# openSX70 assembly instructions

v 2.0
We are going to assume that you know how to disassemble the camera and remove the original PCB. Please use the right tools, I find it simpler to remove the center pins to expose the screws and easily remove them with a proper screwdriver (1mm square "Robertson-type" but totally custom to Polaroid).

Also be very careful when desoldering, especially with the FFA contacts as the flex pcb inside the FFA can be very easily damaged. Also be careful not to break the tracks on the camera in case you might want to go back to your original pcb, and be extra careful with all the pins from from the camera that you will later solder to the new pcb. Do no use excessive temperature on your iron. I recommend using solder wick to remove the original solder paste and then carefully pull the camera pins with a X-acto knife while applying heat.
Also be very careful removing the flex cable and with the soldering iron and with the plastic enclosure not to damage the plastic on that.
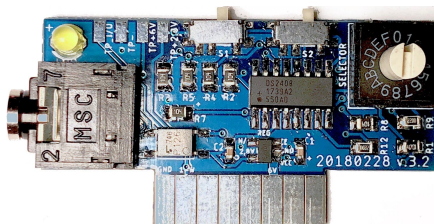
The kit comprises:
the main PCB, comes pre-programmed with the latest sketch (firmware in Arduino lingo) The current version is layout 5.5 aka "Pathfinder" manufactured by SeeedStudio Fusion.
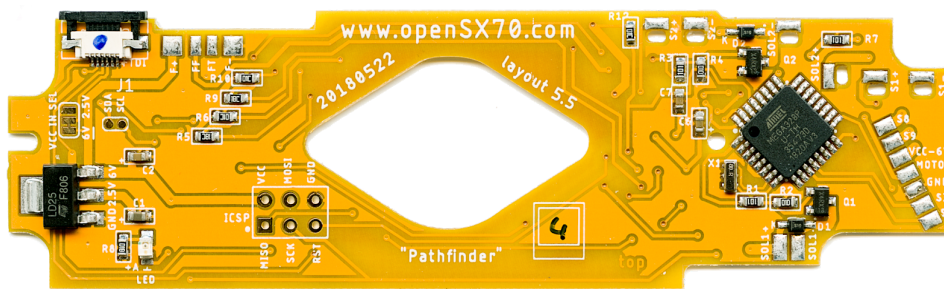
the FTDI USB adapter (type D, based on the FT232RL chip)

the uDongle:

A couple of FPC cables type type 2.

A adhesive "exposure cheat sheet" that has to match with the firmware. I now also stick a mini cheat sheet on the back of the dongle.

A very small piece of plastic packaging that I use to protect the FPC next to the main pcb.

Please make sure that the camera is working 100%, that the shutter works, is fast and clean and that the motor works fine. DO NOT TRY TO FIX A CAMERA WITH THIS, at least unless you know what you are doing.

this modification has been tested on a "perfectly working" Alpha camera. For me it does not work in Model 1 or Model 2s. Of course no Sonars. I don't know why, but my Model 2 seems significantly slower It might be this particular one. I want to do a Sonar-compatible PCB but have to figure out how the sonar flex cable works.

The main PCB that I sent is pre-programmed so in theory you can just install it on the camera. Connect the uDongle and play. That "simple". Without the dongle or a flash inserted the camera will not shoot. It will eject the dark slide though. But check the operating instructions as I want to implement some sort of AUTO600 dongleless mode.

Even though you don't have to, part of the fun of the openSX70 is upgrading the camera when new software comes out.

There are several options for FTDI adapter, but for simplicity I will only mention here "type D" of modern kits and TYPE 2 cable the FPC connector always requires the blue part looking up and the connector on the bottom and type 2 cable.
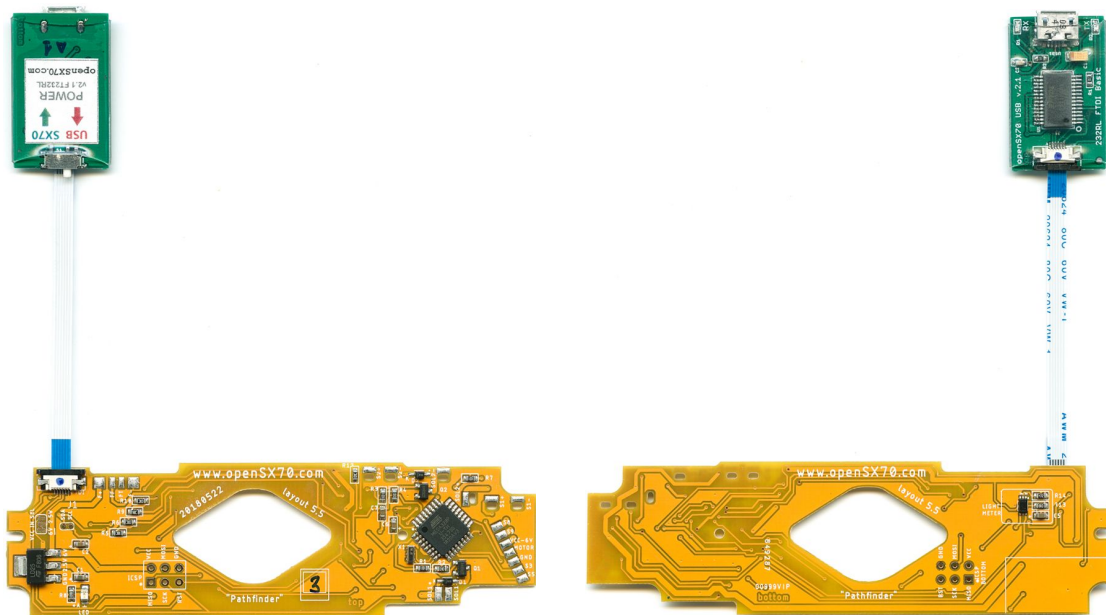
You can program the board without power from the camera with the switch in the red USB position.

