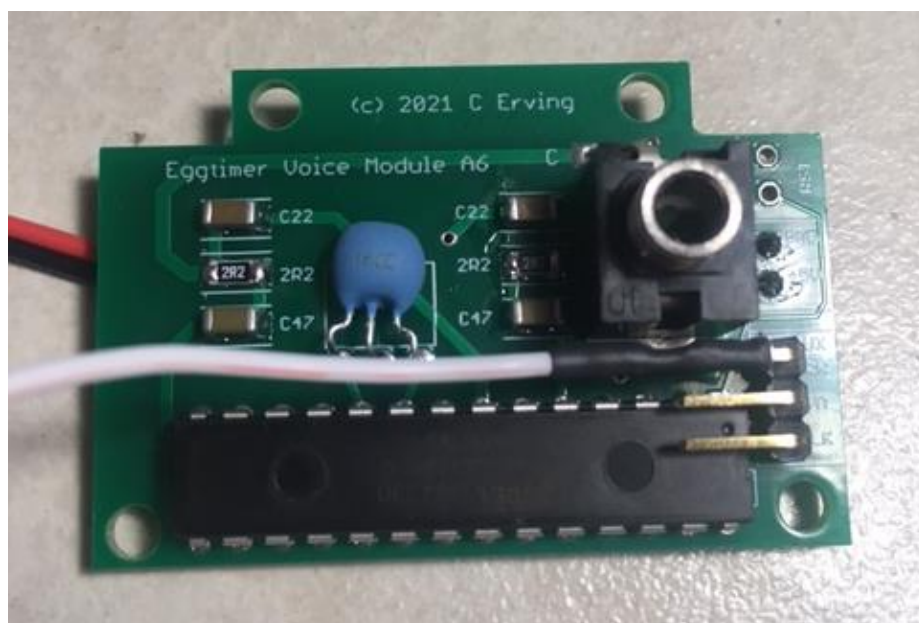


Eggfinder Voice Module Assembly/User's Manual

Board Rev A6



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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 Eggfinder 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.

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## **Before You Start...**

- Go to our web site at [www.Eggtimerrocketry.com](http://www.Eggtimerrocketry.com) and download the latest Assembly/Users Guide..
  - Read them thoroughly before starting... it will save you some grief later, we promise!
- ~~~~~

Thanks for buying an Eggfinder Voice Module! This accessory to the Eggfinder LCD Receiver, along with software versions 2.02 and up, will add a spoken voice to your GPS or altimeter telemetry. For altimeter telemetry using an Eggfinder Telemetry Module with your Eggtimer altimeter, it will typically speak out your real-time altitude, apogee, and deployments. Instead of looking at your LCD receiver all the time, you can concentrate on your rocket.

For GPS tracking, it will speak out the distance and compass direction, and if you have the optional LCD-GPS Module in your LCD receiver it will also give you the distance and left/right degrees that you need to go to get your rocket.

You can use it with standard 3.5mm earbud type headphones, or you can use a standard 3.5mm Aux cable and plug it into an amplifier, PA system (so you can share your flight progress with your club), or your car stereo (handy when you go to retrieve your rocket from a large launch site... you can concentrate on where you're going, not on the display).

The Eggfinder Voice Module is specially designed to fit into the Black Aero V3 case for the Eggfinder LCD receiver, however it will easily fit into just about any case you have. The board is relatively small, and the 3.5mm jack can be mounted directly on the board or it can be wired off the board if necessary. The jack comes with a mounting nut if you need to case-mount it.

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 Eggfinder, 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!).

Note: The User's Guide section of this manual supplements the Eggfinder LCD User's Guide, since some of the functions are substantially different with the addition of the Voice Module board. The programming and frequency changing functions are unchanged; however the tracking functions are greatly enhanced. Refer to the Eggfinder LCD User's Guide for introductory information, then come back to the Voice Module User's Guide to see what has changed.

## **About Soldering Your Eggfinder Voice Module Board...**

Assembling your Voice Module board 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!

This board uses mostly Surface Mount Technology (SMT) parts, but 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 some 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, 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. **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 Voice Module Board, 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 GPS module pads. If you have a temperature-controlled iron, set it to 680F; you may need to adjust that temperature up or down a little if you find that the solder balls up (too cold) or fizzes without flowing out (too hot).

## **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 lighted magnifier, for inspecting solder joints (not essential, but very helpful)
- \_\_\_ A jeweler's loupe or small 10x magnifier, for inspecting the SMT solder joints (again, not essential but VERY helpful)
- \_\_\_ 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)
- \_\_\_ A heat gun (for shrinking heat-shrink tubing)

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 Eggfinder, deviating from them isn't going to make your life any easier.

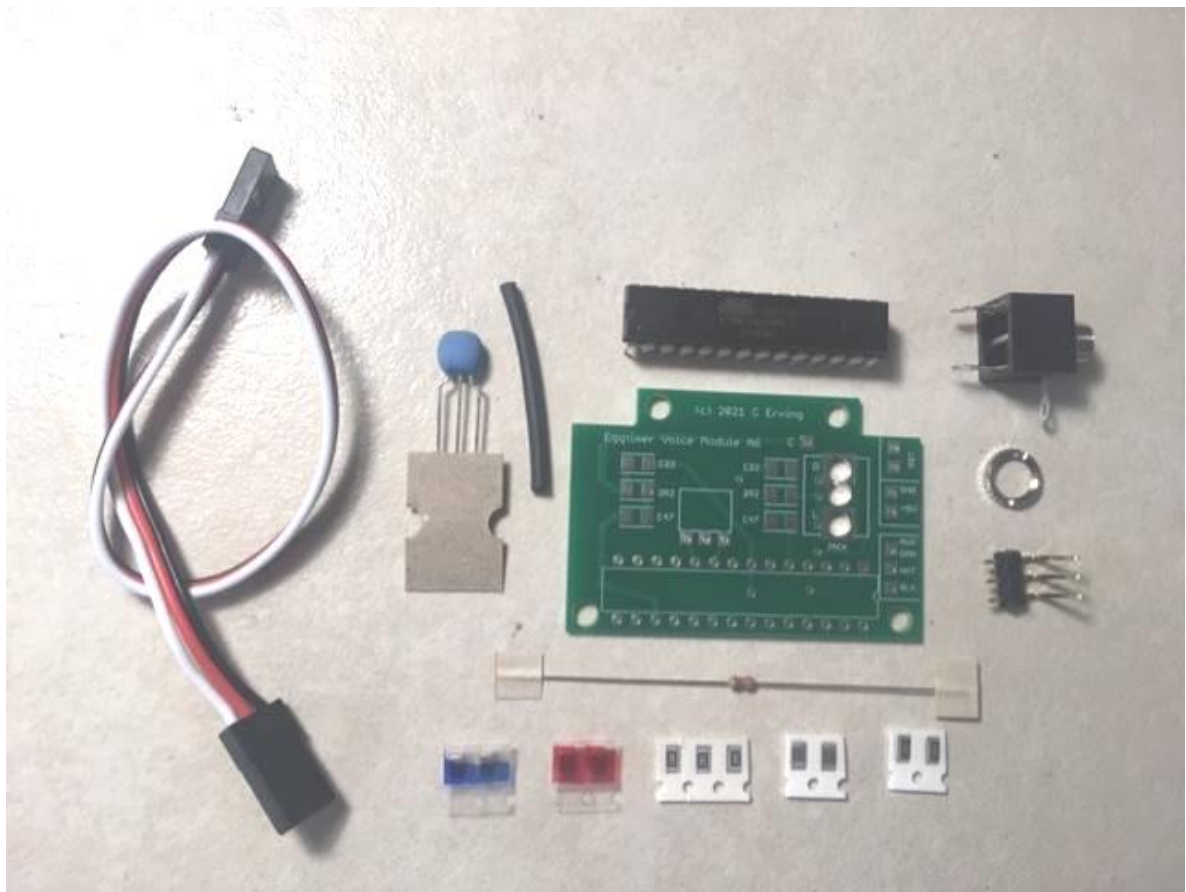
We strongly recommend that you consult the assembly pictures in the assembly guide before you start soldering. Each step is pictured, so you can see exactly what you need to be soldering. Looking at the pictures as you go will help prevent you from soldering the wrong thing, or putting something in the wrong way.

