

kitsch-bent > easy\_CLK

rev. 1.0

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kitsch-bent.com

# before we begin...

## tips

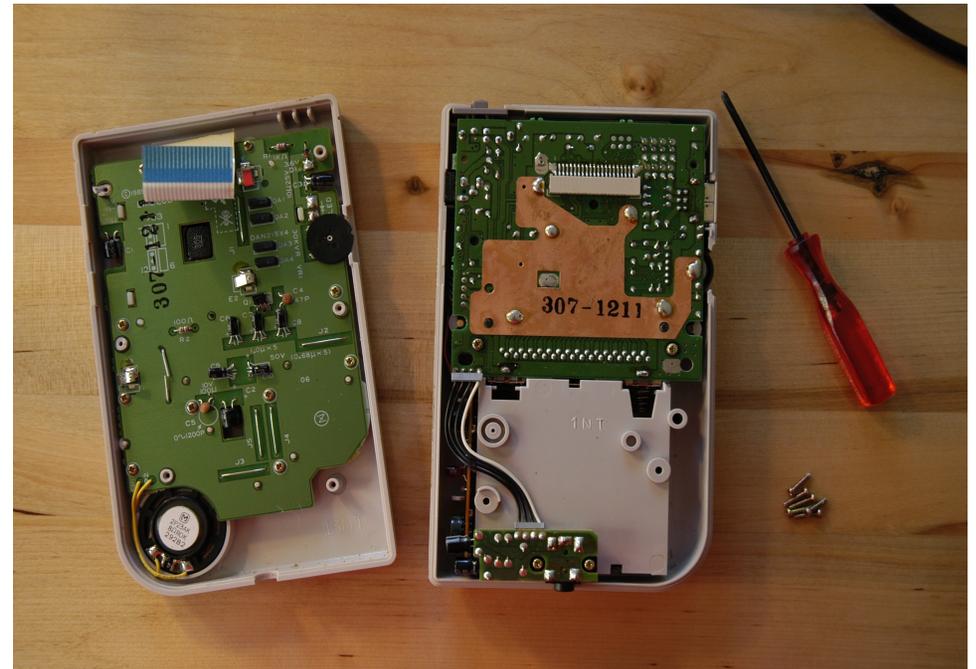
- this circuit is very simple and was made small and thin so it can be placed inside the gameboy easily. feel free to experiment with where you place it ;)
- you may complete steps 1 – 3 ahead of time before the kit arrives. this will save you time upon its arrival.
- be patient! rushing through this tutorial will only result in careless mistakes.
- be confident!
- be willing to ask for help! you may of course e-mail us at kitsch-bent for direct help, but also remember there are several online communities where you can generally find very supportive and wonderful people. these include: [chipmusic.org](http://chipmusic.org) and [chipcoalition.com](http://chipcoalition.com)

## supplies

- tri-wing and phillips screwdrivers. note: some cases are not held together with tri-wing screws. please check your case. the majority use this type of screw, however
- small wire cutters
- easy\_CLK kit
- soldering iron and solder
- a DMG-01 model gameboy (the 'classic')
- an adhesive to hold the circuit in place (we use double-sided tape, but hot glue would work well also)
- (optional) a SPDT switch (on-on). a toggle or pushbutton is what we suggest, although any SPDT on-on switch should work.
- (optional) shrink wrap or electrical tape

