RADCOM TECHNICAL FEATURE

A Temperature Controlled Oven

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THIS OVEN AND CONTROLLER were constructed to test the level controlled Vackar oscillator described in the October 1995 issue of *RadCom*.

OVEN CONSTRUCTION

THE 'OVEN' IS constructed from scrap expanded polystyrene packaging material 35mm thick although several layers of ceiling tiles could be used instead. The internal dimensions are 130 x 130 x 65mm which is large enough to contain the VFO module and a heater. This heater comprises a contact cooled wirewound resistor fixed to a 100mm square of 16-gauge aluminium (heater plate). The VFO is in contact with this heater plate to maintain its temperature constant.

Also mounted on the heater plate is an electronic thermometer probe and a plastic cased ZT108 transistor which is used as the temperature sensing element for the oven controller.

The base-emitter voltage of a transistor tends to reduce as its temperature increases, an effect usually regarded as a nuisance, but in this instance it provides a sensitive means of monitoring the oven temperature.

CIRCUIT DESCRIPTION

THE OVEN CONTROLLER, see **Fig 1**, consists of the temperature sensor TR1, emitter-follower TR2 and the Darlington pair TR3 and 4 which supply the heater current. This is monitored by R9 to supply negative feedback via R8 to the base of TR1 where it is compared with the current supplied by R4 from the 'Set Temperature' potentiometer RV1. Initially this bias is insufficient to turn on TR1 so TR2 is fully conducting, which drives TR3 and 4 sufficiently hard for them to be 'bottomed', and maximum current is supplied to the heater.

Eventually TR1 becomes sufficiently warm for its base/emitter voltage to fall to a point where emitter current begins to flow and TR1 collector voltage progressively falls until the current supplied to the heater is just sufficient to maintain the oven temperature.

For the present purposes the oven temperature has been limited to 25 to 26°C, some 5°C above ambient, and the rate of increase of temperature has been severely limited so that the final temperature is reached in a couple of hours.

However, the circuit has the potential for supplying and controlling more power if higher temperature and faster heating is required. To do this will require reducing the resistance of the oven heater and at the same time making a proportional reduction in the current monitor resistance R9.

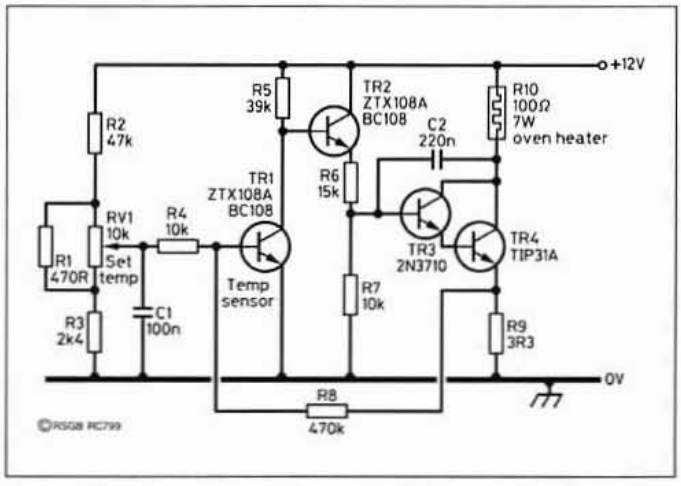

Fig 1: Temperature controlled VFO oven, circuit diagram

CORRECTIONS

IN THE ASSOCIATED article 'Automatic Level Control for VFOs' (*RadCom*, October 1995) Degrees Centigrade was written as C instead of °C.

The expression for C_{max} should be flagged as equation (1) because it is referred to again in the next-to-last line.

$$C_{max} = \frac{(C_2 + C_3) \times C_1}{C_1 + C_2 + C_3} \quad \text{..... (1)}$$

The final equation should read:

$$L1 = \frac{1}{(2\pi f_{LF})^2 C_{max}} = 6.1\mu H$$

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