# **Assembling your Eggfinder Voice Module Board**

## **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...

|   | <u>Qty</u> | <u>Description</u>                                                               |
|---|------------|----------------------------------------------------------------------------------|
| — | 1          | Circuit board                                                                    |
| — | 1          | Pre-programmed Atmel ATMega328P-PU processor (28-pin chip)                       |
| — | 2          | 2.2 ohm 1206-size resistors (marked “2R2”)                                       |
| — | 1          | 10K 1206-size resistor (marked “103”)                                            |
| — | 1          | 1/8W leaded resistor (value is not important, we’re only using it for the leads) |
| — | 1          | .1 uF 1206-size capacitor (brown, in a paper tape with no markings)              |
| — | 2          | 22 uF 1206-size capacitors<br>(brown, in a clear tape with a RED stripe)         |
| — | 2          | 47 uF 1206-size capacitors<br>(brown, in a clear tape with a BLUE stripe)        |
| — | 1          | 8” 3-conductor jumper, female-female                                             |
| — | 1          | 3.5 mm stereo earphone jack                                                      |
| — | 1          | 3-pin long right-angle .1” header                                                |
| — | 1          | Coil of .020” 63/37 No-Clean solder wire                                         |
| — | 1          | 1” of 1/16” heat-shrink tubing                                                   |



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 Voice Module 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 Voice Module, however!) 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 Voice Module 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. 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 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 and capacitor 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 Voice Module board 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 kit 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. Some of the instructions will call for you to tack-tape parts to the board to maintain alignment while you solder, or to protect sensitive areas from solder. You should ONLY use paper masking tape for that purpose, DO NOT use “Scotch”® tape or electrical tape for this; plastic tapes can pick up static electricity and damage parts, and electrical tape tends to leave a sticky residue.

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](mailto: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 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@eggtimerrocketry.com](mailto:support@eggtimerrocketry.com) ***before*** you solder.

## **Check Your Eggtimer LCD Receiver’s Firmware Version**

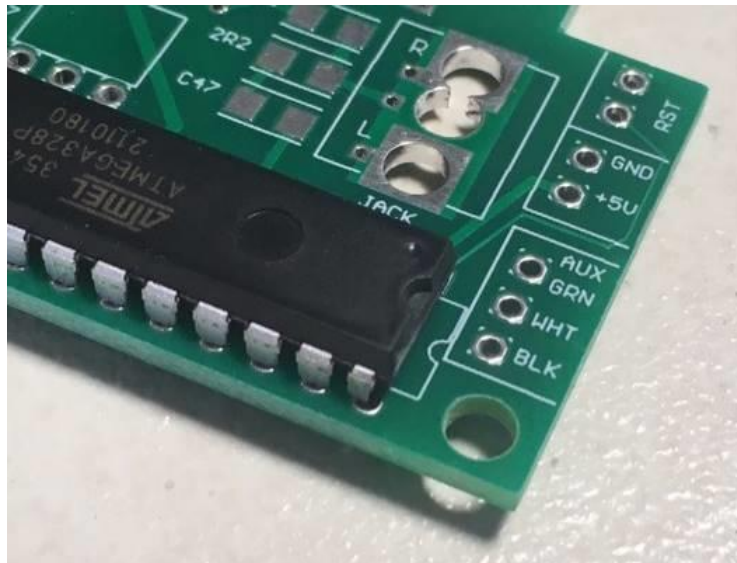
The Eggtimer Voice Module Board requires at least version 2.02 of the Eggtimer LCD receiver firmware in order to operate properly. Before you do anything else, if you are on an older version of the firmware (i.e. 1.09e), update the firmware in your LCD receiver. Instructions are on the Eggtimer Rocketry web site, but we’ve also added them to the end of this manual for your convenience.

## **Assembling the Voice Module Board**

— Mount the Atmel ATMEGA328P-PU Processor

Carefully remove the processor chip from the anti-static foam in which it was shipped. Identify the notch at one end of the chip, this notch needs to line up with the notch that’s silkscreened on the PC board. Gently insert the chip into the holes. The holes are small, so you may have to wiggle it around a bit to get all 28 pins into them.





Turn the board over. Solder ONLY two opposite corner pins, then turn the board upright again, and make sure that 1) you have the chip pointed in the right direction, and 2) the chip is seated completely against the circuit board. If you made a mistake, you will have to carefully unsolder the chip and fix the problem; two solder joints are a lot easier to fix than 28.

If it looks good, turn it back over and finish soldering the rest of the pins.



### Mounting the Resistors and Capacitors

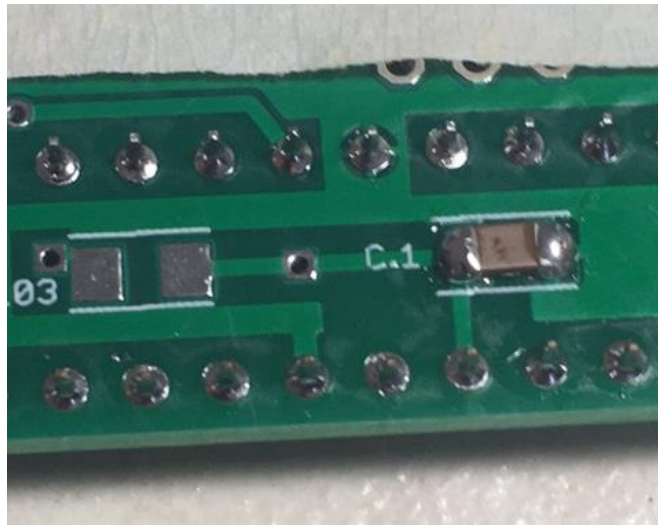
The resistors and capacitors are 1206-sized surface mount parts, yes they are small. However, they're really not hard to mount, once you know the trick and you've done a few. They key is

to follow the below-listed procedure exactly... if you do, you'll wonder why you ever thought that this was such a big deal.

- 1) Very lightly tin **ONLY** one of the resistor pads.
- 2) Holding the resistor with tweezers in one hand and your soldering iron in the other, center the resistor on the pads.
- 3) Once you have it where you want it, touch the tip of the soldering iron to the top of the resistor until the solder which you previously tinned the pad with melts.
- 4) Hold the iron for about 2 more seconds then remove the soldering iron, still holding the resistor in place.
- 5) Wait about 5 seconds then let go of the resistor.
