

Yamaha SY99 Battery Replacement Procedure

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Purpose of Document

Like a lot of synthesizers, the SY99 uses CR2032 Lithium Cells to backup the data and internal sample memory.

The SY99 has two batteries

- One on the DM1 card for internal data such as voices;
- One on the DM2 card for internal custom samples.

These batteries tend to go for 20+ years without any problems; much longer than the typical life quoted in the user manual.

Unfortunately on the SY99 the batteries are of the type that have solder connections, and are soldered to the PCBs, which makes replacing them awkward.

Whilst performing my SY99 display upgrade (see related guide), I noted that one of the batteries was quite low in voltage (around 1.1V), so time to replace them, and also time to put in battery holders to make replacement easier next time around (circa 2034!).

This guide shows you what I did to achieve this, written as a separate guide, and assuming this is the only job that you are doing on the synth.

I couldn't find battery holders that had the correct pin spacing for the PCB layout for the soldered batteries, but this didn't deter me!

Disclaimer

Whilst I have taken care in preparing this guide, and whilst the upgrade worked fine on my SY99, I cannot be held responsible for any damage that you could do to your machine or injury to yourself and/or others as a result of you following these notes; either on your own account or by any error or omission in this guide. You do this upgrade entirely at your own risk!

Please bear in mind that during a production run of any manufactured item, a manufacturer can make changes, and I can't guarantee that all SY99 machines are identical, as I only have the one. So care is needed in checking that the steps advised are appropriate for your machine, as it might be different to mine.

Pre-Requisites

First of all, make sure that you're comfortable with the concept of dismantling your beloved SY99, including unsoldering the batteries from the synth's circuit boards.

You also need to be proficient in soldering, or know somebody who is and who can help you.

You will need the following tools to do this job:

- Posidrive screwdrivers;
- Wire cutters;
- Some small fine nose pliers also come in handy;
- Soldering iron and solder;
- A desoldering pump, or solder removal wick;
- An anti-static wrist strap is recommended;
- Voltmeter (to check battery voltage before closing up).

You need to ensure that you take anti-static precautions whilst the synth is open. If you don't have an anti-static wrist strap, then ensure that you regularly earth yourself on a metal object, such as a radiator to prevent the build up of any static charge.

Electric Shock Hazard Warning

Be very aware that in opening the keyboard, and if it is powered whilst it is open, there will be exposed mains voltages on the power supply board and thus a risk of electric shock. Obviously, the synth only needs to be powered up for short periods whilst it is disassembled. If you keep your hands well away from the power supply board when the case is open and the synth is powered, then the odds of you getting an electric shock will be very small.

If you are in any doubt regarding your ability to work safely with a potential exposed mains voltage hazard, then you should refer this job to a competent electronics technician.

Procedure

Step 1 – Backup your Data

Removing the backup batteries whilst power is off **is going to cause data loss**, so ensure that all of your important user data (Voices, Waves, etc.) is backed up to floppy disk, or via MIDI to computer.

Step 2 – Find a Good Work Area

You'll be working on this for a little while, so find somewhere comfortable and where there's plenty of light. My kitchen was the best place for this in my house. Note the towels under the keyboard to protect the fascia.

References in this document to "top" and "bottom", "left" and "right", refer to you looking at the keyboard in this orientation of the base upwards and the back panel towards you.



Whilst on the subject of avoiding scratches, the next step is very important!

Step 3 – Remove Cat from Work Area

An [EX5Tech](#) pre-requisite in the guides we write, and a very important step if you wish to avoid being “scrammed”! And of course, cat hair is terrible for static, and it gets everywhere¹!



