

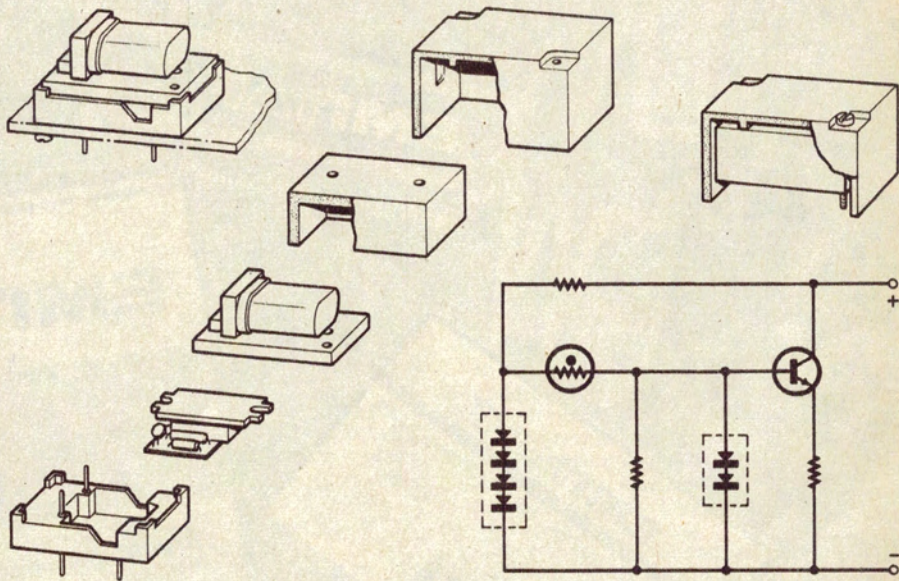
# Temperature Control For Crystal Oscillators

This temperature control device is adaptable to many of the crystal holders currently in use. The control circuit of the TCD is designed for proportional control, each temperature of the sensor being associated with a certain heating power for corrective action. The temperature sensor is a positive temperature coefficient resistor. The sensor's resistance increases with rising temperature, the power transistor current decreases and with it the applied power for heating the crystal. The mean crystal chamber temperature is chosen at  $+75 \pm 5^\circ\text{C}$ .

Notwithstanding the simple design of the control circuit, a very favourable control characteristic has been achieved. Typical variations of the mean crystal chamber temperature over the operating temperature range of 0 to  $+65^\circ\text{C}$ , are  $\pm 1.2^\circ\text{C}$ .

The small dimensions and insulating air gap between heating sheath and case make it possible to operate with a power input of about 2.2 watts for an ambient temperature of  $25^\circ\text{C}$ . In applications where size is not a factor, the power input can be reduced by about 40% by insulating the unit with expanded polystyrene with a wall thickness of about 5mm.

The diagram shows constructional details of the unit. To assure uniform heat distribution, the crystal unit is surrounded by a heating sheath made of a diecast aluminium case and an aluminium plate. The crystal chamber is heated by the power transistor which is mounted underneath the aluminium plate. The electrical components of the control circuit are arranged together on a printed board, located immediately below the power transistor.



Through integration of the baseplate, aluminium plate with socket and control circuit to form the lower section, while the cover with the heating sheath forms the upper section, crystal changing is very simple. After the head screws have been slackened, the upper section can be lifted off and the crystal removed.

The lower section with its four connecting

leads injection moulded into the baseplate remains attached to the printed board to be equipped with components all the way up to the temperature control device. A strip of foam plastic glued to the inside of the heating sheath holds the crystal in position and guards against vibration and shock. (From "Siemens Electronic Components Bulletin".)