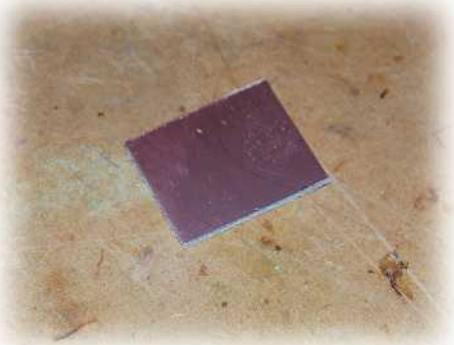
1 - PREPARING THE DC BOARD

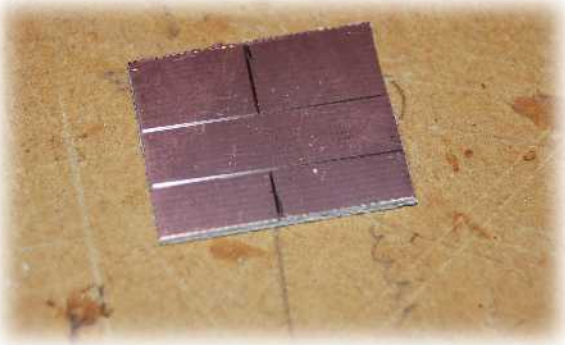


The project consists two boards: DC or 'Bias Tee' Board and VPA or Mast-Top Board



The kit includes a cut board and components for each



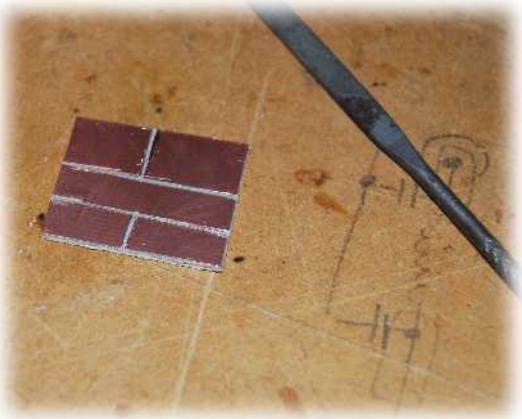


Begin by taking the small (25 x 30mm) board and marking it out





With the guide lines marked, cut the tracks with a needle file

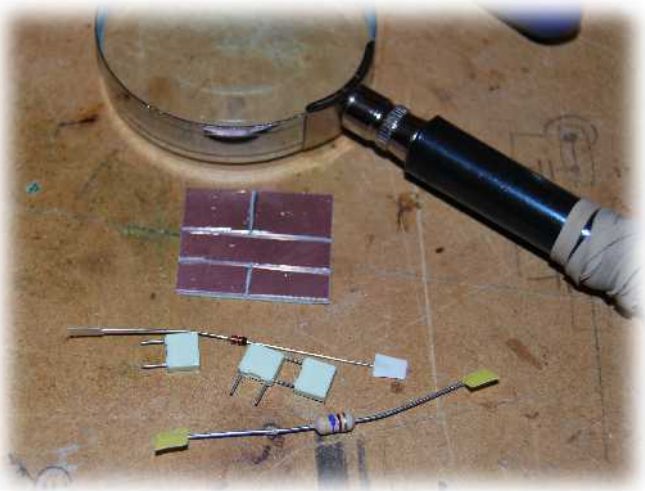


Once the islands have been created, check the continuity between tracks with a meter

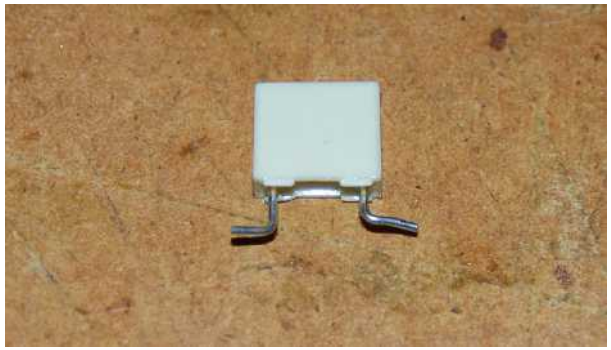


G5VZ

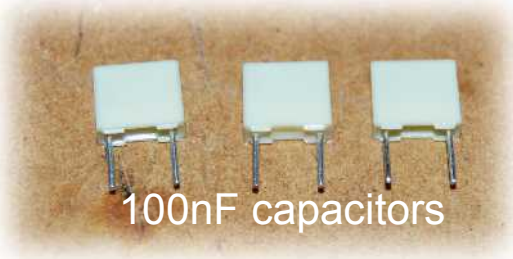
2 - THE COMPONENTS ON THE DC BOARD



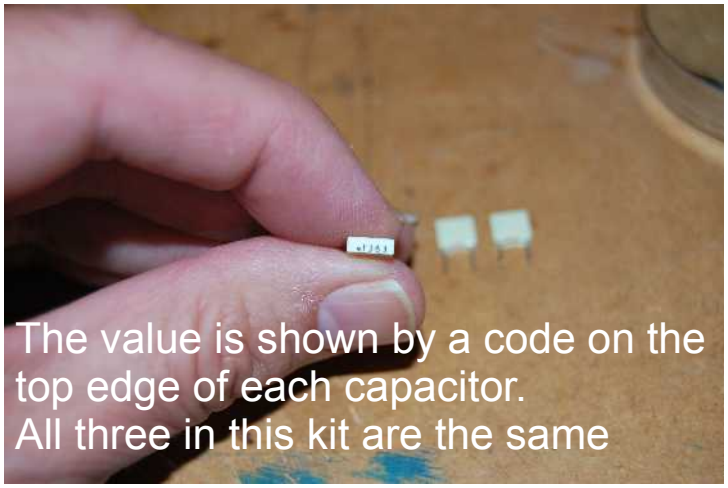
The components – one 470µH inductor, one 1N4148 diode and three 100nF capacitors



