Remote Switches for FLX

Zero 88 FLX lighting desks are supplied with 9 pin sockets on the back that allow for the connection of up to eight switches each of which may be used to either trigger a macro or a playback.

jw-lighting posted a design for a PCB on July 3, 2015 and, if you have the facilities this is one way to gain access to this facility please refer to his post for more information.

However, this was not possible for me and, having tried an external box attached with a cable I was looking for a neater alternative – one that could ride with the desk in a standard flight case and didn't need a separate box. *Obviously, modifying the desk or its casing was out of the question.*

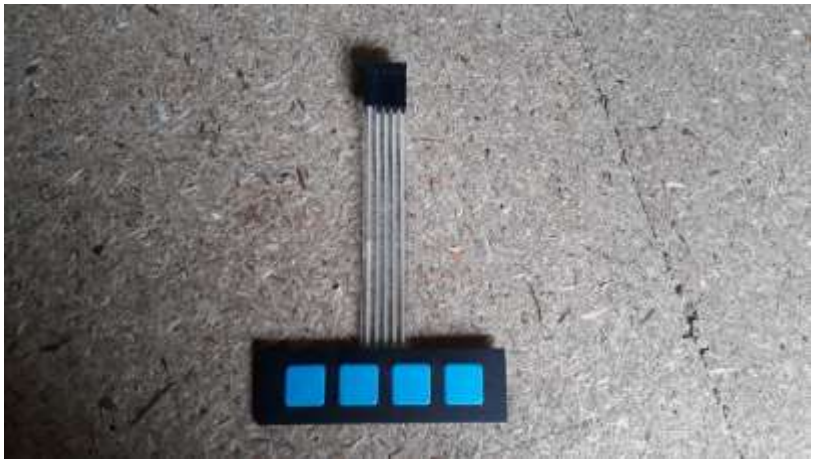
Eventually, I came up with this…

I found the basis of this solution on a well-known online shopping and auction site in the shape of membrane switches (search for "Universal 1x4 4 Key Matrix Membrane Switch Keypad")

There are a number of suppliers of what appear to be identical items on the site at various prices (mostly quite cheap) and they are probably available on other sites so shop around for the best deal. There are also versions where the 4 keys are numbered 1 to 4 as well as other configurations of switches but I didn't find any with eight plain switches in a single row which is a shame.

Please note that the following assumes a basic ability to solder and access to the tools listed below.

The switches look like this…

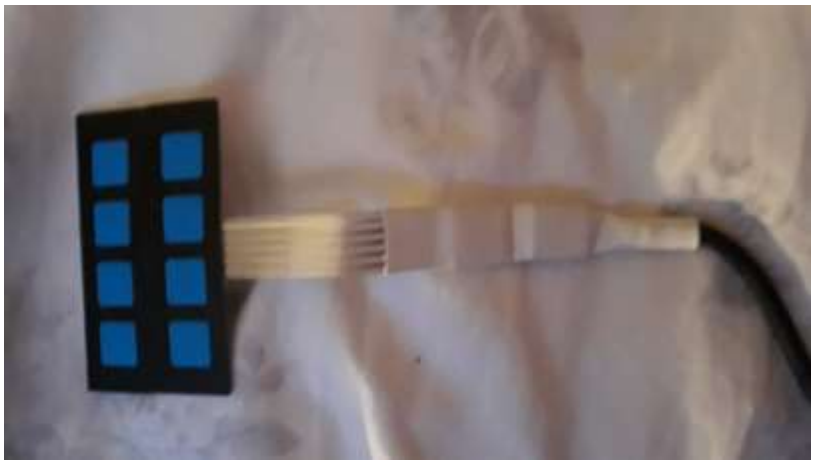


They are very thin (about two business cards thick), have a self-adhesive backing and the leads run out in a flexible ribbon with a connector on the end.

Now, for many of you, that will be enough information, you'll be able to grab your tools and make something up. Feel free to skim through the rest or to skip it altogether – you can always come back and check if you are unsure or it all comes unstuck.

Before you go though, look carefully at the flexible connector. One of the leads (the one on the left in the picture) looks a bit different to the other four – this is the common (pin 9) connection. The other four will be buttons 2, 1, 4 & 3 in that order starting next to the common. I'd suggest you check this for yourself with your meter however.

I have had two goes at this, the first one arranged two blocks of four switches one above the other, this wasn't all that successful.



The two connection ribbons, one on top of the other and insulated with heat-shrink were just not flexible enough and there wasn't really enough room left on the desk for the traditional white-tape labels, feel free to try it however if that suits your needs better.

