Internal Antenna Installation
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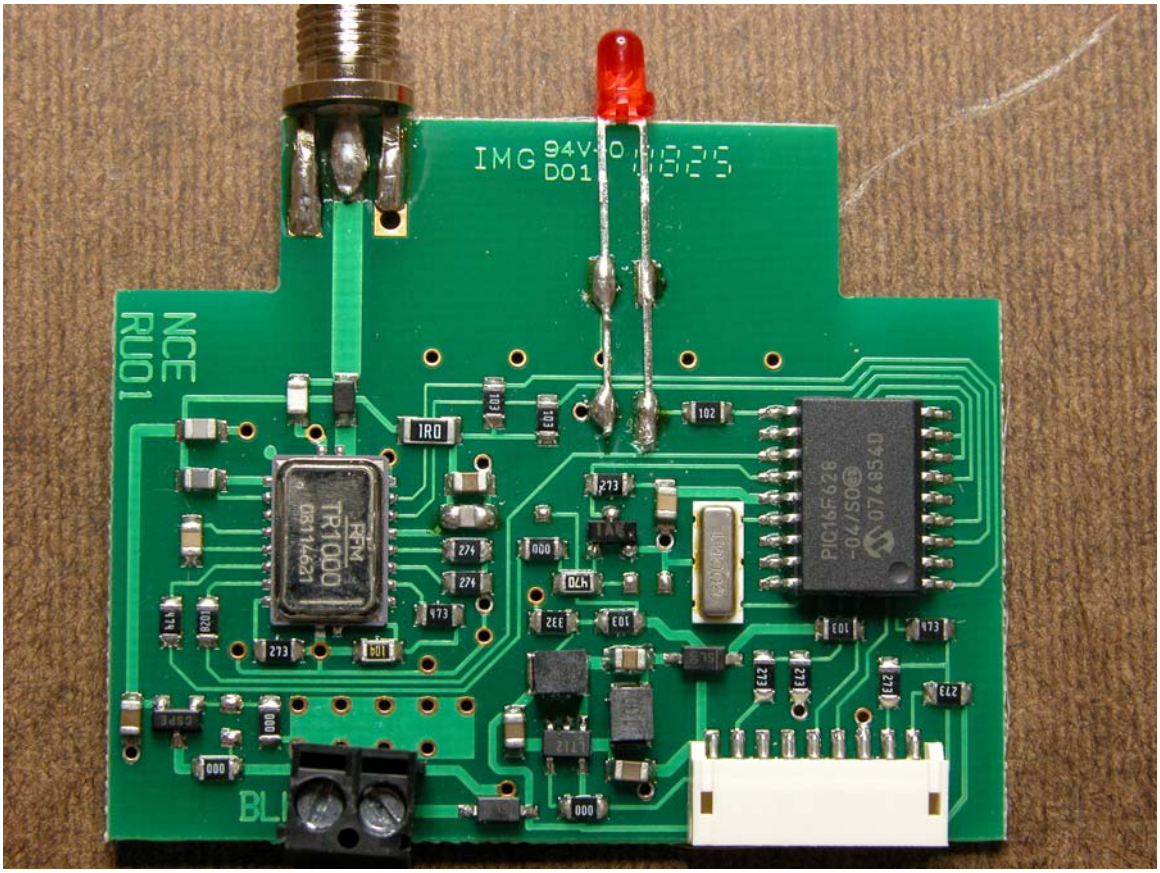
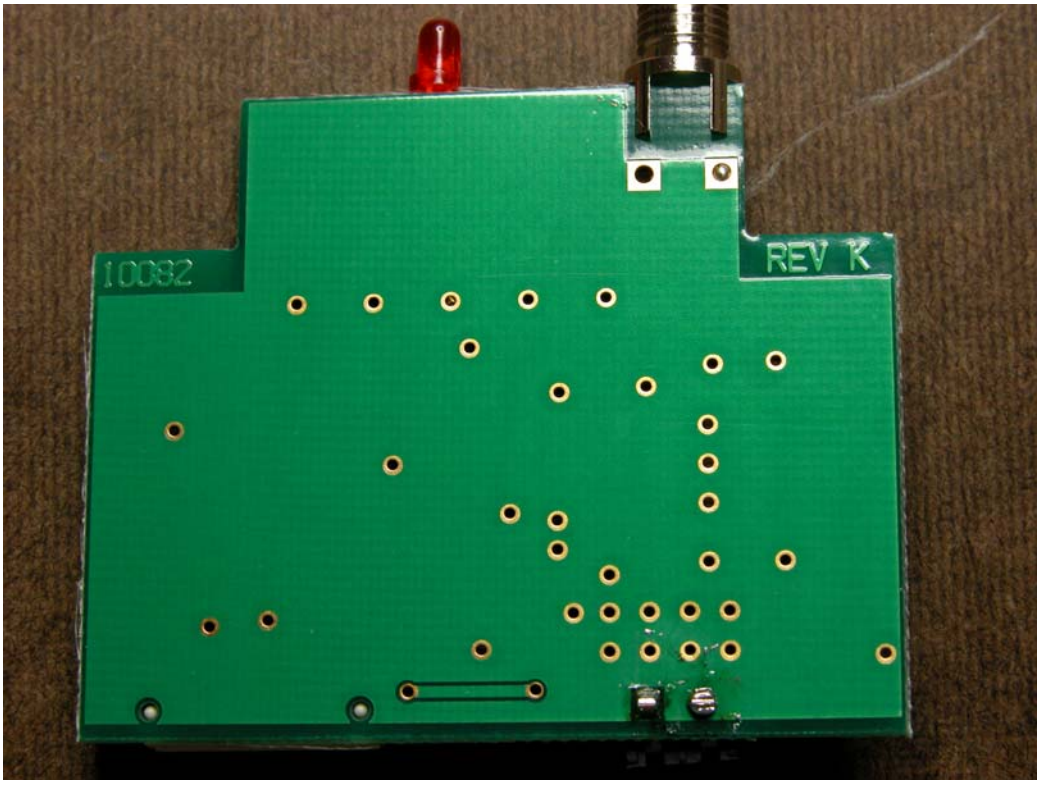
Overview
This document will show the step by step installation of an internal antenna on the NCE radio board. Before going any further note that this modification may void the warranty and this should only be attempted by someone whose soldering skills are up to the task. Proceed at your own risk!