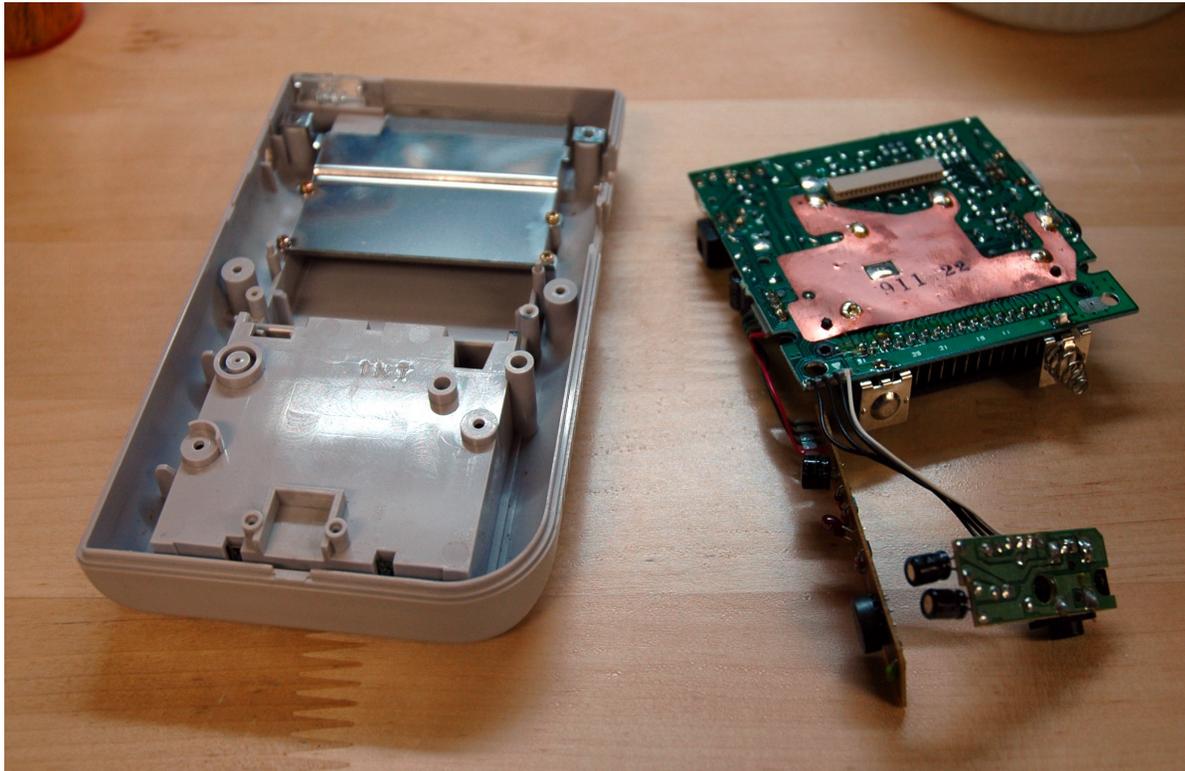
# step one

- take all six screws out which hold the case together, and separate the two halves of the case
- the ribbon cable will come out with a gentle pull downwards
- set the screws and the top half of the case aside. don't lose the screws.



