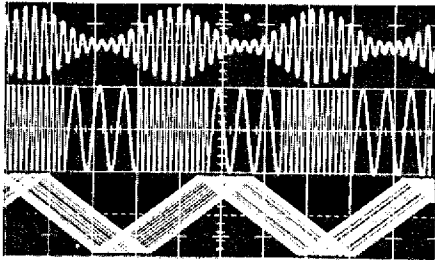


20 MHz AM/FM/PM Generator



- Two Complete Generators
- Internal or External AM, FM and Phase Modulation
- 0.0002 Hz to 20 MHz, 30V Output
- Sweep, Trigger and Gate
- 30 Volt Peak-to-Peak Output

Two Complete Generators

Wavetek's Model 148A AM/FM/PM Generator gives you a one instrument source of modulated waveforms. It has two generators: a main function generator, with full function generator versatility, and a modulation generator, a convenient source for modulating and triggering waveforms or a second, independent signal source.

Internal or External Modulation

Modulation may be internal or external in any combination. Amplitude may be modulated from zero through 100% and in a suppressed carrier

mode; frequency may be modulated or swept to three decades; and phase may be modulated a full plus or minus 50 degrees.

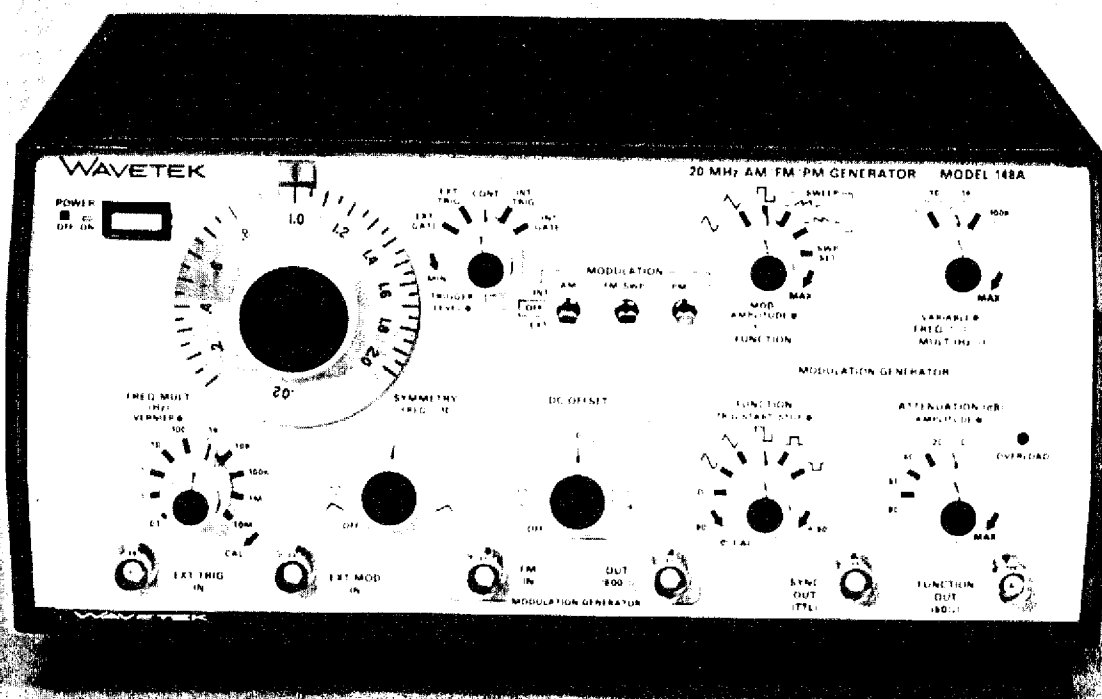
Function Generator

The main generator generates from 200 μ Hz to 20 MHz in continuous, triggered and gated modes with a 30V peak-to-peak maximum amplitude. A unique overload LED indicates output clipping due to excessive amplitude plus offset. Variable symmetry and trigger stop/start controls provide additional special waveforms, and a four step

attenuator with vernier provides 80 dB of amplitude control. A variable trigger level control accepts main generator triggering signals from the modulation generator or trigger signals from an external source.

Generates Complex Waveforms

Main generator frequency, amplitude and triggering source are independently or simultaneously controlled by the modulation generator or external signal. The model 148A can generate an unlimited variety of complex waveforms.



VERSATILITY

Instrument consists of a main generator and a modulation generator which can be connected internally for amplitude, frequency or phase modulated signals or for self-triggering and tone burst signals.

MAIN GENERATOR**Waveforms**

Sine \sim , triangle ∇ , square \square , positive square \sqcap , negative square \sqcup , TTL pulse and dc.

Operational Modes

Continuous, external trigger and gate, and internal trigger and gate.

Modulation Modes

AM: Internal - waveform amplitude is modulated from 0 to >100%.

AM: External - AC signal gives suppressed carrier operation.

FM: Internal modulation or external ac or dc signal provides voltage control of frequency. Up to 1000:1 frequency change possible; linear within limits of selected range.

Sweep: Ramp signal sweeps the main output signal frequency from low to high or vice versa. frequency sweeps to 1000:1 within the selected range. Internal ramp can be held at limits for precision upper and lower frequency setting.

