

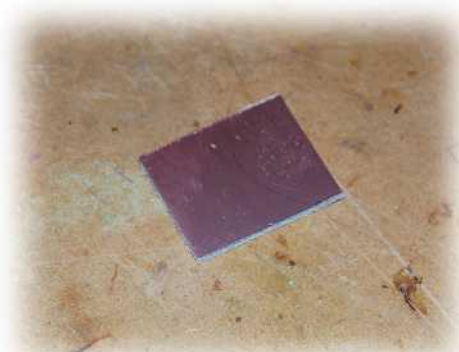
1 - PREPARING THE DC BOARD



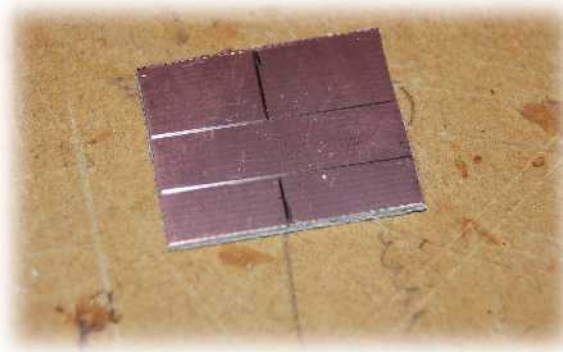
The project consists two boards: DC or 'Bias Tee' Board and VPA or Mast-Top Board



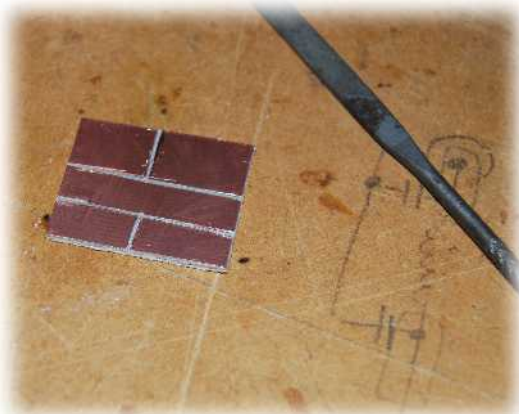
The kit includes a cut board and components for each



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



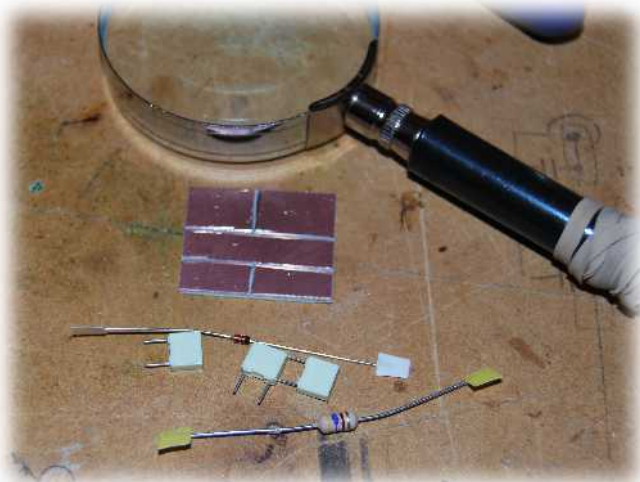
With the guide lines marked, cut the tracks with a needle file



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



2 - THE COMPONENTS ON THE DC BOARD

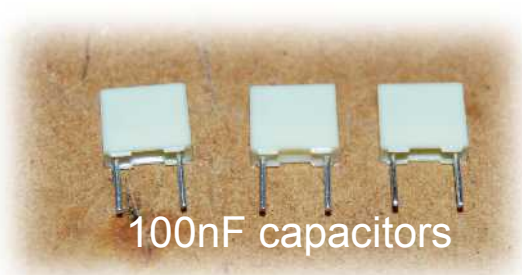


The components – one 470 μ H inductor, one 1N4148 diode and three 100nF capacitors



