

Short form - Constructional Notes for G8ACE MKII OCXO – June 2008

The OCXO is undergoing continuous development and improvement use these notes for current builds. When fitting components to the PCB start with the smallest parts first. A surface mount tuning trimmer is now used for tuning but a ceramic piston tuning trimmer will still fit the PCB pads if preferred. Inductors L3 and L4 will obstruct the positioning and soldering of a larger trimmer and should be fitted after a piston style trimmer if used is in position. Some piston trimmers have an extended metal tab which needs careful shortening before fitting to the board. Fine frequency tuning of the OCXO is best done with an external good resolution potentiometer (not supplied) wired between ground and the regulated dc output feed thro' the pot wiper being connected to the varicap tuning control feed thro' In the case of a PLL the dc feedback control is connected to the varicap feed thro' The M3 threaded hole thru the heater plate needs a small 5mm square piece of tape applying over it on the side placed against the PCB before epoxy is applied to prevent the epoxy flowing into the hole and blocking the threads used for securing the TIP31A heater transistor Q7. Ensure you use an epoxy with a suitably high working temperature when attaching the heater plate to the PCB. Araldite precision, blue and white tubes has been found satisfactory for gluing the plate to the board. Only the thinnest smear of epoxy is required and the plate and PCB must be secured together with sticky tape or other means until the epoxy cures to avoid positional slippage. Inductors L3, L5, L7 are wound using the supplied 0.5mm wire on the supplied cocktail stick which is nominally 2mm diameter, a 2mm drill bit is better. Use the table of coil turns/frequency as a guide for the particular crystal frequency in use. The inductor lead outs should be bent to give a 2mm clearance from the inductor to the PCB. Once the inductors L5 and L7 have been stretch/squeeze tuned for maximum output all three inductors can be doped with Polystyrene Cement. L3 is left tight wound as a solenoid coil. A minimum of +4dbm will be obtained with correctly squeezed tuned inductors L5, L7. Initial oscillator testing can be performed without the heater plate or Q7 by following the instructions elsewhere in the Web/CD notes. The TIP31A and its insulator, the thermistor and the crystal should all be smeared during assembly with heat sink paste to ensure good thermal conductivity. The plastic insulator used for Q7 needs shortening to fit Q7 by carefully rubbing on a fine file.

