

Instructions for building the PGA432 70cm preamplifier

Issue 0.2 17/11/16

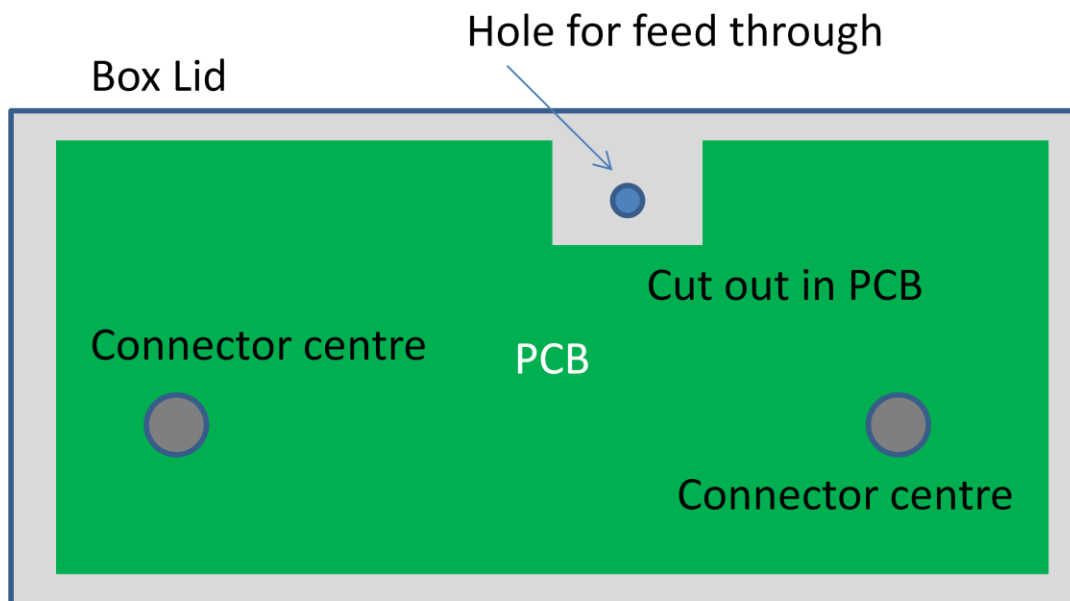
First step

Carefully place the PCB, track side up, inside the lid of the tinplate box. Ensure that the PCB is centrally located.

Mark the positions of the connector centre spills, through the holes in the PCB, onto the inside of the box lid. Double check the PCB is central.

Mark the outline of the cut-out in the PCB onto the lid.

Remove the PCB for safe keeping.



Drill 2mm holes in the box lid corresponding the connector centres and the feed through.

Open out the **connector** holes to 6.5mm diameter. If your drilling is not as accurate as it should be, it is permissible to open out the holes slightly with a small round file to allow the connectors to fit flat to the PCB.

The feed through hole should be opened out to 3mm diameter if the recommended feed-through capacitor is used, otherwise drill for the feed through size you intend to use.

Step 2

Solder all the SMD parts onto the PCB except the PGA103+ , taking particular care to ensure all joints are sound. Small diameter leaded solder and a fine pointed soldering iron bit will help here.

See appendix PGA432 appendix 1 for the schematic diagram for the PGA432 and PGA432 Appendix 2 for the component overlay

Part	value	Kit Identification markings
C1	4.7pF	Yellow purple
C2	3.9pF	Orange/blue
C3	8.2pF	Green
C4	3.9pF	Orange/blue
C5	1.8pF	Green/blue
C6	1.8pF	Green/blue
C7	3.9pF	Orange/blue
C8	1nF	blue
C9	1nF	blue
C10	100pF	yellow
C11	10uF/20V Tantalum	Black/clear
C12	10uF/20V Tantalum	Black/clear
C13	1nF	blue
R1	150R	Brown/green/brown
R2	500R	trimmer
R3		Not used on 70cm version
R4	0R	Black/black
L1, L2	See text	1mm ecw 5mm id
L3	270nH	Green
L4	39nH	Orange
L5	270nH	Green
Q1	PGA103+	SOT89 package
IC2	78M05	DPAK
D1	1N400x series diode	1N400x
CF1	1500pF	Feedthrough cap with washer

Component identification list PGA432 schematic and kit

Do not add L5 unless you are intending to power feed over the coax.