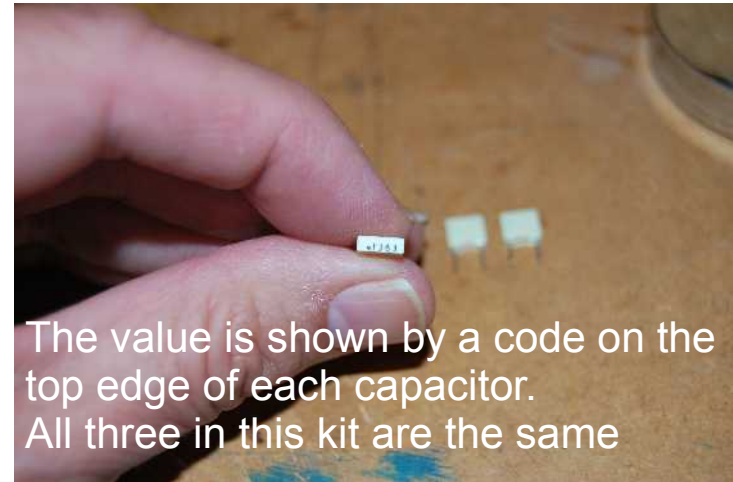
The capacitors are best prepared by bending their legs out.

The horizontal part of each wire can be soldered flat to the printed circuit board



100nF capacitors

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



The value is shown by a code on the top edge of each capacitor. All three in this kit are the same



470 μ H inductor

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



1N4148 diode

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

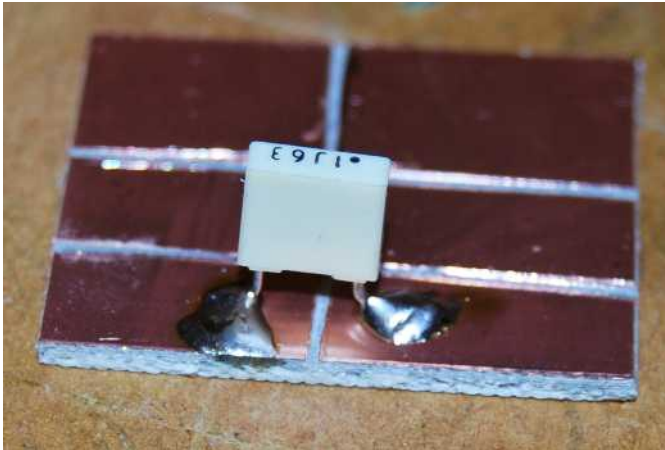


Notice, too that the 1N4148 has a right-way-round and a wrong way.

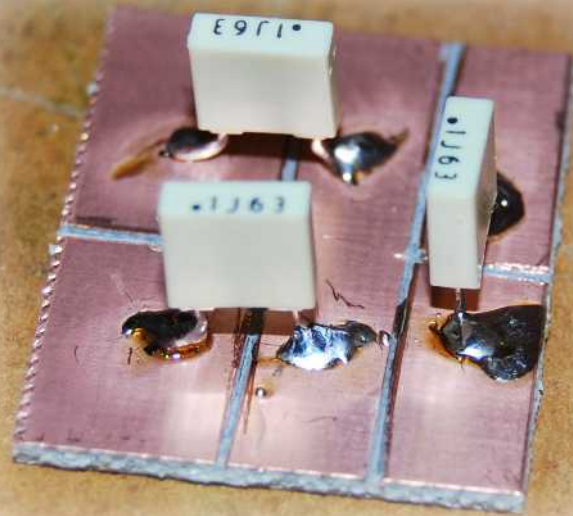
The black ring marks the anode or most-positive end



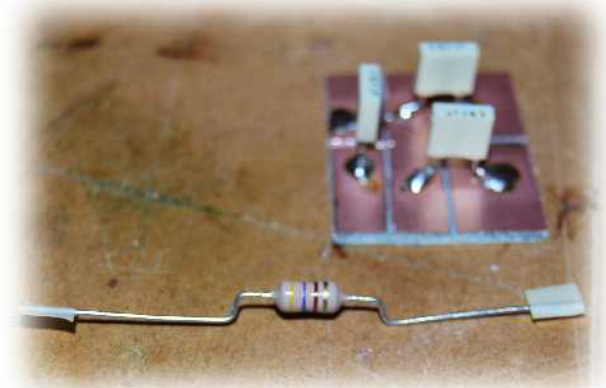
3 - BUILDING THE DC BOARD



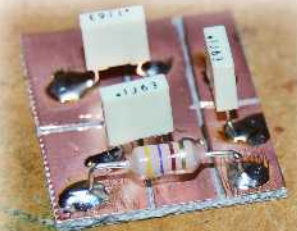
The first capacitor is in the signal path. This blocks the DC from the receiver's antenna socket