Step by Step modifications

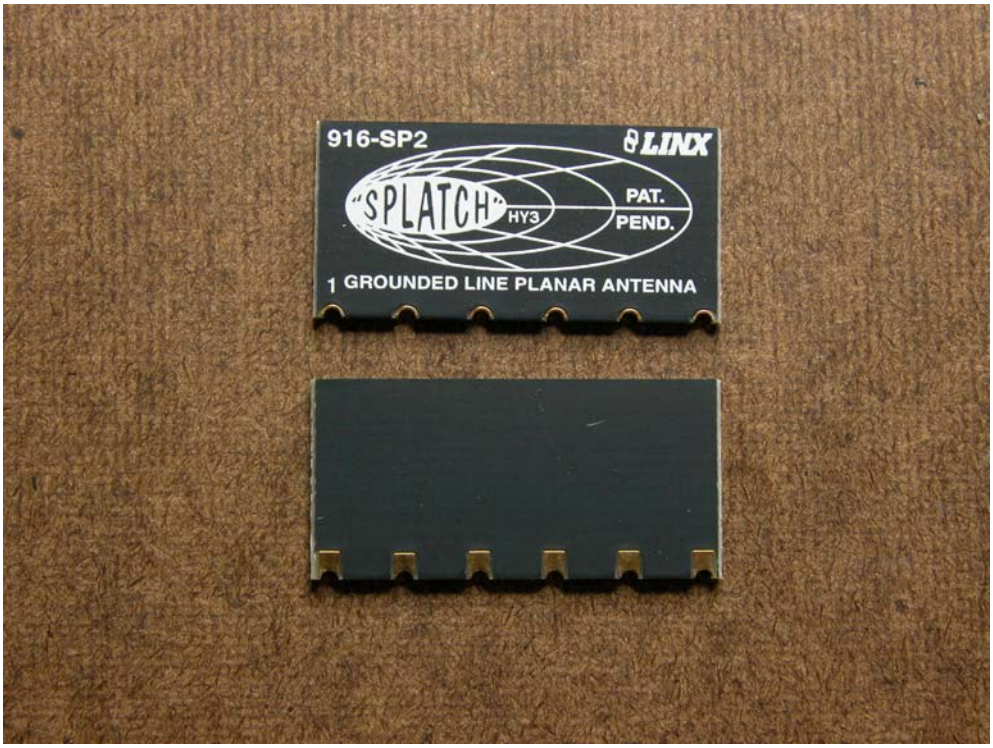
Here are a couple of pictures showing the top and bottom of the radio board as it comes from NCE.



