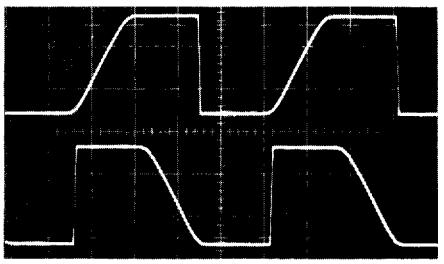
30 MHz Sweep Generator



- 30 μHz to 30 MHz Frequency Range
- Variable Rise and Fall Times
- Trapezoidal Waveforms
- Trigger and Gated Operation
- Sweep Up or Down

30 μHz to 30 MHz Frequency Range
Model 164 provides an extremely wide frequency range for both high and low frequency applications, 30 μHz to 30 MHz. This broad range will cover many of your generator applications.

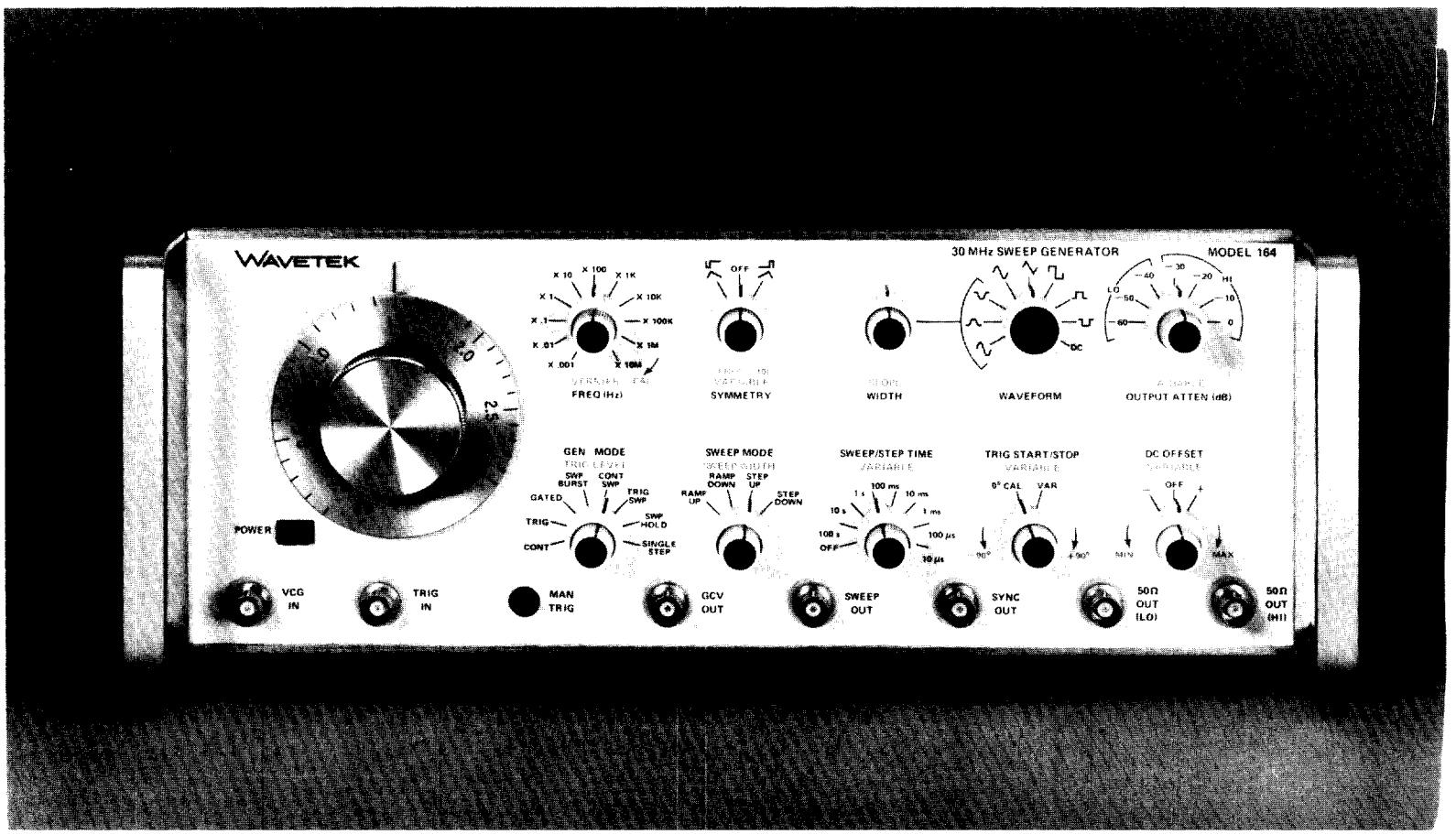
Model 164 is a function generator with full trigger and gate capability as well as a sweep generator with internal sweep and step sweep.