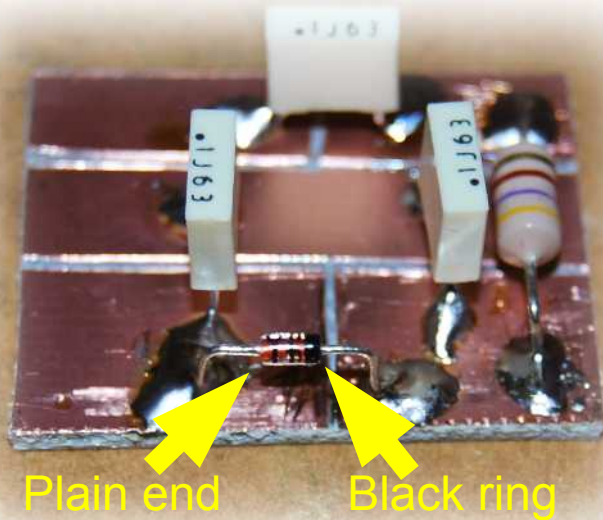
The other two capacitors are connected from the positive DC power islands to the common ground track; they are decoupling capacitors



Prepare the inductor by forming its leads as shown



Then solder it in place



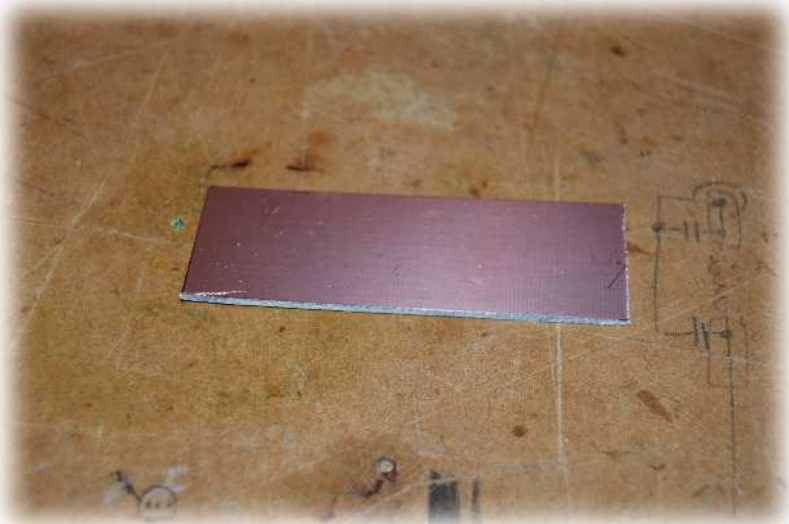
Finally solder the diode in place in the DC power line – solder the diode quickly and right way round!



