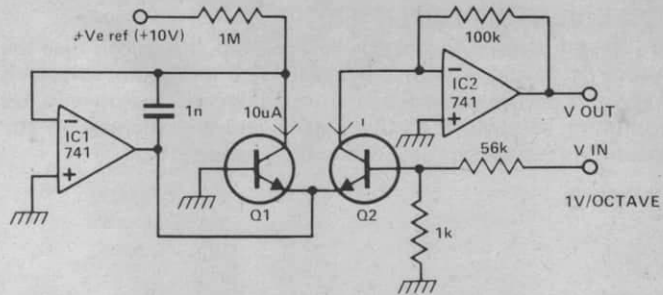


## EXPONENTIAL VOLTAGE TO CURRENT/VOLTAGE CONVERTER

The circuit shown converts a linear input voltage into an exponential current or voltage. This type of circuit is used in music synthesisers to change linear control voltages into musical intervals. That is, if the circuit were used to control an oscillator, input increments of 1 V would change the pitch by one octave. The exponential characteristics of a transistor are employed to generate the correct transfer function. Q1 and Q2 are matched pairs of transistors, preferably a transistor dual. IC1 maintains Q1 at a constant current. Thus, the op-amp serves only to bias the emitter of the second transistor Q2 into a suitable operating region. The purpose of Q1 is to generate this bias voltage. The base-emitter junction of a transistor



has a high temperature coefficient ( $-1.9 \text{ mV}/^{\circ}\text{C}$ ) and so the reason for using a matched pair is to use the first transistor, Q1, to provide temperature compensation for the second.