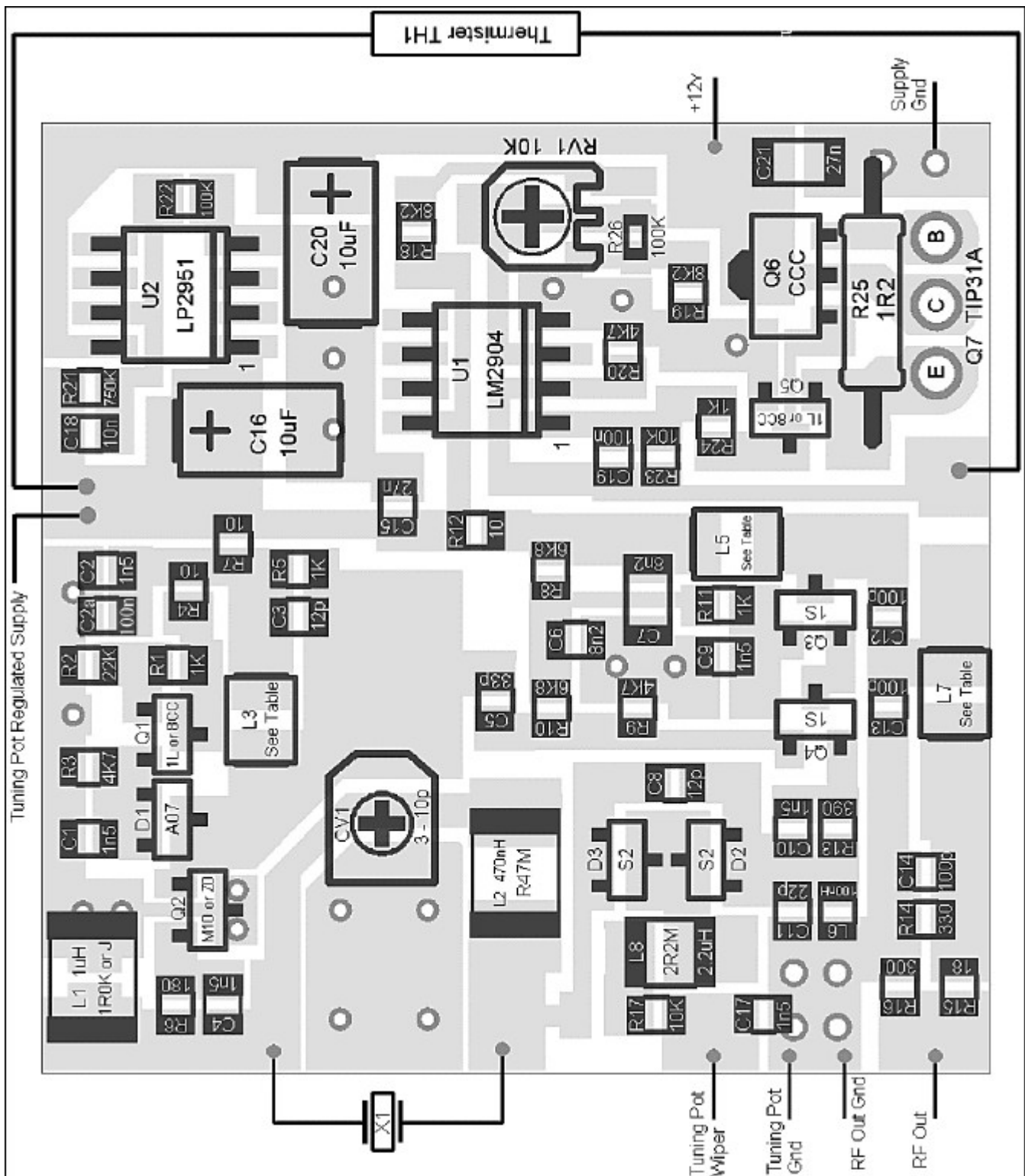
A suggested layout arrangement for the socket and connections through the tin plate box again can be found in my web pages or CD. When drilling the box ensure a wooden or similar block is used to support the box side to prevent distortion. The feed through capacitors should be fed thro the small earth tags supplied to help support the feed through if the hole is slightly oversize. The earth tag also serves for the ground connection for the service on that particular point. The sma may need the insulation and inner conductor shortening before fitting to the box. The OCXO module should be supported firmly in polystyrene or similar thermal insulation inside the box. If the module is used in an outside installation then an extra external layer of insulation is beneficial. The fine frequency control potentiometer can be routed back to the shack if required using two core plus screen cable. The screen ground connection must be made only at the OCXO end and be fully floating elsewhere. Otherwise module supply and heater supply current flowing in the control wire braid will modulate the tuning voltage. The OCXO can be used with the CT1DMK Reflock PLL and other suitable circuits. Visit my website or view CD for Reflock details.

The OCXO will operate down to below 11.5v dc supply voltage for trouble free use when operating portable from 12v battery supplies. In normal operation the dc supply should be moderately stable however. The oven will tolerate a few hundred millivolts change without moving the frequency to any noticeable degree. However larger fluctuations must be avoided otherwise the oven will need to re-stabilise if severe supply voltage changes occur to Q7. A simple external regulator such as a 1 Amp 78L12 should be used for varying/ unstable dc supplies where there is sufficient supply headroom. An LM2941 low headroom design exists for fluctuating supplies in portable use. Contact G8ACE for circuit details.

The crystal for this OCXO should be HC49/U size to fit the heater plate, 5th overtone series resonant AT cut for OCXO use at 60C with turnover point at 60C and calibrated at 60C. Other parameters are normally quoted by the crystal supplier eg. ESR typically 60 ohms.

Oven setup is by measuring for the lowest output frequency versus temperature setting, that sets operation at the knee point in the first instance but the temperature can be modified slightly to minimize the ageing frequency shift encountered if a movement/drift trend is identified in use. A voltage of 6.3v measured at TP1 = 60C operation in the majority of builds. After temperature adjustment is complete correct the precise frequency by tuning and varicap voltage control.

Recent changes: C2a 100n 0603 is fitted adjacent to C2 added June 2008.



Inductor details

Crystal Frequency	94 Mhz	96 Mhz	98 Mhz	100 Mhz	102 Mhz	104 Mhz	106 Mhz	120 Mhz	126 Mhz
L3	12 turns	11 turns	11 turns	11 turns	11 turns	10 turns	9 turns	7 turns	6 turns
L5	10 turns	10 turns	10 turns	9 turns	9 turns	9 turns	8 turns	7 turns	6 turns
L7	14 turns	13 turns	12 turns	12 turns	11 turns	11 turns	9 turns	8 turns	7 turns