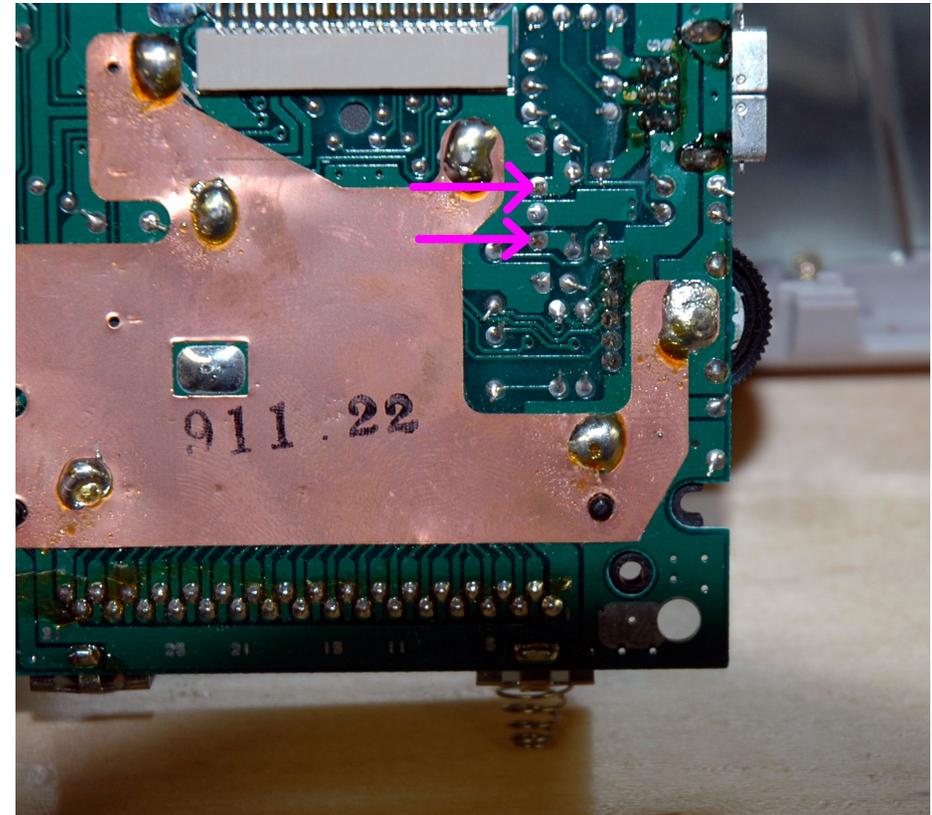
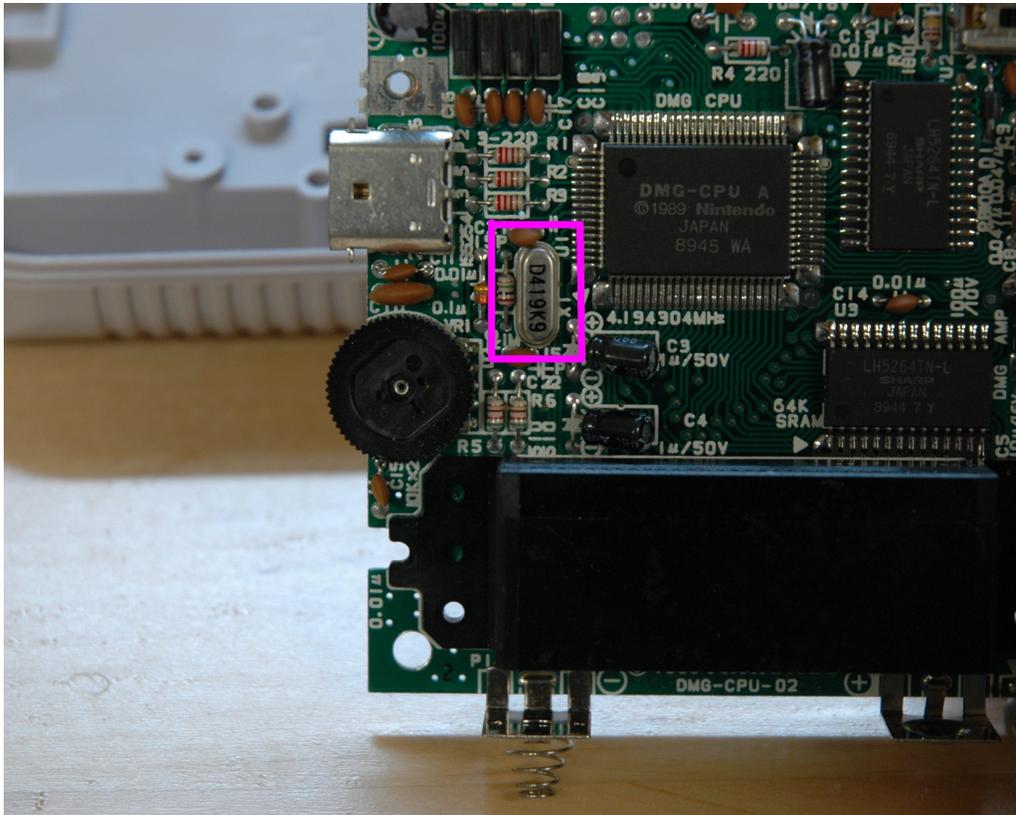
# step two