- 6) Now, solder the untinned pad to the resistor using only a tiny bit of solder, just enough to cover the pad and have it "wick" up the side of the resistor. This will take a very short time, so be ready to remove the soldering iron within a few seconds. If you leave the iron on the resistor for too long, you may heat up the previously-soldered joint, and when you withdraw your soldering iron it will come off the board and stick to your tip, or it will "tombstone" and lay up on end. If that happens, heat up the joint, remove the resistor, and try again.
- 7) Inspect the joints, and heat/solder them if they don't look nice and shiny. You may end up resoldering the joint that you tinned originally, because chances are that it doesn't have enough solder to wick up the side of the resistor. If you do reheat the resistor, be careful not to overheat it; if you do, both solder joints may melt and you may end up lifting the resistor off the board.

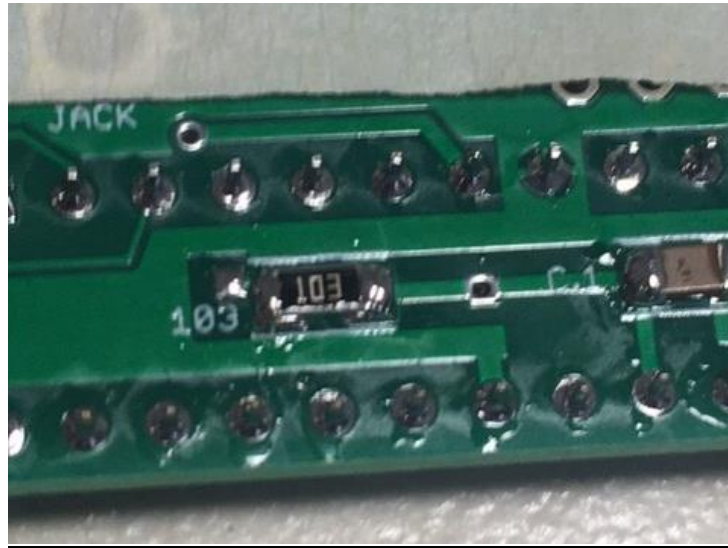
\_\_\_\_ Mount the .1 uF capacitor

Locate the .1 uf capacitor, it's between the row of soldered processor pins, and is marked "C.1". The part is brown, and should be in a paper tape. Solder in place.



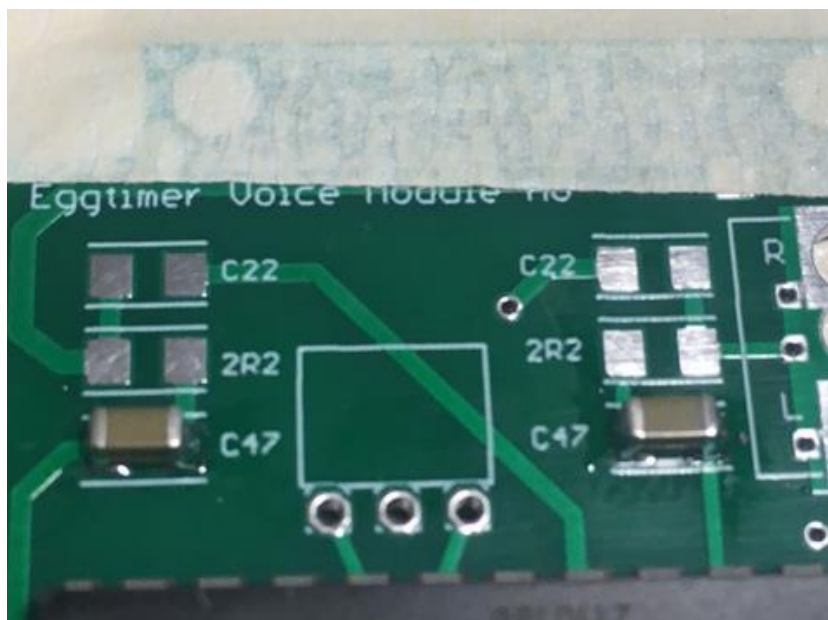
\_\_\_ Mount the 10K resistor (marked “103” or “1022”)

Turn over the board so that it's on the “bottom” side, where the processor solder joints are. Locate the 10K resistor on the board, it's in between the row of soldered pins. Solder in place.



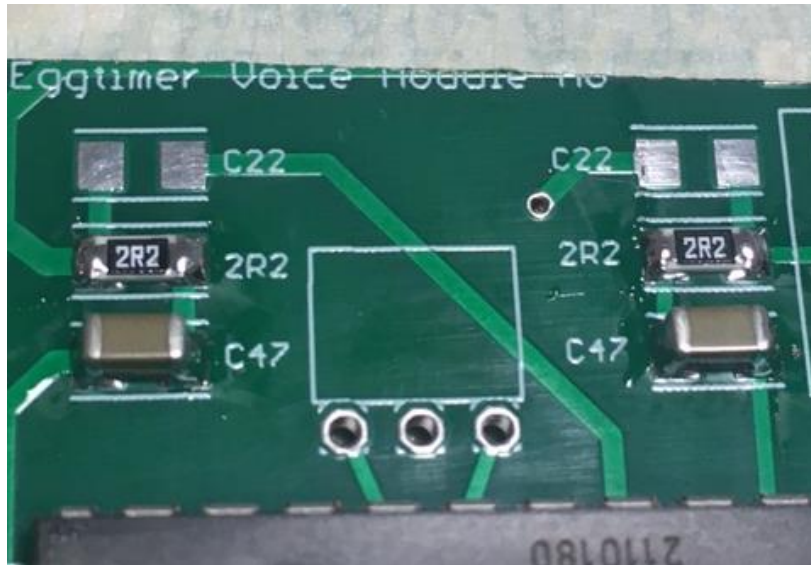
\_\_\_ Mount the 47 uF capacitors (clear tape with BLUE stripe)

Turn the board over so that it's on the “top” side. Just above the processor, you'll see two spaces for the 47 uF capacitors, they're marked “C47”. The 47 uF capacitors are in a clear tape with a BLUE stripe... make sure you get the right ones. Solder in place.



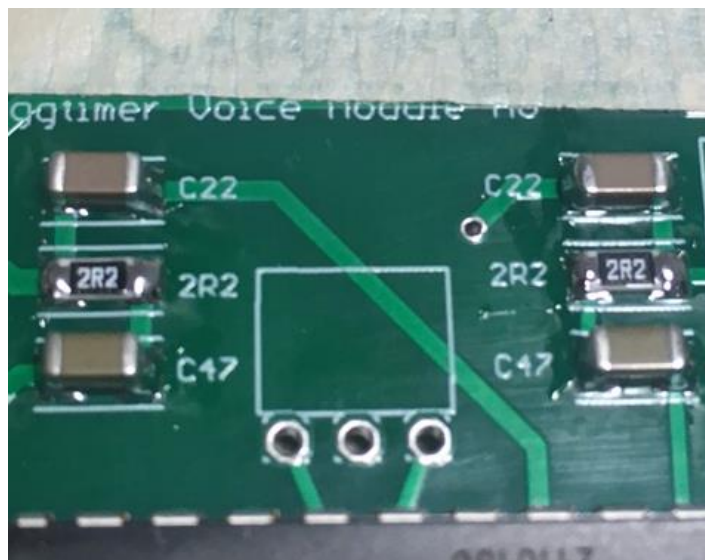
— Mount the 2.2 ohm resistors (marked “2R2”)

Locate the spot for the two 2.2 ohm resistors, just above the two 47 uF capacitors that you just mounted. Solder in place.