Radio board module, topside

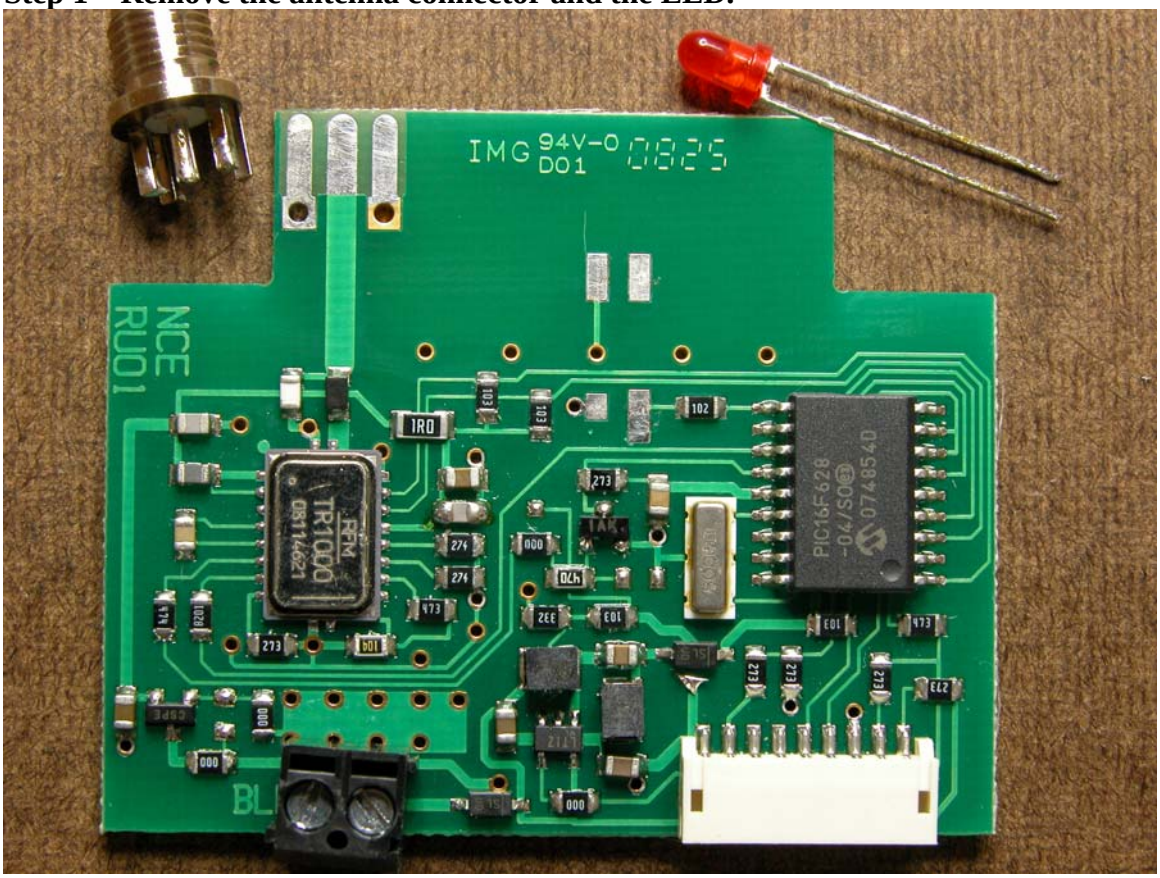


Radio board module, bottom side ground plane.



