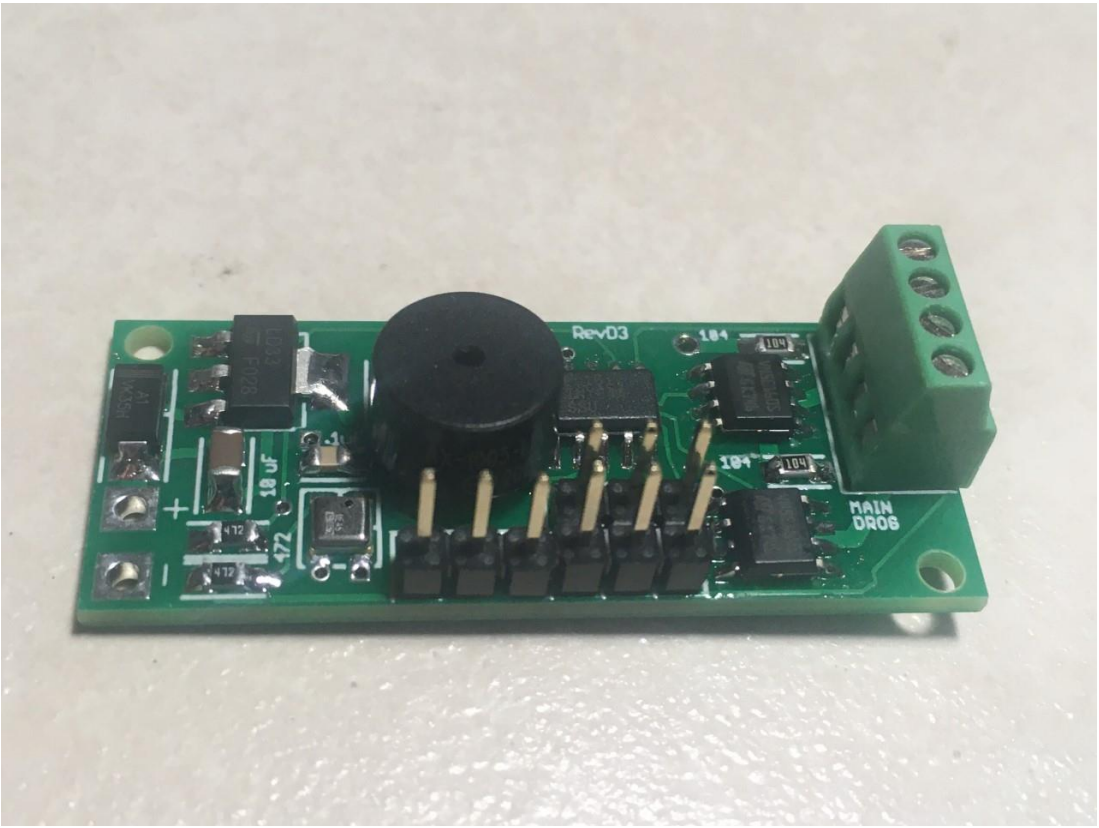
Eggtimer Quark Assembly Manual

Board Rev D3



Disclaimers, Legal Stuff, Etc.

The Eggtimer Quark is meant to be used for hobby and experimental rocketry purposes. Although hobby rocketry has an admirable safety record, largely due to the efforts of the good people at the National Association of Rocketry (NAR) and the Tripoli Rocketry Association (TRA), rocketry can be dangerous if proper safety precautions are not observed. This is particularly true with some of the advanced techniques like pyrotechnic parachute deployment and airstarting motors. People can and have been seriously injured by not following recognized and accepted safety practices. We cannot be responsible for your actions.

We ***strongly*** recommend that if you are not a member of either the NAR or the TRA, you join one of them, join a local rocketry club, and pick the brains of experienced members before you try any kind of electronic deployment or airstart flight. The safety information included in these instructions is by no means comprehensive or complete, and is no substitute for the supervision and advice of experienced rocketeers.

Limited Warranty

Eggtimer Rocketry warrants that all of the parts on the packing list of this Eggtimer Rocketry kit have been included, and that they are all in working condition. If you are missing something, contact us immediately at support@EggtimerRocketry.com and we will send you whatever it is that you are missing. If you are missing something really egregious (like the PC board or the processor, for example), we may ask you to return the entire kit unbuilt, we will send you a prepaid shipping label for this purpose. We'd especially like to see the packing list so we can figure out what went wrong so it doesn't happen again…

If your Eggtimer Quark does not work properly after assembly, take a deep breath, get out the magnifying glass and a good light, and see if you have inadvertently created a solder bridge somewhere. Chances are pretty good that you have, or that you have installed a part incorrectly. We are a very small company and we just don't have the resources to repair your board, but we will be more than happy to give you advice and we might be able to help you find your error if you send us some high resolution pictures, to support@EggtimerRocketry.com . We cannot take responsibility for your assembly techniques; if you do not have experience building kits of this nature, we recommend that you enlist some help. (Another reason for joining a rocketry club, there is usually at least one electronically-inclined member who can be bribed with a beverage or two to give you a hand. Engineering types love a challenge, especially if it's easy for them but hard for you.)

Eggtimer Rocketry warrants that when properly assembled this Eggtimer Rocketry product will perform substantially according to the published documentation. This means that we spent a lot of time trying to ensure that it's going to work the way that we say it does, and we try to fix things that don't quite work right in a reasonable time. Nevertheless, we can not and do not warrant that this product is perfect and will meet every rocketry purpose, for the simple reason that we can't test every possible rocket/motor/environmental combination. It is the buyer's responsibility to determine the suitability of the Eggtimer Quark for their particular purpose. If you have a problem with this, please contact us and we will be happy to send you a prepaid return label for your unbuilt kit and we will refund the purchase price on receipt of your kit.

California Proposition 65 Warning

WARNING: This product contains chemicals (lead) known to the State of California to cause cancer and birth defects or reproductive harm.

This kit includes a special low-temperature ultra-fine leaded solder wire. Including the solder with the kit ensures that you will have solder that can be used to mount the surface-mount parts in the kit. Leaded solders have been used for over a century in electronic assembly, but you should take the following precautions when using it (or just about any chemical, for that matter):

- Do not eat or drink while using it
- Wash your hands after handling it
- Keep it in the protective bag when you're not using it

The MSDS can be found at

http://www.kester.com/download/245%20FluxCored%20Wire%20Lead%20Alloy%20SDS.pdf

The European Union RoHS (Restriction on Hazardous Substances) regulations exempt kits such as the Quark from its regulations, because they are not for resale and since it is well known that hand soldering with non-leaded solder is much more difficult and more damaging to heat-sensitive components.

Before You Start…

• Check the parts against the Packing List in the kit, and let us know right away if anything is amiss.

• Go to our web site at www.Eggtimerrocketry.com and download the latest Release Notes.

• Go to our web site at www.EggtimerRocketry.com and download the latest Users Guide..

• Read them thoroughly before starting… it will save you some grief later, we promise!

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Thanks for buying an Eggtimer Quark. The Quark is named after a tiny elementary atomic particle, which aptly describes the unit. It is designed to be extremely easy to use, and is also very small so you can put it in virtually any rocket that you could possibly want. You can fire the Drogue chute at either nose-over (just past apogee) or you can add 1 second for backup use, and the Main chute can be fired at 300', 500', 800', or 1000'. It beeps out your apogee after every flight, and you can easily test the deployment channels. Finally, you can actually stream live altitude and status data out the serial port for simple telemetry use.

Like other Eggtimer Rocketry products, we sell it as a kit, to keep costs down and provide an outstanding value. This means that you have to do a little work, of course, but considering that most hobby rocketeers that would use our products have some degree of electronics expertise, this should not be much of an impediment. If you do not have any experience soldering kits such as the Quark, we recommend that you ask around… chances are that somebody in your rocketry club would be more than happy to assist you for a small bribe (beverages work well!).

About Soldering Your Quark…

Assembling your Quark isn't that hard, but we recommend that you don't choose it as your first kit project. You must be able to solder small components using fine solder and get nice shiny solder joints. If you have never soldered before, you need to learn anyway, because if you are going to do rocketry electronics you're going to be doing some soldering. If you want to get into advanced projects like telemetry, you're probably going to be doing a lot of soldering. We recommend that you get a few small kits from Ramsey or SparkFun, put them together, and hone your skills on them first. There's a lot of fun stuff out there, so go for it!

