FUNCTIONS OF DIGITAL FREQUENCY METER

1. Input signal conditioning circuit :

In this circuit, an amplifier and schmitt trigger are included. The threshold voltage 01 the schmitt trigger can be controlled by sensitivity control on the control panel. First of all the input signal of unknown frequency is fed into input signal conditioning circuit. There the signal is amplified and then it is converted into square wave by schmitt trigger circuit.

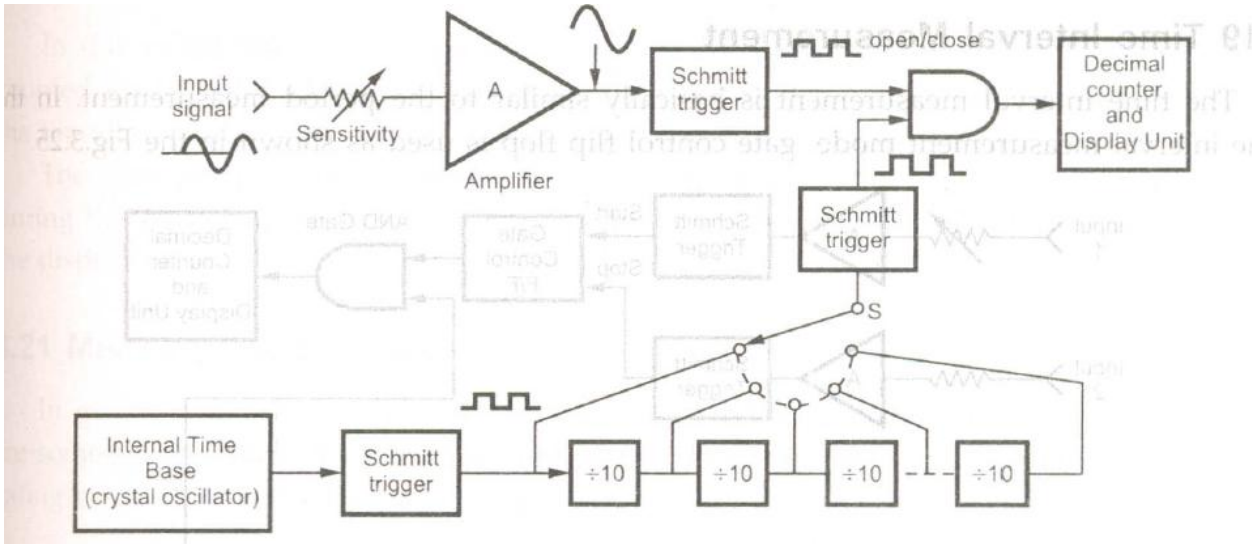
2. Time base generator:

The crystal oscillator produces a signal of 1 MHz or 100 MHz depending upon the requirement. In general, the accuracy of the digital frequency counter depends on the accuracy of the time base signals produced, thus the temperature compensated crystal oscillator is used. rhen output of the oscillator is passed through another schmitt trigger circuit producing square wave output. Then it is fed to frequency dividers connected in cascade. Thus a train of pulses are obtained after each frequency divider section. Using time base selector switch 5 the Gate **Time** can be adjusted. The gating circuit consists of AND gate. When the enable signal is provided to the A D gate, it allows a train of pulses to pass through the gate for the time period selected by the time base circuit. The pulses are counted and then the second pulse generated from the time base generator disables AND gate and thus closes it.

Tn this unit, decade counters are connected in the cascade. The output of the A TD gate is connected to the clock input of the first decade counter. Then the output of this counter to the clock inpllt of next and so on. Using these counters the number of pulses are counted and are displayed by the display unit. As the number of pulses counted are proportional to the input signal frequency, the final display is proportional to the unknown frequency of the input signal.

Using the frequency counter, the period measurement is possible. As we know, time period T == 1/ f. 50 if the frequency to be measured is low, then the accuracy of the frequency counter decreases as less number of pulses are connected to the gating circuit.