Here is a picture of the top and bottom side of the internal antenna that will be installed.

Step 1 – Remove the antenna connector and the LED.



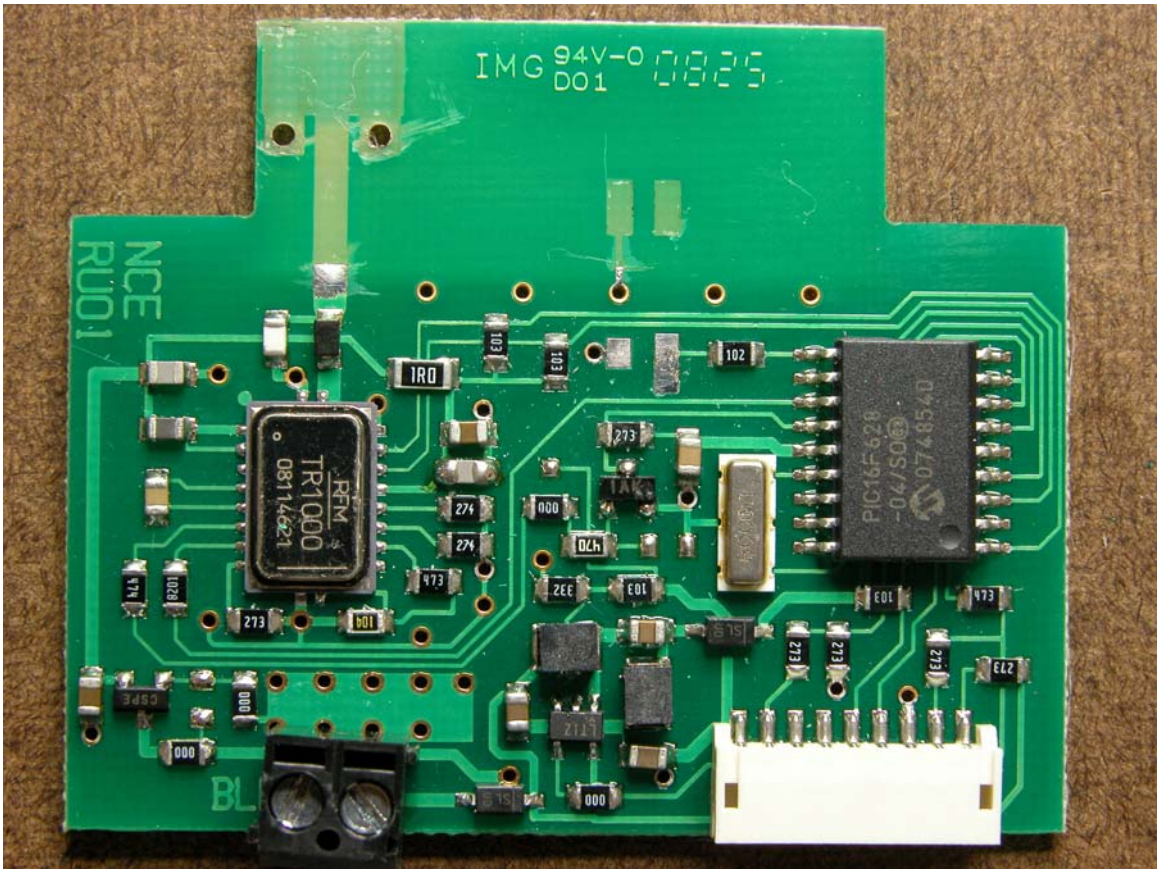
Carefully unsolder the antenna connector and the LED as shown in the picture above. Use some Solderwick and clean the solder from the antenna connector pads and the LED mounting pads.

