

APPENDIX A – IMPORTANT THINGS DURING THE BUILDING PROCESS

1. Attenuator Switch

Before you install the attenuator switch make sure that you turn the switch shaft to maximum CCW position and then move the indexing ring to position 4 (see manual page 14). It is very difficult to fix the attenuator after you install it to the receiver.

2. Battery Connections

Be very careful when you connect the battery. Do not reverse the polarity. Even a short touch of battery clip to battery in reverse polarity could destroy the receiver board. The simplest protection against reverse battery protection is a diode in series with the battery. The diode becomes forward biased and the receiver's normal operating current flows through the diode. When the battery is installed backwards, the diode reverse-biases and no current flows.

You can use any diode but the Schottky diode is better since its forward voltage drop is lower than that of a regular diode. The picture below explains how to install the protection diode.

However, this kind of protection has a disadvantage. The forward voltage drop across the diode shortens the usable battery life.

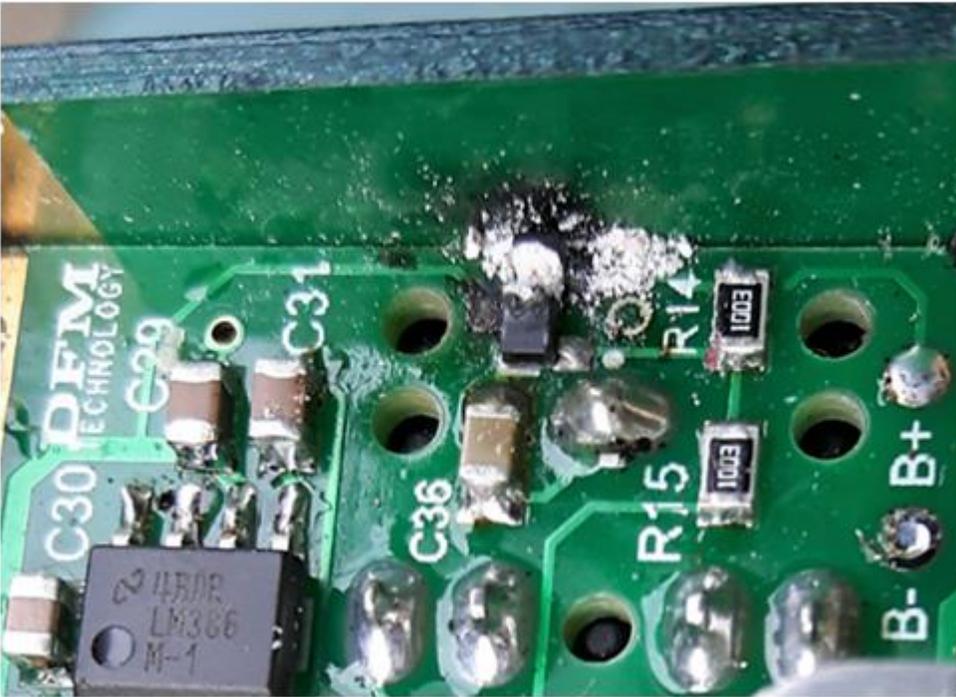
The voltage drop with Schottky 1N5817 or 1N5819 is 0.26V. In other words, if you have a 9V battery then the receiver would actually get $9V - 0.26V = 8.74V$. I do have these diodes and will have them with me at the NSRC fox hunt on Saturday.

Better than Schottky diode protection is one with MOSFET but it requires more sophisticated modification like soldering tiny surface mount MOSFET (I can do it for you).