The capacitors are best prepared by bending their legs out.
The horizontal part of each wire can be soldered flat to the printed circuit board



First to be mounted on the board will be the capacitors – there are three of them





The next part to mount on the board is the inductor – its value is shown by coloured rings: yellow means 4, violet 7 and brown means 'one zero' giving 470





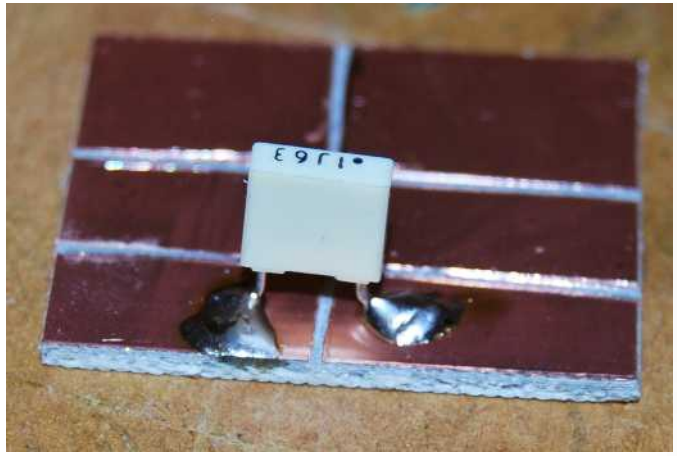
The final part to be soldered on is the 1N4148 diode – this semiconductor is the most heat-sensitive of all the parts



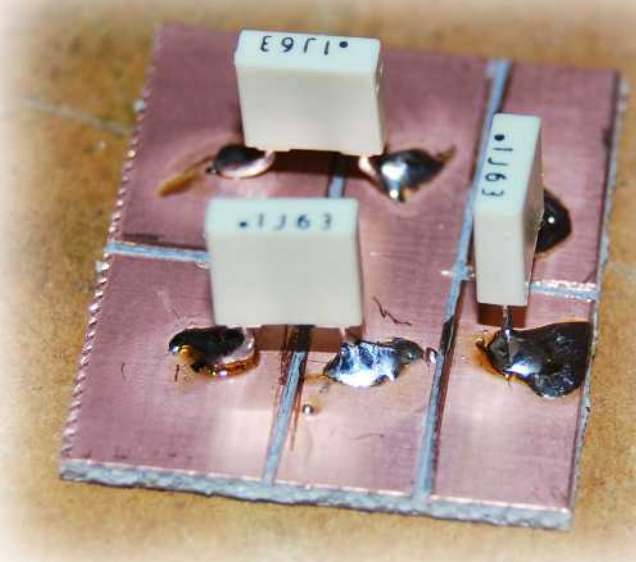
Notice, too that the 1N4148 has a right-way-round and a wrong way.
The black ring marks the cathode

G5VZ

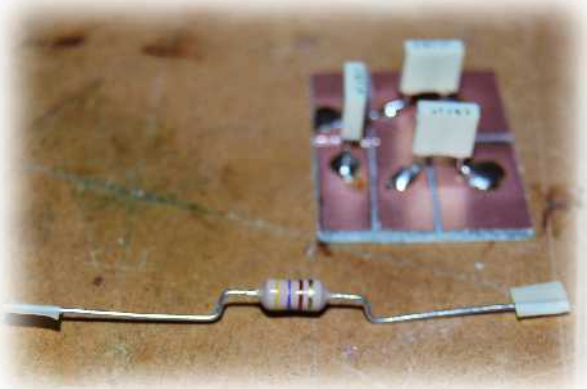
3 - BUILDING THE DC BOARD



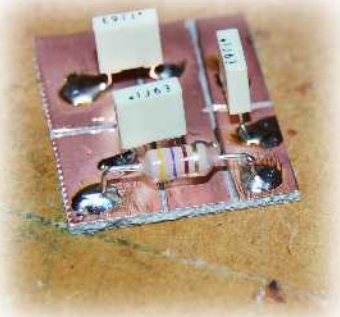
The first capacitor is in the signal path. This blocks the DC from the receiver's antenna socket



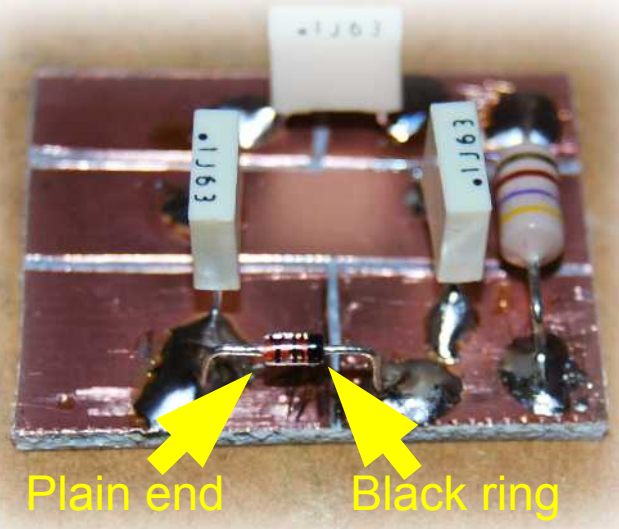
The other two capacitors are connected from the positive DC power islands to the common ground track; they are decoupling capacitors