The Quark uses mostly Surface Mount Technology (SMT) parts, they are large by SMT standards, and are within the realm of being hand-solderable. In order to help make your assembly successful, we have included about 12" of very fine (.020"), very low temperature (about 180°C), no-residue solder. This is not the stuff that you get at Radio Shack… it's designed for soldering small temperature-sensitive parts without transferring much heat to the part itself.

Important note about using extra flux with this board: The solder that comes with the kit is Kester 245, it uses a water-based "no-clean" flux. If you wish to use extra flux with the board,
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it MUST be compatible. You want a liquid (not paste) water-based no-clean flux. Kester 951 is ideal, if you can get it. Chip-Quik sells little 2ml tubes for about $2 each (unfortunately they sell them in 6-packs, you can't just get one) which works very well. If you decide to add flux, you must use only a tiny amount. A few drops will suffice for the entire board. DO NOT use Rosin Core flux, or you will make a mess of the board and possibly damage components. We have built many kits without using any additional flux without any issues, the board is pre-tinned to make solder adhesion easier so in general you should not need to use additional flux.

For soldering components on a board like the Quark, we recommend a small pencil soldering iron, about 15W. If you are only going to use it occasionally, Weller makes a decent cheap 12W iron, it's about $15. There is also a similar iron that's sold by ECG. We like those, but the copper tips seem to oxidize and corrode rather quickly compared to some more expensive irons; fortunately, the tips are replaceable and cheap. Better would be a fancier soldering pencil with iron tips; those run about $30, but they'll last forever. The best iron would be a temperature-controlled solder station, they typically start at about $50 for a cheap one and can go to a few hundred dollars if you want to get really fancy. Weller makes a good one for about $50, if you make the investment that will probably be the last soldering iron you will ever need to buy. These solder stations usually have a little well with a tip-cleaning sponge, so they end up taking less room on your workstation too. Get the smallest tip you can find, preferably a small conical tip. It should be just about the same width as the processor's pads.

General Assembly Information

We're sure that you are ready get started, but before you do you will need to get some tools together. The tools that you will need are:

___ Low-wattage soldering iron, 15W or less, with a fine conical tip

___ Small needle-nose pliers

___ Small diagonal cutters

___ Tweezers to handle the SMT parts

___ A mesh "sponge" for cleaning the tip of your soldering iron

___ A tinning block to clean and tin your iron as you go along

___ A lighted magnifier… unless you have Superman's eyes

___ A jeweler's loupe or small 10x magnifier, for inspecting the SMT solder joints

___ A well-lighted place to work, preferably with a wood or metal surface, also preferably not carpeted

___ Some PAPER masking tape (do NOT use Scotch® tape or electrical tape)

Each installation step has a check-off line, we strongly recommend that you check them off as you go, and that you perform the steps in sequence. We have listed the steps in order to make it easiest to assemble the Quark, deviating from them isn't going to make your life any easier.

Each step is pictured, so you can see exactly what you need to be soldering. Looking at the pictures as you go will help prevent you from soldering the wrong thing, or putting something in the wrong way.

Assembling your Quark

Step 1: Sort the Components

Before you start soldering anything, you need to lay everything out and make sure that you are familiar with all of components, and that you have everything. (Yes, we ARE human and sometimes make mistakes… if you are missing something, let us know immediately so we can send you whatever you need). You should have the following parts, check them off as you sort them…

	Qty	Description
__	1	Circuit board with pre-mounted barometric pressure sensor
__	1	ATTINY84A-20SU Processor (14-pin SOIC chip)
__	1	NCP1117-33 3.3V voltage regulator (SOT223 package)
__	2	VN5E160S Driver Chips (8-pin SOIC chip)
__	1	FM4001 Rectifier
__	2	4.7K ohm 0805-sized resistor (marked “472”)
__	1	10K ohm 0805-sized resistor (marked “103”)
__	2	100K ohm 0805-sized resistor (marked “104”)
__	2	.1 uF 0805-sized capacitors (small brown unmarked parts in PAPER carrier)
__	2	10 uF 1206-sized capacitors (brown, unmarked in PLASTIC carrier)
__	1	Buzzer
__	3	3-pin header strip
__	3	.1” shorting jumpers
__	1	4-pin x 2.54mm Screw Terminal Block
__	1	Coil of .020” 63/37 No-Clean solder wire

Note that some of the components are static sensitive, so you should avoid sources of static electricity while you are handling them. We recommend that you assemble the Quark on a wood or metal surface unless you are fortunate enough to have a high-temperature anti-static mat (don't buy one just to build the Quark, however!) A piece of ceramic floor tile works great, too. Avoid putting it on plastic surfaces that generate static, and preferably put it together in a room that's not carpeted. That being said, it's very unlikely that you will zap any of the components in the Quark with static electricity, but consider yourself notified of the possibility…

Also note that some of the components are polarized, i.e. it matters which way you put them in. If you solder one of these components in backwards, the effect will range from not making any noise (buzzer) to nothing at all working. It is CRITICAL that you test-fit the parts before you solder, and that you make ***SURE*** that you have them pointed the right direction before soldering. Like the old adage says, "Measure twice, cut once." If you solder a part onto the board incorrectly, it can be a minor pain to remove if it only has two pins, or it can be virtually impossible for something with a lot of pins. ***The Eggtimer Quark Limited Warranty does not cover incorrect assembly***, so if you mess up badly enough you may end up having to get another kit and starting over; neither of us want that.

There are several different resistor values, so make sure you get the right ones in the right place. They are marked on the boards, but once again you need to make SURE that you have them in the right place before soldering. Unsoldering parts on a small circuit board like the Quark isn't a lot of fun, even if you have a vacuum desoldering tool. Trust us, we've been there before…

It is very important that you assemble the Quark in the order listed. This makes it easier to access the surface-mount components, if you start soldering out of order it's going to be tough for you to get to the pads of the SMT parts.

Before you solder anything, make ***absolutely*** sure that you have the correct part and that it is inserted in the board correctly. The board has all of the component values, outlines, and polarities silk-screened on the top, so there shouldn't be any doubt about what goes where and how. Nevertheless, if you have any questions about the assembly procedure, do not hesitate to drop us a line at support@eggtimerrocketry.com before you solder the parts to the board. You may have to wait a day for the answer, but it could save you a lot of grief later on!

The Eggtimer Quark Limited Warranty does not cover damage to parts while attempting to desolder them because you inserted something incorrectly. We spent a lot of time making sure that the assembly instructions were clear, but once again if you have any questions about the assembly procedures drop us a line at support@eggtimerrockety.com ***before*** you solder.

OK, so let's get started…

Mounting the Resistors and Capacitors

There's a definite technique to mounting small SMT parts like the 0805 resistors and caps that come with the Quark kit. Once you get the hang of it, a lot of people think it's easier than mounting through-hole parts, because you don't have to bend leads, tape the part down to the board, or clip the leads after you solder them.

To mount these parts…

1) Lightly tin ONE pad.

2) Hold the part in place with tweezers, then heat up the tinned pad until the solder flows underneath the part. Hold for a few seconds, then remove the iron.

3) Hold the part in place for another 5 seconds until the solder cools. When you let it go, it shouldn't move… if it does, you didn't get a good solder joint, you need to start over.

4) Using as little solder as possible, solder the OTHER pad to the part.

5) Inspect both solder joints with a 10x jewelers loupe, making sure that the solder covers the pad and wicks up to the lead on the part. Touch up the solder joint if necessary, adding just a tiny bit of solder if necessary. Don't overheat the part if you do this, because the whole part can lift off the board and stick to your soldering iron if you do.

