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DMM AS FREQUENCY METER

By providing a high-input-resistance multimeter (preferably of the digital type) with a frequency-to-voltage converter, it can be used to measure frequency.

The range of the proposed device extends from 10 Hz to 1 kHz on range A and from 1 kHz to 100 kHz on range B. The sensitivity for frequency measurements up to about 10 kHz is of the order of 35 mV_{pp}, and for measurements from 10 kHz to 100 kHz about 350 mV_{pp}.

The input signal is applied to Schmitt trigger IC₁ via limiters D₁ and D₂. Bistables FF₁ and FF₂ and IC₂ form a monostable. When the monostable is triggered, it generates a pulse whose width is accurately determined by a 12-MHz crystal.

The number of times the monostable is triggered per unit time depends on the

input signal.

The pulse height depends on the supply of the monostable. The supply is provided by voltage regulator IC₃ and is about 5 V.

At the output of the monoflop, i.e., pin 13 of FF₂, there will thus be a train of pulses, whose width and height are constant, but whose number and, therefore, the average voltage is directly proportional to the input frequency.

The RC network at the output of FF₂ forms a low-pass filter, so that the average voltage of the pulses will appear across C₄.

Potentiometers P₁ and P₂ and resistors R₇ and R₈ form a potential divider which enables the frequency-to-voltage conversion factor to be adjusted.

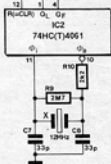
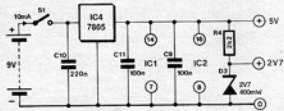
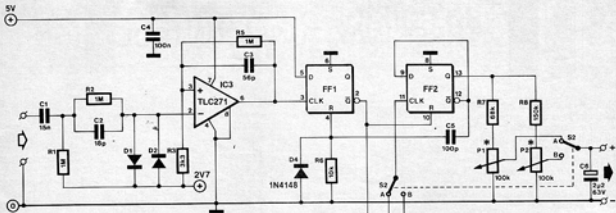
The voltage across C₄ measured by the DMM is thus directly proportional to the

frequency of the input signal.

In range A, a voltage of 10 mV corresponds to 10 Hz, and 1 V to 1 kHz. In range B, 10 mV corresponds to 1 kHz, and 1 V to 100 kHz.

For adjusting the meter, temporarily connect the junction of R₇ and R₈ to pin 12 instead of to pin 13 of FF₂. There should be no input signal. Set the DMM to the 20 V range, and connect it across C₄. Set S₁ to position A, and adjust P₁ until the meter reads 2.93 V. Then set the meter to the 2 V range, and S₂ to position B. Now adjust P₂ until the meter reads 1.875 V. Finally, reconnect the junction of R₇ and R₈ to pin 13 of FF₂.

The meter may be powered by a 9-V PP3 battery: the current consumption amounts to only 10 mA.



D1, D2 = 1N4148
 FF1, FF2 = IC1 = 4013

* multitem