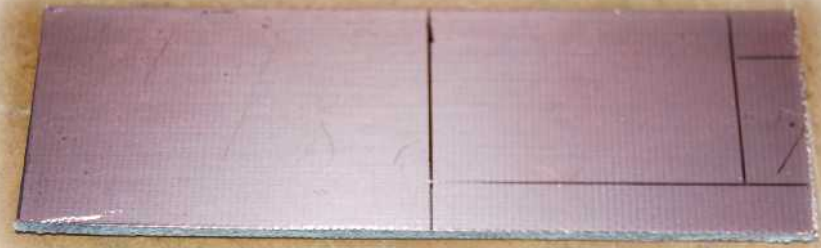
Completed board

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

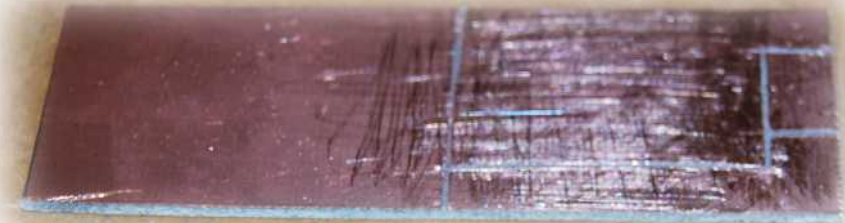
4 - PREPARING THE VPA BOARD



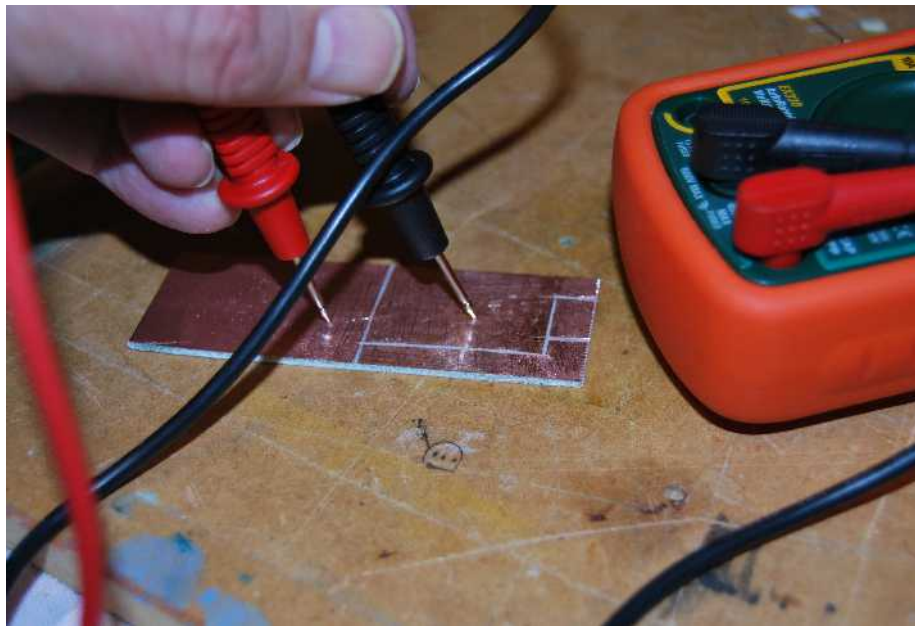
The mast-top board is 90mm long and 30mm wide



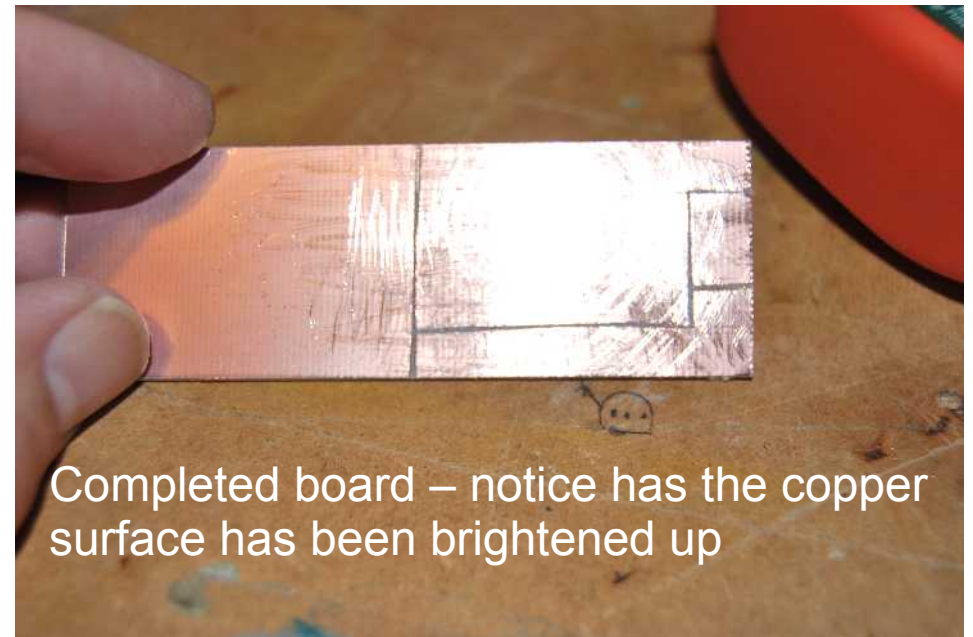
First step is to mark out the board: voltage probe, ground plane, coax core connection and LT supply rail



Then use a needle file to cut the tracks



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

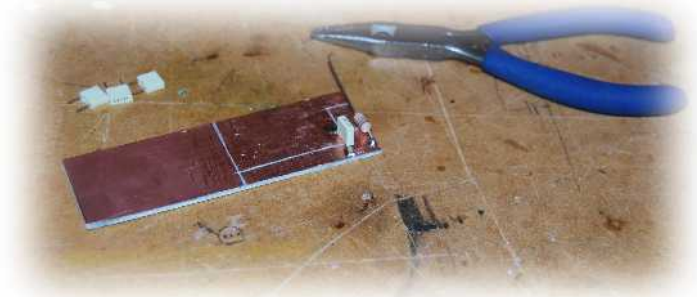
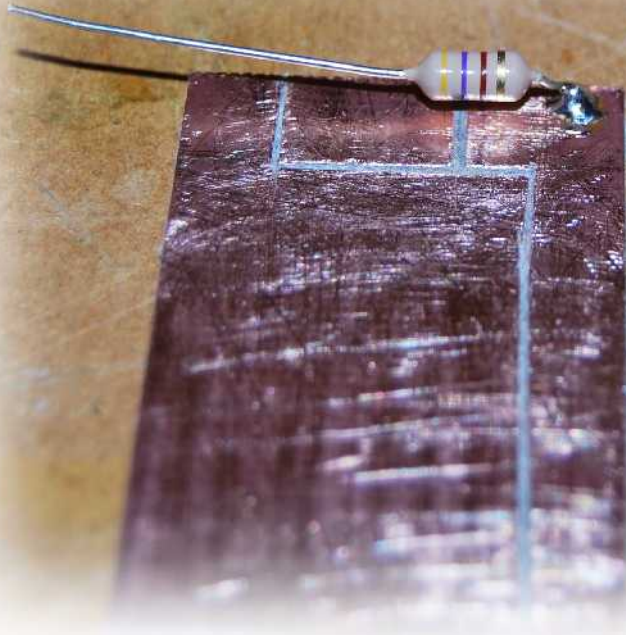


