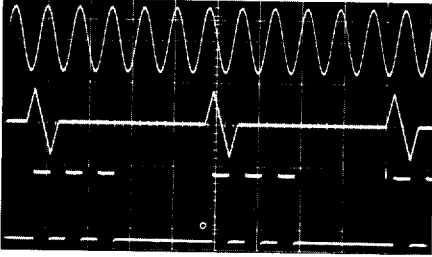


4 MHz Function Generators



- 0.004 Hz to 4 MHz Frequency Range
- Trigger and Gate Modes
- 20 Volt Peak-to-Peak Output
- DC Offset with Calibrated Zero
- 1000:1 Lin/10,000:1 Log Sweep (188)

Wide Frequency Range

Models 182A and 188 cover a wide 4 mHz to 4 MHz frequency span in seven overlapping ranges. Each multiplier setting gives a full 1000:1 frequency band.

In addition, the Model 188 also has a 10,000:1 logarithmic frequency range.

Trigger and Gate

In triggered mode, your manual or external TTL signal initiates a single waveform cycle. Gated mode is similar except there is a burst of waveform cycles for the duration of the signal.

Sweep (Model 188)

In addition to trigger and gates modes, Model 188 has a ramp generator to sweep its main

generator. With sweep, the output frequency repeatedly sweeps up at the desired rate in a selected linear (3 decades) or logarithmic (4 decades) mode.

Output

High level output is a full 20 volts peak-to-peak from a 50Ω termination) with maximum peak current of 100 milliamperes. This high power output allows you to drive low impedance and capacitive loads without saturating or degenerating the waveform output. In addition to high level output, both instruments have a low level (down 20 dB from the high level) output. Both outputs can be varied a full 30 dB.

Voltage Controlled Generator

You can externally modulate or sweep the generator frequency in

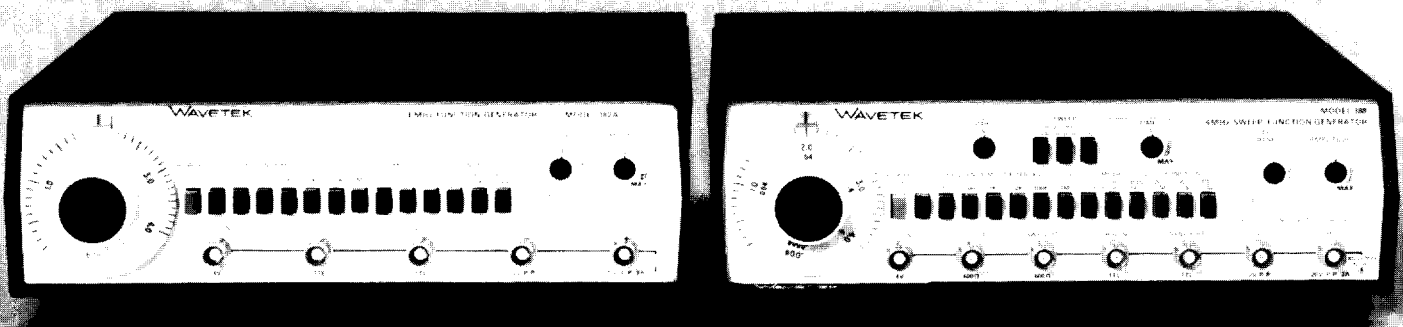
each of its 1000:1 ranges with dc or ac signals. (Model 188 range is 10,000:1 in logarithmic mode.) For example, you can sweep the entire 40 Hz to 40 kHz audio band without switching ranges.

DC Offset With Calibrated Zero

Convenient front panel dc offset control lets you easily raise or lower the output waveform with respect to normal signal ground. Turning the DC offset switch off balances the waveform at a calibrated zero offset.

TTL Pulse Output

For your convenience, these models have an auxiliary TTL pulse output at generator frequency for synchronization or for digital applications.



MODELS 182A & 188

FUNCTION GENERATORS

VERSATILITY

Waveforms

Sine \sim , triangle ∇ , square \square , TTL pulse \square and dc.

Operational Modes

Continuous: Generator runs continuously at selected frequency.

Triggered: Generator is quiescent until triggered by external signal or manual trigger, then generates one complete waveform cycle starting at 0° and at selected frequency.

Gated: As triggered mode, except output continues for duration of gate signal. Last waveform started is completed.

Sweep: (188 only.) Recurring low-to-high frequency oscillation. Range, rate and mode (linear or logarithmic) selectable.

Sweep Stop: (188 only.) Frequency sweeps to high sweep limit. Used to set high frequency limit.

Frequency Range

0.004 Hz to 4 MHz in 7 overlapping decade ranges.

Function Output (50 Ω OUT)

\sim , \square , ∇ selectable and variable to 20 Vp-p (10 Vp-p into 50 Ω) HI output, and to 2 Vp-p (1 Vp-p into 50 Ω) LO output. Both outputs varied with a 30 dB vernier. Peak output current is 100 mA maximum (HI output). Source impedance is 50 Ω .