— Mount the 22 uF capacitors (clear tape with RED stripe)

. Just above the two 2.2 ohm resistors you just mounted, you'll see two spaces for the 22 uF capacitors, they're marked “C22”. The 22 uF capacitors are in a clear tape with a RED stripe... make sure you get the right ones. Solder in place.





## \_\_\_ Mount the Resonator

Locate the resonator, it's a three-pin leaded part. With a pair of needle nose pliers, gently bend the leads down 90 degrees. Be careful not to break the ceramic body of the resonator! Insert the leads into the space in the PC board and tape is down with some masking tape, then turn the board over and solder the three pads. Trim the excess leads.



## Considerations for Mounting Your Eggfinder Voice Module

Before you mount the rest of the parts, you have to consider how your EVM is going to be mounted. Things you need to think about are:

- Are you going to mount the earphone jack on the PC board or separately?
- Which side of the board needs to be accessible for the 3-pin header?

### Marking Your Eggfinder LCD Receiver's Case

The first thing you need to do is to mark your case where the Voice Module Board is going to be mounted. This assumes that you are using the original case that came with the Eggfinder LCD receiver... if you're using a different case, you will have to modify this procedure to fit whatever case you're using.

\_\_\_ Download and print the Eggfinder Voice Module template from the Eggtimer Rocketry web site ([www.EggtimerRocketry.com](http://www.EggtimerRocketry.com) , under Eggfinder Support\Documentation), and cut it out.

\_\_\_ Open up the case of your Eggfinder LCD receiver. Lay the TOP down flat on the table, so the Eggfinder LCD board faces up.

\_\_\_ Take the Voice Module' template and lay it down with the long edge horizontally, about one inch below the bottom of the Eggfinder LCD's circuit board. With some clear Scotch tape, tape the template down to the top cover. With an awl or other similar tool, mark the five holes. Note that one hole is a little bit larger, that's the one for the LED.

\_\_\_ Double-check to make sure that the marks that you made match up with the holes in the PC board. Remove the Voice Module PC template from the cover.

With a 1/8" drill bit drill the four holes in the corners.

IF your're going to use the earphone jack mounted directly to the board, use a 1/8" bit to start the large hole for the earphone jack, then use gradually larger drills until you get to 5/16", that should be large enough for the earphone jack to slightly protrude from the case.

IF you are going to mount the earphone jack separately, use a 1/8" bit to start the large hole for the earphone jack, then use gradually larger drills until you get to 1/4". Test-fit the jack in the hole, ream it out slightly if necessary. Set the jack aside until after you finish the board and attach the wires for the jack.

## Through-Hole Parts Mounting

Note: The pictures illustrate a top-mount installation, similar to what you would do with a Black Aero case or other cases in which all of the through-hole parts are mounted on the top of the board. Adjust your locations as necessary for your installation.

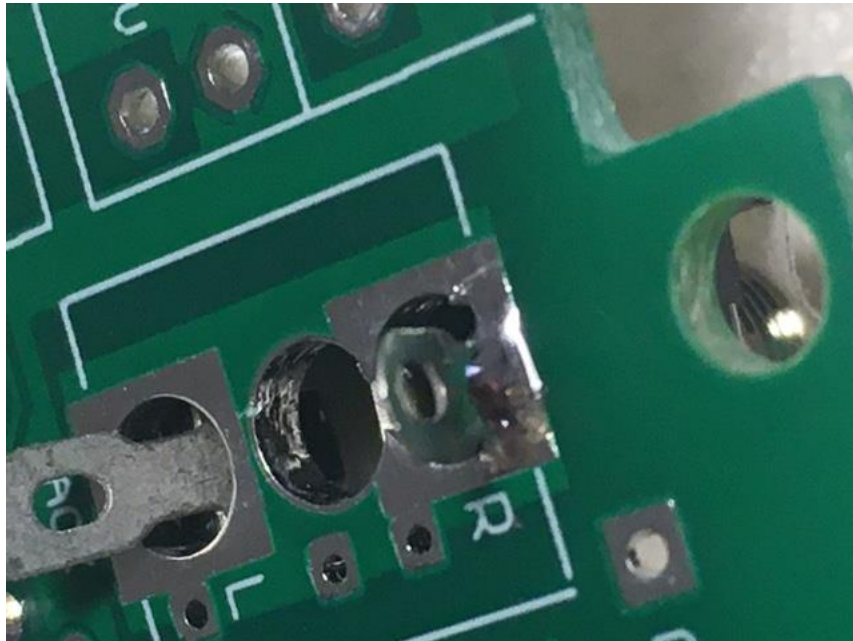
### — Mounting the Earphone Jack

NOTE: If you are going to be mounting the earphone jack externally, i.e. not soldering it to the board, skip this step...

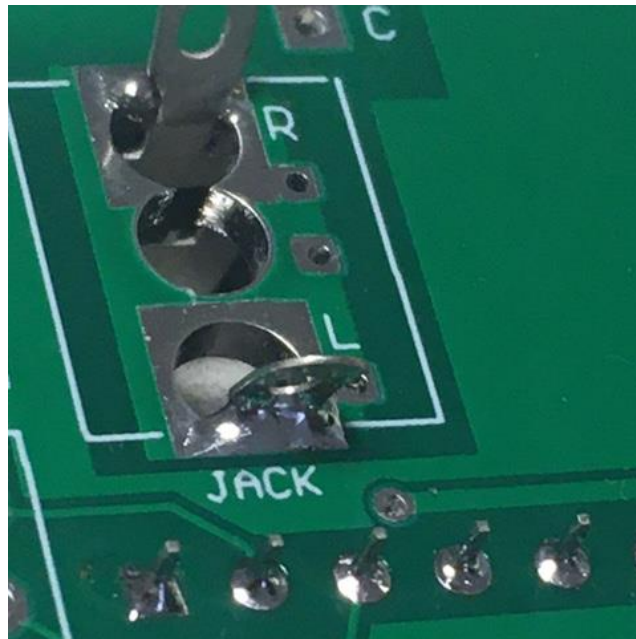
Insert the earphone jack, in the direction that the earphone cable will be accessible. The tab on the side of the jack must face the pad marked “C”, next to the narrow tab of the board. Tape it in place, making sure that it’s centered on the outline.

Turn the board over, and bend the leads out slightly so they contact the outside of the holes. Make sure they’re centered... if they aren’t, turn it over and re-center it.