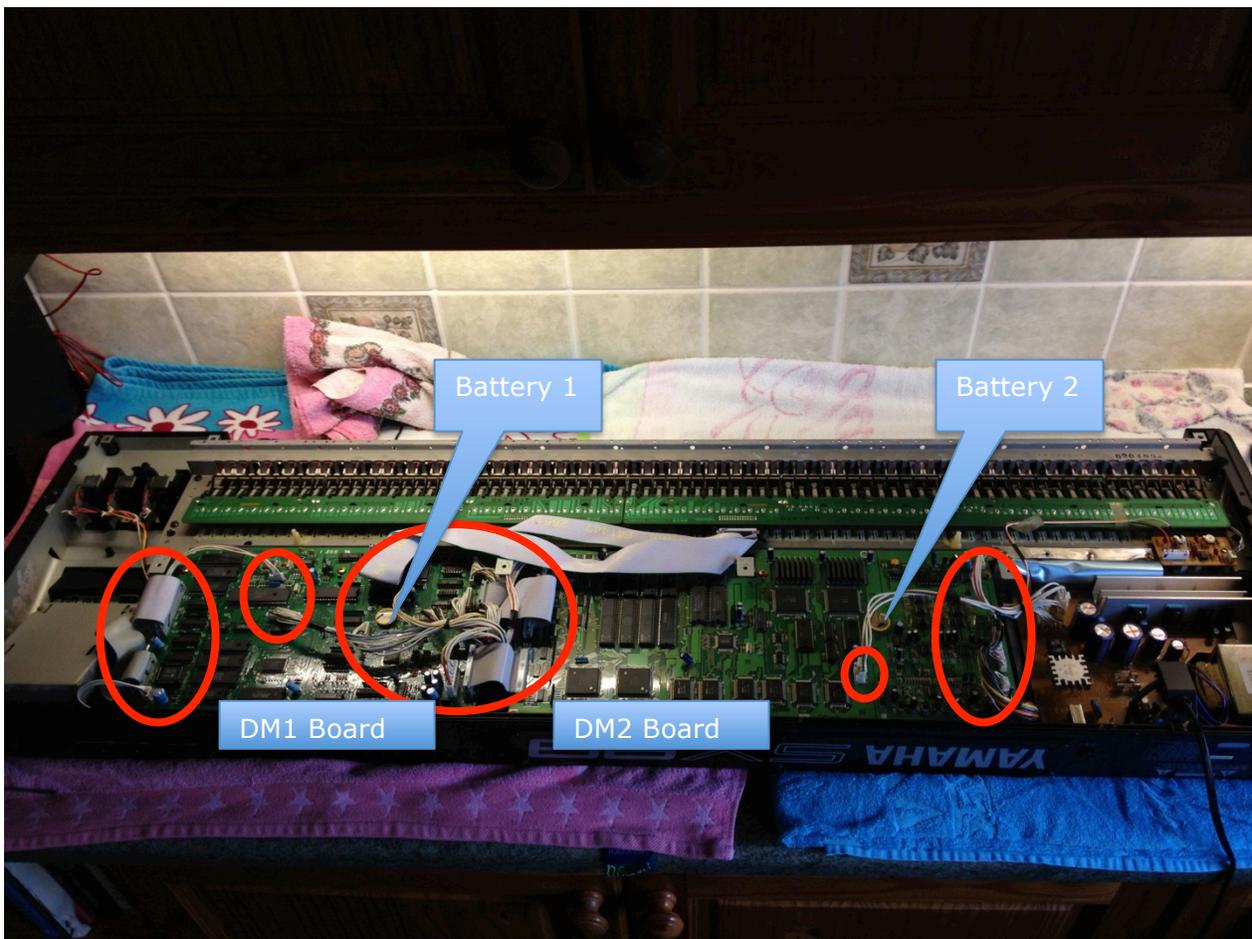
¹ Synth Trivia: If you're in the market for an OSCAR monosynth, look out for one where the innards contain cigarette ash and cat hair; as these were supposedly hand built by chain smoking, cat loving Chris Huggett, the main man behind the Oxford Synthesiser Company.

Step 4 – Remove Bottom Plate

The first big step is to undo all the screws on the bottom plate (including the four rubber feet). The plastic end cheeks can be left in place.