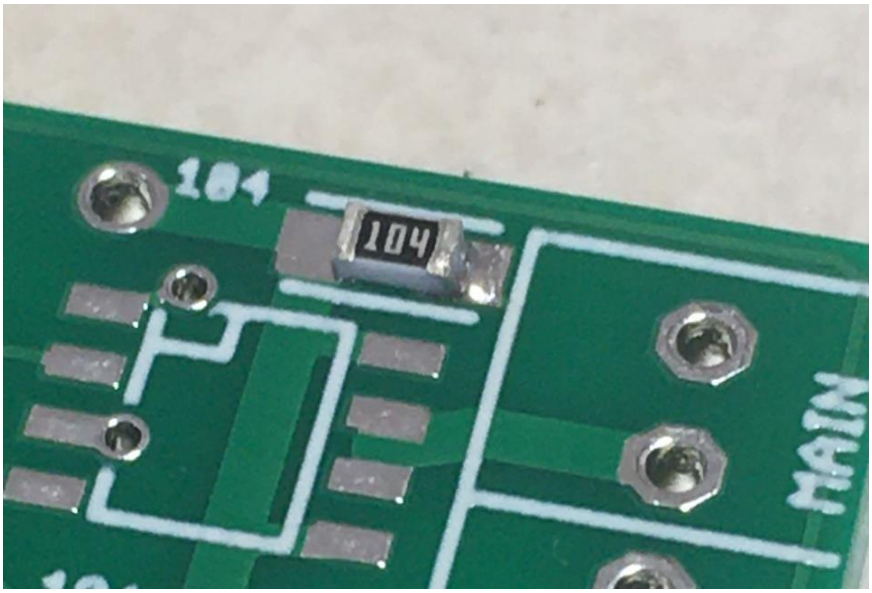
It is critical that you both inspect the solder joints, AND make sure that no solder has bridged over to other parts. In particular, the parts that are mounted around the silver-colored pressure sensor need to be soldered carefully, if you get a solder bridge onto the pressure sensor it may be very difficult to fix since the pads on the pressure sensor are on the bottom of the part, not the sides.

We provide a few extra parts for the 0805-sized parts because they're easy to lose. Chances are good that you'll be thanking us for that at some point in the assembly…

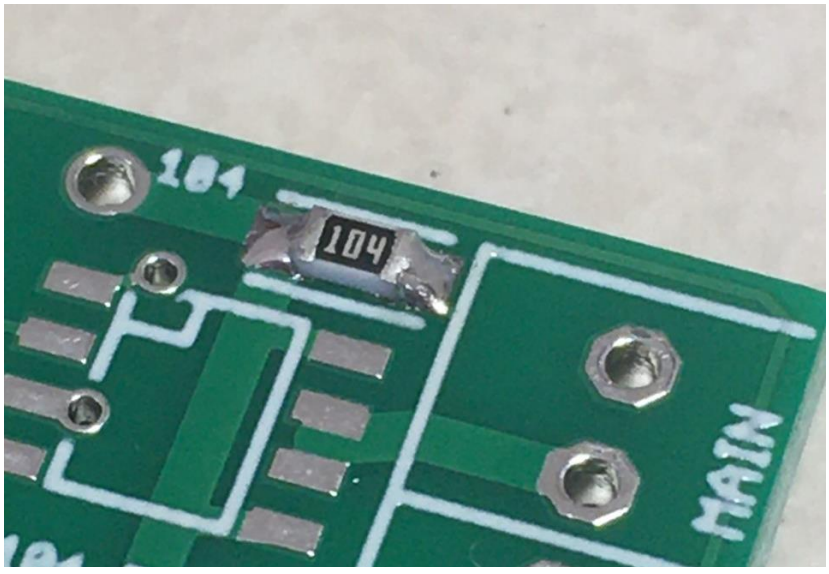
Mount the Top 100K resistor

___ Tin the right pad of the top 100K resistor, marked “104” on the right side of the board.

___ While heating up the tinned pad, place the 100K (104) resistor on the center of the pad. Remove the soldering iron, and let it cool for 5 seconds before you let go of the resistor.

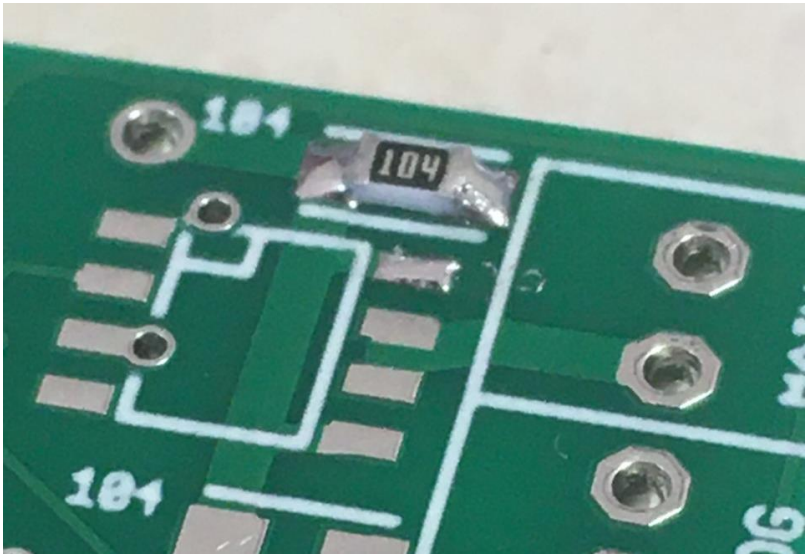


__ Solder the left pad of the 104 resistor. Check both solder joints with a 10x jeweler’s loupe to make sure that the solder joints are nice and shiny and that they cover both the resistor and the pad. Reheat and touch up the solder joints if necessary.



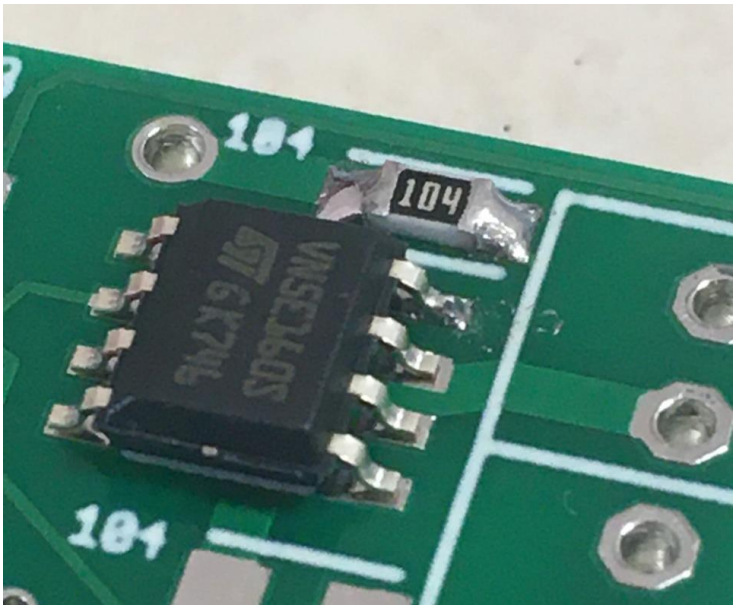
Mount the Top Driver Chip

___ Locate the top driver chip on the board, it's just below the 104 resistor that you just mounted. Lightly tin the upper-right pad on the board.



___ Remove one of the driver chips from its carrier. Look at the writing with a magnifier… you will notice that there is a "ST" logo on the top-left corner of the chip. That is the Pin 1 mark, which must align with the little box in the top-left corner of the driver chip marking on the PC board.

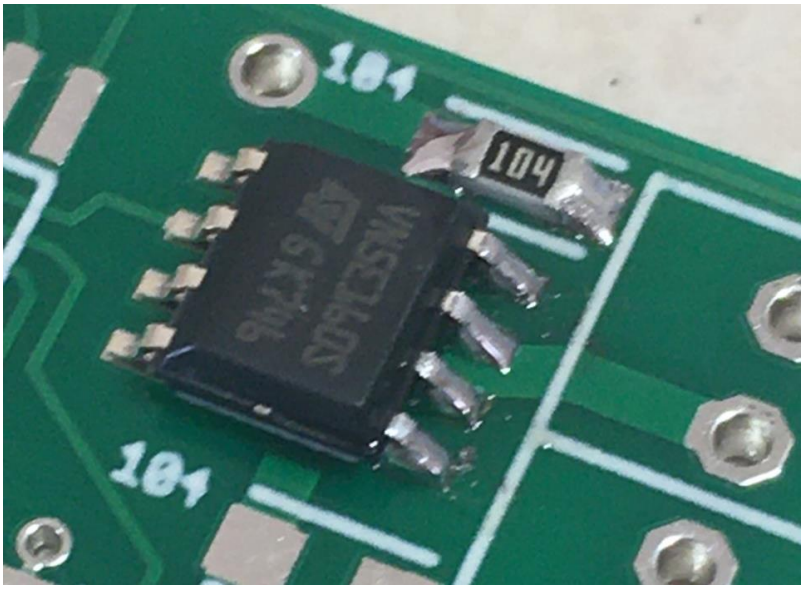
___ Place the driver chip on the board, and hold it in place while heating up the previously tinned upper-right pad. Make sure that the chip is centered on all eight pads, then carefully remove the soldering iron and wait 5 seconds for the solder to cool.