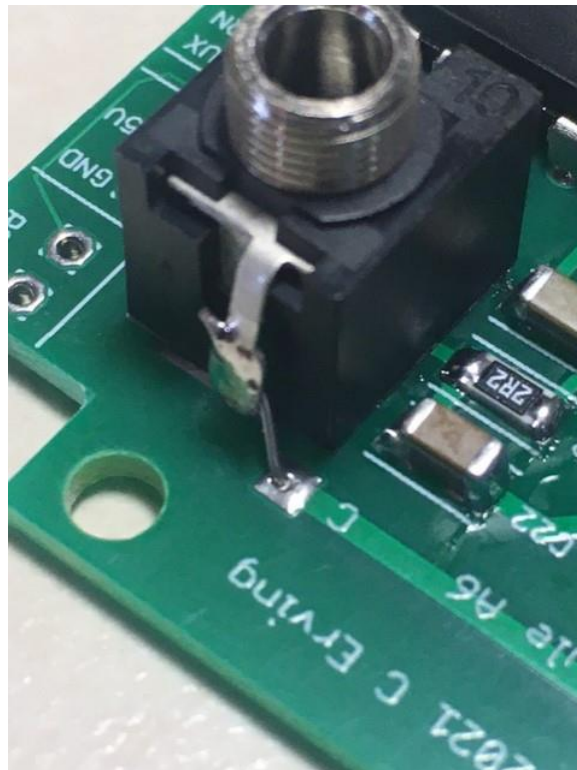
Tack-solder ONE of the leads to the pad, on the outside edge of the hole only (to prevent solder from getting into the jack). Check the alignment of the jack, if it moved you’ll have to reheat the solder joint and put the jack in its place.



When you’re satisfied with the alignment of the jack, generously solder the tabs to the outside edge of the pads... be generous, but don’t put so much solder that it starts running down the inside edge of the tabs, though, because you don’t want any solder get into the jack itself. When you’re done, clip the excess leads.



Take the 1/8W resistor, and slide it through the hole in the end tab, and gently guide it into the pad marked “C”. Solder the wire to the “C” pad, then clip the excess wire on the other side of the board. Bend the tab down so that it’s nearly flush with the jack, then solder the wire to the tab. Clip off the remainder of the resistor.





## — Mounting the 3-pin Header

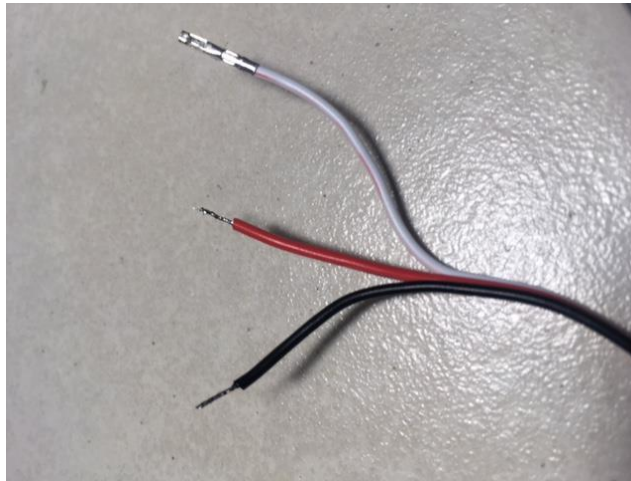
Insert the 3-pin header into the pads marked “GRN”, “BLK”, and “WHT”, on the side that will be accessible from your case. Tape it in place, then turn the board over and solder the header to the pads.



## — Attach the Cable to the board

With a very small screwdriver or a dull hobby knife, gently pry up the plastic tab on the WHITE wire of one of the connectors, then gently pull the socket pin and wire out of the connector.

With a pair of diagonal pliers, clip off the connector with the remaining two wires (black and red). Strip about ¼” from the ends of each of the wires, twist them and tin them.

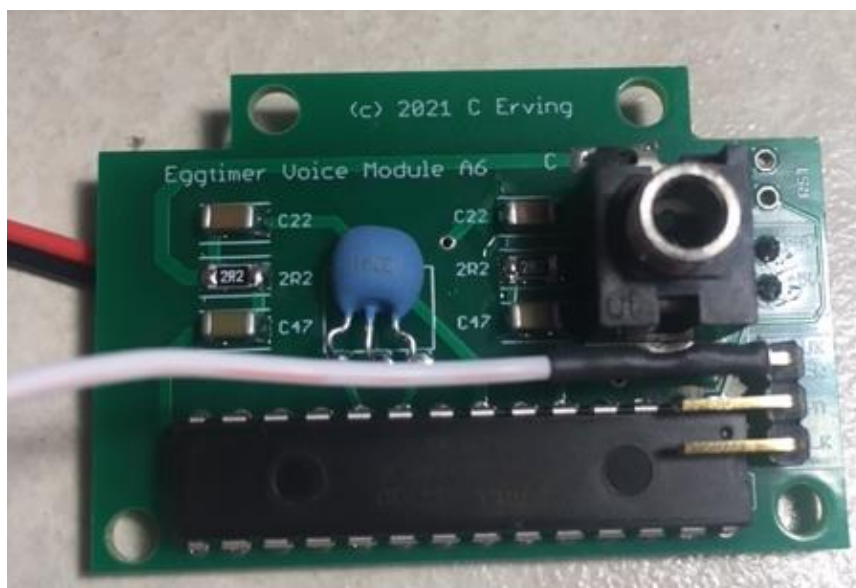


Cut a piece of the 1/16" heat shrink tubing about 3/8" long, and slide it over the bare socket pin so that it's flush with the end. Using a heat gun on low, shrink the tubing around the socket pin.

Insert the tinned RED wire into the PC board in the pad marked "+5V", on the side that will be accessible from your case. Tape it in place, then turn the board over and solder the wire to the board, and trim the excess wire.

Insert the tinned BLACK wire into the PC board in the pad marked "GND", on the side that will be accessible from your case, right next to the red wire that you just soldered. Tape it in place, then turn the board over and solder the wire to the board, and trim the excess wire.

Plug the WHITE wire with the heat shrink into the pin marked AUX. (Note that there is also a "GRN" marking there... that's for the USB-Serial data cable when you update the firmware, see the Appendix for a discussion of that process).



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This completes the construction of your Eggfinder Voice Module board. Now, it's time to attach it to your Eggfinder LCD receiver board, and mount it in your case...

## **Connecting the Voice Module to an Eggfinder LCD RevB5 Board**

\_\_\_ Locate the 3-pin header marked AUX, the pins should be marked OUT, 5V, and GND. Plug the 3-pin connector on the cable onto the header so that the black wire is on the pin marked GND and the WHITE wire is on the pin marked OUT.

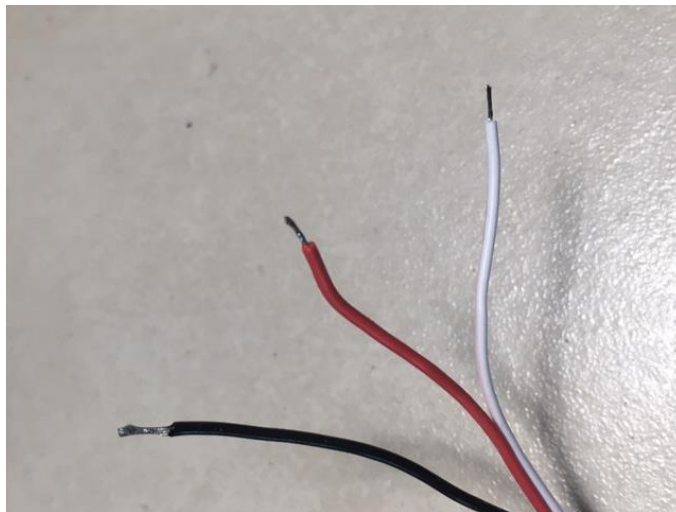
That's it... easy peasy lemon squeezy. Now you can test your Voice Module and mount it in your case.