In addition to the membrane switches, you will need

1. A 9 way plug to suit the socket on the desk.

2. Some 9-way cable.
   The connector is the same as the 9-pin serial connectors found on old, pre-USB, computers so, if you have any old ones lying about, you can use one of those for both the connector and the lead (which is what I did).
3. Some heat shrink in various sizes (really tiny for the individual cores in the cable, a bit bigger for the individual connections to the flexible ribbon, bigger to cover joins in the cable and bigger still to cover the join to the flexible ribbon.
4. Solder.
5. (Optionally) magnets to attach the keypads as described near the end.

You will also need these tools

1. Soldering iron (optionally with a stand, be very careful if you don't have one)
2. Hot air gun or other source of heat (for fixing the heat shrink)
3. Some sort of gripping tool to hold wires while you are soldering. If you are planning to do without one then I suggest you at least have some small crocodile clips to hand to use as heatsinks to protect the heat-shrink from shrinking prematurely.
4. Multi-meter with a resistance range (or some other way of checking connectivity).
5. Stanley knife
6. Small wire snips
7. Wire stripper for *very* thin wires (I didn't have one that would work on the cores of the cable I was using so I had to improvise – you may have to do the same).
8. Small pointy thing (I used a pair of soldering tweezers but read what you have to do and select something you have to hand).

Hint

All your solder joins will need to be insulated with heat shrink tubing. If you haven't used this before then the following may be helpful…

1. Choose a size a little bigger than the biggest thing in your join. For the cores in the cables you'll need something really small.
2. As well as insulating individual cores you will want to cover the whole join. In this project you will join two multi-core cables to a single one so, on one side you need something that just fits over the cable and on the other something that accommodates two cables.
3. Slip your heat shrink over one of the wires before soldering but protect it from premature shrinking by clipping the wire in your helping hands between the heat shrink and the joint or failing that, on the end of the heat shrink.

1. Make (or adapt) a nine core lead

You will need to make a nine pine male plug to bare ends lead long enough to go from the socket on the back of the desk to where you want to site the keypads. Your configuration will differ from mine so I can't give measurements – you can get some idea from the pictures. If in doubt, make it a little too long – you can lose surplus behind the desk.

The instructions are pretty detailed in order to allow for variations in what you are using, skip them if you know what you are doing.

If you don't have an existing 9-pin serial lead. Attach a nine pin plug to a short length of your nine core cable. Make a note of which colour core is attached to each pin. If you have "standard" cable (where the core colours are taken from what I suspect is the resistor colour code) then use 1=Black, 2=Brown, 3=Red, 4=Orange, 5=Yellow, 6=Green, 7=Blue, 8=Purple & 9=Grey) as this is the convention I used and matches the pictures which may be helpful.

If you do have an existing lead. Cut it a suitable distance from the male plug.

However you get your lead, strip a couple of cm of the outer insulation from the cut end & bare the cut ends of the cores

(I don't have a wire stripper that works on such fine wires but I used the heat gun to warm the cut ends which caused the insulation to shrink back a couple of mm which is just enough. Tin the bare ends with the soldering iron. Use your meter to check there are no short circuits between cores.)

Don't discard the rest just yet. Cut two further lengths of the cable, one about 4cm or 5 cm long the other about 18cm to 20cm. Again use your own judgement depending on where and how you wish to arrange your keypads. Strip and tin the ends as described above. Put these to one side, we'll come back to them in a bit.

2. How to identify the cores in an existing wire
(and/or check everything works so far)

My cables conformed to the resistor code mentioned above however, if yours do not or you just want to make sure or check that what you've done so-far works OK then proceed as follows…

Turn on your desk, identify at 8 playbacks with a single cue recorded on them (or record some yourself, it doesn't matter what they do). I used 65 to 72 inclusive.

Now go to set up and set the remote switches to trigger cue 1 on each of these playbacks in the same order (so my switch 1 triggers playback 65 cue 1, switch 2 triggers playback 66 cue 1 and so-on).

Now plug your lead into the back of the desk

If you put your own plug on (and therefore know which core is connected to which pin), touch the pin one core to the pin 9 core – the cue on the first playback should be triggered. Repeat for the rest of the cores to make sure.

If you are using an existing lead with "resistor code" colours, try touching the end of the black core to the end of the grey one. If the cue on the first playback is triggered then try touching the end of the brown wire to the end of the grey one. If the cue on second playback is triggered then it is likely that the rest will follow the pattern described earlier, check them all to make sure. If they don't then you'll have to move on to the next step.

If the above do not apply or don't work then touch any two of the bare ends together. Keep doing this with different combinations until one of the cues is triggered. Make a note of which two cores they were and touch one of them against another wire. If another cue is triggered then the wire from the original pair is the pin 9 (common) , if not touch the other wire from the original pair against another one – this time a cure should be triggered, if not then something is wrong. If a cue is triggered then the wire from the original pair is pin 9. Now that you have pin 9 you can touch it against each of the other wires, see which cue is triggered make a note of the colour and which playback (which will tell you the pin number).