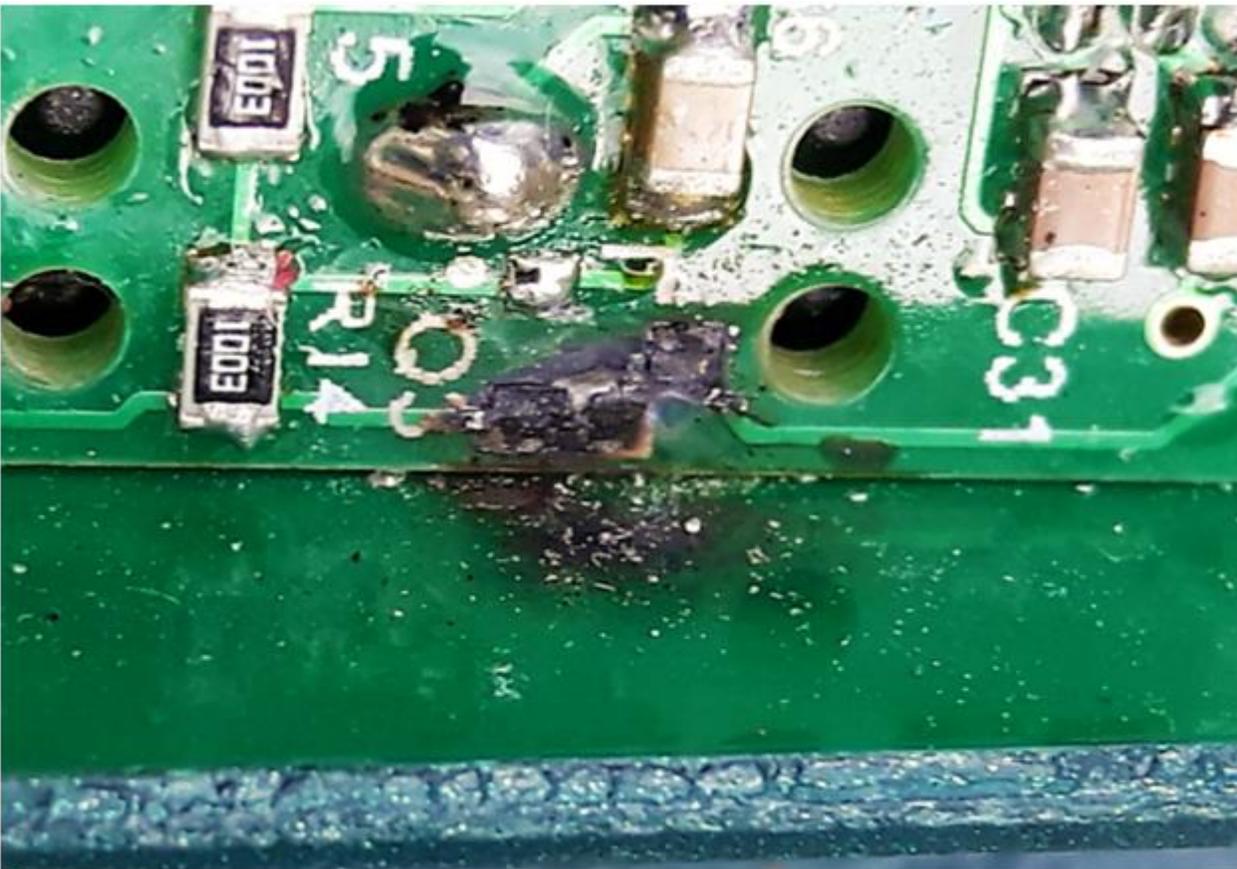


Solder the anode of the diode to ground and connect the negative battery wire (black wire) to the cathode of the diode (cathode is marked with a grey colour band, as per picture). This way you will be protected against the reverse battery voltage.

As I mentioned it, be very careful when connecting the battery. Do not reverse the polarity. I had 2 receivers for repair that were damaged by wrong battery polarity. The first receiver had damaged MOSFET (Q3). That was an easy fix. But the second receiver had extensive damage. It is hard to believe that a 9V battery can do that much damage. It almost like a car battery was connected to the receiver in reverse polarity... See the following pictures.



The above picture shows exploded MOSFET Q3. The voltage regulator U5 was also blown.



The above photo shows the PCB after the blown MOSFET was removed. The heat almost burned a hole to the PCB and a few traces were melted and missing. It took me a while to repair this receiver and it is now in good working condition.

3. Ferrite antenna coils

I had 2 receivers for repair yesterday and both had the same problem: the ferrite antenna wire ends were not cleaned. This wire is coated with a very thin layer of insulation (usually enameled paint) that need to me removed before soldering.

On the picture below the wire ends were not cleaned. This way the wires do not make contact with the PCB copper traces.