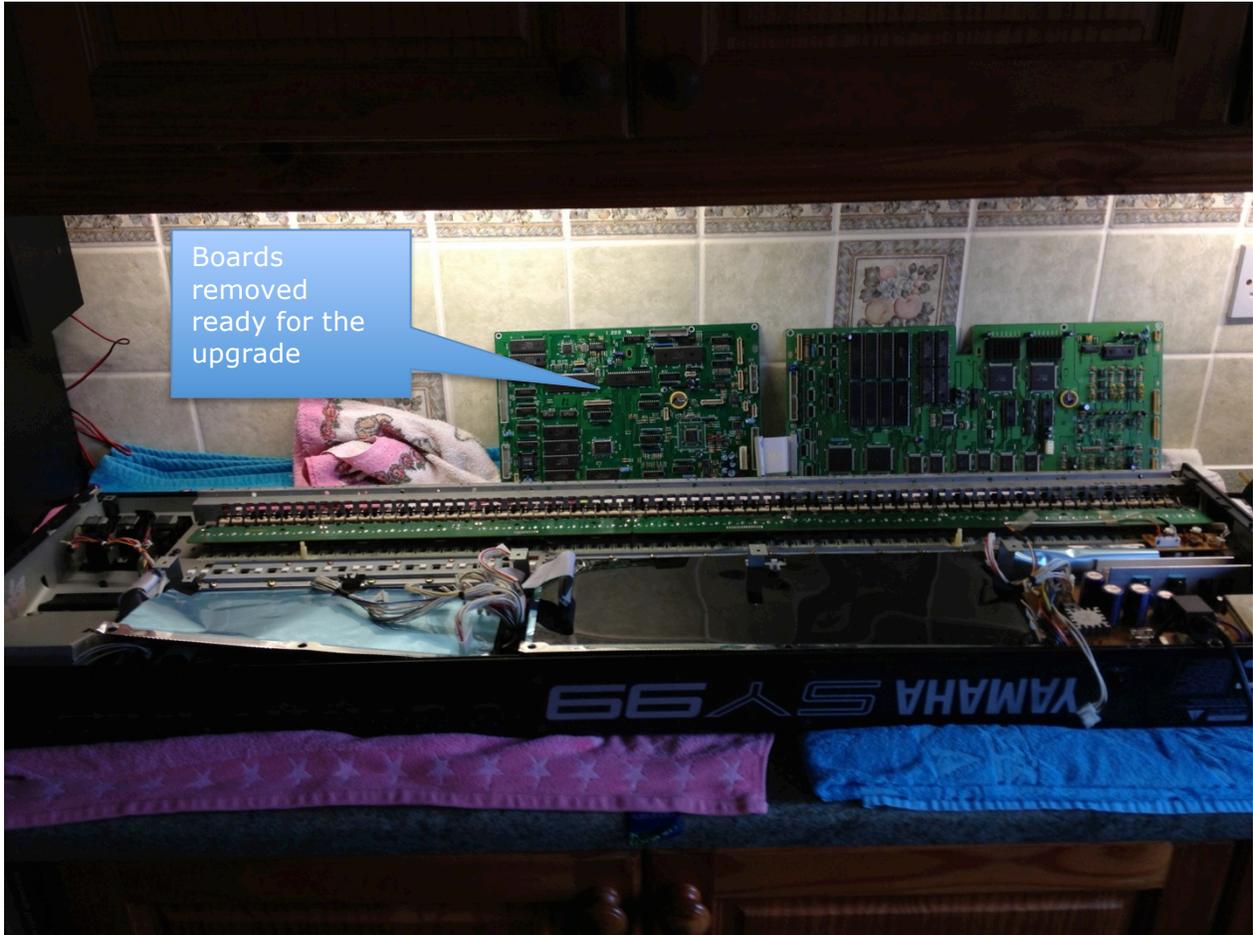
As there are only a few different types of screws, I didn't worry about making diagrams as to where they came from, but I kept the external screws in one bowl, and the internal screws in another to make it easier to sort them out later.

With the bottom cover removed you can see that there are two main boards, DM1 and DM2, with quite a few connectors going between them. All of these connectors need to be removed. Fortunately, all of them have different numbers of pins, and thus their associated plugs cannot be connected in the wrong place. So I didn't worry about labeling the leads with the numbers of the Printed Circuit Board (PCB) connectors that they go to.



Step 5 – Remove Main Boards

Remove all the identified connectors and unscrew and remove the boards. Each board is held by six screws, three at the front and three at the back. Alternatively, if you wish, undo the connectors on one side of the boards only and you can then gently turn the boards over whilst some of the connectors are still attached.



Fortunately, compared to the display upgrade, this is all of the dismantling that you need to do!