Completed board – notice has the copper surface has been brightened up

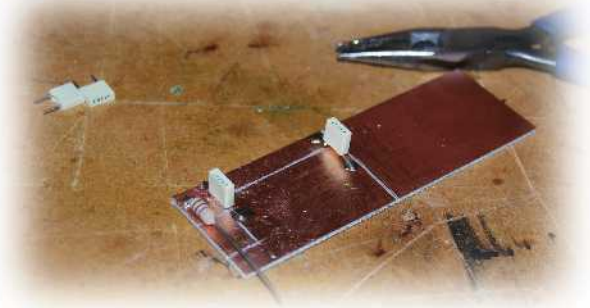
5 – STARTING CONSTRUCTION: VPA BOARD



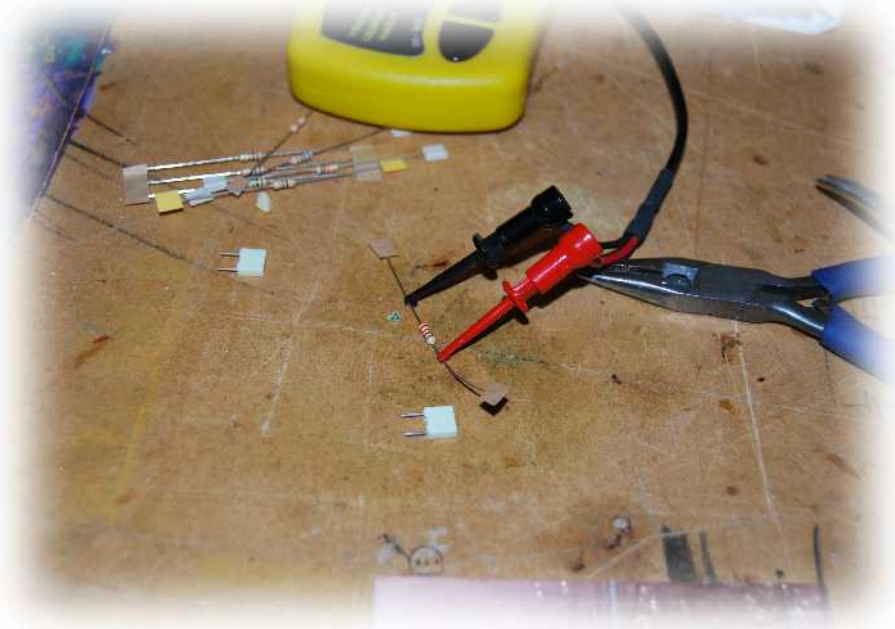
The first part to mount on the board is the 470 μ H inductor. Solder it to the DC LT rail but leave the other end unconnected for now