DC Offset and DC Output

Waveform offset and dc output selectable and variable through HI and LO BNC outputs. DC output selectable by not selecting a waveform function. HI output is ± 10 V max (± 5 V into 50 Ω) as offset or Vdc output. Signal-peak plus offset limited to ± 10 V (± 5 V into 50 Ω). LO output is ± 1 V max (± 0.5 V into 50 Ω) as is signal-peak plus offset limit. DC offset plus waveform attenuated proportionately at LO (-20 dB) output.

TTL Pulse Output

TTL pulse (50% duty cycle) at generator frequency. Drives up to 20 TTL loads.

GCV—Generator Controlled Voltage

(188 only.) 0 to 4V open circuit output from 600 Ω source impedance. Proportional to frequency of main generator. For use as a horizontal drive signal.

VCG—Voltage Controlled Generator

With external 0 to ± 4 V signal:

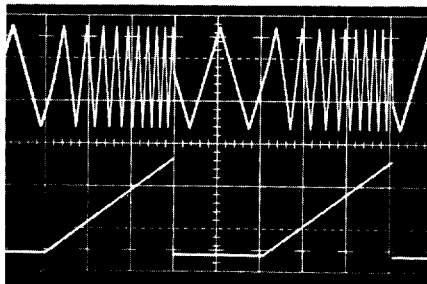
Linear Mode: Up to 1000:1 frequency change.

Log Mode: (188 only.) Up to 10,000:1 change. Upper and lower frequencies limited to maximum and minimum of selected range.

Slew Rate: 2% of range per μ s (linear); 0 to 100% of range in 20 ms (logarithmic).

Linearity: $\pm 0.5\%$ thru $\times 100$ K range; $\pm 2\%$ on $\times 1$ M range.

Input Impedance: 2 k Ω .



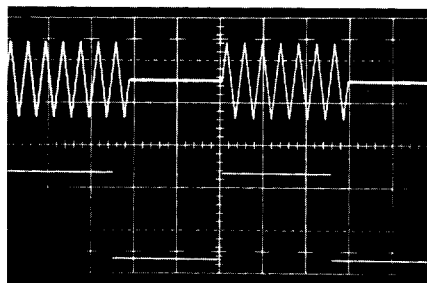
VCG Input (lower) and Generator Output

Trigger and Gate

Input: TTL compatible levels.

Pulse Width: 50 ns minimum.

Repetition Rate: 4 MHz maximum.



Trigger Input (lower) and Generator Output

Sweep (188)

Main generator is frequency modulated by internal sweep generator. Main generator frequency repeatedly rises from frequency set by dial and range button to frequency set by sweep stop knob.

Sweep Mode: Linear (3 decades max) or logarithmic (4 decades max).

Sweep Rate: 30 ms to 1 min (nominal) continuously adjustable.

Sweep Width: Up to 1:1000 (linear) or 1:10,000 (logarithmic) continuously adjustable.

Sweep Output (188)

Ramp waveform output with 4V peak into open circuit. For use as a horizontal drive signal.

Source Impedance: 600 Ω .

FREQUENCY PRECISION

Dial Accuracy

$\pm 5\%$ of full scale.

Time Symmetry

Square wave variation from 0.2 to 4.0 on dial:

To 100 kHz: $< \pm 1\%$

To 4 MHz: $< 5\%$.

AMPLITUDE PRECISION

Sine variation (referenced to 1 kHz with frequency—

On All Ranges Through $\times 100$ K: $< \pm 0.2$ dB.

To 4 MHz: $< \pm 1.0$ dB.

WAVEFORM CHARACTERISTICS

Sine Distortion

On Ranges—

$\times 1$ K and $\times 10$ K: $< 0.5\%$.

$\times 1$, $\times 10$, $\times 100$ and $\times 100$ K: $< 1\%$.

X1M: All harmonics 25 dB below fundamental.

Triangle Linearity

Greater than 99% to 200 kHz.

Square Wave Rise and Fall Time

At HI output, less than 50 ns for 10 Vp-p output into 50 Ω termination.

GENERAL

Environment

Specifications apply at $23^\circ \pm 5^\circ$ C. Instrument will operate from 0° to 50° C ambient temperatures.

Dimensions

28.6 cm (11 $\frac{1}{4}$ in.) wide; 8.9 cm (3 $\frac{1}{2}$ in.) high; 26.7 cm (10 $\frac{1}{2}$ in.) deep.

Weight

182A: 2.5 kg (5.4 lb) net; 3.6 kg (8 lb) shipping.

188: 2.5 kg (5.4 lb) net; 3.6 kg (8 lb) shipping.

Power

90 to 128V or 198 to 256V (selectable); 48 to 66 Hz; less than 15 VA.

NOTE: All specifications apply for dial between 0.2 to 4.0; amplitude at 10 Vp-p from HI output into 50 Ω termination.

FACTORY/FOB

San Diego, CA