- remove the PCB from the bottom half of the case



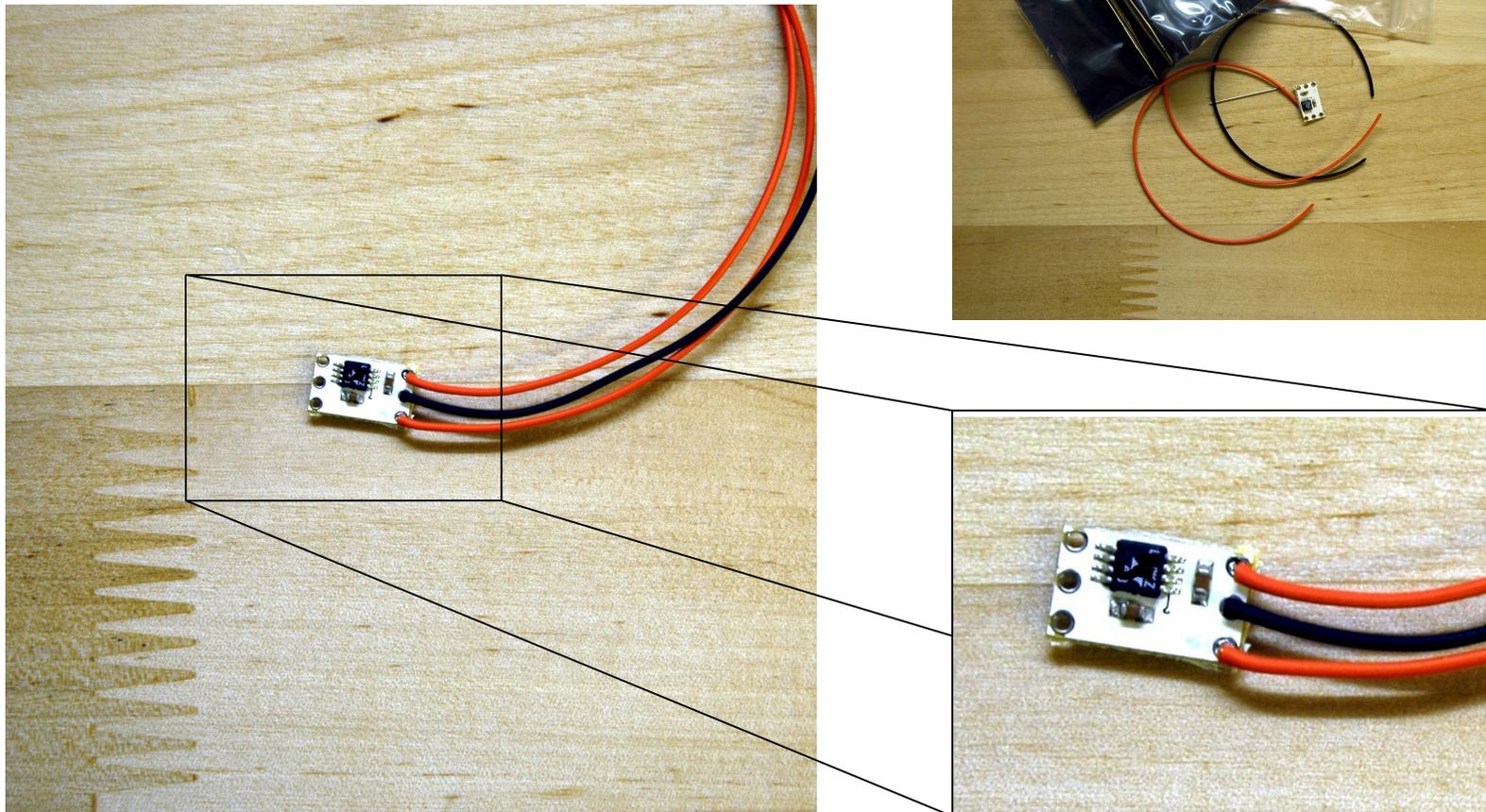
# step three

- remove the crystal oscillator from the PCB. heating up the solder points on the back and prying it up GENTLY with tweezers or pliers is the easiest way we've found to remove this part.