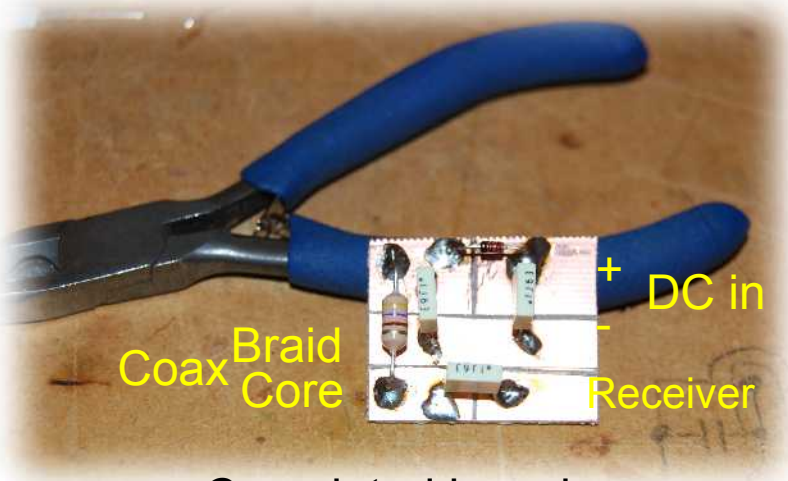
Prepare the inductor by forming its leads as shown



Then solder it in place



Finally solder the diode in place in the DC power line – solder the diode quickly and right way round!

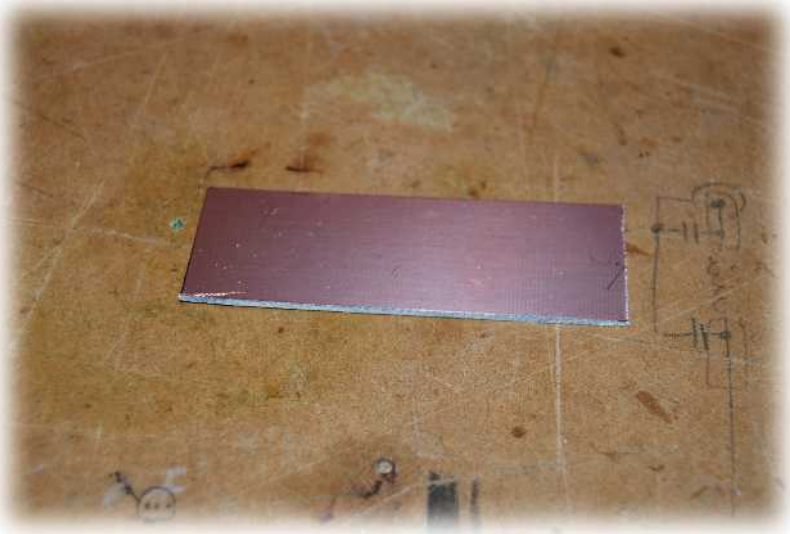


Completed board

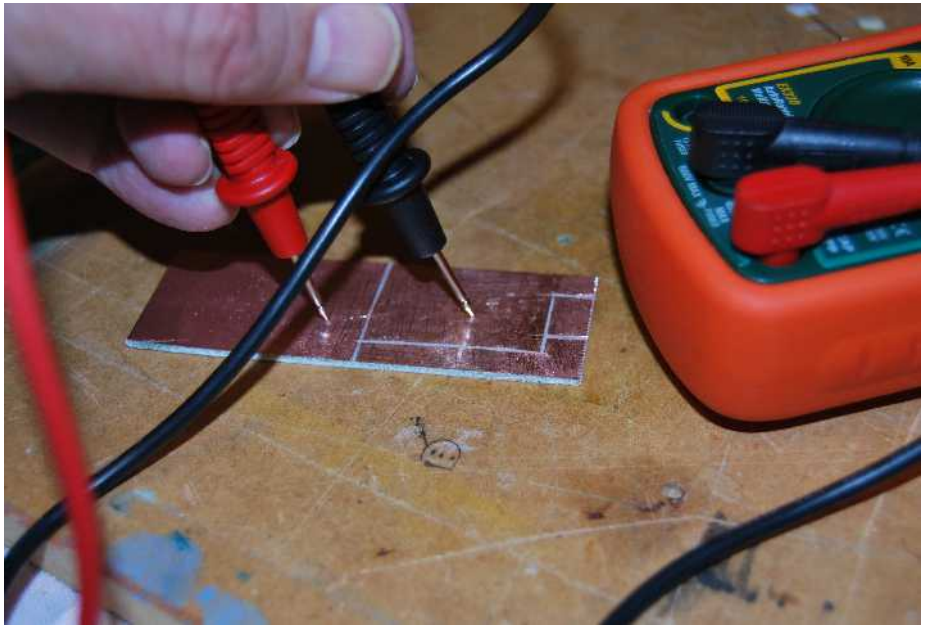
The completed board is now ready for testing: ensure there is DC on the mast-side connection of the board and no DC on the receiver side