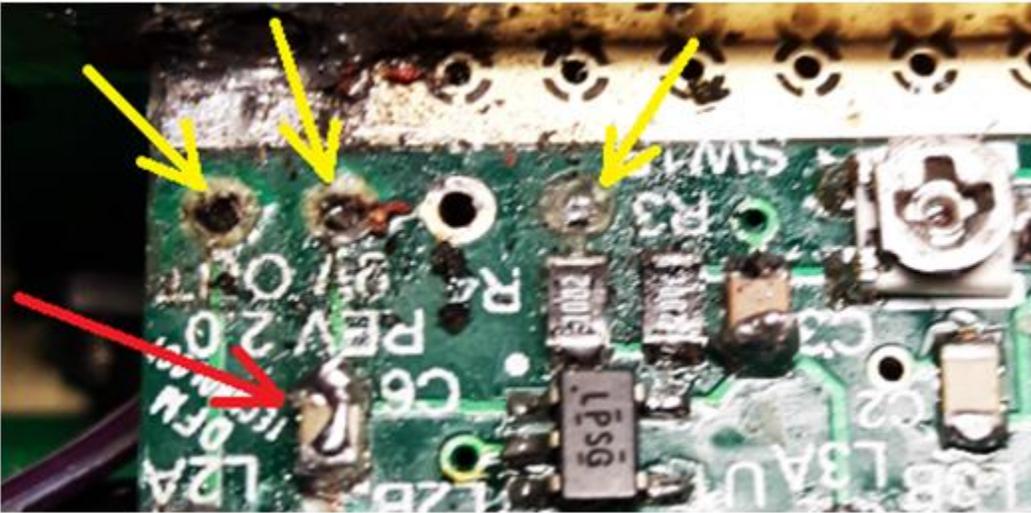
Here is the detail of the wire with cleaned ends. Use a sharp knife or a utility knife (exacto knife) to crape off the paint from the wire end.



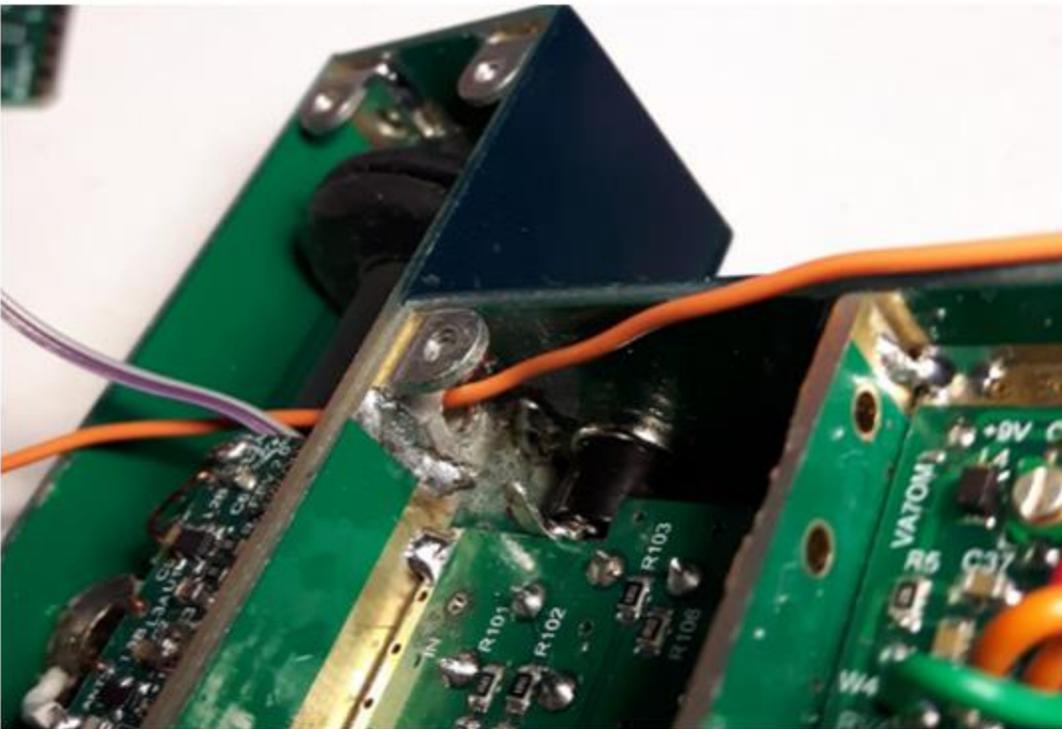
4. Wiring

Do not use a heavy gauge solid wires for wiring. Use light stranded wires. Wires with Teflon insulation are the best because the insulation does not melt when heated..

The following picture shows damaged PCB traces after heavy solid wires were used (yellow arrows). Note a solder bridge across capacitor (red arrow). Be very careful with soldering.