The FPC and the FTDI: that thing sticking out of the camera
As for the aesthetic installation of the FTDI you have a few options:

But being realistic I think that for most folks they will never (hopefully) want/need to upgrade. In those cases the upgrade will be done while in service. In that case there is no need to have the FPC cable sticking out of the camera. I also think that maybe it could be an option to have the FTDI functionality already built-in the main PCB and perhaps a discrete micro-USB connector on the side...
Clean option: you open the camera (remove the rear screws etc…) every time you need to program the camera with a new sketch. This is done while servicing the camera. It is the desired option for most photographers.

Minimalistic option: you insert the cable in the main pcb and tape it to the camera with electricians tape. In this case I recommend to make a tap with the tape and place it looking outwards of the camera:


Full option:
In this case you can stick the FTDI board to the side of the camera. I recommend using 3M command to avoid damage to the camera or to the leather. In that case put the tap facing the front of the camera and connect and disconnect the FPC cable once it has been secured. This is practical in case of intensive debugging as you can be connected to the PC without being afraid of damaging the FPC or the pcb.
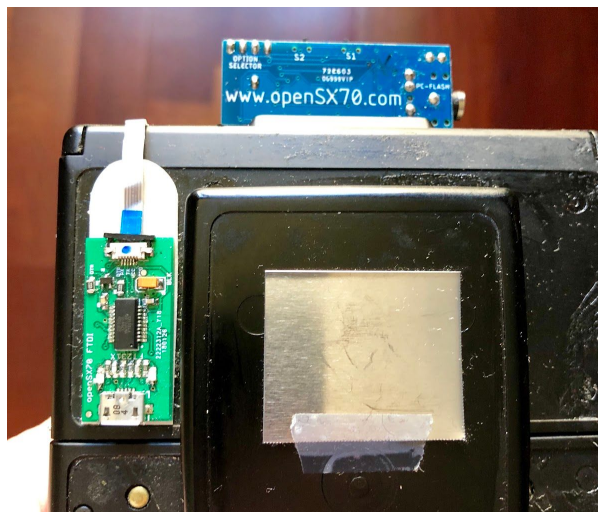
NOTE about the FPC: sockets and cables.
(Preliminary note: most of what I do now is type 2 cable, both connectors are the same (on USB adapter and on the main PCB and with the blue-dot, connector on the bottom), those use **type 2 cable**.
But for explanation purposes there are two types of FPC cables type 1 (contacts are on the same side on both ends) and type 2 (contacts are on opposite sides on each end)
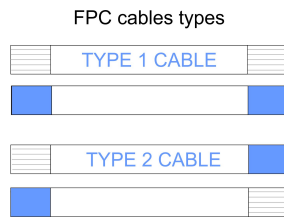
Also there are two types of connector with contacts on top or bottom. I have rudimentarily marked them with either a blue dot (connector on the bottom) or a few black strips (connector on top)
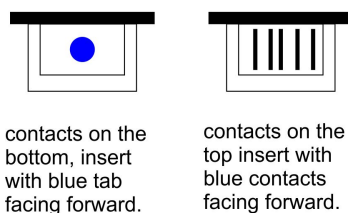

You kit is now blue-dot, connector on the bottom on both boards. So you will have to insert it with the blue side facing upwards. I mark the connector on the pcb with a blue dot to indicate that:

To insert the cable you have to pull the black tab very carefully and insert the cable, then push the black tab until the cable is secure.
I usually here put the plastic bit (or something you might consider).
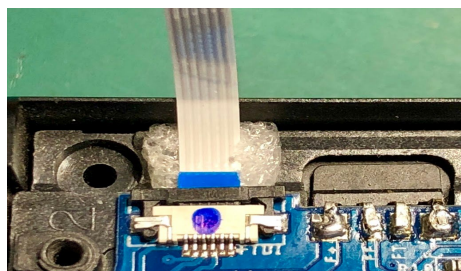
Keep in mind that the cable is very fragile, and the stress of the hinge of the camera does not help. I have included extra cables in case it breaks. Sometimes I bent the cable back to the PCB and then again outwards. This is to avoid stress on the FPC connector.

Always be very careful when inserting and removing the cable and handling the tabs on the connector as they are not prepared for intensive use and break easily.

WARNING: **NOTE on POWER: while programming the PCB you can power from the USB (5V) of from the camera BUT NEVER BOTH AT THE SAME TIME.**
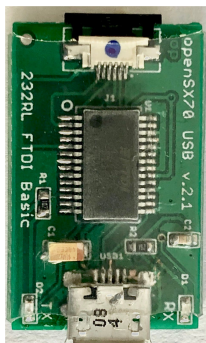
When you want to program the PCB while it is **outside of the camera (NOT INSTALLED)** you have to choose the red USB position on the switch.

BUT ONCE THE BOARD IS IN THE CAMERA, I recommend cutting the USB power by choosing the green SX70 position and have an empty cart on the camera to supply the 6V.

I have been testing and testing, but I cannot warranty any of this, you install it at your own risk: you may damage your camera or spoil precious film. That it has worked for me does not mean that it has to work for you, but I sincerely hope so. Keep in mind that is early early in the game.

But if it works I encourage you to use it and even loan it to friend photographers. I only ask that you use the #openSX70 hashtag.

There is another document regarding upgrading/programming the camera.