Note: Before removing the LED carefully examine the orientation. LED's have to be installed in the correct polarity so you need to make sure you put it back in the right way. LED's often have a small flat indent in the package that indicates the polarity. If you can identify the flat then note which direction it is, or better yet get a Sharpie marker and place a line on the case so that you know which lead goes where.

Step 2 – Remove the traces under the antenna

For the best operation the traces and ground plane area underneath the internal antenna need to be removed. This can be done by carefully peeling the copper from the circuit board. Use a sharp Xacto blade and peel up a corner of the copper and then grab it with a good pair of needle nose pliers. Then use the pliers and peel the copper off the board.

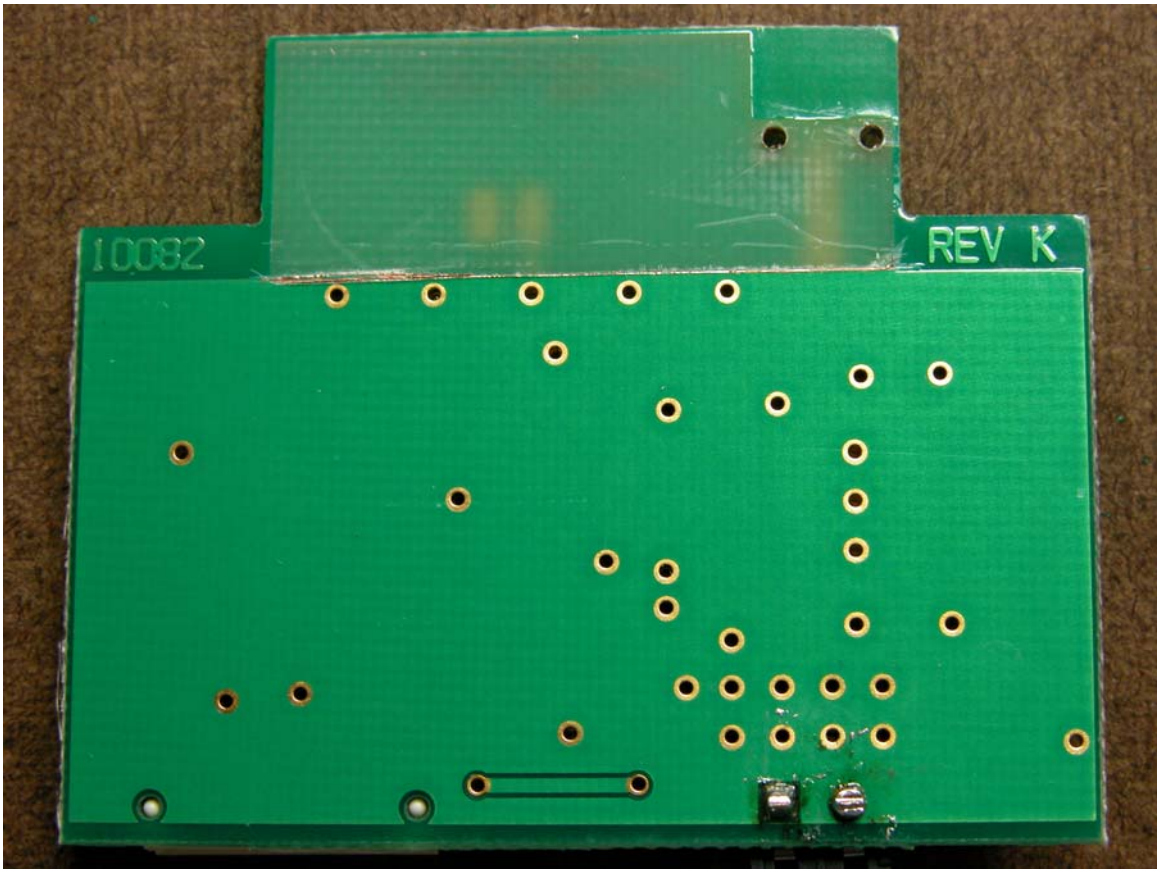
Here is a picture of the topside of the radio board module with the traces removed.