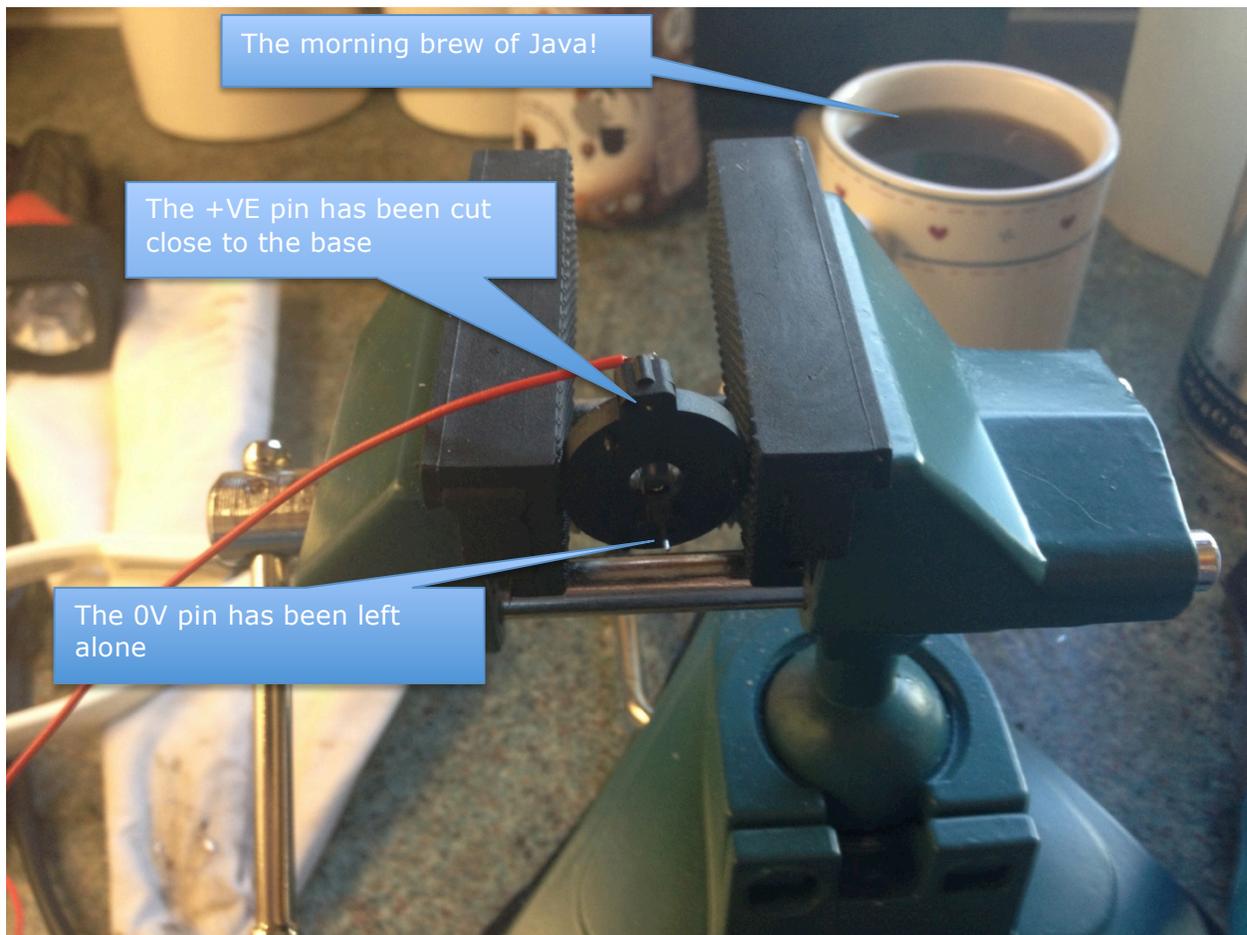
Step 7 – Prepare the Battery Holders

As mentioned, I couldn't find battery holders with the correct pin spacing, but I was OK with that as I felt that I could improvise! The holders that I found (see the Parts List at the end of the guide) had the terminals on small legs, so there was space to feed a wire underneath them.