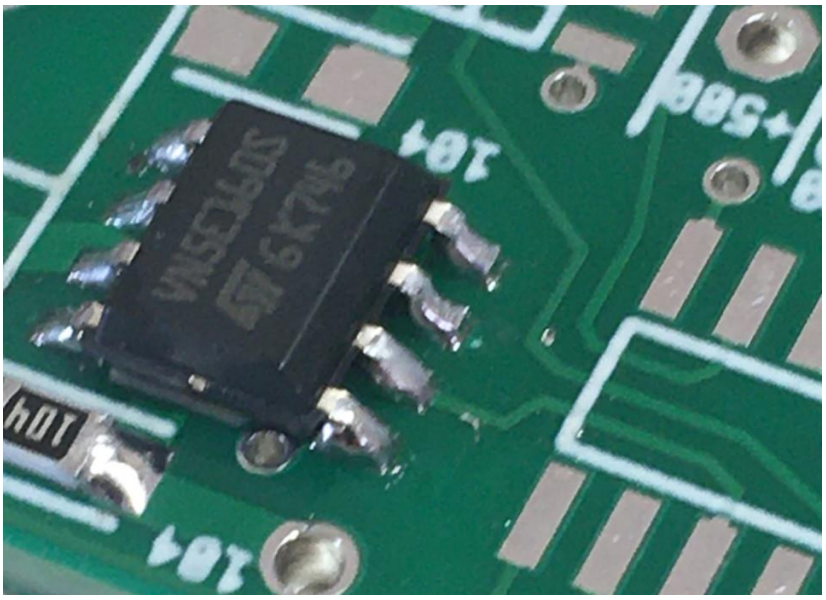
___ Carefully solder the lower-right pad. Check the pad with a 10x jeweler's loupe to make sure that the solder joint covers both the lead of the chip and the pad on the PC board. It's very easy to get solder on the chip's lead but miss the PC board pad; a good solder joint should actually flow underneath the chip lead and bond the "elbow" of the lead to the pad.

___ Now, solder the remaining leads in the same manner. You may have to go back and resolder the first lead (the one that you tinned earlier).

___ Go back and check all of the leads with a 10x jeweler's loupe, and retouch as necessary.



Right-Hand Leads…

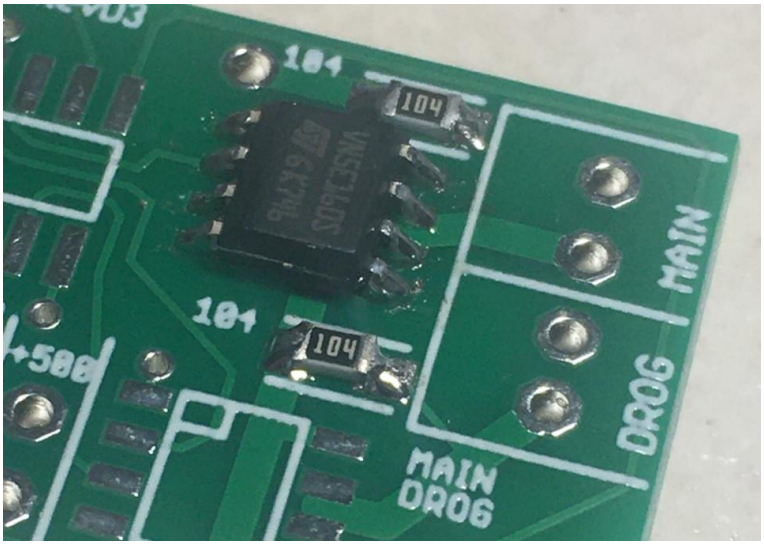


Left Hand Leads

Mount the Bottom 100K resistor

___ Tin the right pad of the bottom 100K resistor, marked “104” on the right side of the board, just below the driver chip that you just mounted.

___ Solder the bottom 100K resistor in place in the same manner as the top one.



Mount the Bottom Driver Chip

You will now mount the bottom driver chip… it’s mounted the same way as the top one.

___ Locate the bottom driver chip on the board, it's just below the 104 resistor that you just mounted. Lightly tin the upper-right pad on the board.

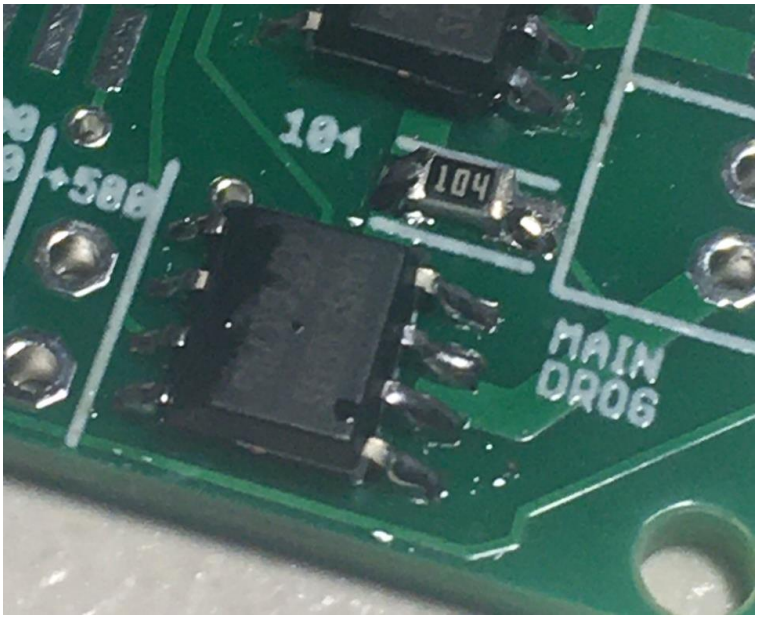
___ Remove one of the driver chips from its carrier. Look at the writing with a magnifier… you will notice that there is a "ST" logo on the top-left corner of the chip. That is the Pin 1 mark, which must align with the little box in the top-left corner of the driver chip marking on the PC board.

___ Place the driver chip on the board, and hold it in place while heating up the previously tinned upper-right pad. Make sure that the chip is centered on all eight pads, then carefully remove the soldering iron and wait 5 seconds for the solder to cool.

___ Carefully solder the lower-right pad. Check the pad with a 10x jeweler's loupe to make sure that the solder joint covers both the lead of the chip and the pad on the PC board. It's very easy to get solder on the chip's lead but miss the PC board pad; a good solder joint should actually flow underneath the chip lead and bond the "elbow" of the lead to the pad.

___ Now, solder the remaining leads in the same manner. You may have to go back and resolder the first lead (the one that you tinned earlier).

___ Go back and check all of the leads with a 10x jeweler's loupe, and retouch as necessary.

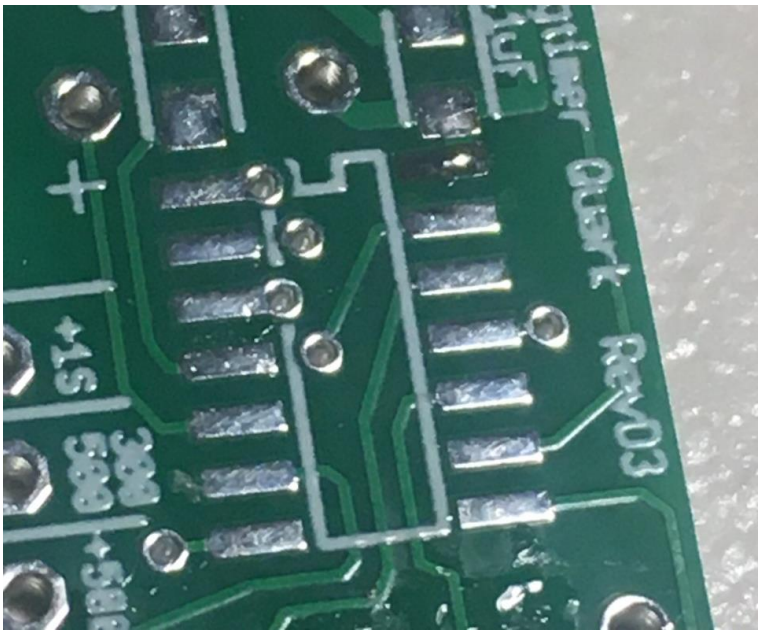


Mount the Processor

___ Orient the board so that it's pointed vertically, with the previously-soldered componetnts on the bottom.

___ Locate the space for the processor, it's a 14-pin chip on the right side of the board. Note that there is a notch on the "top" side of the processor; this will help you orient the chip properly.

