ELECTRONIC ASSEMBLY

Materials needed, tips, soldering, circuit installation, tests...

Revision 20.02.26
Soldering

Using the right tools can go a long way to making the job a lot more enjoyable.

If you can, use a temperature-controlled soldering iron station. This allows delicate elements not to be overheated and a temperature suitable for the type of soldering to be used, for example higher for the large pins of the adapters.

Set the temperature between 325 C and 375 C for delicate items and between 400 C and 450 C for large adapter pins.

Alternatively, you can use a 30 or 40 watt single soldering iron.

A 2 mm tip can be used for all cases.

Use lead-free solder with a diameter of 0.8 mm.

Solder in a well ventilated area. You can use a bathroom fan near your soldering station (~ 20 cm) to vent the fumes to the outside.
Installation of the SKYPIKIT microcontroller and other integrated circuits

Never solder the SKYPIKIT and the other circuits with 8 pins or more directly on the printed circuit board.

Always use a DIL (dual in line) integrated circuit adapter.

Solder this adapter on the board, then insert the integrated circuit into the adapter later, when needed.

The adapter must be oriented correctly. A check mark (notch) indicates the direction on the adapter and on the integrated circuit.
Installation of polarized elements

Certain parts must absolutely be installed in the correct direction, otherwise they could be destroyed when the power is turned on. There is even a risk of explosion in the case of electrolytic capacitors.

For diodes, a strip indicates the side of the cathode.

A light band indicates the negative side of the electrolytic capacitors.

A small + sign indicates the positive side on a tantalum capacitor.

It is more difficult to know the direction of a 3mm LED. There is no danger of burning it, but it will not light if it is connected backwards. You can test the direction on an experimental board.

Symbols always indicate the direction of the elements to be soldered on the printed circuit boards.

Other elements are not polarized and can be installed in any direction: resistors, ceramic capacitors, crystal ...
RESISTANCE VALUES

The resistance values are coded by color bands: black = 0, brown = 1...

The first two bands encode a value from 10 to 99.

The third band is the exponent of 10 of the multiplier.

The fourth band gives the precision, for example golden for an accuracy of 5%.

EXAMPLES

47 \times 10^2 = 4700 \text{ ohms} = 4\text{K7}

20 \times 10^3 = 20000 \text{ ohms} = 20\text{K}

10 \times 10^5 = 1000000 \text{ ohms} = 1\text{M}

POWER

Almost all of the resistors mounted on the boards of this project are 1/8 watt resistors.
You can use elastic bands or masking tape to keep the pieces and printed circuit boards well aligned during mounting and soldering.

Ordinary pliers can be used to hold certain SMD parts (surface mounted devices).

You can use two stages of Arduino adapters between two SPK-Shield boards to distance the pads far enough so that there are no short circuits.
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TESTS

Take the time to always test your circuits before connecting and powering the Skypikit microcontroller.

Double check that all polarized elements are soldered in the correct direction.

Power your printed circuit board without Skypikit connected and check that the voltages (voltages) at each of the pins are correct.

For example, there should be 3.3 volts at the 3.3-volt power pins, and 5 volts at the 5-volt power pins. Refer to the diagrams to forecast the voltages at all other pins.

Insert the Skypikit and other ICs in their adapters in the right way only when everything has been well tested.

Afterwards, always do checks every time you add parts to your project.

You will need to use a multimeter during assembly and for testing.

The multimeter must be able to measure resistances, direct and alternating voltages, as well as currents. It is an asset if it can also measure the capacitors.
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END