Note that you have to carefully slice through the antenna trace as shown. Carefully using a Xacto knife scrape the green solder mask off of the antenna trace and make a square pad for the antenna to attach to. Go ahead and tin the copper pad with some solder as shown above.

Step 3 – Remove the ground plane on the bottom side of the board

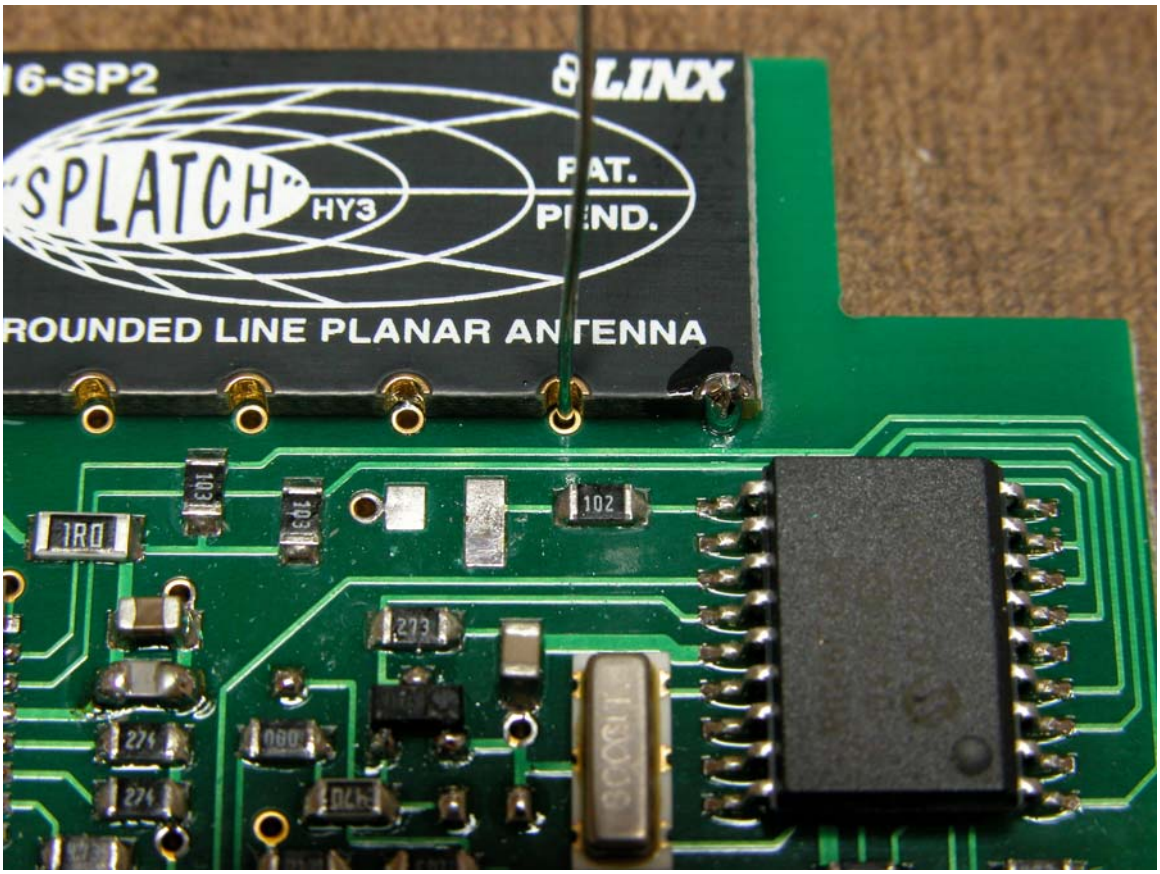
As with the top side of the board all the copper ground plane area under the antenna needs to be removed for the antenna to radiate properly.



Carefully slice through the ground plane just above the row of holes as shown above. Then carefully peel off all the copper under the antenna area as shown above.