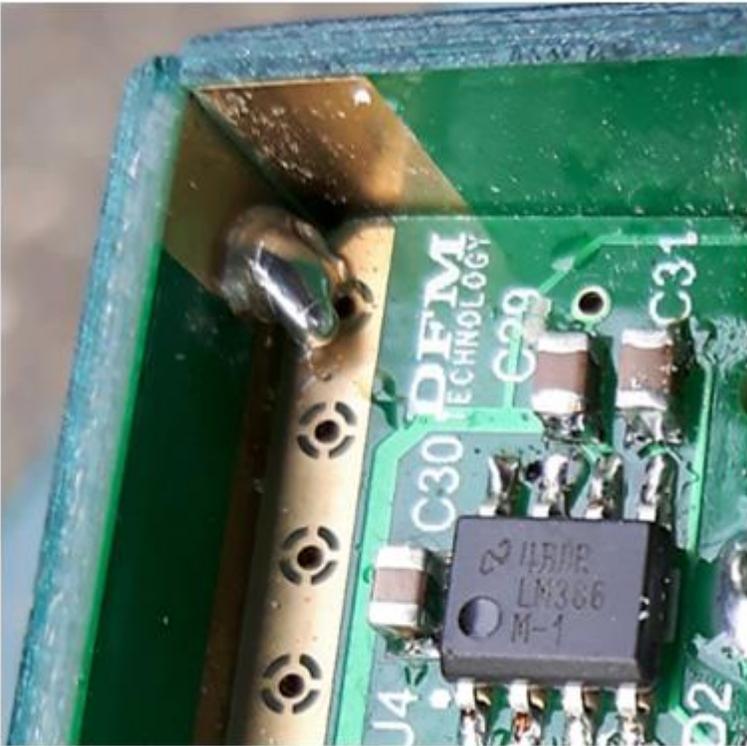
If you have difficulty fishing the wires through a hole below the attenuator, here is an idea that may help. Remove the screw (as per picture below) and run wire(s) through the hole. If the bracket is soldered properly then the screw is not needed and the hole could be used for wiring.



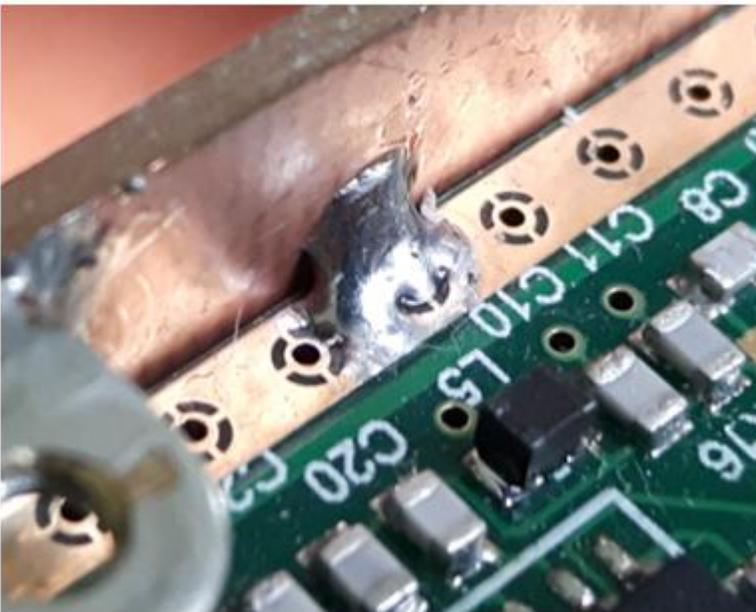
5. Soldering the enclosure

Make sure that the enclosure pieces (and/or PCB) are clean before soldering. Always use flux-cored solder wire. You need to heat both parts of the enclosure and wait until the solder melts and "clings" to the both pieces of enclosure.

Picture below shows an improper (cold) solder job - the pieces are not connected (not soldered together):