3. Create a Y split

From here on in I shall refer to cores by their number and the colour of my lead (so that you can compare with the photographs more easily).

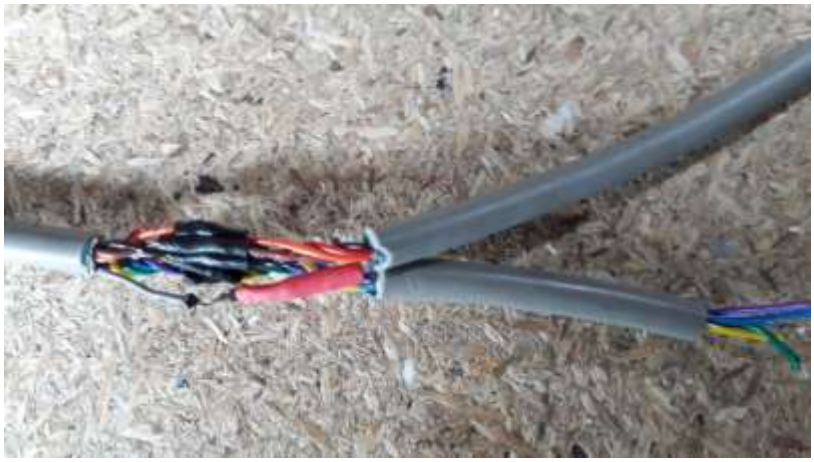
Now you know which core is connected to which pin, take one of your two short pieces of cable, which depends on where you will be putting your switches. Mine are to the left of the socket on the back of the desk which makes switches 1 to 4 further away than 5 to 8 so I started with the long one.

Snip off cores 5/Yellow, 6/Green, 7/Blue and 8/Purple at each end. Working with each core in turn (1/Black, 2/Brown, 3/Red & 4/Orange) and solder it to the same colour core in the main lead.

Leave core 9/Grey alone for now.

Now take the other piece of cable, this time snip off cores 1/Black, 2/Brown, 3/Red & 4/Orange from both ends and connect cores 5/Yellow, 6/Green, 7/Blue and 8/Purple to your main cable.

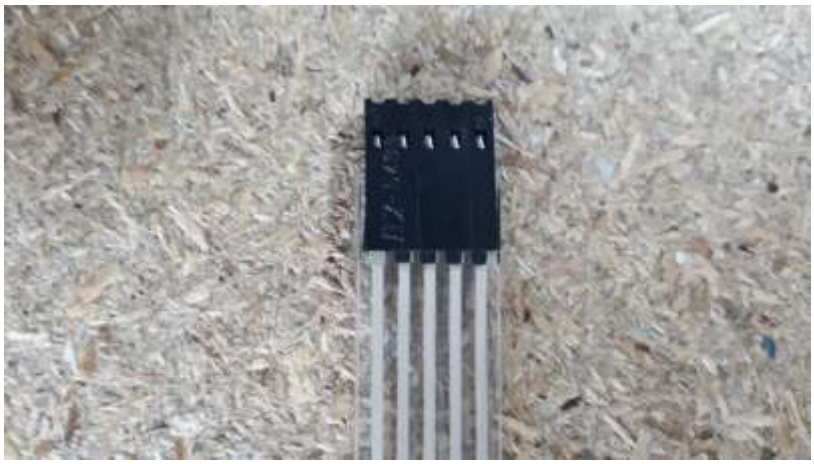
Now join all three 9/Grey wires together.



Now go back to your desk and repeat the touching wires together process to check you have playbacks 1 to 4 on one arm of the splitter and 5 to 8 on the other.

4. Attach the membrane switches

Now take one of your membrane keypads and examine the flexible connector.



One of the leads (the one on the left in the picture) looks a bit different to the other four – this is the common (pin 9) connection. The other four will beconnected to pins 2, 1, 4 & 3 in that order starting next to the common. I'd suggest you check this for yourself with your meter however.

The other thing you should notice is those little bits of metal showing through the plastic cover. These are little spring catches that hold the cover on. You don't need the cover so you could simply break it up but that might damage the flexible ribbon inside. If you take your "small pointy thing" (see the tools list) and press down on each of these little catches in turn you can bend them down…

and the plastic cover will simply slip off…

Turn the keypad over and you will see that each of the metal bits forms a nice little channel for your wires to sit in. Tin all five of the connections with your soldering iron - use a heatsink and/or be quick or you might damage the ribbon (which gets hot, don't hold it in your fingers).

Start with the 9/Grey core and attach it to the common (that *was* the top one in the photo but you've turned it over so it is now the *bottom* one).

