

Temperature Controller

THE temperature sensing element in this circuit is the LM3342 current source IC. This is programmed by means of a resistor to pass a current of about 1 mA. Due to the nature of the device the current is not greatly affected by the voltage across it but is affected by the temperature. In fact the current increases linearly as the temperature rises and this is used to generate a voltage proportional to the absolute temperature. In order to make use of this effect we have employed a well-known voltage regulator IC, the 723. This gives us several functions in one device which would otherwise have to be provided separately. First it contains a temperature stable voltage reference which is used to supply the temperature sensor and the reference adjusting potentiometer. Second it contains an operational amplifier with a moderately high gain and lastly it has an output transistor capable of passing up to 150 mA.

The circuit is configured such that increasing temperature tends to reduce the power in the load. To use this in a linear mode feedback can be provided from the output to the inverting input to the op-amp section. The resistor value chosen for this gives about 1 volt per degree Centigrade. For switching mode operation the necessary feed back is provided to the

non-inverting input of the op-amp which gives a sharp on-off action. The rate of switching will depend on external factors such as the thermal inertia and sensor position, etc.

For low power operation it may be possible to omit the output transistor from the circuit and use the 723 output device

only. This is made possible by shorting IC2 pin 10 to R9 using LK1 and replacing R8 with another link.

For wide range operation you may find it necessary to put a resistor of 1k or so across link LK1. The diode D1 is only necessary when inductive loads such as relays or fans are used instead of resistors.