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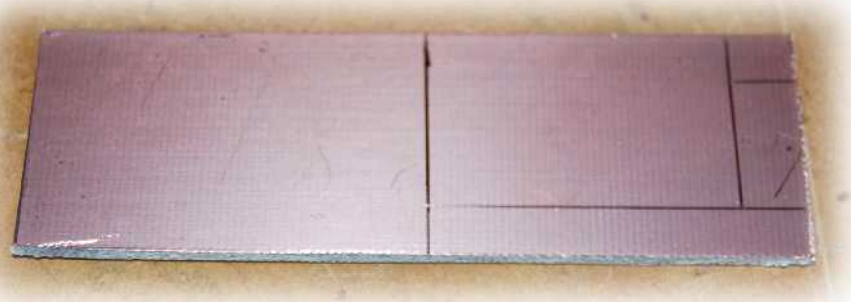
4 - PREPARING THE VPA BOARD



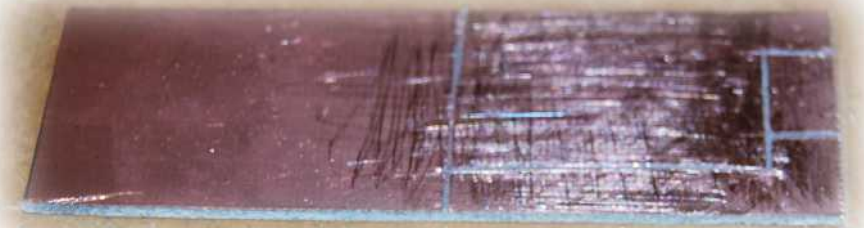
The mast-top board is 90mm long and 30mm wide



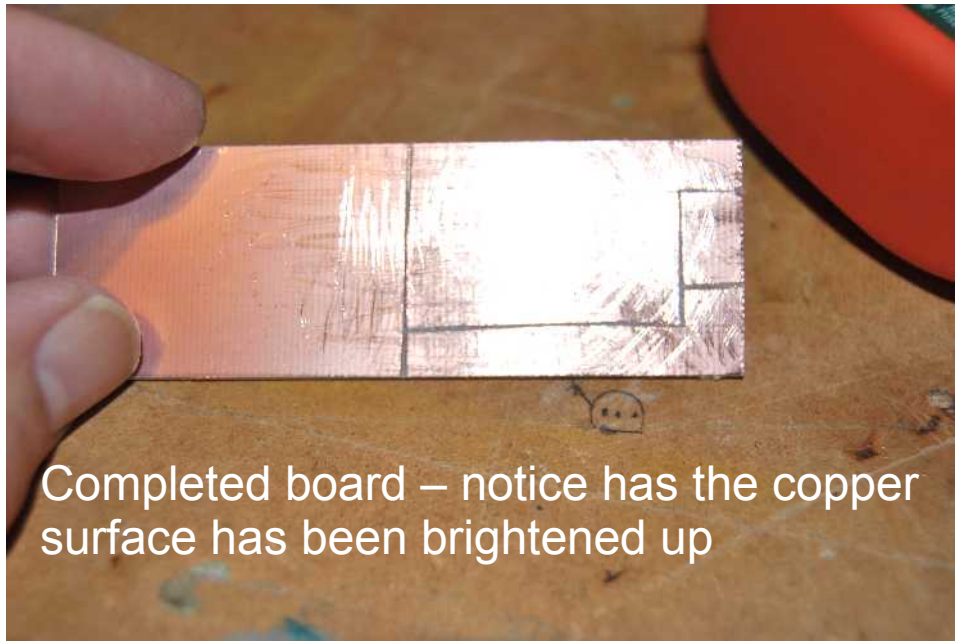
Once the islands are formed, check the continuity with a meter



First step is to mark out the board: voltage probe, ground plane, coax core connection and LT supply rail



Then use a needle file to cut the tracks

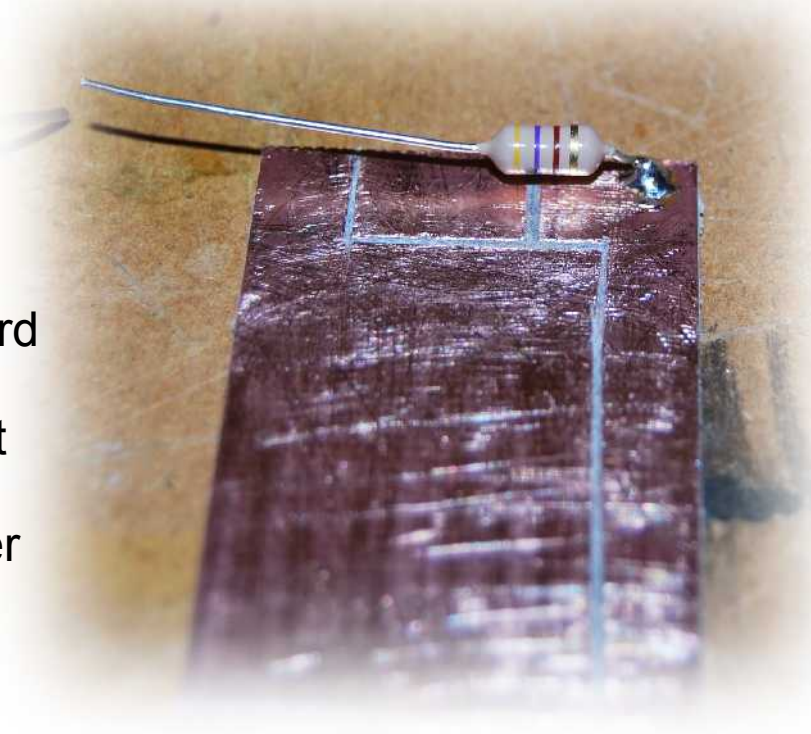


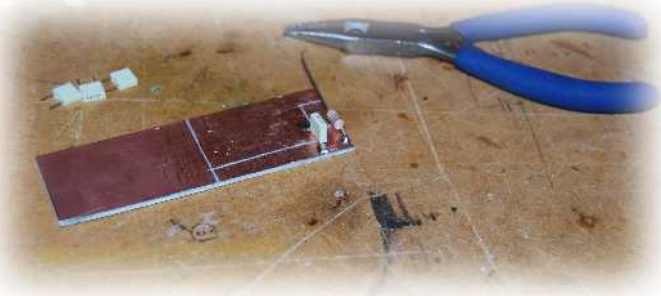
Completed board – notice has the copper surface has been brightened up