Next is the first of the 100nF decoupling capacitors



Then the second capacitor

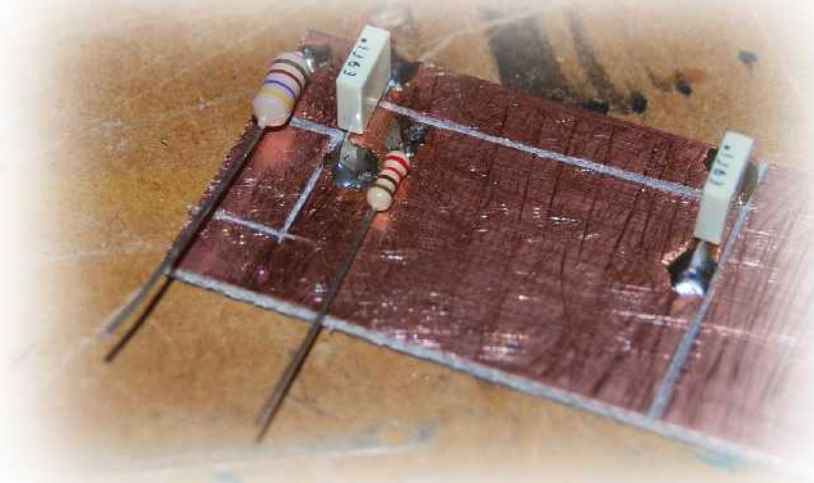


Each resistor can be identified by its colour-code rings. But – just to be sure – check the value of each resistor with a meter before soldering it in place

6 – VPA CONSTRUCTION

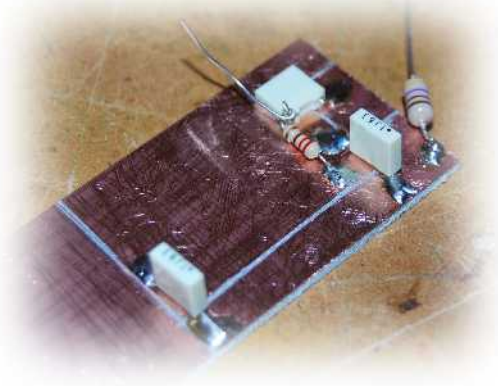


The first resistor to mount is the 220 Ω component: its colour code is red (2) red (2) and brown (“one zero”) But check it with a meter!



Solder one end of the resistor to the ground plane

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

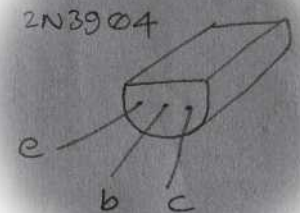


The unconnected lead of the capacitor is then soldered to the coax-core island

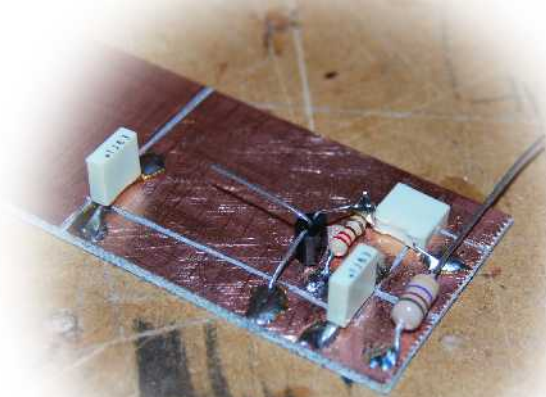


The next job is to identify the pin-out of the NPN transistor. This can be a 2N2222 type but in the kits supplied the transistor is type 2N3904

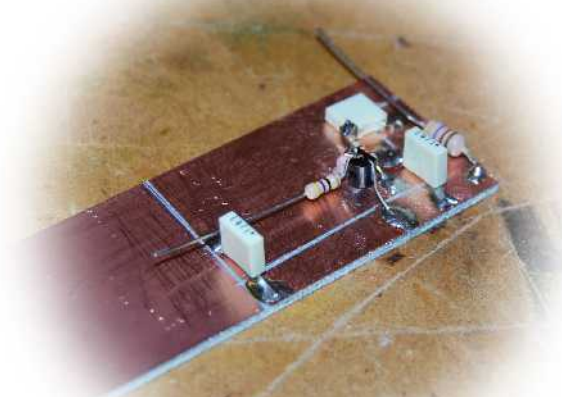
Its pin out is as shown here – this is correct for the component supplied in the kit! (Not every 2N3904 you might encounter)