___ Lightly tin the upper-left lead of the processor pads on the PC board.

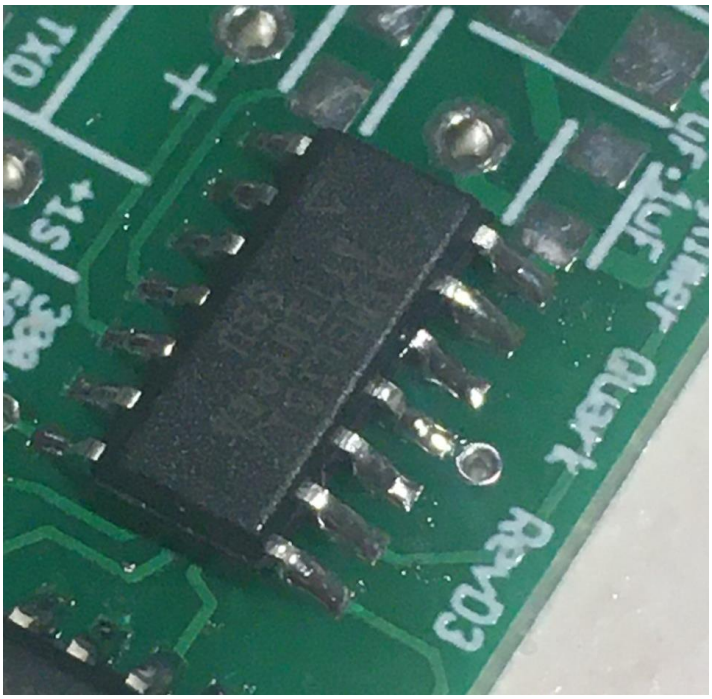


___ Remove the processor from it's package, and inspect it with a 10x jeweler's loupe. You will see that there is an indented "dot" on one corner of the package. That is the "Pin 1" mark, it must go on the upper-left corner of the pads on the board.

___ Place the processor chip on the board, and hold it in place while heating up the previously tinned upper-right pad. Make sure that the chip is centered on all 14 pads, then carefully remove the soldering iron and wait 5 seconds for the solder to cool.

___ Carefully solder the lower-right pad. Check the pad with a 10x jeweler's loupe to make sure that the solder joint covers both the lead of the chip and the pad on the PC board. It's very easy to get solder on the chip's lead but miss the PC board pad; a good solder joint should actually flow underneath the chip lead and bond the "elbow" of the lead to the pad.

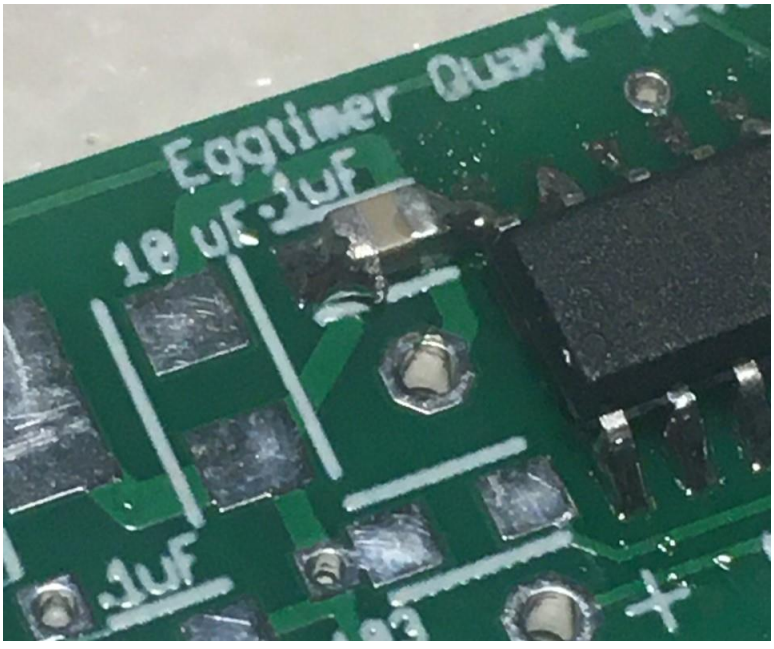
___ Now, solder the remaining leads in the same manner. You may have to go back and resolder the first lead (the one that you tinned earlier).



Mount the .1 uF Capacitor Next to the Processor

___ Tin the right pad of the .1 uF capacitor next to the processor.

___ Solder the capacitor in place in the same manner as the resistors. Note that the right pad is next to the upper-right pad on the processor... they are actually connected, so don't worry about any extra solder getting on the processor lead.

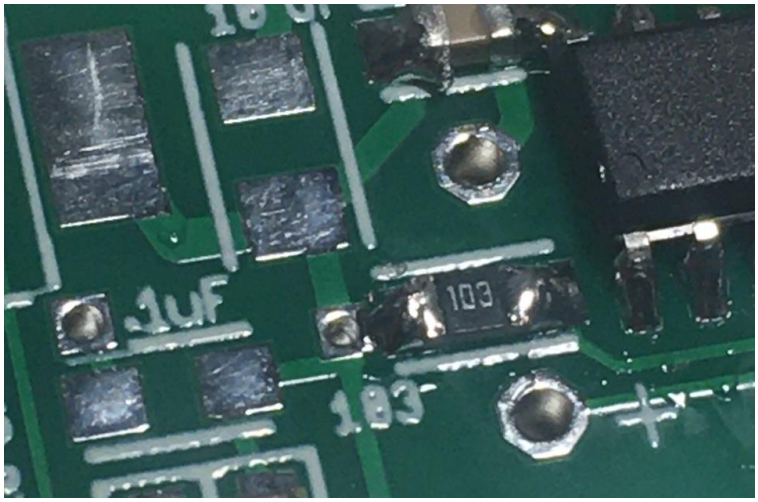


Mount the 10K Resistor

___ Locate the 10K resistor pads, it's next to the Pin 1 mark on the processor and is marked "103" on the board.

___ Tin the right pad of the 10K resistor next to the processor.

___ Solder the 10K resistor in place in the same manner as the other resistors. Note: Unlike the .1 uF capacitor that you soldered earlier, this resistor does NOT connect to the nearby processor lead, so if you get a solder bridge between the two you will need to remove the excess solder with some desoldering wick.