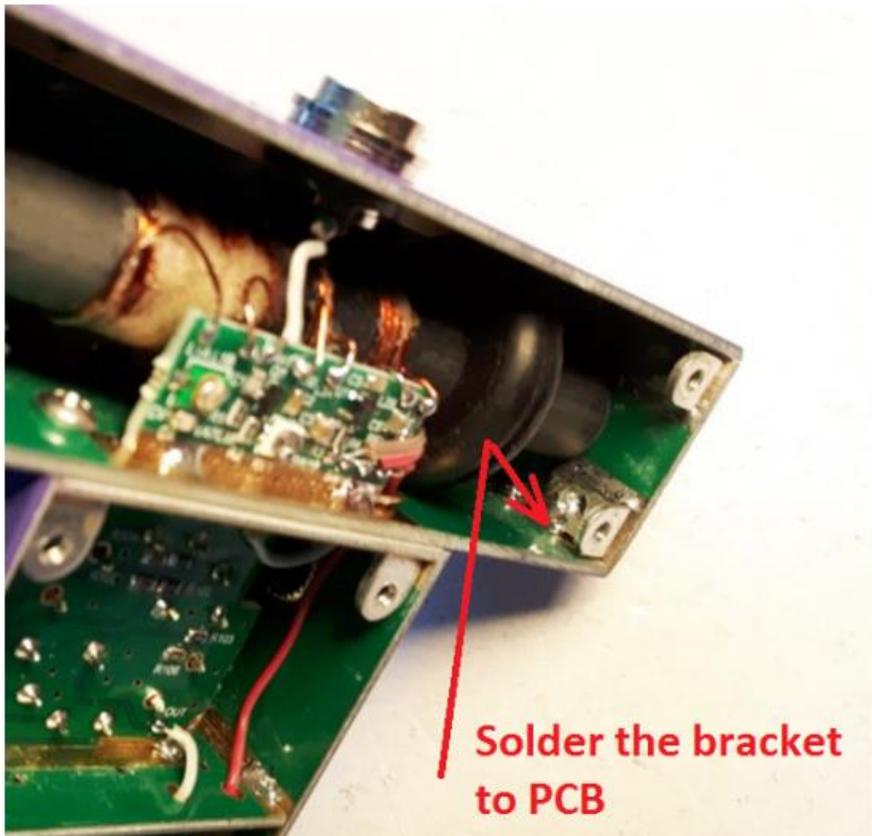
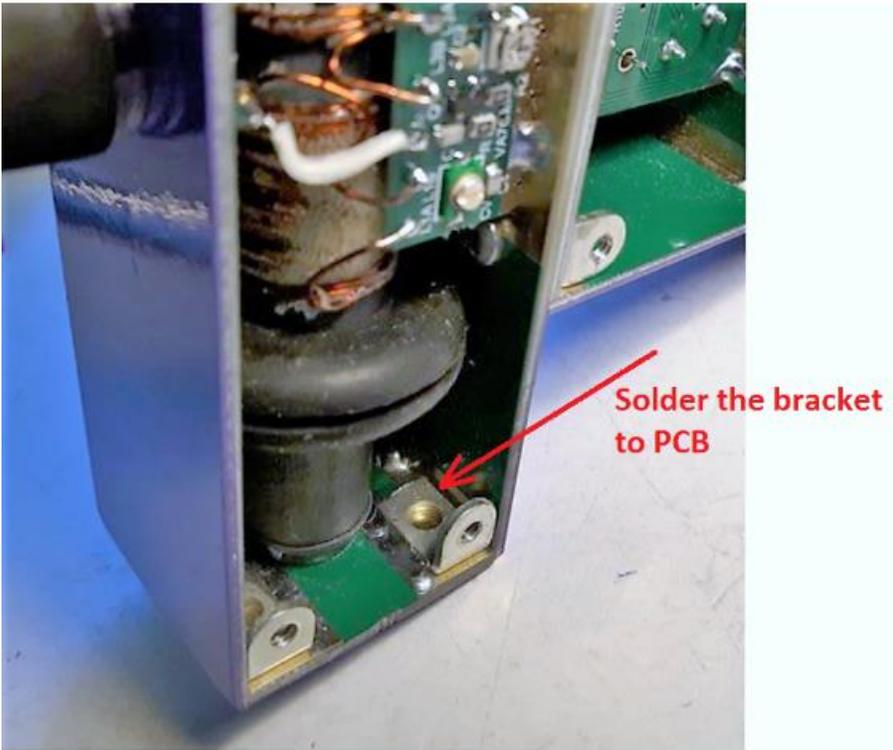
This is how the proper soldering should look:



If you are not experienced in soldering here is a good article to read:

<http://www.wikihow.com/Solder-Electronics>

To ensure good ground connection of the antenna compartment to the enclosure you need to solder the two brackets as per pictures. Be careful, do not heat the brackets too much because they may fell off...



6. Wire lengths

Keep the attenuator wires and sense antenna wires short.



No need for this loop.
Keep wire short.

This wire is too long