

# Assembly Guide for the KAPtery [SkyShield Kit](http://kaptery.com/guides)

User manual, parts list, circuit design, and Arduino sketch at [KAPtery.com/guides](http://kaptery.com/guides)

Technical support: <http://kaptery.com/contact/>

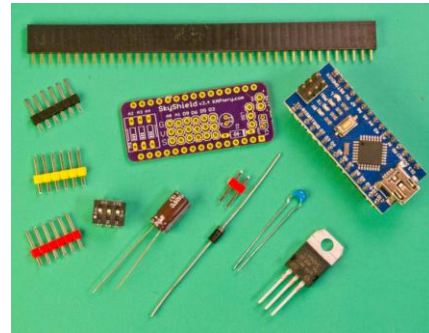
The SkyShield is a custom circuit board which is a "shield" for an Arduino Nano. The shield allows easy connection of cameras, servos, and a battery pack using RC connectors. A sketch (program) loaded on the Nano allows eight different regimes of pan/tilt/shoot sequences, and any mode can be selected in the field using a DIP switch on the shield. The shield allows up to two cameras (or other devices) and four servos (or other devices) to be connected for alternate applications. The SkyShield is open-source, and the circuit and software are available here: <http://kaptery.com/guides/>

This guide describes how to solder the electronic components on to the through-hole printed circuit board. A user manual for the SkyShield and instructions for making a camera cable are available here: <http://kaptery.com/guides/>

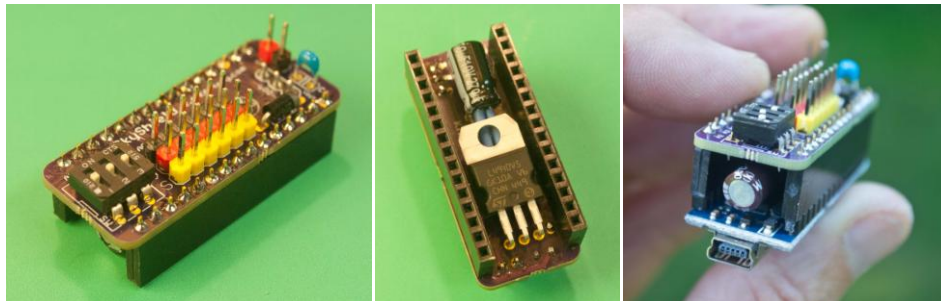
## Assembly (time: 1 hour)

### Tools needed

- fine point soldering iron
- fine solder
- wire snips
- needle-nosed pliers
- pocket knife or X-acto knife
- hot glue or electrical tape
- black Sharpie

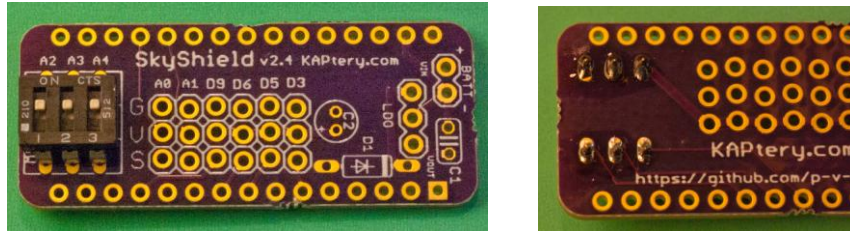


*Eleven components must be soldered onto the PCB*

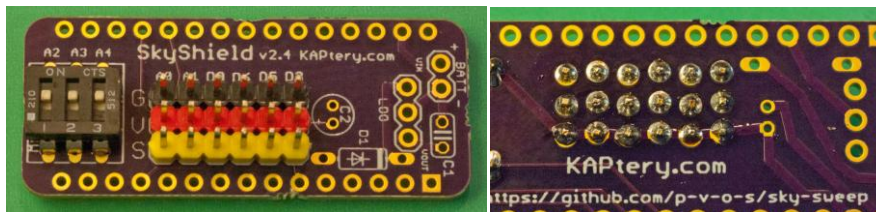


Above are photos of the finished PCB from the top (left), from the bottom (center) and with the Arduino Nano attached (right).

