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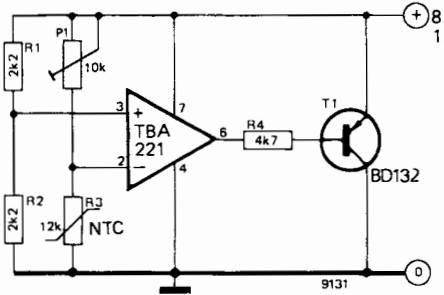
mini-oven

This circuit arrangement will operate as a low-power temperature stabiliser, suitable for 'ovening' quartz crystals.
If the NTC resistor R3 and the transistor T1 (heating element!) are mounted together with the crystal on a metal block, the circuit will hold the temperature of the block constant within 0.5°C. A suitable operating point would be in the range 60 ... 70°C; this can be maintained for ambient temperature 0 ... 40°C with or without supply voltage variations within the range 8 ... 16 V.



The NTC resistor forms one arm of a Wheatstone bridge (R1, R2, R3 and P1). The unbalance voltage from the bridge is applied to the differential input of the TBA 221 op-amp, which operates as a low-hysteresis voltage comparator. The op-amp quickly saturates in one direction or the other, so that the current through T1 is effectively turned on or off. It is the heat dissipation of this transistor which maintains the block temperature above ambient (as required). For optimum performance it is necessary to mount the transistor and the NTC as close as possible to each other.
The values of R1, R2, R3 and P1 have been so chosen that the bridge arms have roughly equal resistance values at the typical operating temperature-range of 60 ... 70°C.

(Mullard)