PM: Internal or external modulation signal causes instantaneous carrier frequency shift proportional to rate of signal amplitude change, producing up to $\pm 50^\circ$ carrier phase shift. Enabled for main generator frequency range $\times 100$ and above.

Frequency Range

0.0002 Hz to 20 MHz in 10 overlapping ranges with vernier.

Function Output (50 Ω)

\sim , ∇ , \square selectable and variable to 30 Vp-p (15 Vp-p into 50 Ω). \sqcap , \sqcup up to 15 Vp (7.5 Vp into 50 Ω). All waveforms and dc give 150 mA peak current and attenuate to 60 dB in 20 dB steps plus 20 dB continuous control.

DC Output and DC Offset

Between ± 15 Vdc (± 7.5 Vdc into 50 Ω) with signal peak plus offset limited to ± 15 Vdc (± 7.5 Vdc into 50 Ω).

Sync Output (TTL)

TTL level pulse which will drive 10 TTL loads.

External Modulation Input

AM: Sensitivity of 3 Vp out/Vp (1.5V into 50 Ω). Input impedance is >2.5 k Ω .

FM: Sensitivity of 20% of frequency range/Vp. Input impedance is 5 k Ω .

PM: Sensitivity of 10° phase shift/Vp. Input impedance is 10 k Ω .

Symmetry

Symmetry of all waveform outputs is

continuously adjustable from 1:19 to 19:1. Varying symmetry provides variable duty-cycle pulses, sawtooth ramps and nonsymmetrical sine wave.

NOTE: When SYMMETRY control is used indicated frequency is divided by approximately 10.

Trigger and Gate

Input Range: 1V p-p to ± 10 V.

Impedance: 10 k Ω , 33 pF.

Pulse Width: 25 ns min.

Repetition Rate: 10 MHz max.

Adjustable Triggered Signal Start/Stop Point: Approximately -90° to $+90^\circ$ to 2 MHz.

FREQUENCY PRECISION**Dial Accuracy**

\pm (1% of setting + 1% of full range) on $\times 100$ thru $\times 1$ M ranges.

\pm (2% of setting + 2% of full range) on $\times .01$ thru $\times 10$ and $\times 10$ M ranges.

Time Symmetry

$\pm 0.5\%$ on $\times 100$ thru $\times 100$ K ranges and from 0.2 to 2.0 on dial.

$\pm 5\%$ on all other ranges and from 0.02 to 2.0 on dial.

AMPLITUDE PRECISION**Amplitude Change With Frequency**

Sine variation less than:

± 0.1 dB through $\times 100$ K ranges;

± 0.5 dB on $\times 1$ M range;

± 3 dB on $\times 10$ M range.

Step Attenuator Accuracy

± 0.3 dB per 20 dB step at 2 kHz.

WAVEFORM CHARACTERISTICS**Sine Distortion**

$<0.5\%$ on $\times 100$ to $\times 10$ K ranges.

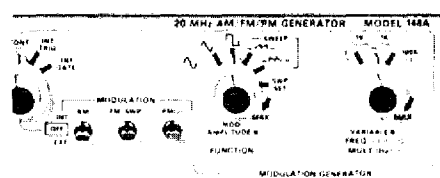
$<1.0\%$ on $\times 0.01$ to $\times 10$ and $\times 100$ K ranges.

All harmonics 30 dB below fundamental $\times 1$ M range.

All harmonics 26 dB below fundamental on $\times 10$ M range.

Square Wave Rise/Fall Time

At FUNCTION OUT <25 ns for 15 Vp-p into 50 Ω load.

MODULATION GENERATOR

Modulation Generator

Waveforms

Selectable \sim , ∇ , \square , \sqcap and \sqcup

Frequency Range

\sim , ∇ , \square : 0.1 Hz to 100 kHz in three 100:1 ranges.

\sqcap , \sqcup Sweep: 0.2 Hz to 200 kHz (2 \times setting).

Output (600 Ω)

\sim , ∇ and \square are fixed level 10 Vp-p. \sqcap and \sqcup are fixed level 0 to +5V (open circuit).

Frequency Modulation (FM IN)

Voltage control of modulator frequency with sensitivity of 20% of range/volt. Input impedance is 5 k Ω .

WAVEFORM CHARACTERISTICS**Sine Distortion**

$<5\%$.

Time Symmetry

$<1\%$ from 1 Hz to 10 kHz.

$<5\%$ from 0.1 Hz to 100 kHz.

GENERAL**Stability**

Short Term: $\pm 0.05\%$ for 10 min.

Long Term: $\pm 0.25\%$ for 24 hr.

Percentages apply to amplitude, frequency and dc offset.

Environment

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

Dimensions

28.6 cm (11 $\frac{1}{4}$ in.) wide; 13.3 cm (5 $\frac{1}{4}$ in.) high; 27.3 cm (10 $\frac{3}{4}$ in.) deep.

Weight

4.5 kg (10 lb) net; 5.9 kg (13 lb) shipping.

Power

90 to 105V, 108 to 126V, 198 to 231V and 216 to 252V selectable; 48 to 400 Hz; less than 40 VA.

NOTE: Unless otherwise noted, all specifications apply from 0.1 to 2.0 on frequency dial, when FUNCTION OUT is at maximum and 50 Ω terminated, with SYMMETRY control at OFF. Symmetry and vernier affect frequency calibration. Maximum possible asymmetry is a function of frequency setting.

FACTORY/FOB

San Diego, CA