5 – STARTING CONSTRUCTION: VPA BOARD

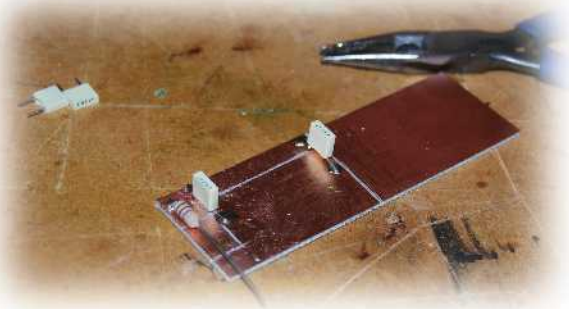


The first part to mount on the board is the 470µH inductor. Solder it to the DC LT rail but leave the other end unconnected for now





Next is the first of the 100nF decoupling capacitors



Then the second capacitor



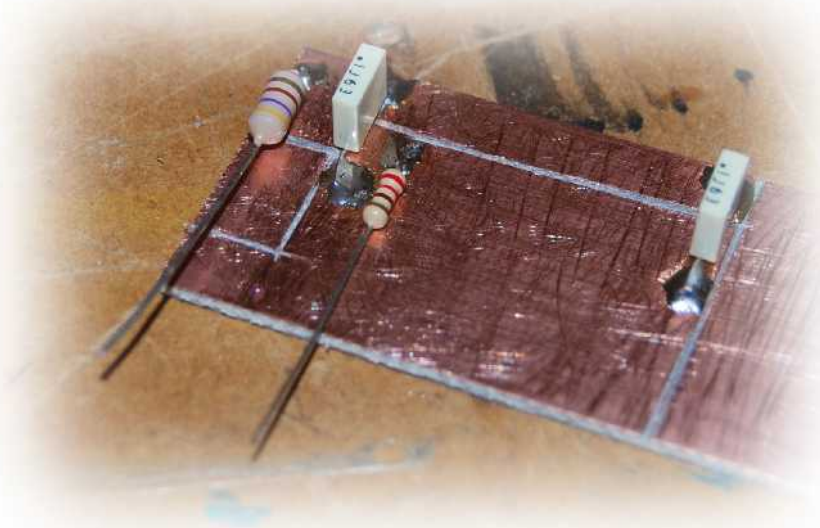
Each resistor can be identified by its colour-code rings. But – just to be sure – check the value of each resistor with a meter before soldering it in place

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6 – VPA CONSTRUCTION

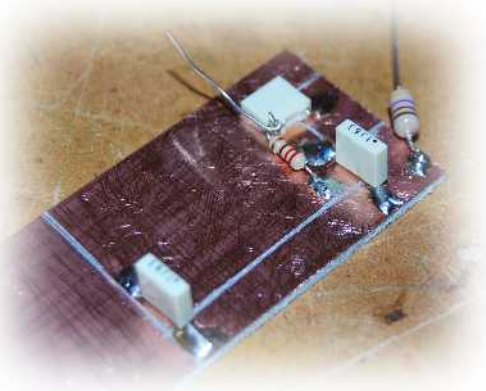


The first resistor to mount is the 220Ω component: its colour code is red (2) red (2) and brown (“one zero”)
But check it with a meter!



Solder one end of the resistor to the ground plane

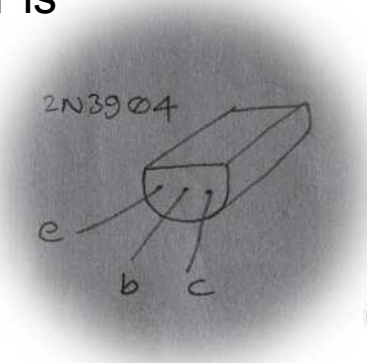
Its other end is twisted onto one lead of a 100nF capacitor



The unconnected lead of the capacitor is then soldered to the coax-core island

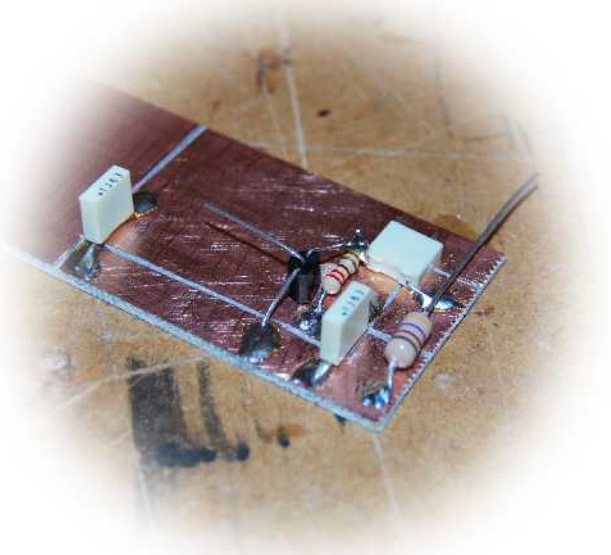


The next job is to identify the pin-out of the NPN transistor. This can be a 2N2222 type but in the kits supplied the transistor is type 2N3904
Its pin out is a shown here – this is correct for the component supplied in the kit! (Not every 2N3904 you might encounter)