## **Connecting the Voice Module to an Eggfinder LCD RevA/B2 Board**

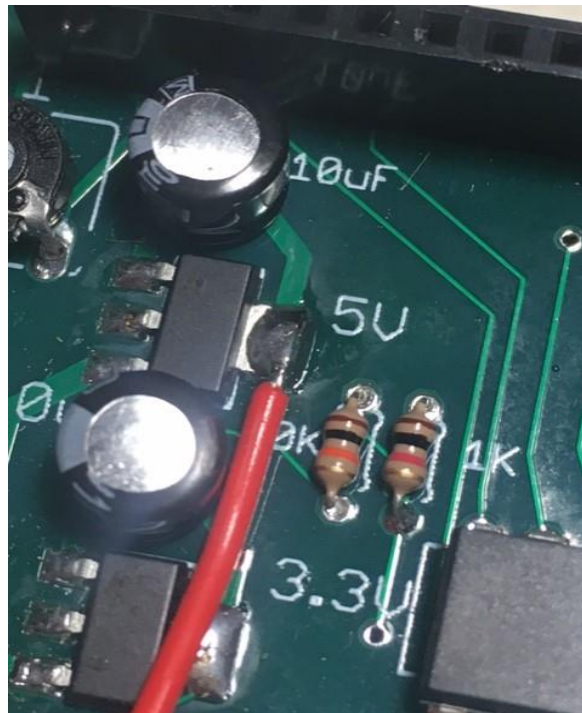
The older LCD boards don't have a 3-pin header for the Voice Module, so you're going to have to solder the wires to the board. It's not difficult... most of the pads are pretty large.

\_\_\_ Clip the remaining 3-pin connector off the cable. You're not going to need it... you're going to be soldering the wires directly to the board. Strip about 1/8" off of each end, and twist and tin the wires.

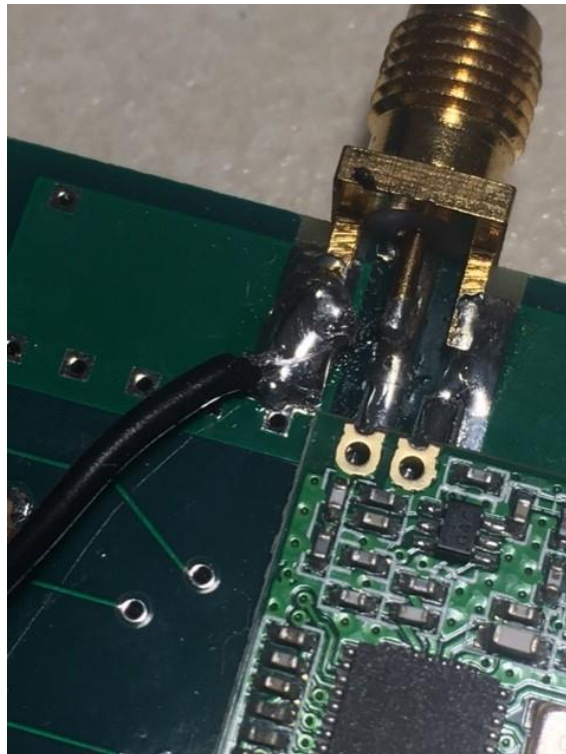
\_\_\_ Carefully separate the three wires, up to about 3" from the end.



\_\_\_ Locate the 5V regulator, it's the TOP one, there's a "5V" marking next to it. Tape the RED wire down so the tinned end is on top of the large tab on the regulator, then generously solder it to the tab.



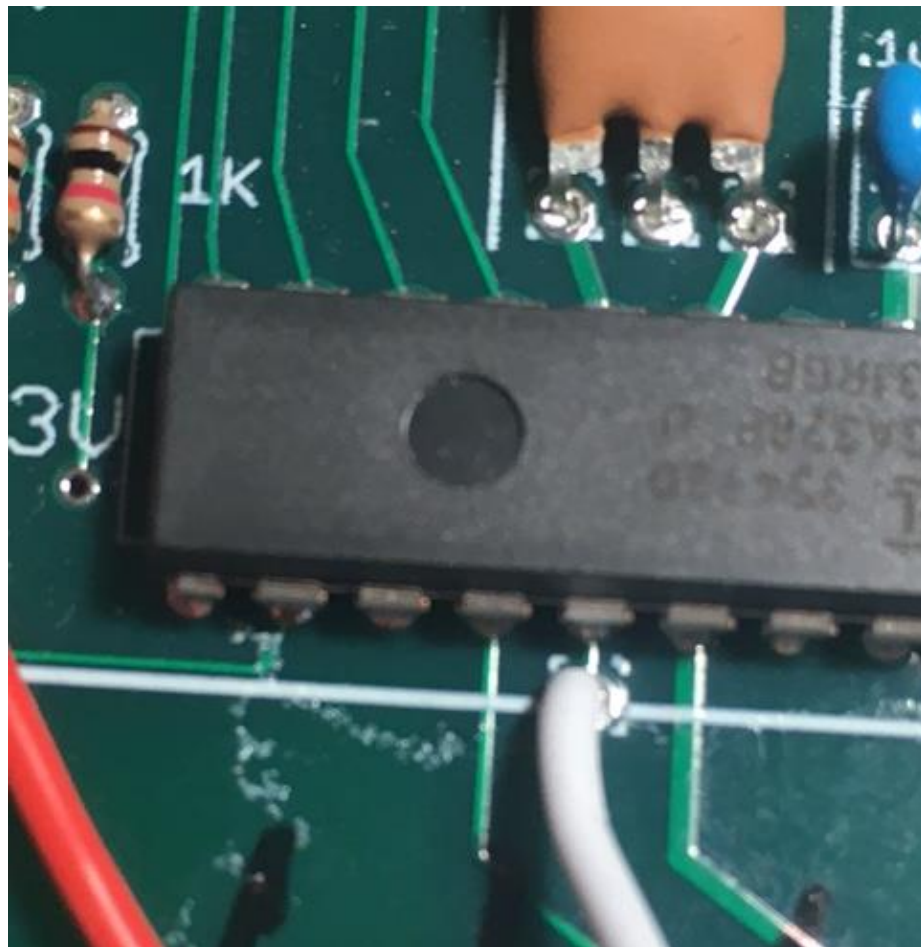
\_\_\_\_ Locate the ground pads next to the antenna, you'll be using the left one. Tape the BLACK wire down so the tinned end is on top of the large pad. Note that this picture shows the external antenna connector... if you have the wire antenna, this pad won't have anything on it. Solder the wire generously to the pad... however, be careful that the solder and/or wire does not touch the antenna or bridge any other pads.



\_\_\_ The WHITE wire is the data output from the processor to the Voice module.  
Depending on which of the boards you have, there may or may not already be a pad to connect the wire... use the appropriate instructions below for your board.

### **For the B2 Board...**

Locate the pad marked AUX, near the bottom left side of the processor... note that it may only be marked on one side, so if you're going to solder it on the unmarked side make sure you have the right pad. Insert the WHITE wire into the AUX pad's hole, tape the wire down so it won't move, then turn the board over and solder the wire to the pad. Trim any excess wire flush.



\_\_\_ You are now done... proceed with testing and mounting the Voice Module in your case.



## For the RevA Boards...

These boards do not have a pad for the AUX function, so you'll have to solder the wire directly to the processor. It's not all that hard... the processor has a pretty decent amount of space between the pins.