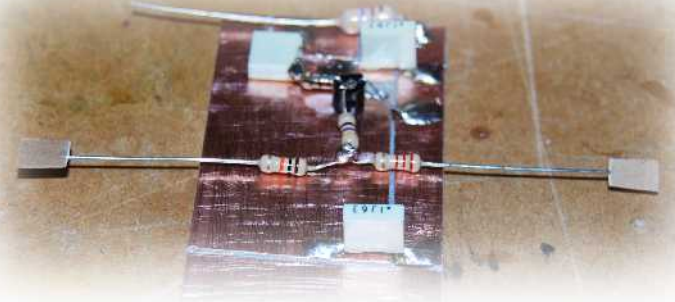
7 – VPA CONSTRUCTION



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

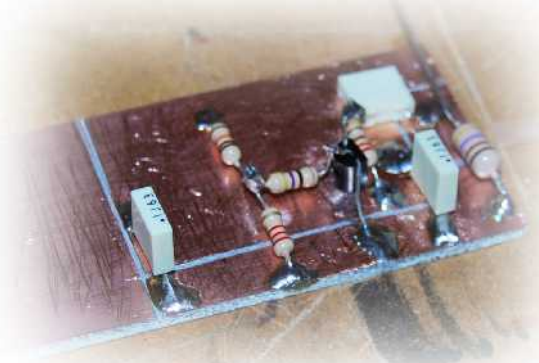


The 47 Ω resistor (Yellow, violet, black) is connected to the base and leads out towards the input stage of the amplifier, as shown



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

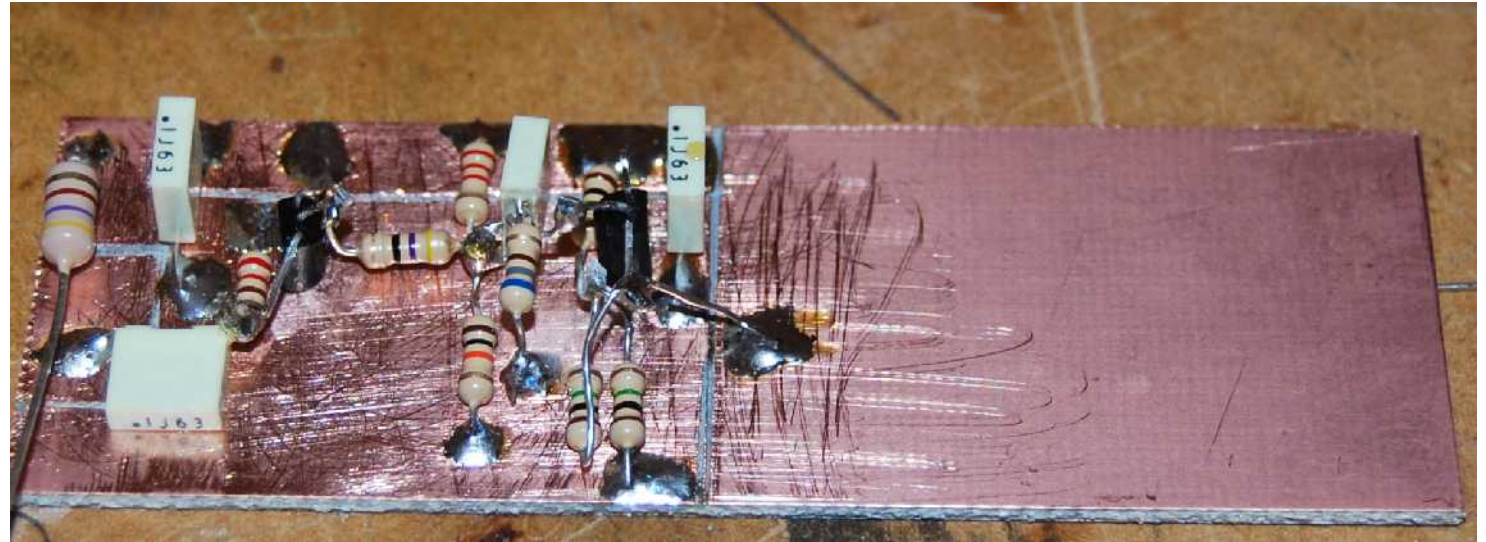
The 10k is connected to the DC supply and the 2k2 component to the ground plane



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



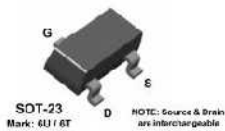
The capacitor – once in place – has its other end connected to a 680Ω resistor (Blue, grey, brown), the far end of which is soldered to the ground plane.

The pin-out of the FET should be checked and for the J310 supplied with this kit, the pins are as show here