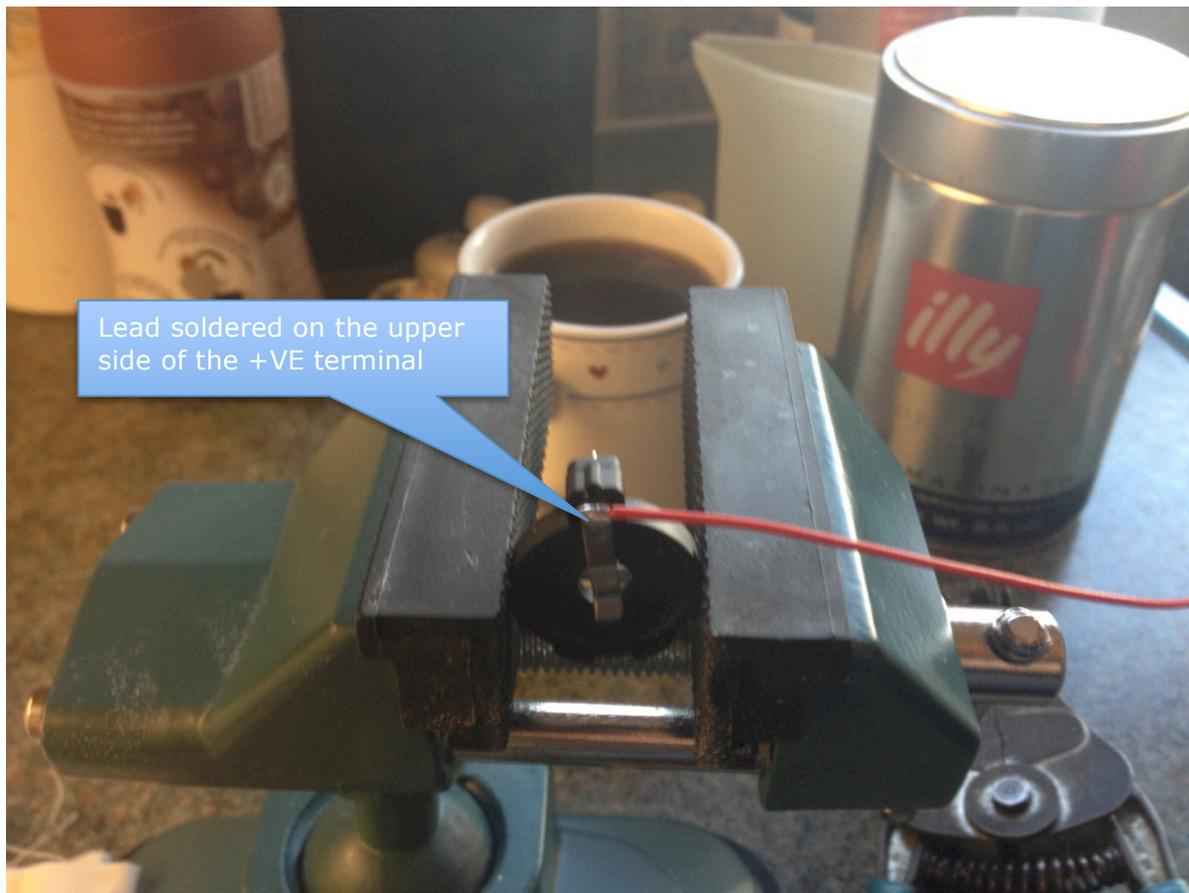
The following worked for me. Prepare two battery holders like this.

Cut the +VE terminal underneath the holder, flush to the base of the holder. This pin is used for the modification, because there is some "real estate" above the holder on this terminal on which a lead can be soldered.

Leave the 0V pin alone.