Step 3

Wind inductor L1. This should be 2 turns of the supplied 1mm diameter enamelled copper wire (ecw) on a 5.0mm diameter mandrel. This coil will be opened out to adjust the LPF knee frequency and give lowest noise figure.

Bend the 'tails' of the coil down and cut off to 2mm long.



L2 should be 8 turns, close wound on a 5.0mm diameter mandrel.

Scrape the enamel off the tails of the coils and tin with a hot soldering iron.

Insert the coil tails into the respective holes in the PCB so that the bottom of each coil is 2.5mm off the surface of the PCB. use a 2.5mm drill shank to space the coil from the PCB. Solder to the track or pad. This is best done from the underside of the PCB. Cut off the excess tail lengths so that they do not protrude more than 0.25mm below the PCB to prevent shorting to the lid of the box when the unit is assembled.

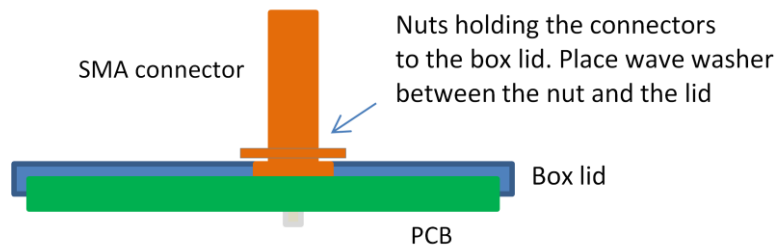
Step 3

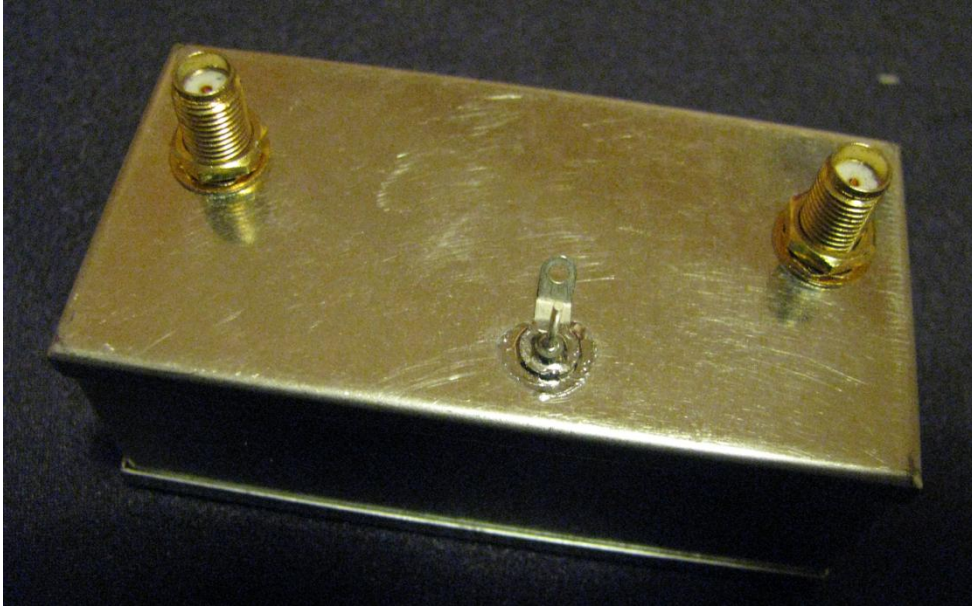
Solder the PGA103 to the PCB pads taking care not to short the input pin to ground as this would instantly destroy the device when power is applied.

Step 4

Turn the PCB over and solder the pins (spill) of the two long SMA connectors to the track pad on the top (component side) of the PCB, ensuring the connector is **flat** down onto the PCB pad on the underside (bottom) of the PCB. Once you are sure it is perfectly straight, solder round the edge of the connector to attach it firmly to the PCB.

The connectors are inserted through the two 6.5mm holes and held in place with a washer and nut, as shown below.