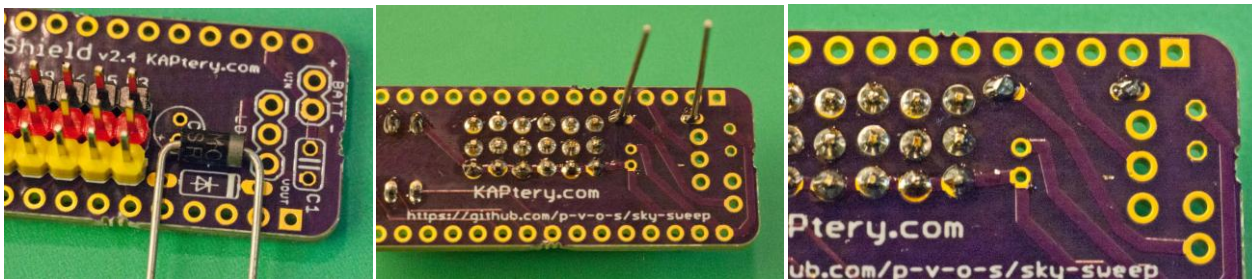
Solder the components in the following order (or close to it).



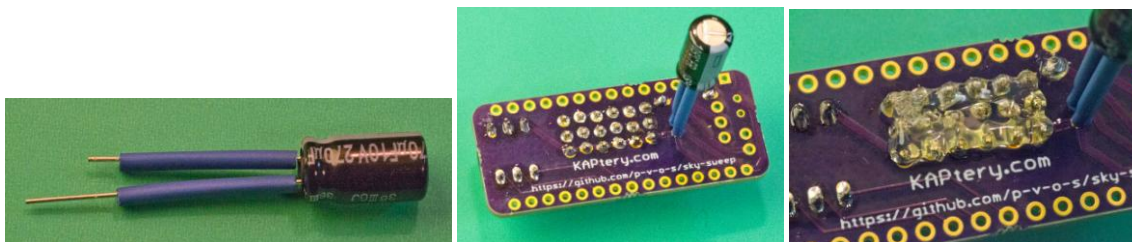
1. Insert the six legs of the DIP switch as shown (top side of PCB, left). Flip the PCB over and solder each leg (right).



2. Insert the short legs of the three header strips as shown (left). G = ground (black), V = voltage (red), S = signal (yellow). Flip the PCB over and solder the 18 legs (right).

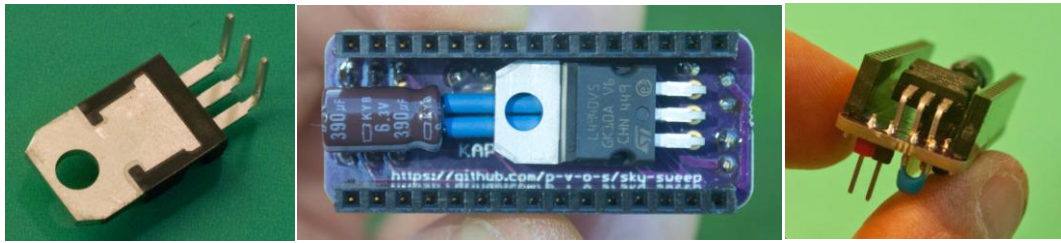


3. Bend the legs of the diode to fit into the holes at “D1” (left). Polarity is important, so insert the legs so the light end of the diode matches the light end on the silk screen symbol. Flip the PCB over and solder the two legs (center), then snip the legs off flush with the top of the solder (right).

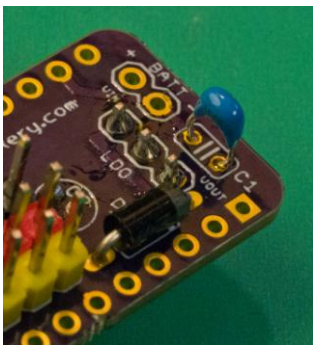


4. Put pants on the big capacitor (two pieces of heat shrink tubing, left). It is not necessary to heat-shrink the tubing. Insert the legs from the *bottom* of the PCB (center, see below for final position). Polarity is important, so the longer leg must go into the hole marked “+.” Flip the board over and

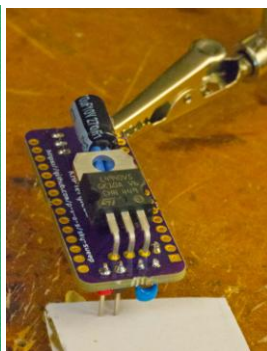
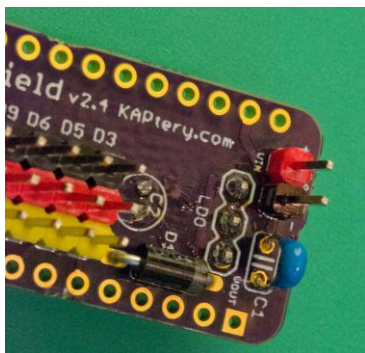
solder the two legs after positioning them so the end of the shorter leg is barely extending above the surface of the board (the goal is to make the legs **as long as possible**). The legs get bent over, so it is a good idea to insulate the 18 pins from the headers with hot glue (above, right) or a layer of tape.