Variable Rise and Fall Time
For pulse applications, Model 164 provides positive, negative and balanced pulse outputs. Duty cycle, rise and fall times and dc offset levels of these outputs are all independently variable.

Trigger and Gated Operation
Single cycles or "bursts" of cycles of the selected waveform can be produced by triggering the generator with an external signal or with the manual front panel switch. Trigger start/stop point can be adjusted to give haversine outputs as well as complex waveforms.

Sweep Up or Down
Besides the conventional low-to-high frequency sweep, Model 164 will sweep high-to-low. Sweep width is fully adjustable to 1000:1 and sweep time is continuously adjustable from 10 microseconds to 100 seconds. Sweep hold mode stops the generator at the sweep limit so that you can easily and accurately adjust the total sweep width.

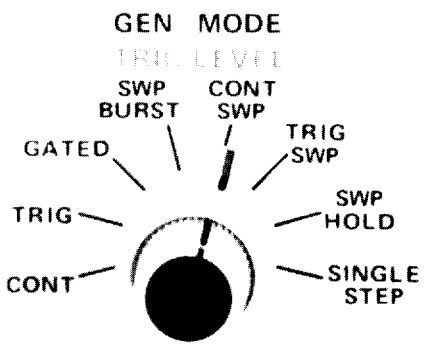
Incremental Frequency Steps
Step sweep is another sweep mode on the Model 164. The sweep width is divided into 10 steps, giving 11 frequencies. You can step sweep through 11 frequency steps automatically or make one step with each press of the manual trigger switch. Steps can be up or down in frequency.



VERSATILITY

Waveforms
Sine ∿ , square ⊓ , triangle △ , positive square ⊓ , negative square ⊔ , trapezoid ⏢ , positive trapezoid ⏢ , negative trapezoid ⏢ , ramp ◿ and stair step (up and down) ⌐⌐⌐ .

Operational Modes
Continuous: Main generator oscillates continuously at selected frequency.
Triggered: Generator quiescent until triggered by an external signal, then generates one cycle at selected frequency.
Gated: As triggered mode, except main generator oscillates for the duration of the external signal. Last cycle started is completed.
Continuous Sweep: Recurring low-to-high or high-to-low frequency oscillations. Range and rate selectable.
Triggered Sweep: Low-to-high or high-to-low frequency oscillation with each trigger input; then returns to initial frequency after sweep.
Sweep Hold: Sweep from start frequency to stop frequency and continued oscillation at stop frequency.
Sweep Burst: Main generator quiescent until gated, then in sweep hold mode for duration of gate; return to quiescent state when gate signal is removed.
Single Step: Main generator steps to next frequency with each trigger in stair sequence. After 10th step, returns to initial frequency.



Mode Control

Frequency Range
0.00003 Hz to 30 MHz in 11 decade ranges with dial and frequency vernier.

Main Output
∿ , △ , ⊓ and ⏢ selectable and variable to 20 Vp-p (10 Vp-p into 50Ω). ⊓ , ⊔ , ⏢ and ⏢ to 10V peak (5V peak into 50Ω). DC voltage adjustable to ±10V, 50Ω source. Output peak current is 100 mA minimum for all waveforms and dc. 0 to 60 dB attenuation in 10 dB steps with a 20 dB vernier; maximum overall attenuation 80 dB. High level 0 to −50 dB and low level −40 to −80 dB outputs.