# step four

- open up your kit and empty the content. you'll find three wires, a jumper, and the circuit board.
- solder the three wires to the circuit board as shown in the picture below

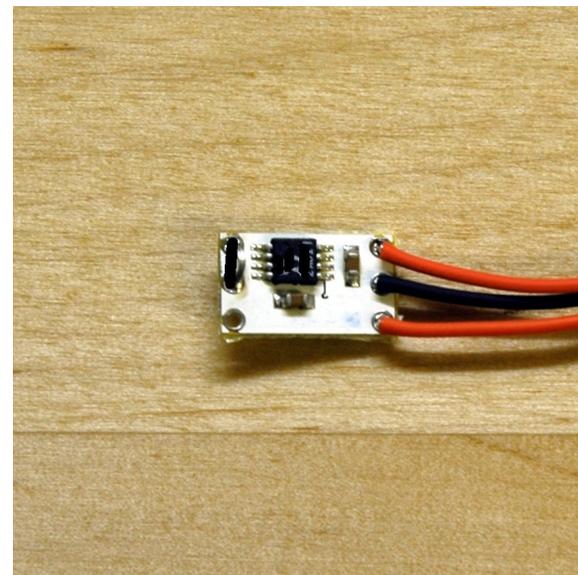
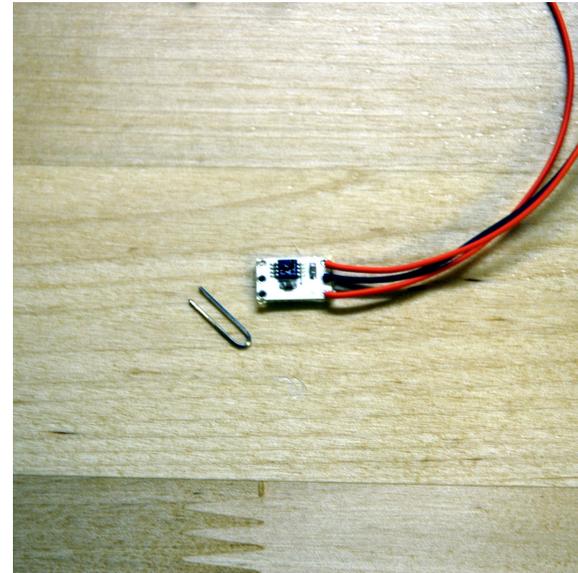


# choose your hookup option:

- there are numerous ways to change between normal and half-speeds with this circuit. before you install it inside your gameboy, its easier to figure out now how you want the circuit to be connected, either with or without a switch.
- **WITH SWITCH** – this PCB was designed to easily connect to a SPDT switch. please refer to to the steps labeled “with switch” at the top of the page for this method.
- **WITHOUT SWITCH** – if you do not want to switch between normal and half speed, you can use the included jumper to put the circuit into half-speed mode. this is a much easier installation, but you cannot change between the two speeds with this method. please refer to the installation pages that say “no switch” at the top to install easy\_CLK this way.

