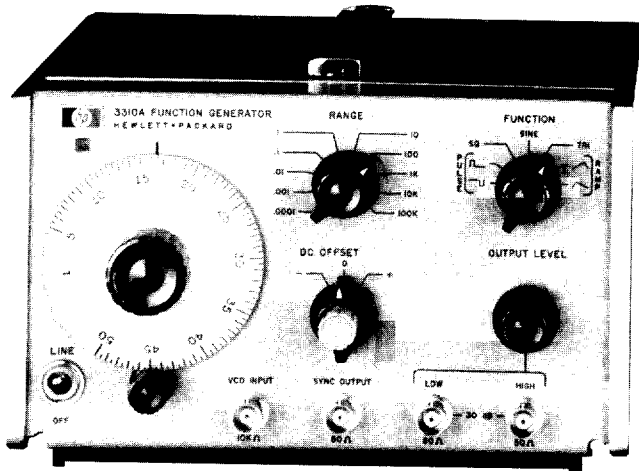


# FUNCTION GENERATORS & FREQUENCY SYNTHESIZERS

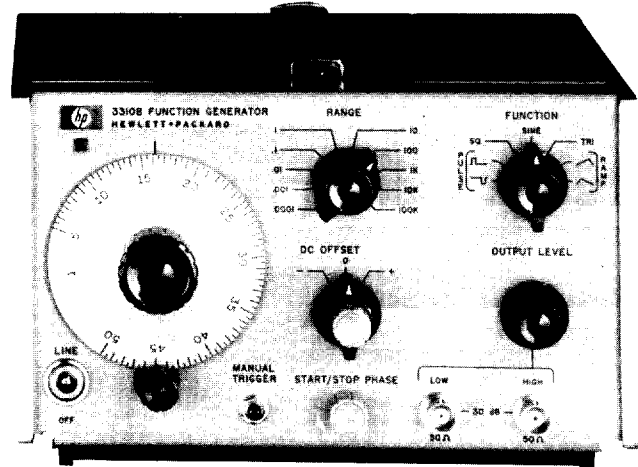
0.0005 Hz to 5 MHz Function Generators

Model 3310A/B

331



3310A



3310B

## Description

The 3310A Function Generator is a compact voltage-controlled generator with 10 decades of range. Ramp and pulse functions are available in addition to sine, square and triangle. DC offset and external voltage control provide wide versatility. A fast rise time sync output is provided. Aspect ratio of nonsymmetrical function is 15%/85%.

The 3310B has all the features of the standard 3310A plus single and multiple cycle output capability.

## 3310A Specifications

**Output waveforms:** sinusoidal, square, triangle, positive pulse, negative pulse, positive ramp and negative ramp. Pulses and ramps have a fixed 15% or 85% duty cycle.

**Frequency range:** 0.0005 Hz to 5 MHz in 10 decade ranges.

### Sine Wave Frequency Response

**0.0005 Hz to 50 kHz:**  $\pm 1\%$ ; 50 kHz to 5 MHz:  $\pm 4\%$ . Reference, 1 kHz at full amplitude into 50  $\Omega$ .

### Dial Accuracy

**0.0005 Hz to 500 kHz all functions:**  $\pm (1\% \text{ of setting} + 1\% \text{ of full scale})$ .

**500 kHz to 5 MHz sine, square and triangle:**  $\pm (3\% \text{ of setting} + 3\% \text{ of full scale})$ .

**500 kHz to 5 MHz pulse and ramps:**  $\pm (10\% \text{ of setting} + 1\% \text{ of full scale})$ .

**Maximum output on high:**  $> 30 \text{ V p-p}$  open circuit:  $> 15 \text{ V p-p}$  into 50  $\Omega$  (except for pulses at frequency  $> 2 \text{ MHz}$ ).

**Pulse (frequency  $> 2 \text{ MHz}$ ):**  $> 24 \text{ V p-p}$  open circuit:  $> 12 \text{ V p-p}$  into 50  $\Omega$ .

