Function Generator Tutorial: Agilent 33120A

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Introduction

The Agilent 33120A function generator is a signal source which provides precision sine, square, or triangular waveform signals over the 0.1 mHz to 15 MHz frequency range. The instrument also provides a continuously variable dc offset, variable duty cycle, and the clock signal voltage levels adjusted to TTL Integrated Circuit components.

Definition of Terms

Period of a periodic signal x(t) is the smallest time interval T for which x(t+T)=x(t) holds for any time t. A fundamental segment of a periodic signal's waveform spans one period of the signal's waveform.

Frequency of a periodic signal is the number of periods (cycles) through which the signal goes per second. The frequency is the inverse measure of the period.

Duty Cycle of a square waveform signal is the ratio of the the high signal value to the low signal value time intervals within a signal's period.

DC Offset of a periodic voltage/current signal is the quantity representing the average signal value calculated over one period of the signal (constant voltage/current component of a voltage/current waveform).

Signal Frequency and Waveform Selection

Turn the function generator on by engaging the **POWER** button.

Select the desired signal waveform (SINE, SQUARE, or TRIANGLE) by engaging one of the **FUNCTION** buttons.

Select the signal frequency by pressing the **FREQ** button then using the right and left arrow keys and turning the knob.

The signal of desired frequency appears at the **OUTPUT** jack.

Signal Level Selection

The Agilent 33120A provides fixed voltage signals (on the **SYNC** port), and adjustable voltage signals (on the **OUTPUT** port). The fixed voltage signals are specifically adjusted to the needs of the TTL Integrated Circuits (**IC**). In all Lab exercises, except for the first part of Lab Assignment#1, the fixed TTL voltage level (**SYNC** port) must be used to protect the ICs from damage.

For the first part of the Lab Assignment#1 only, adjust the amplitude of the output as desired using the **AMPLITUDE** control. A signal of desired amplitude and frequency appears at the **OUTPUT** jack. The maximum signal level is 10 V p-p (into 50 Ohm).

A superimposed DC component can be added to the output signal by pressing the **OFFSET** button. This enables the **DC OFFSET** control, which is used to regulate the amount of DC offset added to the signal.

TTL Square Wave Generation

The **SYNC** output jack provides a fast rise time square wave output with fixed TTL output level. The TTL-level square wave will be the most often used function during our lab experiments. It will serve as an external clock signal for synchronizing the logic/digital circuit operation. The following procedure should be carefully followed in order to avoid damage to IC components:

- connect the output cable to the **SYNC** jack.
- turn on the **POWER** switch.
- select the desired **FREQUENCY** as required. Note that **OUTPUT LEVEL** and **DC OFFSET** controls have no effect on the **SYNC** port.

The desired clock signal appears at the **SYNC** port.

NOTE: In order to avoid damage to Integrated Circuit components, use always TTL LEVEL for clock signal (square wave) generation, and never use the **OUTPUT** port!!