Step 4 – Install the antenna

The next step is soldering the antenna in place. Tack the leftmost pad of the antenna to the square pad area on the antenna trace. Make sure that all the half-holes on the antenna line up with the row of holes on the radio board. See the picture below:

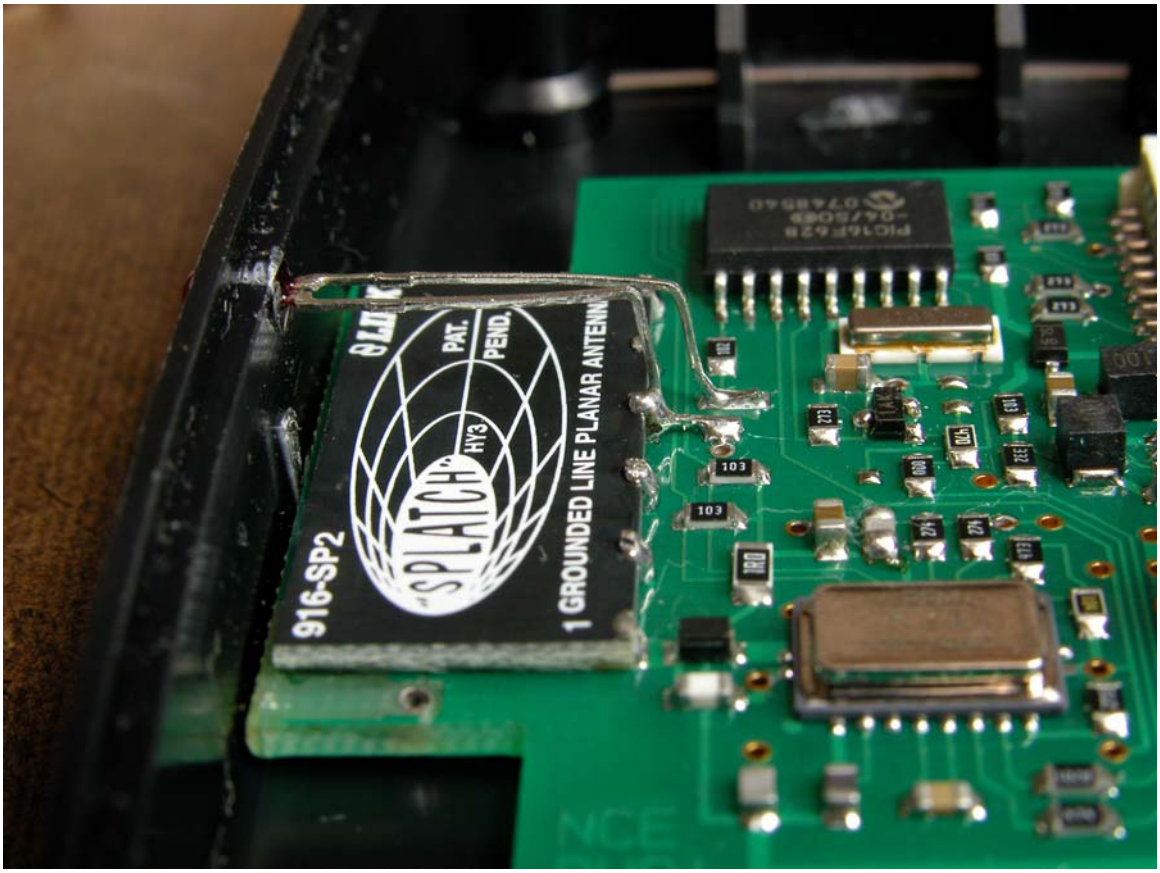


Using some bus wire (or a resistor lead) place a wire through each hole and solder the antenna to the ground holes in the board. Be sure to use enough heat to get the solder to flow down into the ground holes. After soldering each wire in place cut it off flush with the top surface of the antenna.