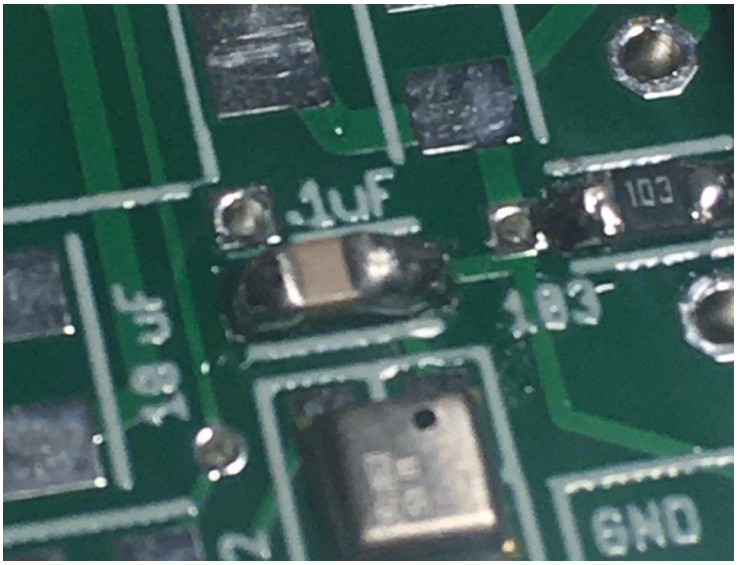


Mount the .1 uF Capacitor Next to Baro Sensor

___ Locate the spot on the PC board for the .1 uF capacitor just above the silver baro sensor.

___ Tin the right pad of the .1 uF capacitor.

___ Solder the .1 uF capacitor in place in the same manner as the other resistors & capacitors.



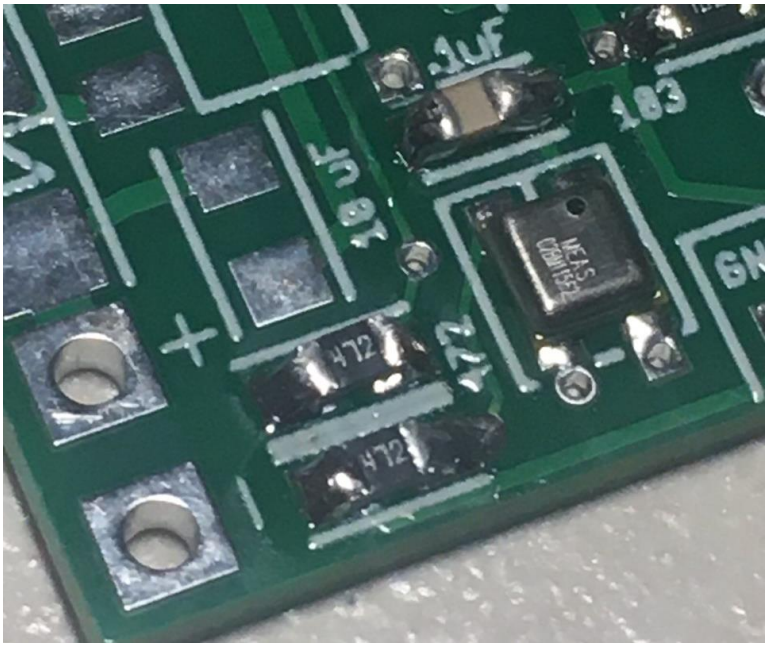
Mount the Two 4.7K Resistors

___ Locate the spot for the two 4.7K resistors, they're just to the left of the silver baro sensor and are marked "472" on the board.

___ Tin the right pad of the top 4.7K resistor.

___ Solder the top 4.7K resistor in place in the same manner as the other resistors & capacitors.

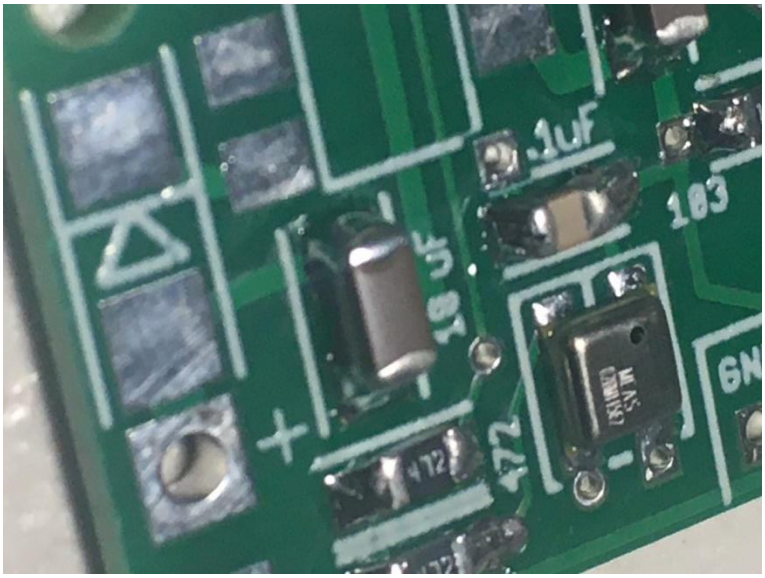
___ Similarly, mount the bottom 4.7K resistor.



Mount the 10 uF Capacitors

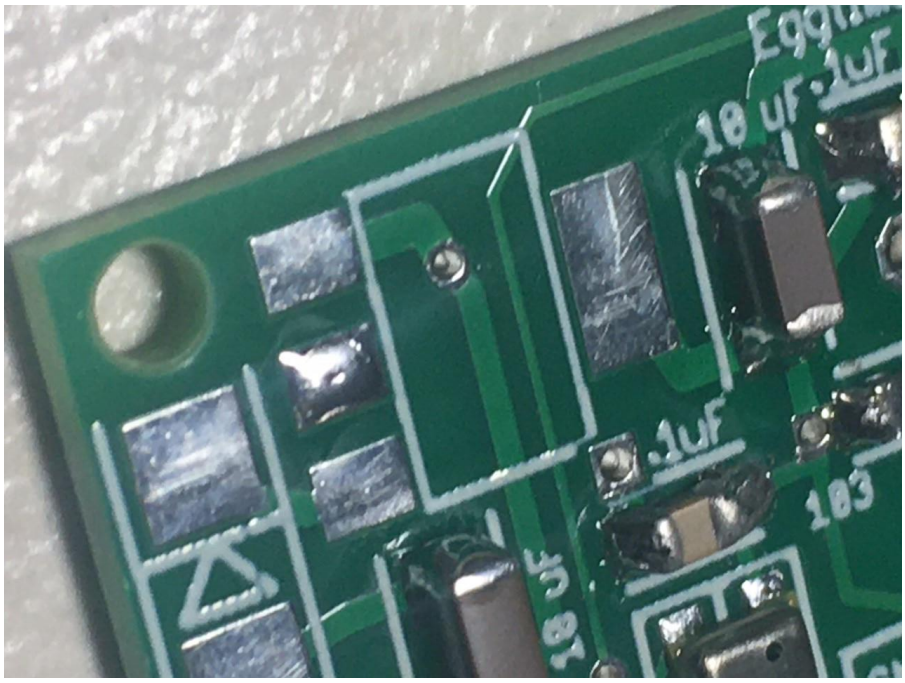
___ Locate the space for the 10 uF capacitor just above the two 4.7K resistors.

___ Solder the 10 uF capacitor in place in the same manner as the other resistors & capacitors.



___ Locate the second 10 uF capacitor, to the left of the processor and the .1 uF capacitor.

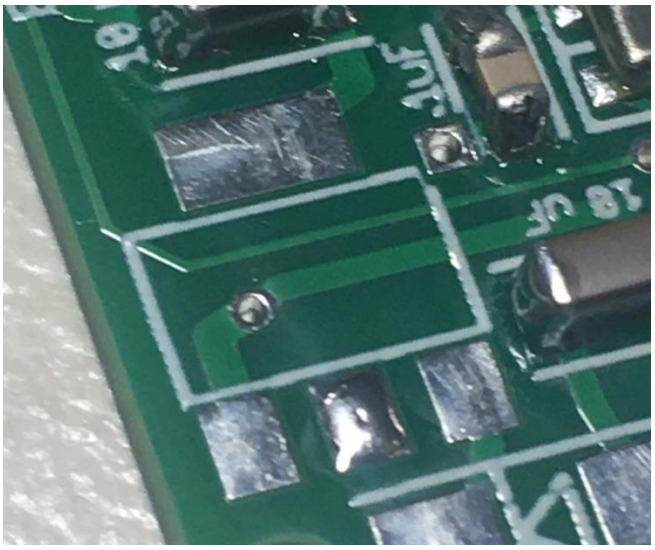
___ Solder the 10 uF capacitor in place in the same manner as the other resistors & capacitors.



Mount the Voltage Regulator

___ Locate the spot for the voltage regulator on the PC board, it's near the left side of the board. You'll see that there is one large pad on the right side, and three smaller pads on the left side.

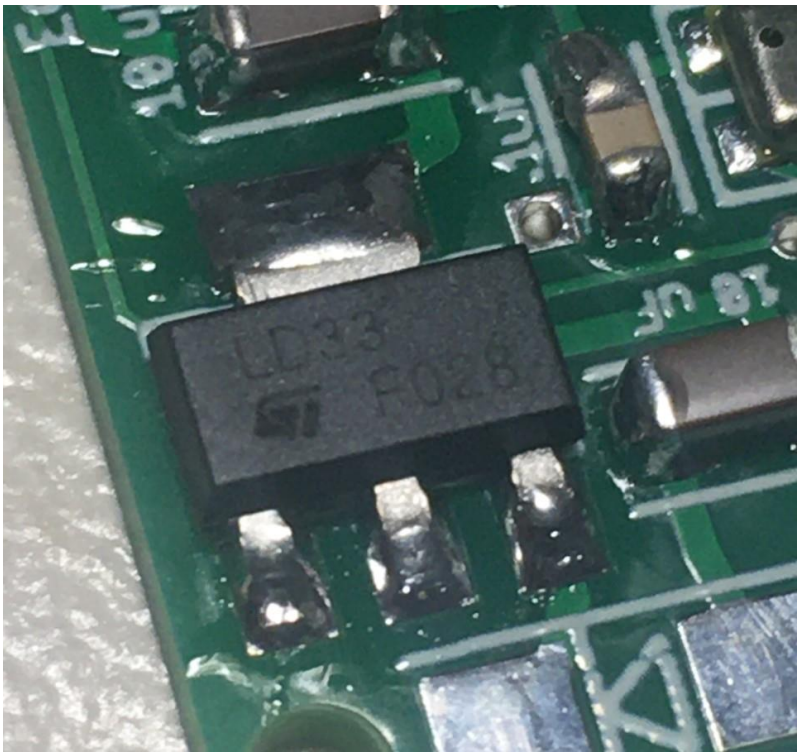
___ Lightly tin the center pad of the three pads on the left.