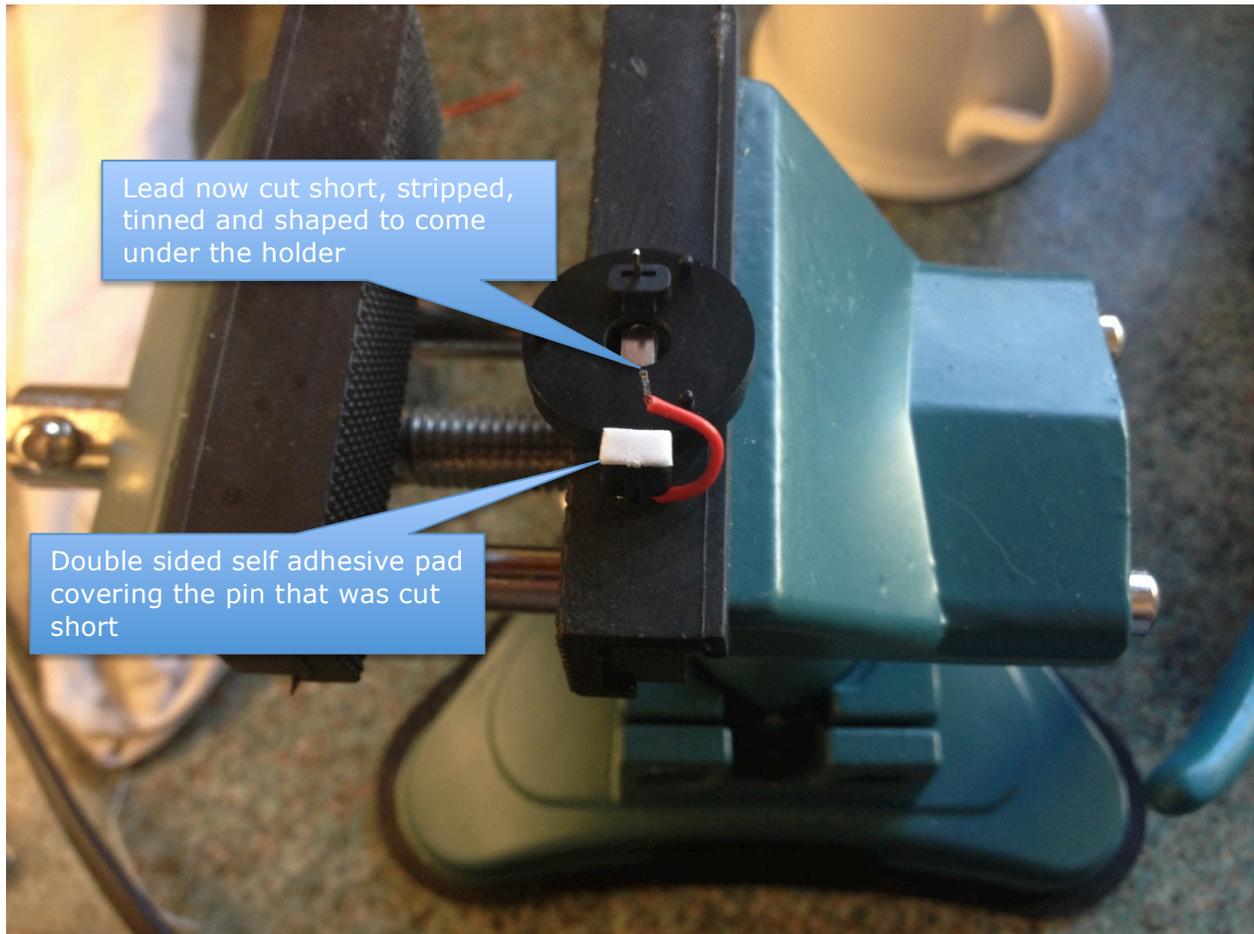
Solder a lead direct to the +VE terminal on the top of the holder.



Shape the lead and cut it short so that it fits under the holder.

Strip and tin the lead ready for soldering into the PCB.

Put a double sided self adhesive pad, cut to size, where the +VE pin was cut short. This will help secure this side of the holder to the PCB, and it also insulates the pin that was cut short.



Step 8 – Solder the Battery Holders

This is the same for both DM1 and DM2 cards.