5. Bend the three legs of the LDO voltage regulator at right angles as shown (left). Bend the big capacitor parallel with the PCB (center). Insert the legs of the LDO and solder them from the top of the PCB. When the two black headers are added along the sides of the PCB (last step, below) the big capacitor and the LDO should not extend above them (right).

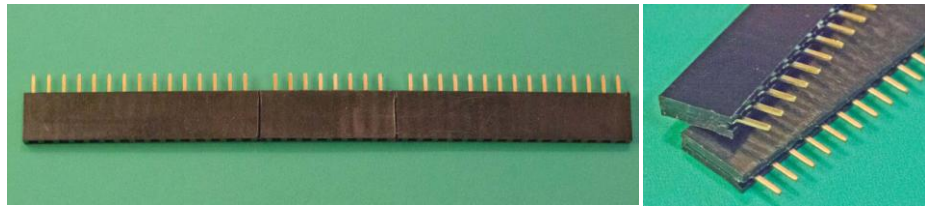


6. Insert the small capacitor (blue) in the two holes marked "C1." Polarity is not important. Flip the board over and solder the two legs, then snip them off flush with the solder.

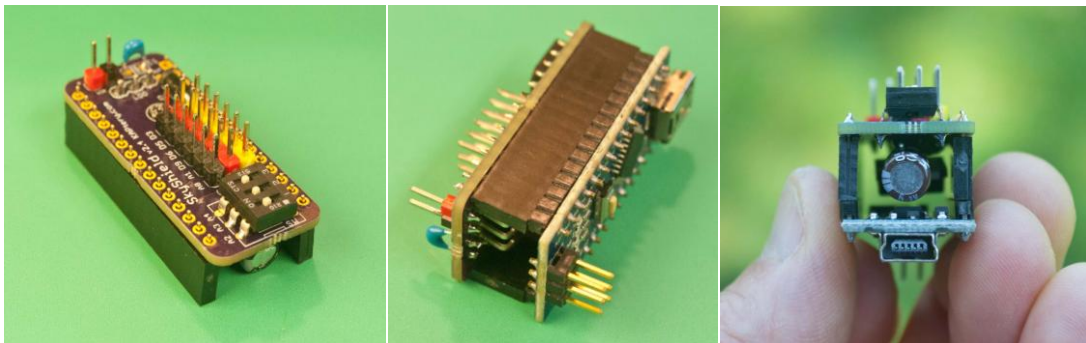


7. Use a black Sharpie to darken one half of the two-pin red header. Insert the short end of the pins in the holes marked "Batt" with the black header at the "-" sign (left). Flip the PCB over and solder the two pins while supporting the header so it is perpendicular to the PCB (right).



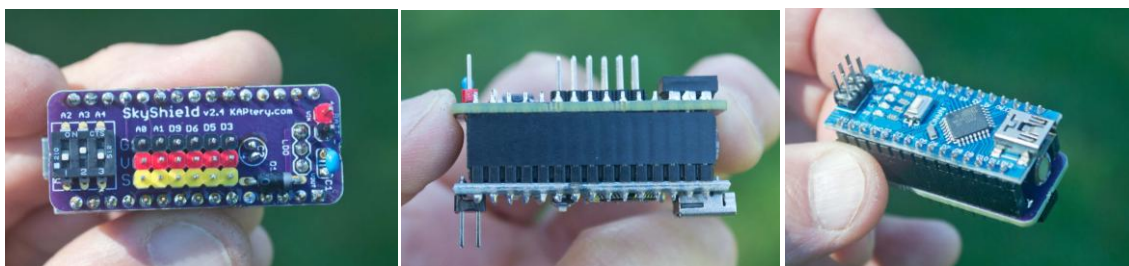


8. Cut the female header strip to make two pieces with 15 pins each. First use needle-nose pliers to remove two pins leaving 15 pins on each end. Score both sides of the plastic with an X-acto knife halfway between the pins in the gap (above, left). Keep scoring until the pieces separate. Neaten up the newly cut ends with the X-acto knife (right).



9. Insert the pins for both long headers as shown (left). To ensure that the headers are aligned correctly while soldering, the Arduino Nano can be attached (center) by pressing its 30 pins into the long headers. Support the whole unit so the headers are in place. Solder just the end pins on both sides and then check for snug insertion before proceeding. Solder the remaining pins where they emerge above the top of the PCB.

10. You are done!



Above are some views of the finished PCB and the attached Arduino Nano. The Nano should be connected so its USB port is at the same end as the DIP switch on the SkyShield (center). The 30 pins slide in with some resistance and hold firmly.