DC Output and DC Offset
Waveform offset and dc output selectable through 50Ω outputs. Adjustable between ±10V (±5V into 50Ω). DC offset and output waveform are attenuated proportionately by the attenuator.

Sync Output
Approximately 0 to +4V into open circuit; 50Ω source. Rise and fall times typically 10 ns into 50Ω. Sync waveform normally square is rectangular with SYMMETRY control on.

Sweep
Sweep/Step Time: 10 μs to 100s in 7 ranges selectable.

Sweep Output
Sweep Signal: 0 to +5V ramp or stair step.
Source Impedance: 600Ω.

GCV—Generator Control Voltage
0 to +5V output proportional to main generator frequency
Source Impedance: 600Ω.

VCG—Voltage Controlled Generator
Up to 1000:1 frequency change with external 0 to ±5V signal. Upper frequency is limited to maximum of selected range.
Input Impedance: 5 kΩ.
Slew Rate: 2% of range per μs.
Linearity: ±0.5% for 0.0003 Hz to 3 MHz.

Symmetry Control
Symmetry of all waveform outputs is continuously adjustable from 1:19 to 19:1. Varying symmetry provides variable duty cycle pulses, sawtooth or nonsymmetrical trapezoidal waveforms.

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

Slope and Width Control
For trapezoidal waveforms ⏢ , ⏢ and ⏢ only. Ratio of period to rise or fall time is variable from 2:1 (triangle) to greater than 100:1 with 12 ns minimum rise and fall time.

Trigger and Gate
Input Range: 1V p-p to ±50V.
Impedance: 10 kΩ, 33 pF.
Pulse Width: 25 ns min.
Repetition Rate: 20 MHz max.
Adjustable Triggered Signal Start/Stop Point Approximately:
−90° to +90° to 3 MHz.
−90° to 0° for 3 to 30 MHz.

FREQUENCY PRECISION

Dial Accuracy
±(1% of setting +1% of full scale) or 0.0003 Hz to 300 kHz.
±(3% of setting +2% of full scale) for 300 kHz to 30 MHz.

Time Symmetry
±0.5% for 30 Hz to 300 kHz.
±1.0% for 0.0003 to 30 Hz.

AMPLITUDE PRECISION

Amplitude Change With Frequency
Sine variation less than:
±0.1 dB to 300 kHz.
±0.2 dB to 3 MHz.
±2.5 dB to 30 MHz.

Amplitude Symmetry
1% of amplitude range to 3 MHz.

Step Attenuator Accuracy
±0.25 dB per 10 dB step.

WAVEFORM CHARACTERISTIC

Sine Distortion (Continuous Mode)
<0.5% for 10 Hz to 100 kHz.
<1.0% for 0.0003 Hz to 300 kHz.
All harmonics at least 26 dB down to 30 MHz.

Triangle Linearity
Greater than 99% for 0.0003 to 300 kHz.

Square Wave Rise and Fall Time
Less than 12 ns terminated into 50Ω load.

Total Aberrations
Less than 5%.

GENERAL

Stability
Amplitude, dc offset and frequency.
Short Term: ±0.05% for 10 minutes.
Long Term: ±0.25% for 24 hours.

Environment
Specifications apply at 23° ±5°C. Instrument will operate from 0° to +55°C.

Dimensions
36.8 cm (14½ in.) wide; 13.3 cm (5¼ in.) high; 34.3 cm (13½ in.) deep.

Weight
6.8 kg (14.9 lb) net; 8.6 kg (19 lb) shipping.

Power
90 to 110V, 105 to 125V, 180 to 220V or 210 to 250V; 50 to 400 Hz; less than 50 VA.

NOTE: Specifications apply from 10 to 100% of a selected frequency range 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