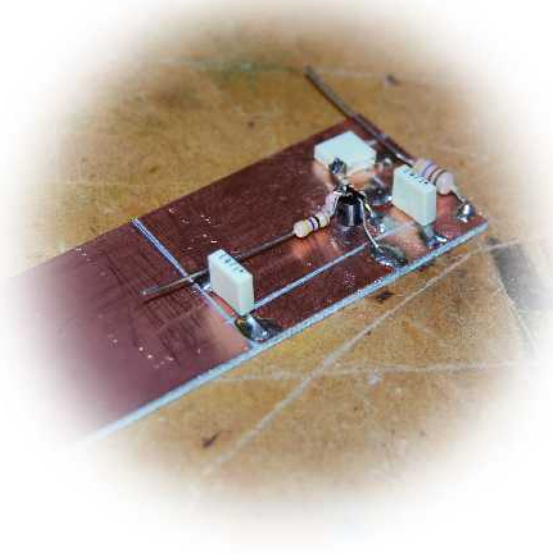


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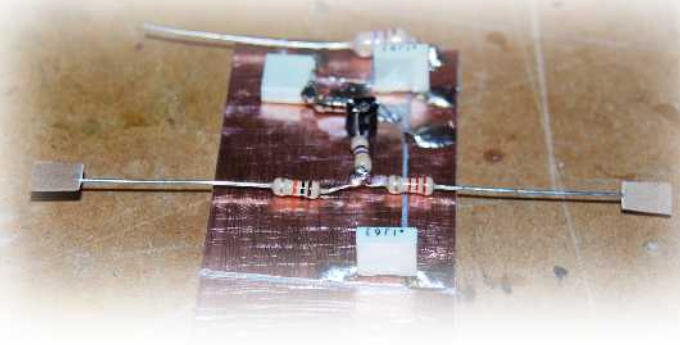
7 – VPA CONSTRUCTION



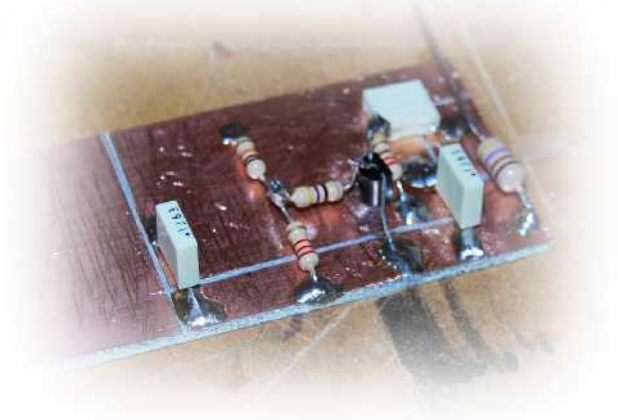
The transistor is placed on the board upside down (Wires up, that is) and its emitter wire is soldered to the junction of the 220Ω resistor and the 100nF capacitor. Next, the collector wire is soldered onto the DC supply rail



The 47Ω resistor (Yellow, violet, black) is connected to the base and leads out towards the input stage of the amplifier, as shown



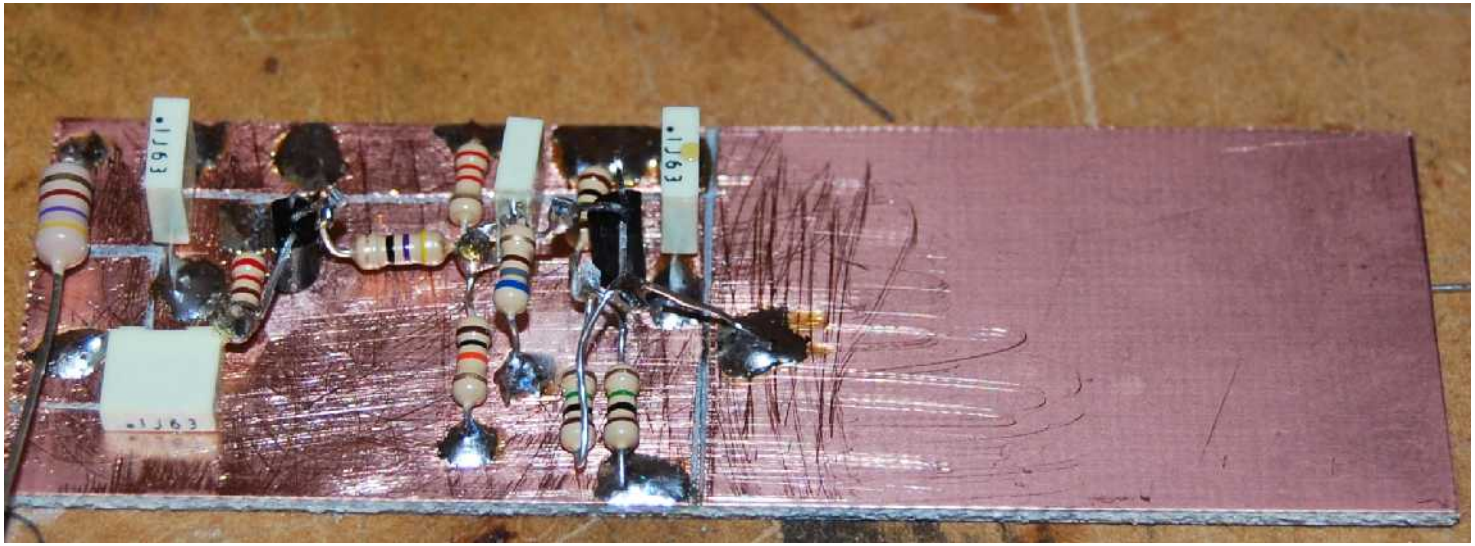
The unconnected end of the 47Ω resistor is connected to three other components. First, the bias resistors are connected: 2.2kΩ (Written 2k2 and with bands red, red, red) and 10kΩ (Brown, black, orange)
The 10k is connected to the DC supply and the 2k2 component to the ground plane