Moving away from the common (and depending on which arm of the Y you are doing connect the cores in the order

2/brown, 1/black, 4/orange and 3/red

Or

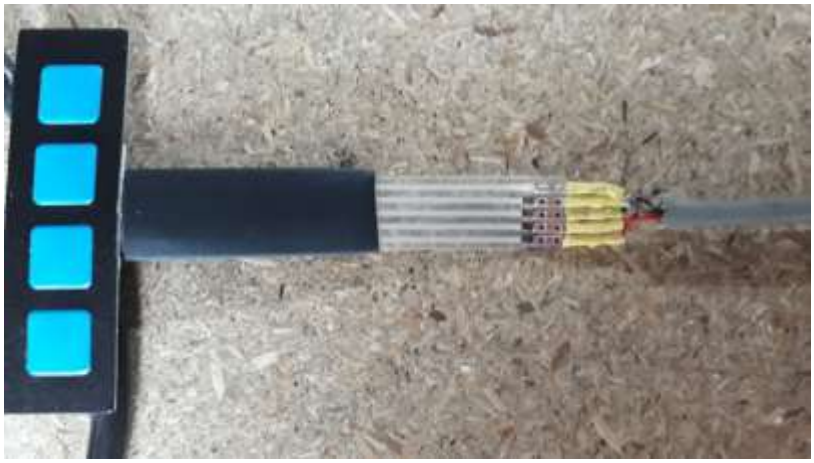
6/green, 5/yellow, 8/purple, 7/blue

Or

Whatever you established by checking with your meter.

Or

The reverse of the orders above (if you want your switches on the bottom edge of your desk with the cable running underneath and coming up at the front).

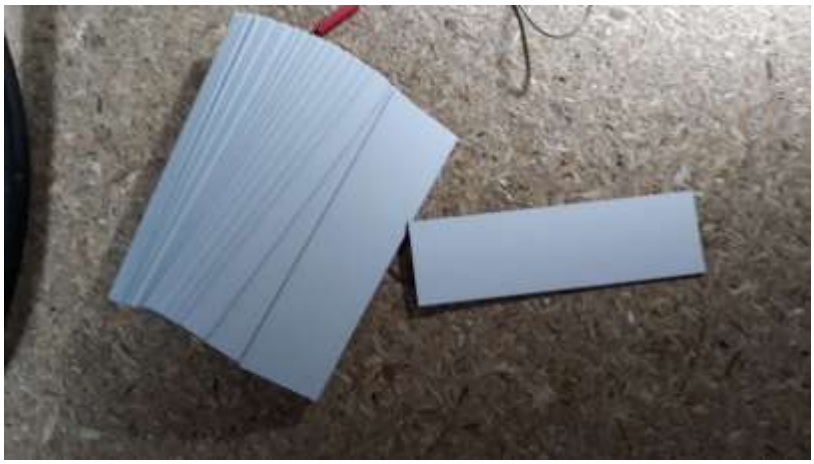


Before you fix the outer heat shrink, return to your desk and test that all the buttons fire the right cue (and only that).

Fix the outer heat shrink and your keypad is ready to install on your desk.

5. Installation

As the keypads are self-adhesive you could just stick them to the desk however I wanted a less permanent installation and felt that sticking the keypads to magnets would be preferable. It took me a while to some up with suitable ones but, on the same sales/auction site I eventually found some magnets exactly the same size (70mmx20mm) as the keypads (search for "*Magnetic Stripes Writable Magnets*").



They are intended as write-on/wipe-off shelf labels for warehouses and they do come in packs of 50 (and I only needed 2) but they are, IMHO, perfect for the job. I expect the spares will get used – possibly instead of white tape for labelling faders & UDKs. There are other options including sheets of magnetic material that you can cut to size. Again, shop around and see what suits you.

(Keypads installed on the top edge of my Wing with the connection ribbons going over the edge of the desk into the mass of wires in the dog-box. The 9pin plug is just visible on the right of the picture.)

Final point

Pressing one of these buttons does a "Go" on the cue it is linked to. This means that you can be left with no easy way of stopping whatever it is you've started.

I tend to use these to run effects so I use 7 of them for things I want to run while the 8th does a "no effect" cue and additionally uses cue macros to release the cues fired by all the other buttons.

You may need to apply a similar "fiddle" to make practical use of your new buttons with cues. As the buttons fire cues (not playbacks) you could, I suppose, have all the cues in a single playback. Not sure how that would work out but it might be worth investigating.

I haven't used them with macros but it should be possible please refer to the manual.

Disclaimers

You need to be confident that you have the skills do everything above safely and that it will not in any way harm your desk to use it. **If in doubt, don't do it** as I will not be held responsible for injury to you, your desk, anybody else or their property. This information is offered in good faith for anyone to use themselves and may not be used as the basis of a commercial enterprise making up such devices for profit.

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