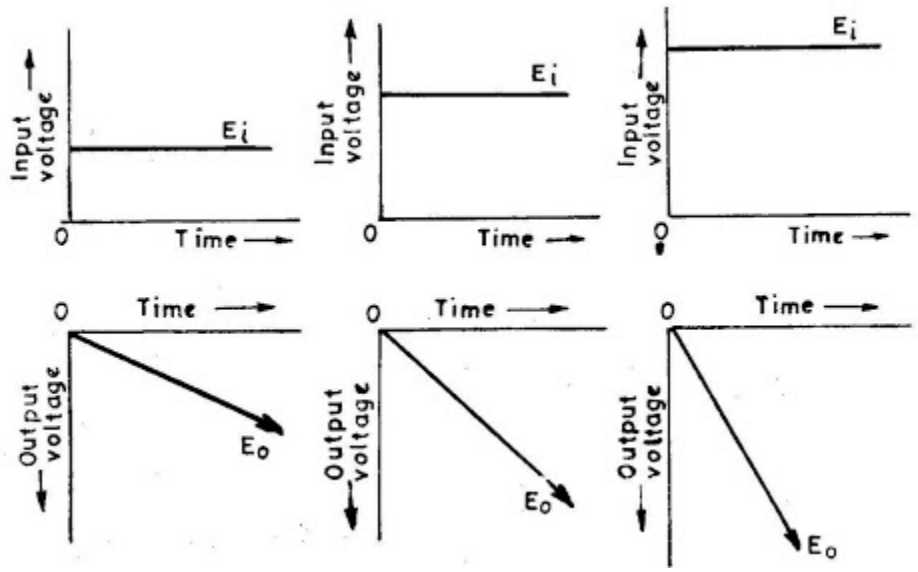
INTEGRATING TYPE DIGITAL VOLTMETER

- The voltmeter measures the true average value of the input voltage over a fixed measuring period.

- In contrast the ramp type DVM samples the voltage at the end of the measuring period.

- This voltmeter employs an integration technique which uses a voltage to frequency conversion.

- The voltage to frequency (VIF) converter functions as a feedback control system which governs the rate of pulse generation in proportion to the magnitude of input voltage.



- Actually when we employ the voltage to frequency conversion techniques, a train of pulses, whose frequency depends upon the voltage being measured, is generated.

- Then the number of pulses appearing in a definite interval of time is counted.

- Since the frequency of these pulses is a function of unknown voltage, the number of pulses counted in that period of time is an indication of the input (unknown) voltage.

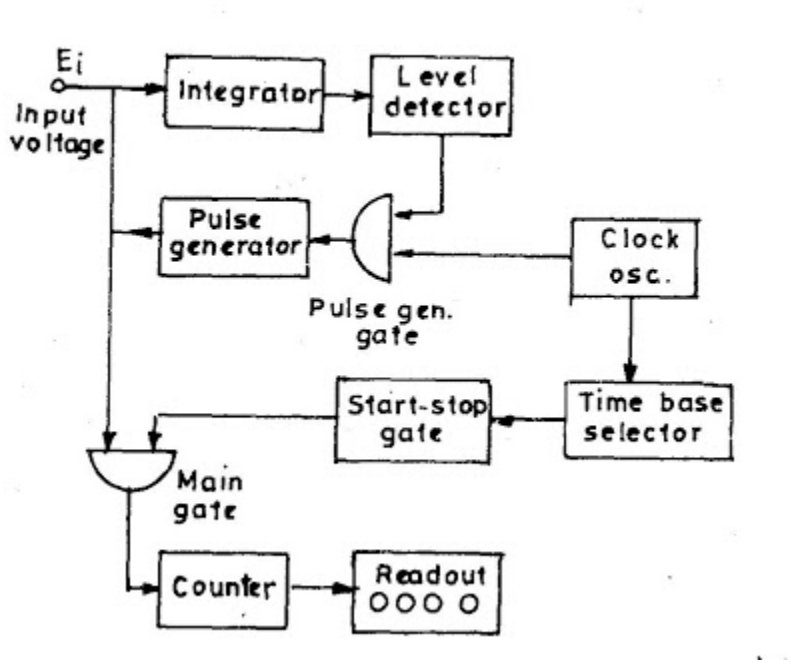
- The heart of this technique is the operational amplifier acting as an Integrator.

- Output voltage of integrator E = -Ei / RC*t

- Thus if a constant input voltage E is applied, an output voltage E is produced which rises at a uniform rate and has a polarity opposite to that input voltage.

- In other words, it is clear from the above relationship that for a constant input voltage the integrator produces a ramp output voltage of opposite polarity.

The basic block diagram of a typical integrating type of DVM is shown in



- The unknown voltage is applied to the input of the integrator, and the output voltage starts to rise.

- The slope of output voltage is determined by the value of input voltage

- This voltage is fed a level detector, and when voltage reaches a certain reference level, the detector sends a pulse to the pulse generator gate.

- The level detector is a device similar to a voltage comparator. The output voltage from integrator

is compared with the fixed voltage of an internal reference source, and, when voltage reaches that level, the detector produces an output pulse.

- It is evident that greater then value of input voltage the sharper will be the slope of output voltage and quicker the output voltage will reach its reference level.

- The output pulse of the level detector opens the pulse level gate, permitting pulses from a fixed frequency clock oscillator to pass through pulse generator.

- The generator is a device such as a Schmitt trigger that produces an output pulse of fixed amplitude and width for every pulse it receives.

- This output pulse, whose polarity is opposite to that of and has greater amplitude, is fedback of the input of the integrator.

- Thus no more pulses from the clock oscillator can pass through to trigger the pulse generator.

- When the output voltage pulse from the pulse generator has passed, is restored to its original value and starts its rise again.

- When it reaches the level of reference voltage again, the pulse generator gate is opened.

- The pulse generator is trigger by a pulse from the clock generator and the entire cycle is repeated again.

- Thus, the waveform of is a saw tooth wave whose rise time is dependent upon the value of output voltage and the fail time is determined by the width of the output pulse from the pulse generator.

- Thus the frequency of the saw tooth wave is a function of the value of the voltage being measured.

- Since one pulse from the pulse generator is produced for each cycle of the saw tooth wave, the number of pulses produced in a given time interval and hence the frequency of saw tooth wave is an indication of the voltage being measured.

Source : http://mediatoget.blogspot.in/2011/12/integrating-type-digital-voltmeter.html