J309
J310



MMBFJ309
MMBFJ310



Detail from a J310 JFET data sheet

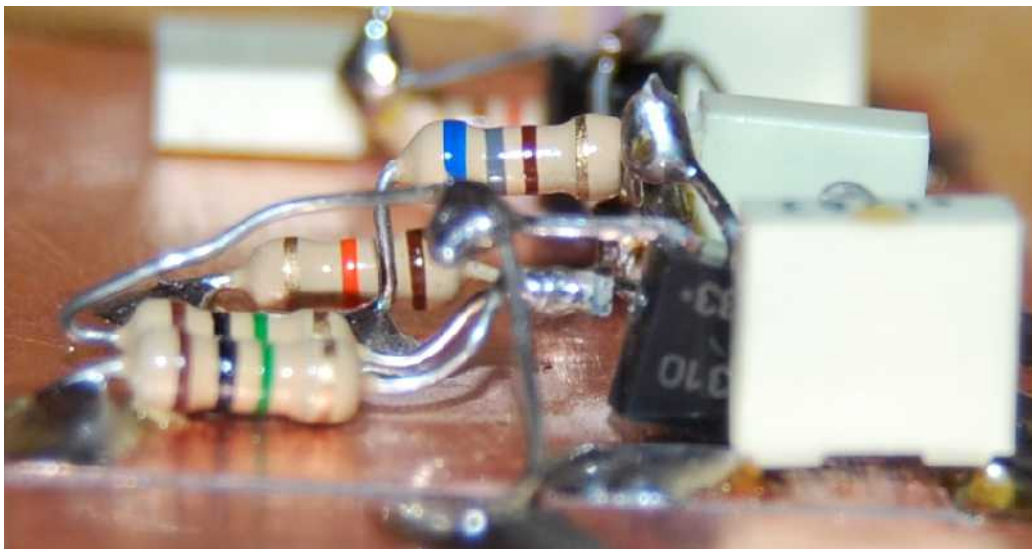


The transistor is placed such that its drain wire is closest to the DC supply island and the source is beside the junction of the 100nF capacitor and the 680Ω resistor. Connect the drain wire to the DC supply island and solder it in place; the source is soldered to the resistor/capacitor



9 – VPA CONSTRUCTION: FINAL STEPS

1M Ω – one million ohms – Brown, black, green



Three 1M Ω 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.

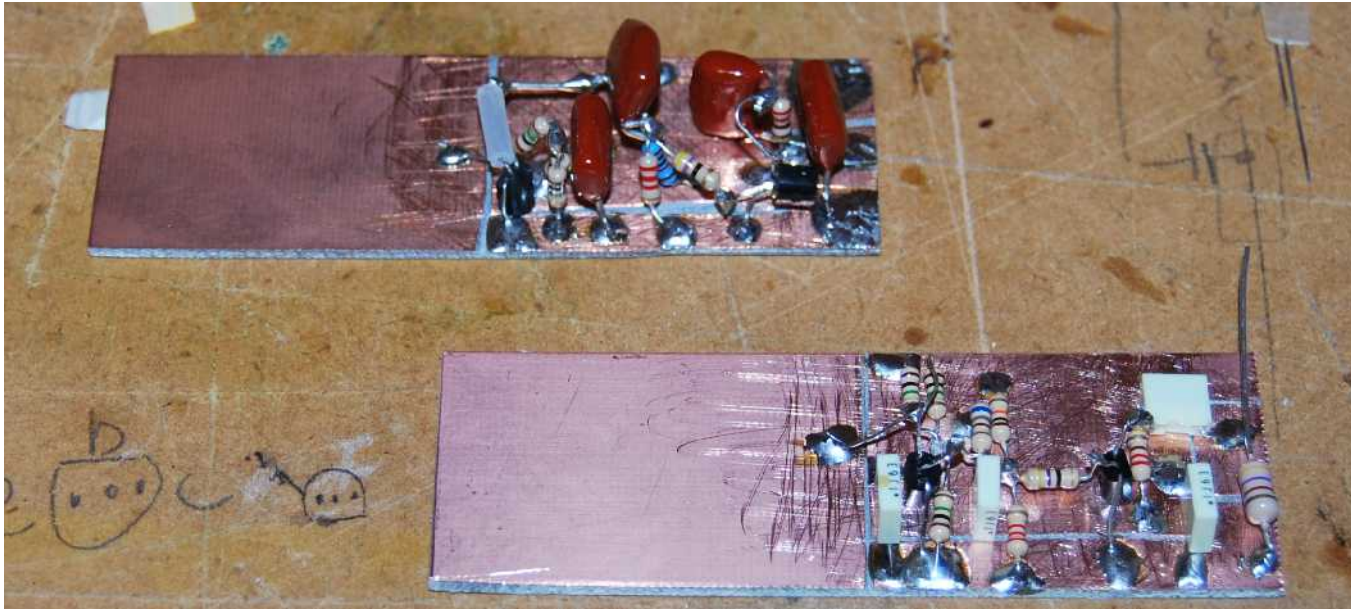


Test the VPA board and finally connect the free end of the inductor to the coax core connector island



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