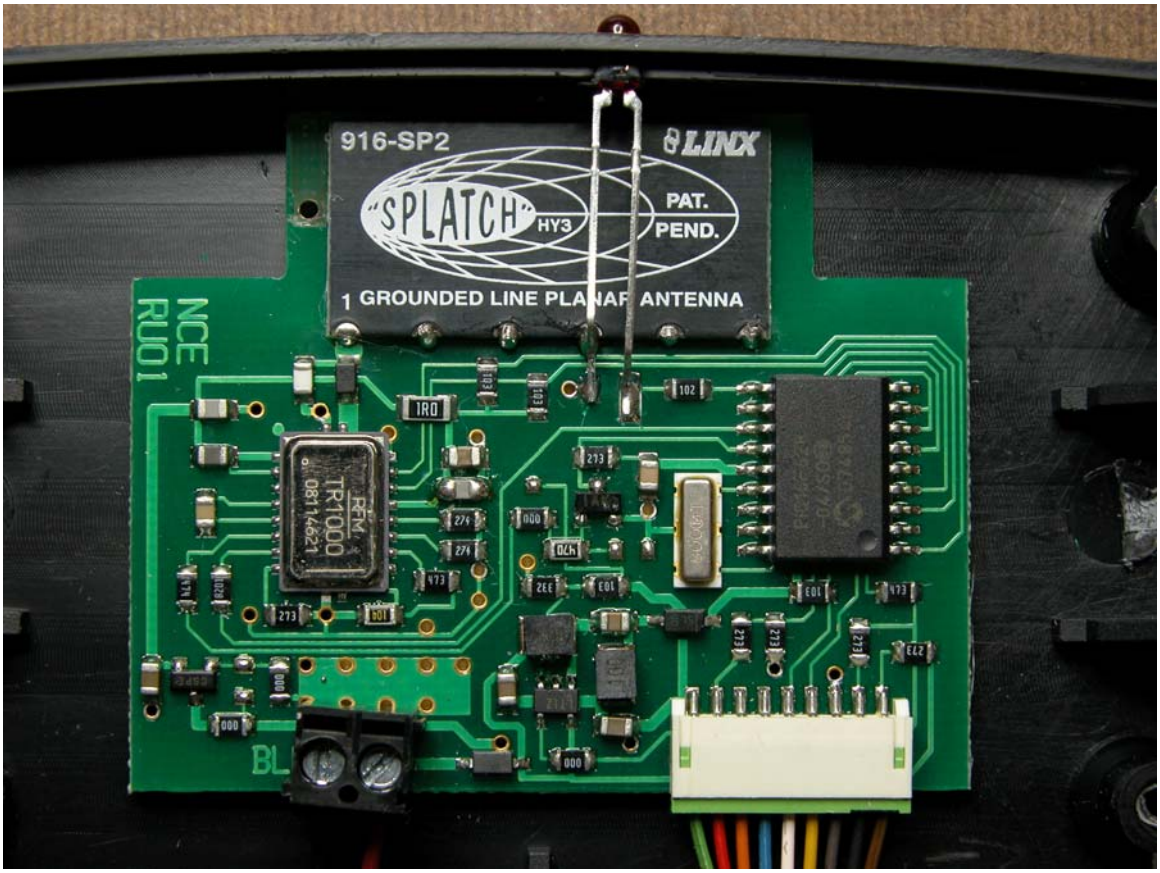
Step 5 – Reinstalling the LED

The next step is to reinstall the LED. The wire leads of the LED must be kept at least 1/8” above the surface of the antenna. If the LED wires are too close to the antenna the range of the cab can be severely restricted. If you reuse the same LED you will probably have to solder some leads to the LED to extend the leads above the antenna.

Here is a picture showing how the LED leads are kept above and away from the antenna.



Here is a photo showing the completed installation in a PowerCab.



That's all there is to it, now you don't have to worry about breaking off any more antenna connectors.

Internal Antenna Information

Link to manufacturer's data sheet:

http://www.antennafactor.com/documents/ANT-916-SP_Data_Sheet.pdf

Link to Digikey's product page:

http://search.digikey.com/scripts/DkSearch/dksus.dll?Detail?name=ANT-916-SP_-ND