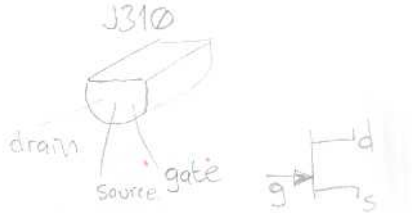
8 – VPA CONSTRUCTION

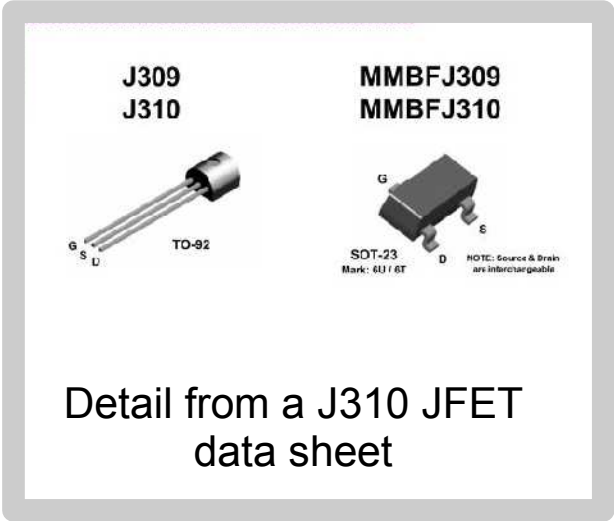


Once the resistors are in place, the next step is to add the 100nF capacitor that joins the FET input stage to the NPN transistor stage



The capacitor – once in place – has its other end connected to a 680Ω resistor (Blue, grey, brown), the far end of which is soldered to the ground plane.
The pin-out of the FET should be checked and for the J310 supplied with this kit, the pins are as show here