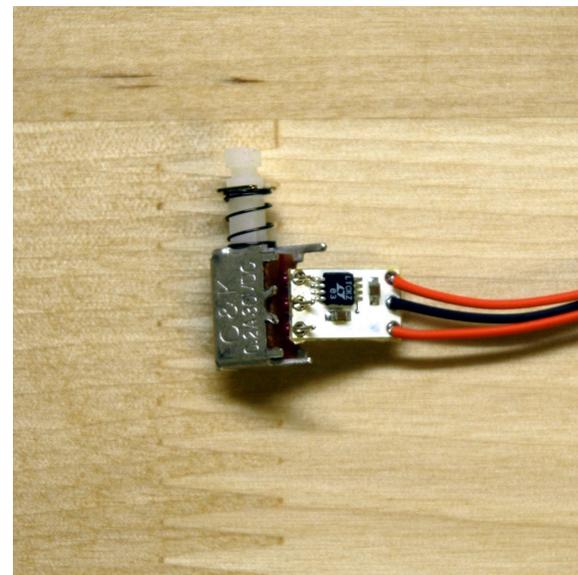
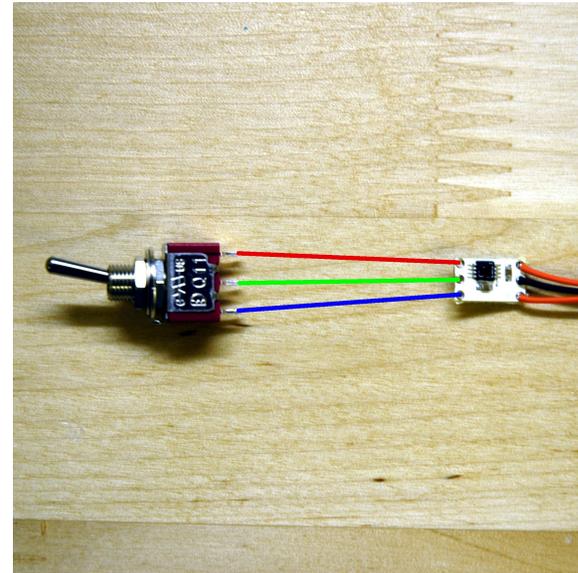
# step five(a) – no switch

- first, bend the included jumper as shown in the top picture.
- second, solder the jumper into place in the two thruholes indicated in the bottom photo.
- soldering it this way will result in ½ speed. if you wish the circuit to operate at normal speed, simply solder the jumper from the middle hole to the other not used in the picture here. although, there is no point in installing easy\_CLK at all if you do this.
- that's it! if you chose this method of installation, skip to step 6!