\_\_\_ Turn the board over so that the antenna side is facing away from you. The battery connection should be on the right, and the header connection should be on the left.

\_\_\_ On the bottom row of processor pins, locate the FIFTH pad from the RIGHT, and mark it. Silver Sharpie pens are really good for this.

\_\_\_ Tape the tinned WHITE wire down so that it contacts the pin that you marked, being careful that it does not short against anything else.

\_\_\_ Solder the tinned wire to the pin, use enough solder so there's a nice fillet but not so much that it globs up.



\_\_\_\_ We recommend that you use a small dollup of hot melt glue next to the pin to tack the wire to the board, this keeps it from accidentally getting pulled off as you move the board around.

\_\_\_\_ You are now done... proceed with testing and mounting the Voice Module in your case.



## Testing Your Voice Module Board

Plug a set of earbuds into the jack, connect the battery to your LCD receiver, then turn on the power. After a one second delay, you should hear “POWER ON” through the earbuds. That means that your Voice Module is getting power... you’re halfway there!

If you do NOT hear anything, please go to the Troubleshooting section.

At this point, testing will depend on what you’re going to be using with your LCD receiver.

If you’re using a GPS tracking device (Eggfinder TX/Mini or Eggtimer TRS), what you want to do is to get a GPS output from it. That will usually entail taking it outdoors and powering it on, until you get a fix on your Eggfinder LCD receiver. Once you have a fix, press the button until you see the compass display... your Voice Module should call out the distance and compass direction every 10 seconds (“FORTY SEVEN DEGREES, SIX HUNDRED FEET”) for example. If you have the LCD-GPS module for your LCD receiver, press the button again and you should get the distance/bearing display... start walking away from your transmitter and you should hear the distance/bearing spoken (“LEFT SEVENTEEN DEGREES, FOUR HUNDRED FEET”). If you hear that, you’re done... finish mounting the Voice Module in your case.

If you’re using an Eggtimer Telemetry Module (or an Eggtimer TRS), your output will vary depending on which altimeter you’re using. With the WiFi-enabled devices, you will hear “ALTIMETER NOT READY” whenever you refresh the Status Page.

# Troubleshooting

If your Voice Module board doesn't work after assembly and testing, turn off the LCD receiver, take a deep breath, get out a beverage to clear you mind, and start troubleshooting...

## **Check Your Firmware Version**

The Voice Module board requires Eggfinder LCD firmware version 2.02 or higher to operate properly. Earlier versions (i.e. 1.09e) won't hurt anything, but the Voice Module board won't be recognized and you'll never get the "Waiting for GPS Module..." prompt. If you have an older version, update the software first.

## **Check Your Wiring**

The very first thing you should do is to check to make sure that the three wires are connected to the right place. Check the colors, and take a look at the pictures of the wiring on the Eggtimer Rocketry web site. It's particularly easy to get the TXD wiring wrong... that's why we repeated it in ALL-CAPS...

## **See if You Get a Fix LED**

Carefully peer under the case top with the power on. After a few minutes (less if outdoors) you should see the amber LED on the Voice Module board blink about once per second. This means that you have a fix. This is strictly a troubleshooting tool... it's not necessary for operation. Note that it may take as long as 30 minutes to get a fix indoors, so be patient. If you do NOT get an amber LED and you never get the "GPS Fix..." screen, then there's something wrong with the board.

## **Check Your Solder Joints**

The next thing you should do is to check out all of the solder joints under a lighted magnifier. You are going to have to carefully unscrew the Voice Module board from the case top to do this... be careful, as the wires are relatively fragile at the solder joints. 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. Also, the pads on the GPS module are small, so you want to make sure that you got just enough solder on them to bond the module to the pads. Most of the holes and 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 inside the GPS module, there's no 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 Voice Module board 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.

### **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 major 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](mailto: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 Sound When You Power It On

- Bad wiring connection (check the power/AUX cabling)
- Bad solder joint on earphone jack
- Incompatible earphones (we recommend stereo 3mm earbuds)
- Processor reversed
- Bad/missing solder joint on one of the other components

### No Output From Your Altimeter/GPS

- Incompatible Firmware on LCD receiver (min. 2.02 required!)
- Incompatible Firmware on your device (Check the firmware matrix)
- Bad solder joint on the white cable wire and/or 3-pin header
- Bad solder joint on one or more of the resistors/capacitors
- No telemetry signal (do you get anything on the LCD display?)

## **Eggfinder Voice Module User's Guide**

Note: This manual is a supplement to the Eggfinder LCD Receiver User's Guide. It only addresses differences from the "standard" Eggfinder LCD operation, it is not a comprehensive guide. It does not cover the programming, frequency updating, or pairing functions, or using it with other devices (such as the Eggtimer TRS)... check your device's User's Guide for those instructions, and/or the firmware updating instructions.

The 3.5mm stereo jack on the Voice Module is designed to directly drive standard earbuds, we've used it with a number of them from \$1 cheapies all the way up to fancy \$40 earbuds. There's no volume control, but you'll find that the volume is more than adequate for use outdoors at a launch, you will probably also find that more expensive earbuds, especially those with an integral volume control, will produce more volume and sound better.

You can also directly connect the earphone jack to the AUX input on your vehicle's audio system or your club's PA system. When plugged into your vehicle, it's great for those really long recoveries... you can concentrate on your driving instead of looking down at the screen to figure out which way to go.

## **Tracking Your Rocket with the Voice Module**

The 2.02 firmware for the LCD receiver that supports the Voice Module adds a few new screens to the standard Eggfinder LCD. When you first turn on the Eggfinder LCD, you'll see the familiar screens

**Eggfinder LCD  
Ver 2.02N**

**Status: F:919 4  
GPS:D Alt:F 7.9V**

Assuming you have the LCD-GPS module, you'll see

**waiting for  
GPS Module...**

This screen tells you that the Voice Module board is present and the software is waiting for a valid GPS fix before continuing. Since proper tracking depends on getting a good fix from the internal GPS as well as from your rocket, the software will not continue until it receives a valid GPS fix. If you do this indoors (which you'll only do in testing, of course...) it may take as long as 30 minutes to pick up a GPS satellite fix. Outdoors, it usually takes just a few minutes, and more often than not under a minute.

Once you do get a fix, you'll hear a long beep, followed by this screen for about 5 seconds:

## GPS Fix...

This tells you that there's a fix, and it's continuing... the next screen will be the familiar

### Waiting for Fix

As usual, it will sit there until it receives a valid GPS fix from your transmitter. Once you get a fix from your transmitter, you'll see

**33.12345 4■ 0**  
**-116.64738 1326**

This is the familiar latitude and longitude screen, plus the Satellites in View (the "4"), the HDOP bargraph, and the altitude display (the "1326", which will be either the ASL altitude from the GPS module or the AGL altitude from the baro sensor if you're flying an Eggtimer TRS).

This information is very useful, but by itself it won't tell you where to go to look for your rocket. That's where the GPS and Voice Module boards comes in.

### The Compass Screen

Press the button on the LCD receiver (if you have not yet done so, we strongly recommend connecting an external button... see the Eggfinder LCD User's Guide for details). This will tell it to flip to the "Heading" screen...