**Minimum output on low:**  $< 30 \text{ mV p-p}$  open circuit:  $< 15 \text{ mV p-p}$  into 50  $\Omega$ .

**Output level control:** range  $> 30 \text{ dB}$ . High and low outputs overlap for a total range of  $> 60 \text{ dB}$ ; low output is 30 dB down from high output.

### Sine Wave Distortion

**0.0005 to 10 Hz:**  $> 40 \text{ dB}$  (1%).

**10 Hz to 50 kHz (on 1 k range):**  $> 46 \text{ dB}$  (0.5%).

**50 kHz to 500 kHz:**  $> 40 \text{ dB}$  (1%).

**500 kHz to 5 MHz:**  $> 30 \text{ dB}$  (3%).

**Square wave and pulse response:**  $< 30 \text{ ns}$  rise and fall times at full output.

**Triangle and ramp linearity:** 0.0005 Hz to 50 kHz,  $< 1\%$ .

**Impedance:** 50  $\Omega$ .

### Sync

**Amplitude:**  $> 4 \text{ V p-p}$  open circuit,  $> 2 \text{ V p-p}$  into 50  $\Omega$ .

## DC Offset

**Amplitude:**  $\pm 10 \text{ V}$  open circuit,  $\pm 5 \text{ V}$  into 50  $\Omega$  (adjustable).

**Note:** max V ac peak + V dc offset is  $\pm 15 \text{ V}$  open circuit,  $\pm 7.5 \text{ V}$  into 50  $\Omega$ .

**External frequency control:** 50:1 on any range.

**Input requirement:** with dial set to low end mark, a positive ramp of 0 to  $+10 \text{ V} \pm 1 \text{ V}$  will linearly increase frequency 50:1. With dial set at 50, a linear negative ramp of 0 to  $-10 \text{ V} \pm 1 \text{ V}$  will linearly decrease frequency 50:1. An ac voltage will FM the frequency about a dial setting within the limits  $(1 < f < 50) \times \text{range setting}$ .

**Linearity:** ratio of output frequency to input voltage ( $\Delta F/\Delta V$ ) will be linear within 0.5%.

**Sensitivity:** approximately 100 mV/minor division.

**Input impedance:** 10 k $\Omega$ .

## General

**Power:** 115 V or 230 V  $\pm 10\%$ , 48 Hz to 440 Hz,  $< 20 \text{ VA}$  max.

**Size:** 114 mm H (without removable feet) x 197 mm W x 203 mm D (4.5" x 7.8" x 8").

**Weight:** net, 2.7 kg (6 lb); shipping, 4.5 kg (10 lb).

## Accessories Available

For rack mounting, order HP 5060-8762 Rack Adapter Frame; 5060-8540, 5060-8760 Filler panels.

## 3310B Specifications

Same as 3310A with the following additions:

**Modes of operation:** free run, single cycle, multiple cycle.

**Triggered frequency range:** 0.0005 Hz to 50 kHz (usable to 5 MHz in normal mode).

**Single cycle\*\*:** ext trigger (ac coupled) requires a positive-going square wave or pulse from 1 V p-p to 10 V p-p. The triggering signal can be dc offset, but  $(V \text{ ac peak} + V \text{ dc}) \leq \pm 10 \text{ V}$  ext gate (dc coupled) will trigger a single cycle on any positive waveform  $\geq 1 \text{ V}$  but  $\leq 10 \text{ V}$  which has a period greater than the period of the 3310B output, and a duty cycle less than the period of the 3310B output. The gate signal cannot exceed 10 V.

**Multiple cycle\*\*:** manual trigger will cause the 3310B to free run when depressed. When the trigger button is released, the waveform will stop on the same phase as it started. Ext. gate will cause the 3310B to free run when the gate is held at between +1 and +10 V. When the gate signal goes to zero, the 3310B will stop on the same phase as it started.

**Start-stop phase:** the start-stop phase can be adjusted over a range of approximately  $\pm 90^\circ$ .

## Ordering Information

**3310A** Function Generator

**3310B** Function Generator

**Price**

\$1060

\$1160

\*\* This specification applies on the X.0001 to X 1k range only.