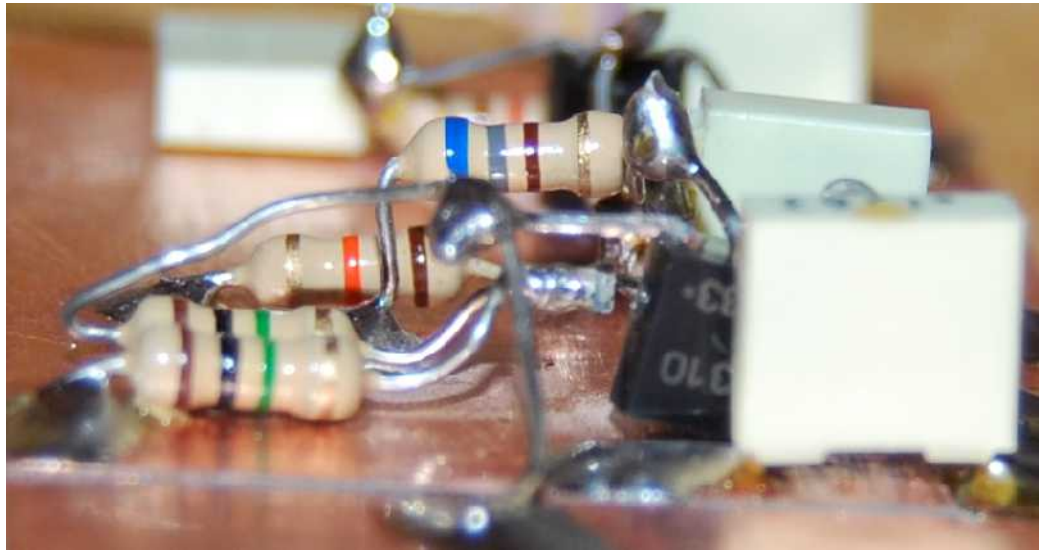
Detail from a J310 JFET data sheet



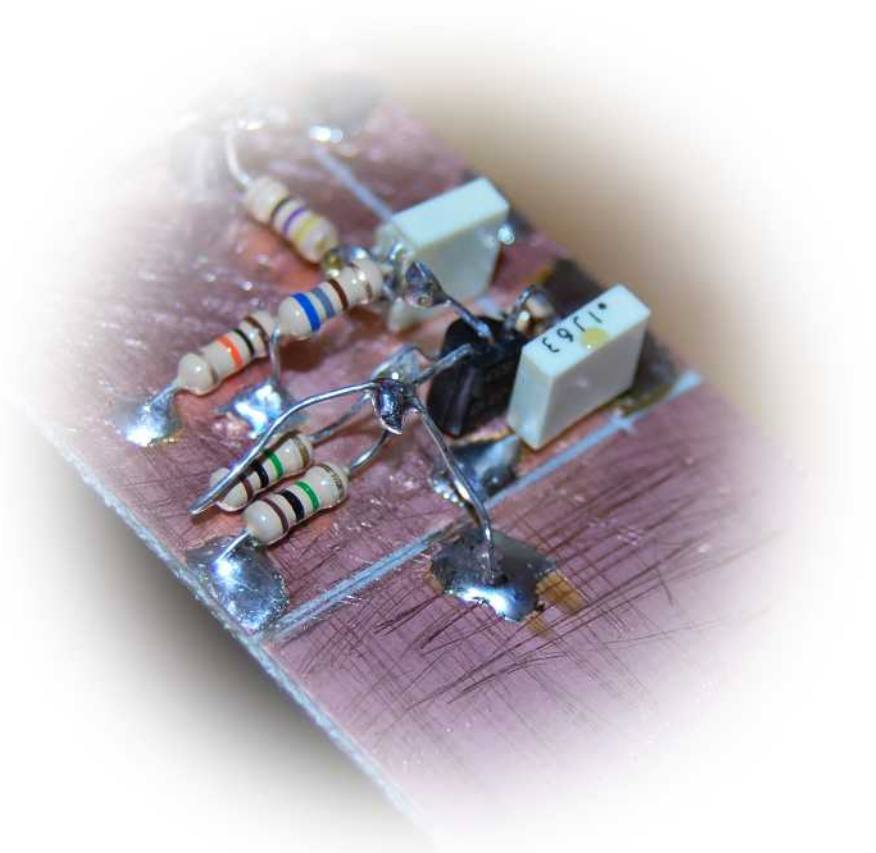
The transistor is placed such that its drain wire is closest to the DC supply island and the source is beside the junction of the 100nF capacitor and the 680Ω resistor. Connect the drain wire to the DC supply island and solder it in place; the source is soldered to the resistor/capacitor

9 – VPA CONSTRUCTION: FINAL STEPS

1MΩ – one million ohms – Brown, black, green



Three 1MΩ resistor are the final components to solder in place. Notice that they are all joined in one place so begin by twisting together the leads and solder them together.
Next bend one resistor down to connect to the ground plane. Solder it in place. Then one is bent up to meet the gate lead of the JFET and these should just be twisted together.
Next, the third 1M resistor is soldered to the ground plane of the copper board.
Finally, the lead from the gate/1M resistor is soldered and also soldered to the voltage probe area.

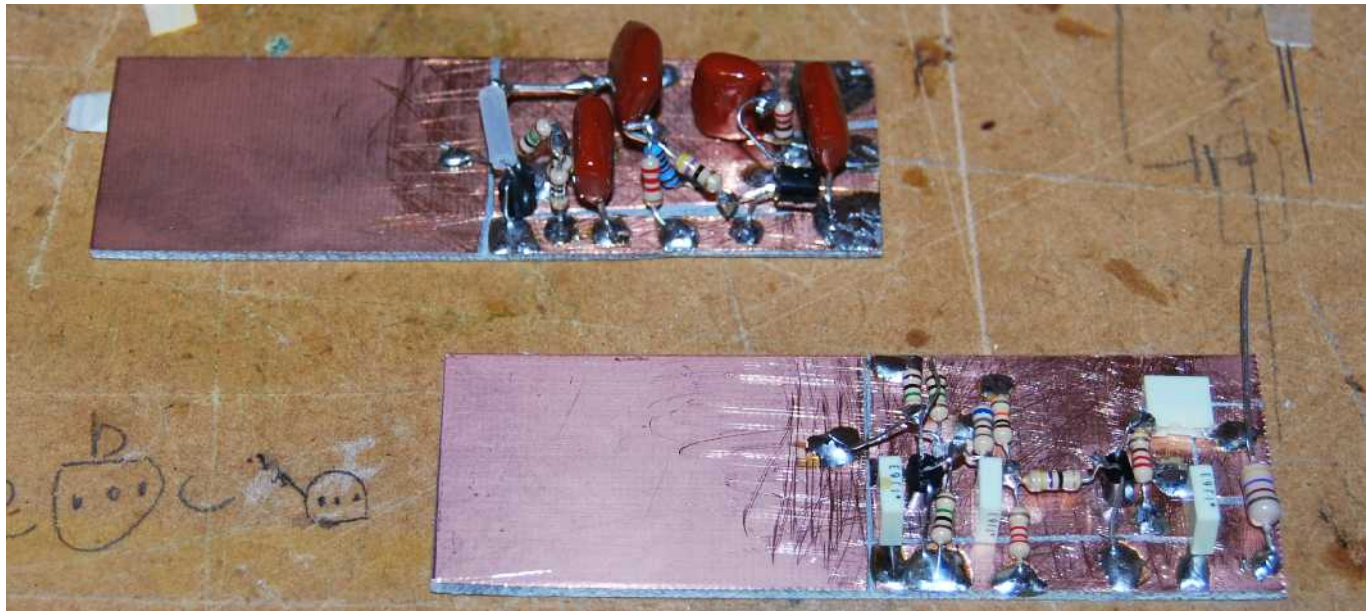


Test the VPA board and finally connect the free end of the inductor to the coax core connector island



Connected to a BNC socket

10 - BUILDING STYLES



Building
ugly style,
often the construction
that looks most chaotic
works the best!

Short, direct wiring and logical layout





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