___ While heating up the tinned pad, hold the voltage regulator in place on the pads. Make sure that it's centered on the pads, then remove the soldering iron, and let it cool for 5 seconds before you let go of it.

___ Solder the other two smaller leads, then solder the large tab to its pad on the board. It's OK if there's a pretty fair amount of solder on the pads… that will actually help with heat conduction.

___ If necessary, go back and resolder the pad that you tinned earlier.



Mount the Rectifier Diode

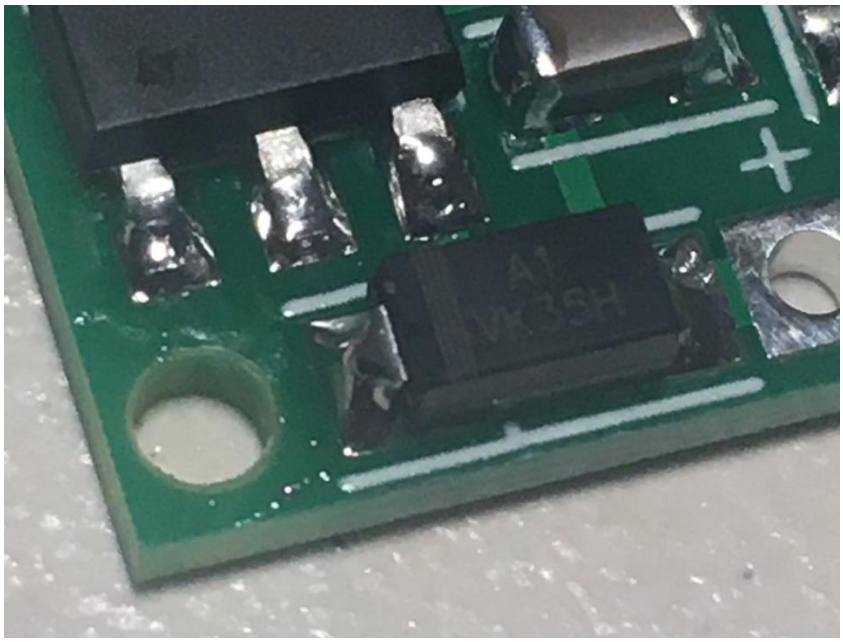
___ Locate the spot on the PC board for the diode, it's at the far left side of the board and has a mark with an arrow and a line at one end.

___ Tin the right pad of the diode.

___ If you look at the diode, you'll see that the package has a stripe at one end. This stripe must match the line marked on the left side of the PC board pads.

___ Hold the diode in place so that the line is on the left side of the pads, then heat up the tinned right pad until the solder flows. Remove the iron, then wait 5 seconds before letting go.

___ Solder the left pad to the diode. If you need to, resolder the right pad that was previously tinned.



Mount the Buzzer

___ Locate the spot for the buzzer, there are two holes: one just to the left of the processor, and one just below the 10K/103 resistor. The one next to the 10K resistor has a "+" marking next to it.

___ When you mount the buzzer it will cover a few of the parts, so you need to check the solder joints on a few of them right now with a 10x jeweler's loupe, and touch them up if necessary. Once you solder the buzzer, you will not be able to get to them, and you don't want to have to remove the buzzer… it's not all that easy.

___ With a 10x jeweler's loupe, check the solder joints on:

- ___ The 10K/103 resistor
- ___ The .1 uF capacitor to the left of the processor
- ___ The 10 uF capacitor to the left of the .1 uF capacitor
- ___ The .1 uF capacitor above the baro sensor
- ___ The processor

___ When you're satisfied that those solder joints are good, place the buzzer in the two mounting holes. Note that the buzzer has a "+" marked on one side, and that the lead next to the "+" side is longer than the other lead. That lead must be mounted in the bottom hole on the PC board with the "+" mark next to it.

___ With a piece of masking tape, hold the buzzer in place.

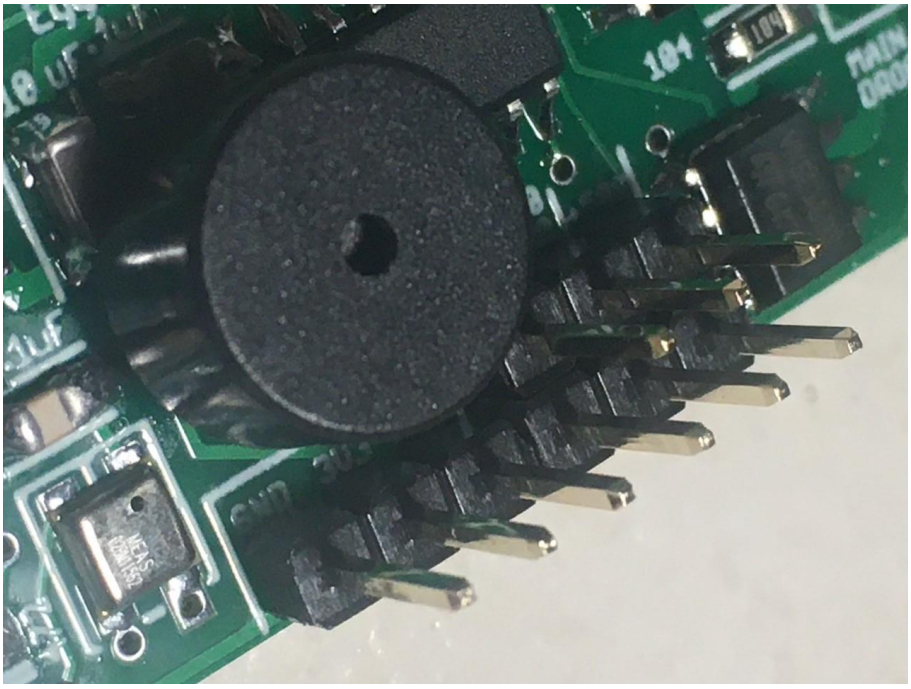
___ Turn the board over, and solder the two leads to the pads. With a set of small diagonal cutters, clip off any extra leads.

___ Turn the board back over, and remove the tape. Also remove the protective cover on the buzzer.

Mount the Headers

___ Locate the spot for the three 3-pin headers near the bottom-center of the PC board.

___ Put the headers in place, so that the short end goes through the PC board. With some masking tape, hold them in place. Turn over the board, and solder the pins to the pads on the PC board. Turn the board over again, and remove the tape.



Mount the Terminal Block (optional)

Optionally, you can install the 4-pin terminal block for your deployment wiring. Given the relatively low cost of a Quark, we generally recommend that you hardwire it to your sled by soldering your deployment wiring to the board, and don't remove it. However, some people like the convenience of removable screw terminal blocks for their wiring, so we've designed the board to take them too.