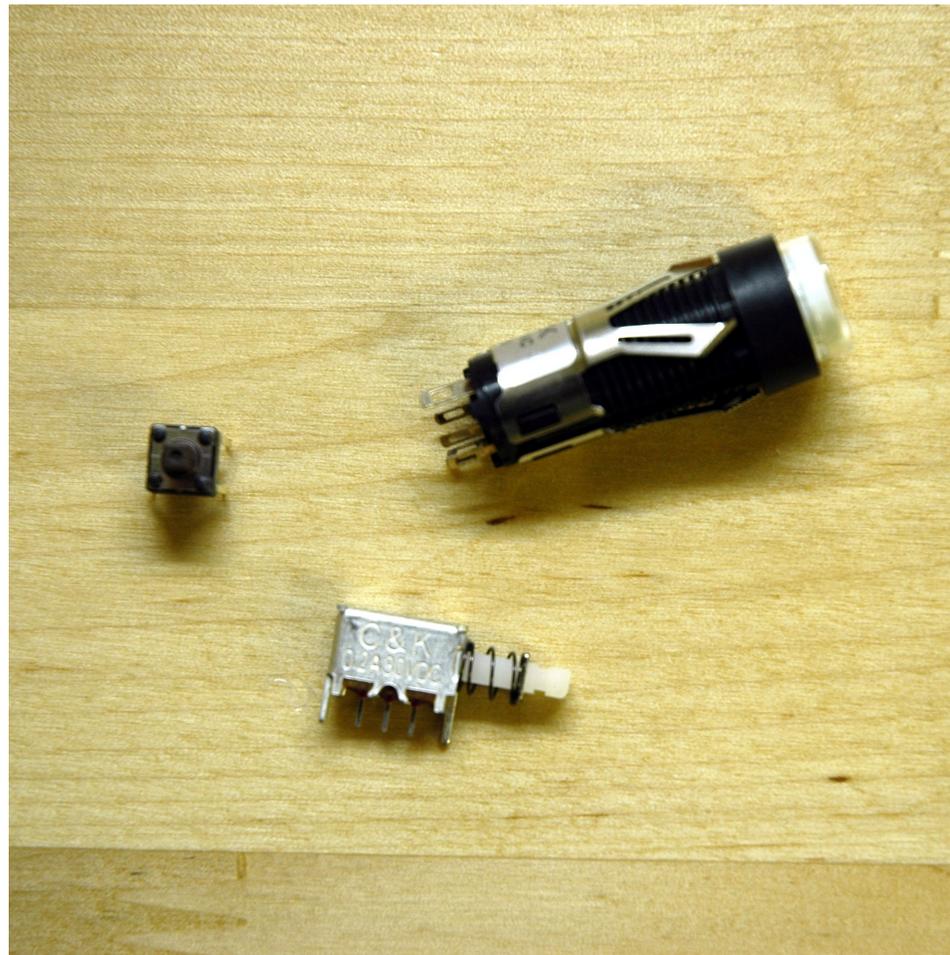
# step five(b) – with switch

- this method is a little more difficult to install but still simple.
- first off, if the switch you are using requires installation into the case before you solder wires to it, do that now. there is nothing worse than getting a switch wired and **then** realizing you need it disconnected to get it installed into the case.
- the top picture shows the correct way to wire a typical SPDT switch to the circuit.
- the bottom photograph shows a switch soldered directly to the PCB, without using wire. the holes on the PCB are a common spacing, it is possible to solder the PCB directly to many types of switches if you wish. the spacing is 2.54mm (0.1”).
- after you've completed this, move to step 6!



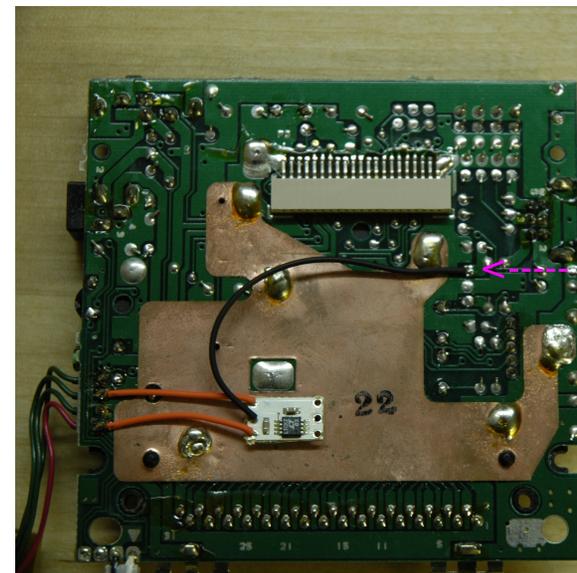
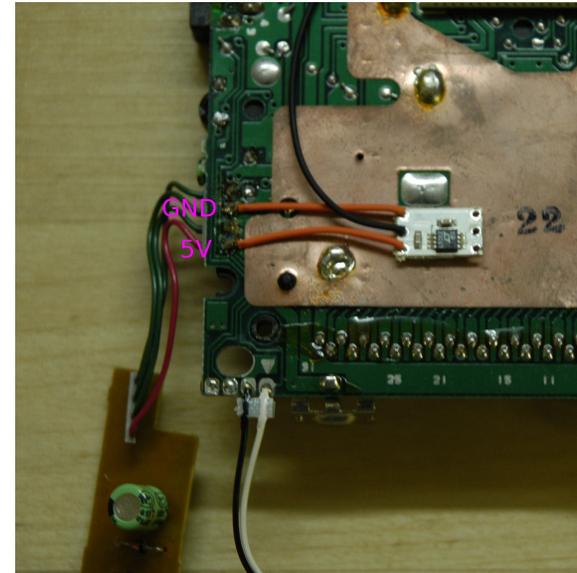
# step five(b) – with switch

- here are other types of switches which are compatible with this circuit.