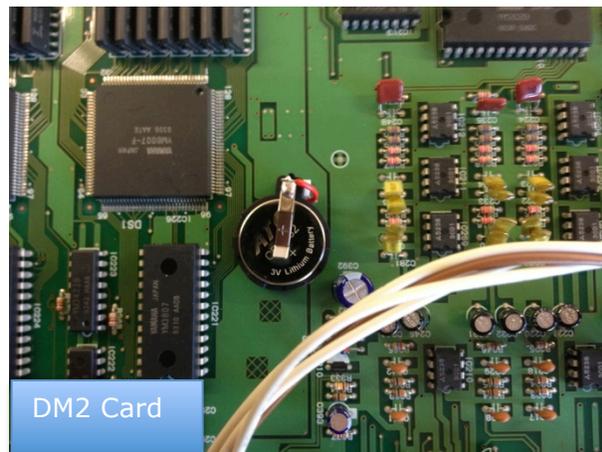
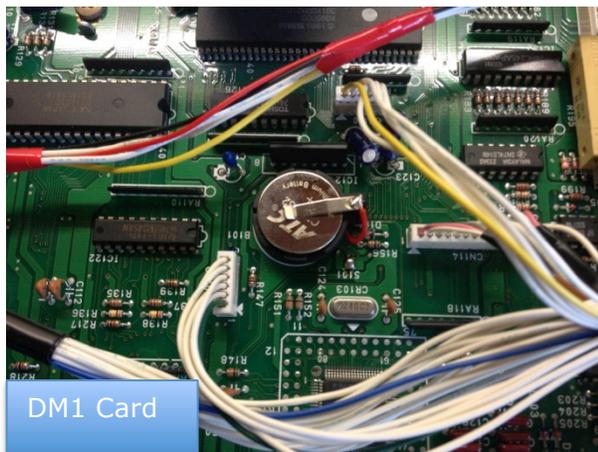
Insert the lead into the +VE hole on the PCB, where the original battery was soldered, then put the 0V terminal in and press down to secure the holder with the self adhesive pad.

And of course, solder the leads.

Step 9 – Insert Batteries and Check Voltage

Place the fresh batteries into the holder, taking care not to short the positive and negative terminals. Check the voltage to ensure that it is better than 3V, which indicates a nice healthy battery.

Here is what the completed job looks like on the DM1 and DM2 Cards.



Step 10 – Reassemble Keyboard

So easy to say it, but assembly is “simply” the reverse of disassembly, replacing the boards into the synth, taking care that all the connectors go back in the right place!

Step 11 – Power on and Reset Synth

Power the synth on. The chances are that it will not even make as sound (mine didn't, even on the preset sounds) as the internal memory (including system settings) are now blank.

To get going again, press the **Voice**, **D** and **8**² keys together to enter the diagnostic mode. Press the **COPY** button to reinitialize the synth with the factory set data. This should get it all going again.

Conclusion

By the end of this, hopefully you now have fresh batteries in the keyboard, which are now also easier to replace in future, but probably good for another 20 years!

And hopefully, you had no screws left over!

² The **8** button in the Voice select buttons 1-16 under the **D** button, not the one on the numeric pad.

Acknowledgements

The "Cat on Keyboard" shot is courtesy of my EX5Tech colleague, Jim Attfield. The observant of you will notice that the keyboard in this instance was not an SY99.

Parts List

The following table provides a list of parts that I used in this project.

Part	Description	Supplier	Link
L01AC	CR2032 PCB Battery Holder	Maplin	http://www.maplin.co.uk
ZB74R	CR2032 Lithium Cell	Maplin	http://www.maplin.co.uk

Links

EX5Tech as a good resource for the EX5, with sub forums for other Yamaha synths:

<http://www.ex5tech.com>

The Yamaha UK forums also provide a very good forum for all things Yamaha (and more), which is a good resource for the Yamaha SY series, and there has been a lot of activity recently about doing upgrades on the SY77, TG77 and SY99.

<http://www.yamahaforums.co.uk/>

Finally, a bit of blatant self promotion(!):

My website for my Java based x.factory librarians, available for the EX5, AN1x, FS1R, DX7/DX7II and Motif synthesizers and, of course, the SY77, TG77 and SY99!

<http://www.xfactory-librarians.co.uk/>

My Pink Floyd Tribute Band, Pure Floyd

<http://www.purefloyd.co.uk/>

My Celtic/Ambient/Progressive project, Carreg Ddu

<http://www.carregddu.co.uk/>

And my progressive/classic rock influenced project, Echoes

<http://www.echoes-music.co.uk/>