Digital Measurement of Time

operation

The beginning of the time period is the start pulse originating from input 1 + end of the time period is the stop pulse from input 2.

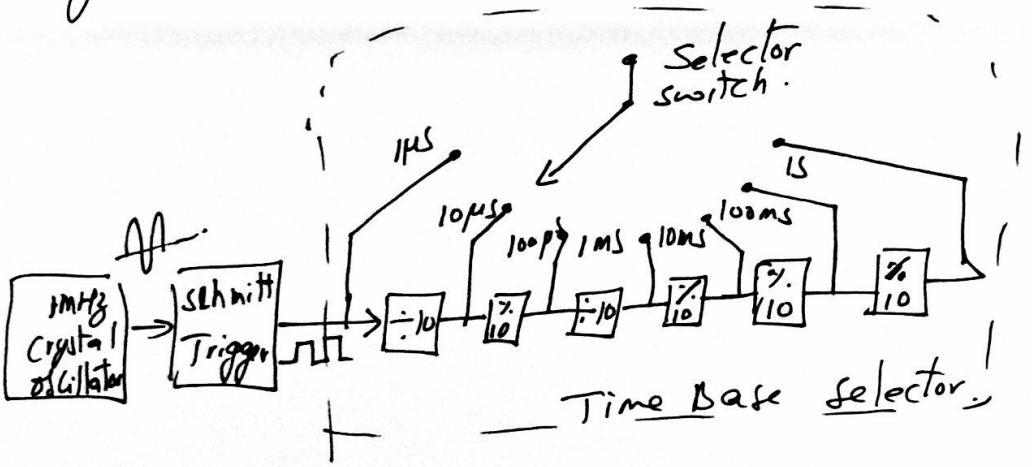
The oscillator runs continuously, but the oscillator pulses reach the o/p only during the period when the control F/F is in 1 state. The number of o/p pulses counted is a measure of the time period.

Time Base selector

To know the value of frequency of the input signal, the time interval between the start and stop of the gate must be accurately known. This is called time base.

A fixed frequency crystal oscillator which is very accurate due to the use of crystal is used for the time base circuit. The output is fed to a Schmitt Trigger, which converts the input sine wave to an o/p consisting of a train of pulses at a ~~rate~~ rate equal to the frequency of the clock oscillator. The train of pulses then passes through a series of frequency divider decade assemblies connected in cascade. Each decade divider consists of a decade

counter and divides the frequency by ten. outputs are taken from each decade frequency divided by means of a selector switch. Any o/p may be selected.



A oscillator is having a 1MHz. frequency. The o/p of Schmitt Trigger is 10^6 pulses per second & this point corresponds to a time of 1μs. Hence by using a 6 decade frequency dividers, a time base with a range of 1μs - 10μs ---- 1S can be selected.

Measurement of Time (Period measurement)

In some cases it is necessary to measure the time period rather than the frequency. Especially true in the measurement of frequency in the low freq range. To obtain good accuracy at low frequency we should take measurements of the period rather than make direct frequency measurements.

Fig (a) shows the circuit for measurement of time period. The gating signal is derived from the unknown input signal, which controls the enabling & disabling of the main gate. The number of pulses which occur during one period of the unknown signal are counted & displayed by the decade counting assemblies.

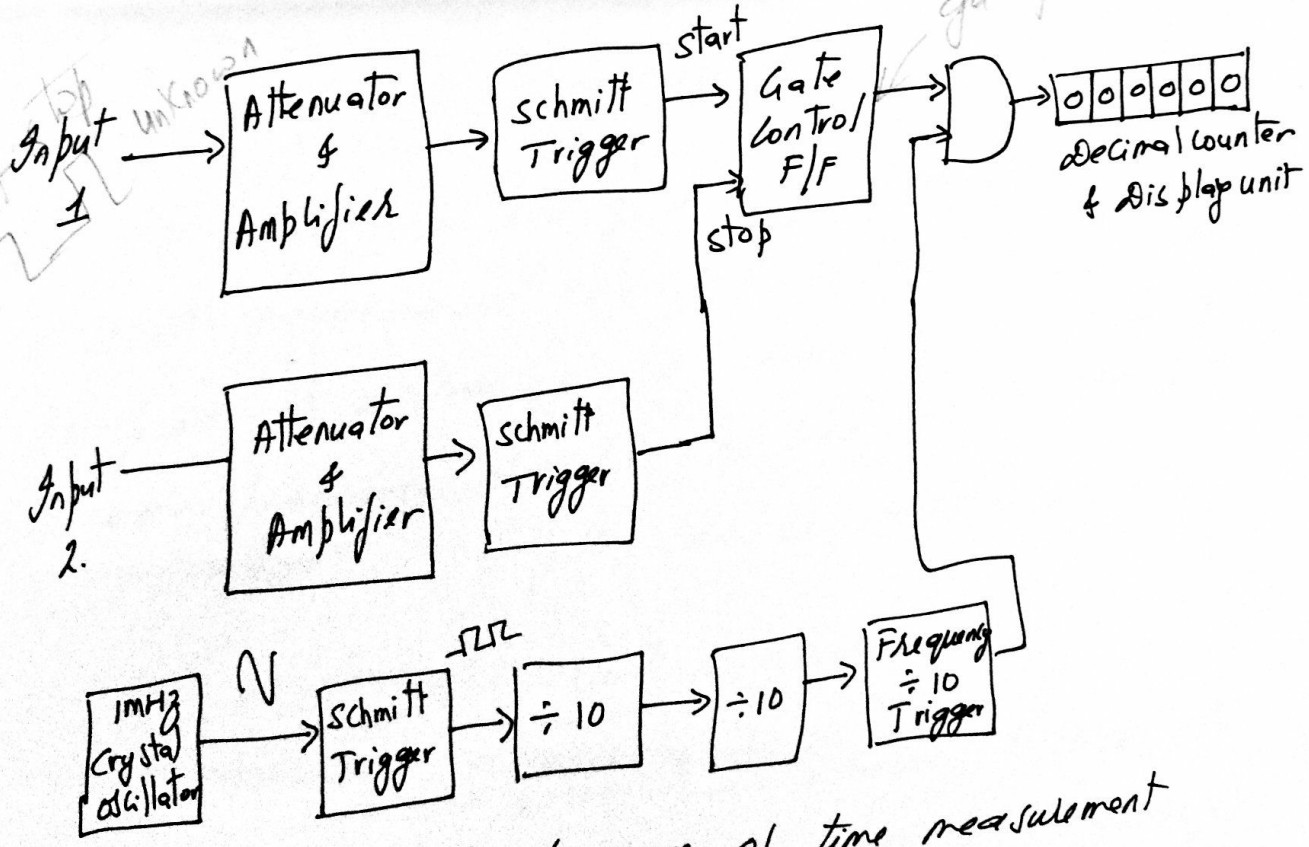


Fig (a) Basic block diagram of time measurement

The circuit used for measuring frequency can be used for the measurement of time period if the counted signal & gating signal are interchanged.