**Compass:347 0**  
**Dist. F:1770**

This is the compass direction relative to North (347 degrees), and your distance to the rocket (1770 feet... the "F" means that it's in Feet, it would be "M" if you had set the LCD receiver up for Meters).

The numbers on the top are referenced to "North-up", which means that everything assumes that you're pointed North. They are:

The "0" is the Time to Last Fix – Just what it says... how many seconds since your last valid fix from the rocket. It will go up to 99, then you'll see "\*\*\*"... just like on the latitude/longitude display.

You will see this display when you press the button whether or not you have the LCD-GPS module installed in your LCD receiver. If you do NOT have it installed, the reference point is NOT where you are located (since it has no way of knowing...), but rather the location that the rocket was at when you first pressed the button. This is the "home point"... usually you'll want it to be either your work table or the pad that you launch from, in either case you want it to be a recognizable reference point. The distance will not change as you get closer, however

it will change if your rocket is in flight and moving relative to your home point. This will tell you which way your rocket is drifting, which can be a very handy thing to know.

If you DO have the LCD-GPS module installed, the data is referenced from your actual location, the compass direction and distance will change as you get closer to your rocket.

Every 10 seconds, you will hear the compass point updated, and spoken as follows

THREE HUNDRED FORTY SEVEN DEGREES, SEVENTEEN HUNDRED FEET

The compass reading is pretty self-explanatory... 347 degrees.

The distance is rounded down to the nearest thousand feet if your distance is over 10,000', and to the nearest hundred feet if your distance is between 500' and 10,000'. Below 500' it will give you the exact distance.

### **The Navigation Screen (LCD-GPS Module Installed Only)**

If you press the button from the Compass Screen and you have the LCD-GPS installed, you will see something that looks like this:

**Left:        22    0**  
**Dist. F: 1770**

This is the Navigation Screen, which tells you which way your rocket is relative to the direction that you are moving, and how far.

Direction: Left/Right: This is the direction that you need to go *in relation to the direction that you are already moving*. Note that if you are not moving, this direction (and the number of degrees) may not be accurate. That's why there's the Compass Screen... it's always accurate, but it doesn't really tell you which way to go.

The "22" is the number of degrees, in this case the rocket is located 22 degrees to the Left of your current direction. To prevent circular routing, your current direction is updated from points taken every 10 seconds, and you must go at least 10 meters (30') from the last point in order for the current point to be updated.

The Distance is the same as the Compass Screen... it's how far you need to go in Feet/Meters.

The "0" is the number of seconds since the last GPS fix from your rocket. If your rocket is on the ground, it will probably start counting up until it gets to "\*\*\*", which means more than 99 seconds have elapsed.

Like the compass, the distance/bearing is updated every 10 seconds, as long as you're moving. In this example, you will hear

LEFT 22 DEGREES, SEVENTEEN HUNDRED FEET

Like the Compass Screen, the distance is rounded down to the nearest thousand feet if your distance is over 10,000', and to the nearest hundred feet if your distance is between 500' and 10,000'. Below 500' it will give you the exact distance.

Note that if you are moving fairly quickly you may see a different value on the display than is spoken. That's because the display can update a lot faster than it can speak to you. The output is generated every 10 seconds. We recommend that if you're going a long way that you keep going on the original heading and make small corrections rather than going back and forth every time it changes... once you start getting close (under 1,000') then you can slow down and it should direct you right to your rocket.

This is what makes Voice Module navigation so easy to use. All you basically need to do is to listen and it will tell you where to go. All you need to do is to keep going where it tells you to go and it will take you right to your rocket within a few feet. Most of the time that we've flown with the Voice Module and LCD-GPS we spotted the rocket before we got all that close, and that includes recoveries well over a mile away in heavy desert scrub brush.

If it says that it's nearly 180 degrees, that means that you need to turn around. Winds do funny things up in the air... we've had plenty of flights when we were "sure" when the rocket went, and we were 180 degrees off. That's what the Compass Screen is good for... during flight, it will show you where your rocket is going, and once it's on the ground you use the Navigation Screen to go get it.



## Using the Voice Module for Eggtimer Telemetry

The Voice Module adds spoken real-time altitude and event call-outs to your Eggtimer Telemetry Module and LCD receiver system. What you get out of it is dependent on which altimeter the Telemetry Module is connected to...

|                   | Quark<br>(Pre-D3) | Quark<br>(D3+) | ION | Quantum | Proton | TRS |
|-------------------|-------------------|----------------|-----|---------|--------|-----|
| Ready/Not Ready   |                   |                |     | X       | X      | X   |
| Launched          |                   |                | X   | X       | X      | X   |
| Realtime Altitude | X                 | X              | X   | X       | X      | X   |
| Deployment Status |                   | X              |     | X       | X      | X   |
| Apogee            |                   | X              | X   | X       | X      | X   |

Telemetry from the altimeters is sent to the LCD receiver every two seconds, however that's a bit too fast for most real-time altitude call-outs... you'd hear continuous altitude updates, which would be annoying (trust us on this...). In the 2.02 LCD receiver firmware, there is a new screen to control the rate that real-time altitude updates are called out. Note that events will be called out when they occur. To get to that screen, go to the Receiver Config page by holding the button down for at least two seconds when you see the settings/voltage display, and tap the button down until you see

### Receiver Config Period: 4

The default is to call out your real-time altitude every 4 seconds (the range is 2 to 10 seconds by two), for low altitude and moderate altitude flights (under 5,000') that should suffice, however if you're going really high you may want to turn that up to 6 or 8 seconds.

Here's what you can expect to hear during flight:

Not armed: ALTIMETER NOT READY, DO NOT LAUNCH

Armed: ALTIMETER READY FOR LAUNCH

Altitude: <altitude> FEET (or METERS)

Launched: LAUNCHED

Apogee: HIGH ALTITUDE <apogee> FEET (or METERS)

Deployments: NUMBER <channel number> FIRED

#### Armed/Not Armed

If you have one of the WiFi-enabled devices you'll get a call-out of not-ready status when you are on the WiFi page and refresh the page. When you arm the altimeter and it's in flight mode (i.e. "chirping") it will call out a "ready" status.

### Altitude

The real-time altitude is called out at the interval that you selected in the Receiver Config screen, typically every 4 seconds. For altitudes over 10,000', it is called out to the nearest 1,000'; for altitudes under that, it's called out to the nearest 100'. Duplicate altitudes are not repeated, so if you have two samples at 11,386' and 11,743' you will hear ELEVEN THOUSAND FEET once, and you will not hear another altitude call-out until you either exceed 11,999' or drop below 11,000'.

### Launched

When the altimeter has detected launch, you will hear LAUNCHED.

### Apogee

After your rocket noses over after apogee, you will hear HIGH ALTITUDE <apogee> FEET (or METERS)  
Reported apogee is the actual value, it is not rounded down.

### Deployment Events

Deployment events are called out by channel number, depending on the altimeter:

Quark: Drogue: Channel 1, Main: Channel 2  
Quarntum: Drouge: Channel 1, Main: Channel 2  
TRS: Drogue: Channel 1, Main: Channel 2  
Proton: Actual channel numbers (1 through 6)

### Landing

If you pick up a ground packet after landing (and you may or may not, depending on the distance), you may also hear LANDING.