get a high-velocity 'twang' out of the synthesizer. It still does not feel as good as the Roland S-10 and ep-77 keyboards I've used for reference. The Nordlead would probably benifit from some added spring tension, but I think it would be awkward to modify the springs. As it is, the keys tend to get a trifle bouncy because of the added weight. Also, I think the Nordlead velocity sensing software is not as accurate as it could have been.

That said, I think the weighting is a definite improvement, and it gives the synthesizer an added 'heaviness' that goes well with its character and sound.

Other thoughts

I've been wondering about how well the adhesive will hold up with all the bashing on the keys. The weights are intended for mounting on vehicles so the glue should be quite strong; on the other hand, they are intended to be mounted in such a way that centrifugal force holds them in place. At any rate I've figured that if the glue gives up, by that time I will have decided whether to make the modification permanent, and can then glue the weights in place using epoxy glue; that looks to be more or less what Roland have used in their keys (see the images at the top of this page).

And finally...

Finally, give some thought to the slight difference in meaning the name Nord ***Lead*** now has. J