Step 5

Hold the solder tag in a pair of long nose pliers and carefully bend the solder part up about 45°

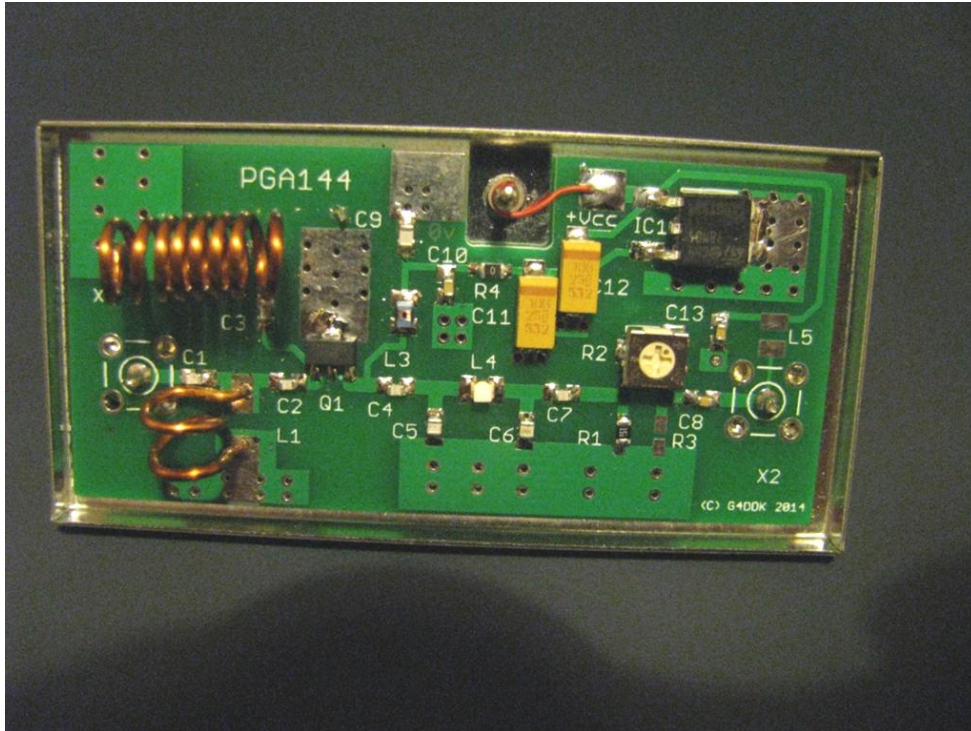
Place the feed through capacitor through the 3mm hole in the solder tag.

Place the feed through capacitor through the 3mm hole in the box.

Carefully solder the tag and feed through to the outside of the box lid as shown, ensuring the feed through is straight.

Step 6

Inside the box, solder the 1N400x series diode between the feed through and the adjacent PCB +Vcc pad (not the ground pad!) with the cathode (banded) end of the diode to the Vcc pad



Note that the PGA432 shown is constructed on the existing PGA144 PCB. This will change with issue B boards. No 1N400x series diode shown in this view. It replaces the red wire.

Step 7

Assemble the sides and bottom of the box and solder the sides and bottom together to form an open topped box. When complete this will provide the screening for the PGA432. There should be no need to solder the lid, with its PCB, to the remainder of the box. If they fit together loosely, gently fold the lip ends of the lid inwards a VERY SMALL amount to ensure a tight fit.



Step 8

Carefully inspect the built PGA432 for errors and dry joints. When you are satisfied it is all correct proceed to testing and alignment.

Testing and alignment

Connect to a +12v source and check that the current taken is 85mA (a few mA either way is OK).

If it's significantly different to 85mA you have a fault and this must be found before proceeding.

You must align the preamp before it will give its best results. If you don't have suitable equipment to do this then by following the instruction that follow you will be very close to optimum performance.

Ensure L1 is initially close wound. It will be opened out during alignment in order to place the notch on 144MHz.

Adjust the 500Ω gain trimmer pot, R2, fully clockwise for maximum gain.

Either connect a low level (below -30dBm) swept 100 to 500MHz signal or a 144MHz CW signal to the input whilst monitoring the output level. Listening to a strong, nearby, beacon should work well. Carefully open out the end turns of L2 to minimise the 144MHz signal or observe a sharp notch at 144MHz on the swept output. It will be necessary to open out the coil as shown in the photo. In spite of the BPF at the output, you will still see the 144MHz notch and high pass characteristic at the output.

The swept signal will show a bandpass characteristic from around 300MHz to around 500MHz. There will be a sharp notch at 144MHz. The 435MHz gain should be 18dB at maximum gain setting.

If you have the right test equipment you can carefully adjust L1 for best input return loss. The return loss at 435MHz will be between 9 and 10dB. This is perfectly satisfactory and needs no further attention.

That's it. The PGA432 is ready to use!

Document history.	Version 0.1	Initial draft	17/12/14
	Version 0.1	First revision	15/11/16
	Version 0.2	Revised component list	17/11/16