<u>Hardwired</u>
- Lower Profile possible
- Requires soldering the wires
- Can't come loose in flight
- Not easy to move
- Servo tape mounting OK

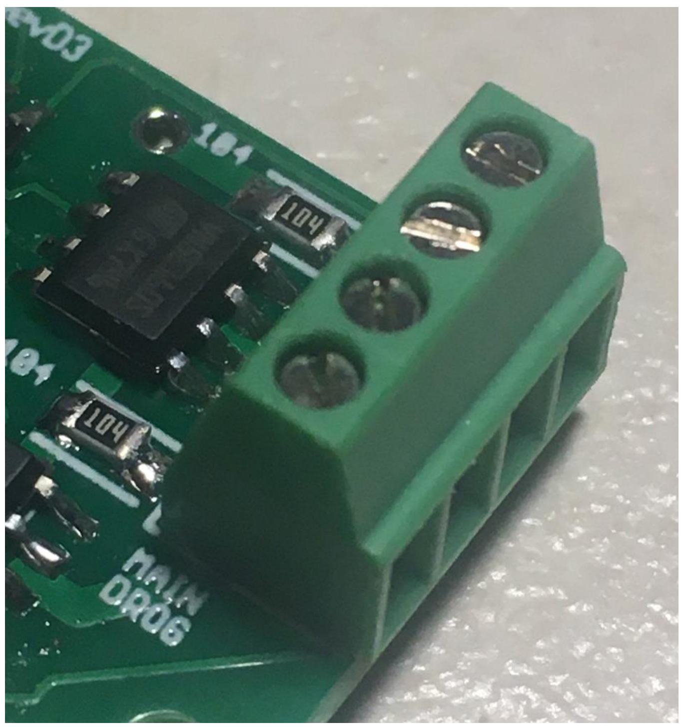
<u>Terminal Blocks</u>
- Slightly taller profile
- Wires are simply screwed into the blocks
- Wires can potentially vibrate loose in flight
- Easier to move between rockets
- Requires screw mounting due to torque

___ Locate the spot for the terminal block on the far right side of the PC board.

___ Inspect the terminal block, you’ll notice that one end has larger holes and the other end appears to be closed off.

___ Install the terminal block in the mounting holes, so that the larger holes are on the RIGHT side of the board (the edge). The “closed off” side should be on the left (the inside) part of the board. Check this carefully… if you install the terminal block backwards it will be almost impossible to get to the wiring!

___ With some masking tape, hold the terminal block in place. Turn over the board, and solder the four pins to the pads on the PC board. Turn it over again, and remove the tape.



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Congratulations, you are now done! Time for some testing….
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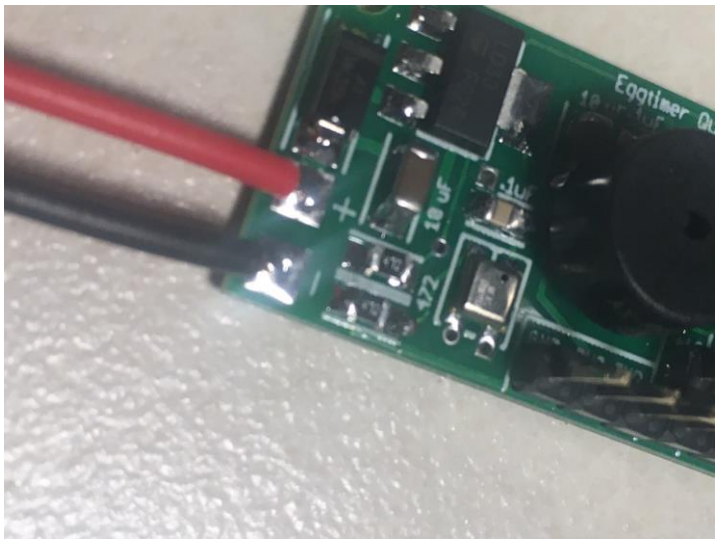
Preliminary Testing

Take the "pigtail" for the battery you are using, and compare it to your battery. Identify which lead is "+" and which lead is "-"… normally, the "+" lead is RED and the "-" lead is BLACK. IF YOU HAVE ANY DOUBT AT ALL, USE A DVM TO TEST IT WITH THE BATTERY BEFORE YOU MOUNT IT TO THE BOARD. The Quark is polarity-protected so it shouldn't be damaged if you connect the battery backwards, but it's better not to do it anyway.

We use JST connectors for almost all of our LiPo batteries. They're polarized so theoretically you can't connect the battery backwards. We say "theoretically" because some of the cheap ones aren't molded very precisely and it IS possible to insert them backwards, particularly since these connectors require a little bit of force to insert (and remove!) anyway. To help prevent against this, we take a black Sharpie marker and color the black side of both the pigtail and the battery connectors so that we have an easy reference: Match up the black stripes and you're good.

Strip about 1/8" from each lead of the pigtail, and tin the leads. Solder the "+" lead to the TOP side of the pad marked "+". Similarly, solder the "-" lead to the BOTTOM side of the pad marked "-".



Connect your battery to the pigtail. You should immediately hear a 1-second beep, and after a few seconds you should hear the "last apogee" beeps. Since it's just been programmed, it will beep 6-5-5-3-4. After another 15 seconds, you should hear four beeps, followed by a pause, then five beeps followed by a pause, with this sequence repeating for as long as you have the battery connected. This is telling you that neither of the deployment channels has continuity, which isn't surprising considering that there's nothing connected to them yet.

If you get this far, congratulations! At this point, you need to get out the Eggtimer Quark User's Guide, and perform the baro and deployment tests. Once everything passes, you're ready to mount it in your rocket at start enjoying the advantages of electronic deployments.

Troubleshooting

If your Quark doesn't work after assembly and testing, take a deep breath, get out a beverage to clear you mind, and start troubleshooting…

Check Your Solder Joints

The very first thing you should do is to check out all of the solder joints under a lighted magnifier. The most common reason for things not working are solder bridges, i.e. putting too much solder on the pads and shorting two adjacent pads together. You can also get into problems by bridging pads with "vias" on the board, the smaller holes that don't have any components soldered to them. Most of the pads are very small, so it doesn't take much solder to get a nice "tented" solder joint. If you get a solder bridge, heat it up and use a solder wick or a vacuum bulb to remove the excess; afterwards, we recommend resoldering the joints. Note: NEVER use "canned air" or compressed air to "blow away" excess solder. The resulting splatter will almost always cause more damage than the original solder bridge, and if you get solder splatter under the baro module there's no easy way to fix it.

Another thing to look out for is "cold" solder joints, they look dull and blobby compared to a nice shiny "tented" solder joint. If you have a cold solder joint, it won't conduct well; at the low power that the Quark uses this could easily keep things from working. If you have a cold solder joint, heat it up and put just a little bit of solder on it, the main idea is to get a little more flux on the joint. If there's too much solder, use a fine solder wick or (preferably) a vacuum bulb to remove the excess, then heat it up and resolder the joint.

Finally, it is relatively easy to actually miss a solder joint, especially with the optoisolator since it has very "stubby" leads. When you solder the pads, don't just melt the solder on top of the leads… it can get stuck there and actually miss the pads. We've had it happen. Head up the pads, not the leads, then gently apply the solder until it flows around the leads.

Check Your Component Polarity

Most of the small components aren't polarized, with some notable exceptions (i.e the diode). The outline of the parts is silk-screened on the board, so you should be able to see readily if you have a component soldered in backwards, or sideways.

If you inserted a component incorrectly, you will have to carefully unsolder it, clear any solder residue from the holes, and resolder it. If you find that a component was soldered incorrectly, you will have to use a vacuum bulb or vacuum desoldering tool to unsolder it. We cannot stress enough that you need to check the orientation of the parts ***before*** you solder them. The Eggtimer Quark Limited Warranty does not cover damage to a component while attempting to unsolder it, so make take your time and make sure you get it right before you solder.

Check Your Battery & Connector

Make sure that you are using one of the recommended batteries to test with. Make sure that you have the polarity correct: The RED wires must go to the "+" side and the BLACK wires must go to the "-" side.

If It Still Doesn't Work…

There is, of course, always an outside chance that you have a bad component. We test each PC board and the surface mounted components before they leave us. Nevertheless, it is always possible that something may be wrong; there may be a bridge on the PC board itself, etc. If you have gone through all of the troubleshooting steps and the board still doesn't work, let us know at support@eggtimerrocketry.com . A high-resolution picture (5 megapixel or better) of both sides of your circuit board and a description of the problem would be very helpful…

Troubleshooting Tips (in approximate order of likelihood)

No Beep When the Battery is Connected

- Check the polarity of the buzzer… it may be in backwards
- Bad solder joint on the processor
- Incorrect battery polarity, or bad solder joint on battery connector pads
- Bad solder joint on voltage regulator
- Bad solder joint on the 10 uF capacitors
- Bad solder joint on the 4.7K resistors

Unexpected Beeps When the Battery is Connected

- Bad solder joint and/or short on the processor
- Bad solder joint on the two 4.7K resistors
- Bad solder joint and/or short on the driver chips