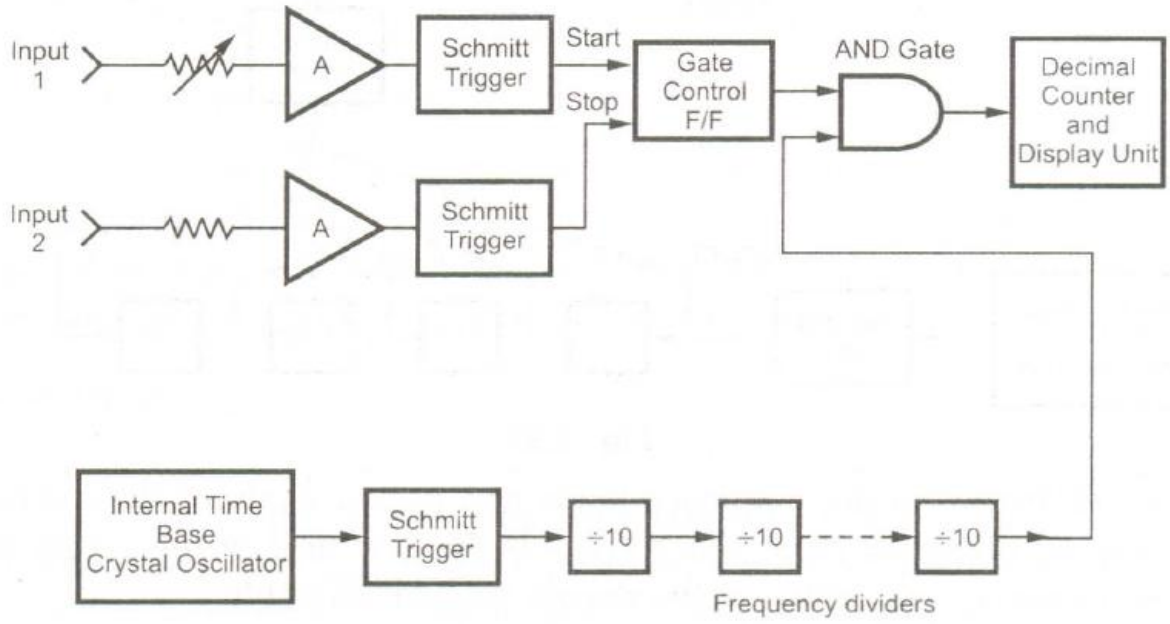
Thus in low frequency region it is better to measure period rather than frequency. The block diagram of the period mode of the digital frequency counter is as shown in the Fig



The main difference in the frequency mode and period mode of the digital frequency counter is that the unknown input signal controls the gate time of the gating circuit while the time base frequency is counted in the decade counter assembly. Note that in the period mode, the input signal conditioning circuit produces a train of pulses. So the positive going zero crossing pulses are used as trigger pulses for opening and closing of AND gate in the gating circuit. The main advantage of the period mode is that the accuracy is grealer for the low frequency input signals.

Time interval measurement:

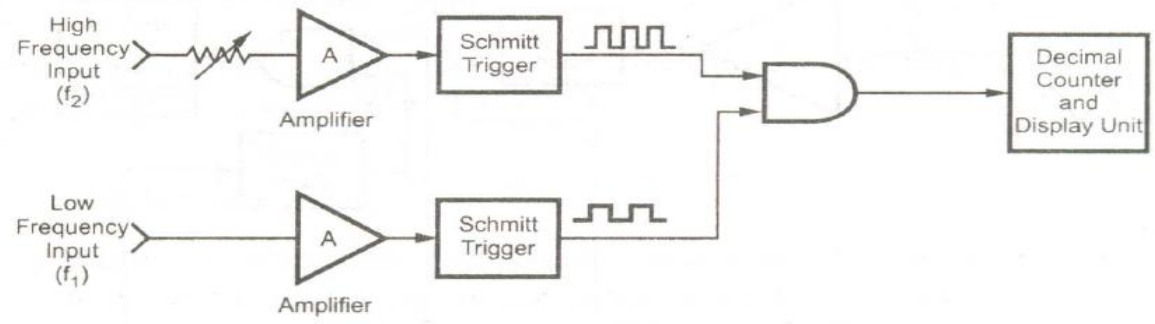
The time interval measurement is basically similar to the period measurement. In the time interval measurement mode, gate control flip flop is used as shown in the Fig



In this measurement mode, two inputs are used to start and stop the counting. Here similar to the period measurement, the internal frequency pulses generated by time base generator circuit are counted. The start and stop signals are derived from two inputs. The AND gate is enabled with the external input 1 applied. The counting of the pulses starts at this instant. The AND gate is disabled with the input 2 applied. Thus pulses are counted in the time interval which is proportional to the time interval between application of inputs 1 and 2.

Frequency ratio measurement:

By using the frequency counter, the ratio of two frequencies can be measured. It is again similar to period measurement. The block diagram is as shown in the Fig.



In this mode, the low frequency signal is used as gating signal, while the pulses are counted for the high frequency signal. Hence it is clear that the low frequency represents the time base.

The number of pulses corresponding to the high frequency signal f2 are counted during the period of the low frequency signal f1, by the decade counters and displayed by the display unit.

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