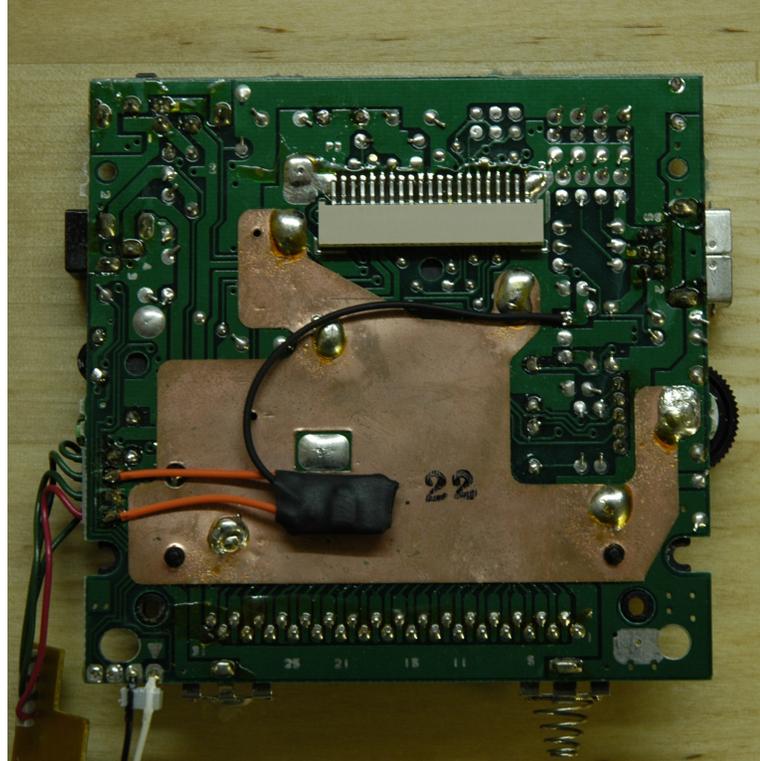
# step seven

- in this step you will solder the PCB to the gameboy's regulated 5V, ground, and also the easy\_CLK's output to where the old crystal oscillator was removed
- **IMPORTANT!** the wires included in your kit are long enough to locate this circuit most anywhere inside the gameboy. it is best to install it out-of-the-way. i am installing it in this particular location only to make illustrative purposes easier in this tutorial.
- the top picture illustrates where to solder the 5V and ground. these solder points are located on the back pcb.
- **PAY ATTENTION** to which wire goes to which location.
- the bottom picture shows where to solder the output from the easy\_CLK (the middle hole). solder this wire to the TOP hole from the removed crystal oscillator on the gameboy's circuit board.



# step eight (optional)

- if you have placed the circuit in a location where it may be exposed to the gameboy's circuitry, please make sure to cover it in electrical tape or shrink-wrap.
- you may use double-sided tape or hot glue to hold the circuit in place if required.
- if you have installed your circuit in the same place as I have done in this tutorial, you will need to bend the part Q1 (a transistor) on the gameboy's LCD PCB the other direction, in between the capacitors. otherwise the circuit will touch this part when the case is put back together.
- lastly, there isn't a switch pictured below. obviously, if you have wired a switch you will have wires coming from the other side of the circuit.



# step nine

- screw the DMG back together



# congratulations!

you are finished :)

we hope you enjoy your easy\_CLK

if you have any questions, please do not hesitate to contact us.

