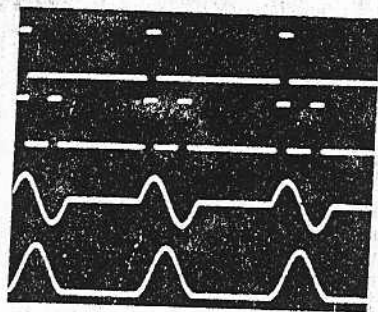


MODEL 145

FUNCTION GENERATORS

20 MHz Pulse/Function Generator



- Fixed TTL and ECL Outputs
- 20 MHz Repetition Rate
- 30V Peak-To-Peak Output
- Delayed and Double Pulse Outputs
- Full Function Generator Performance

Pulse and Function Generator

The Wavetek Model 145 Pulse/Function Generator gives you a versatile combination of two indispensable laboratory instruments, the pulse generator and the function generator.

Pulse Generator Circuits

As a pulse generator, the 145 gives you pulse outputs with calibrated repetition rates up to 20 MHz. Convenient fixed amplitude outputs are available for TTL and ECL. In addition, the variable pulse output

gives pulses up to a full 30V peak-to-peak. For further utility you can select delayed pulses and double pulses and continuous, triggered or gated output. Pulse width and delay are independently controllable.

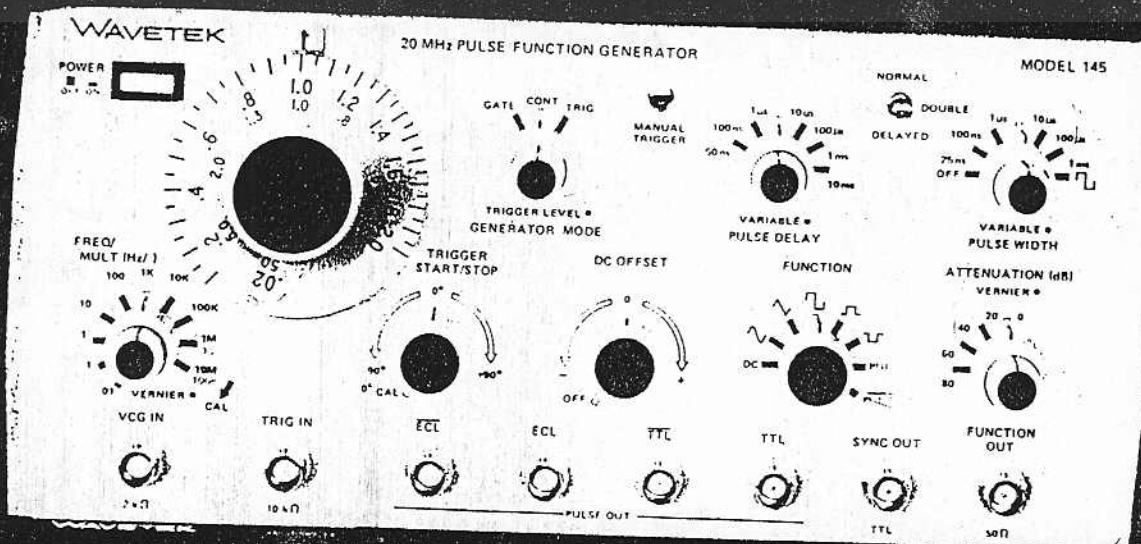
Full Function Generator Performance

As a function generator, the unit furnishes sine, square and triangle waveforms with continuous, triggered or gated output. A variable trigger start/stop control lets you

select a haversine or other special waveform output. The Wavetek VCG circuit lets you sweep the frequency of the generator over a full 1000:1 range.

Combination Outputs

Calibrated repetition rate, swept pulses, simultaneous pulse and waveform outputs are only a few of the capabilities of the Model 145 Pulse/Function Generator.



MODEL 145

FUNCTION GENERATORS

VERSATILITY

Instrument operates as either a function generator or pulse generator.

FUNCTION GENERATOR

Waveforms

Selectable sine \sim , square \square , triangle ∇ , positive square \sqcap , negative square \sqcup and dc. TTL sync pulse and fixed amplitude pulses of TTL, TTL, ECL and ECL, all simultaneously available with function output.

Operational Modes

Continuous: Generator oscillates continuously at selected frequency. Triggered: Generator is quiescent until triggered by an external signal or manual trigger, then generates one cycle at selected frequency. Gated: As triggered mode except generator oscillates for the duration of the gate signal.

Frequency Range

0.0001 Hz to 20 MHz in 10 overlapping ranges with approximately 1% vernier control.

Function Output

\sim , \square , ∇ selectable and variable to 30V p-p (15V p-p into 50 Ω). \sqcap , \sqcup , to 15 Vp (7.5 Vp into 50 Ω). All waveforms and dc can supply 150 mA peak current and may be attenuated to 60 dB in 20 dB steps with an additional 20 dB vernier.

DC Output and DC Offset

Selectable thru FUNCTION OUT output. Controlled by front panel control or by applying an external voltage. Adjustable between ± 15 Vdc (± 7.5 Vdc into 50 Ω) with signal peak plus offset limited to ± 30 Vdc (± 15 Vdc into 50 Ω). External offset sensitivity approximately -1 V/V with output into open circuit. DC offset and output waveform attenuated proportionately by the 60 dB output attenuator.

Sync Output

A TTL level pulse. Will drive 50 Ω termination.

GCV — Generator Controlled Voltage

At GCV OUT connector, a 0 to +2V signal proportional to generator frequency. 600 Ω source impedance.

VCG — Voltage Controlled Generator

Up to 1000:1 frequency change with external 0 to 2 volt signal to VCG IN connector. Upper and lower frequencies limited to maximum and minimum of selected range.

Slew Rate: 2% of range per μ s. Linearity:

$\pm 0.2\%$ for 10 Hz to 200 kHz.
 $\pm 0.75\%$ for 0.001 Hz to 2 MHz.
Impedance: 2 k Ω .

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

$\pm 3\%$ of full range from $\times .01$ Hz to $\times 1$ MHz.
 $\pm 5\%$ of full range on $\times 10$ MHz.

Time Symmetry

Square wave variation less than:
 $\pm 1\%$ from 0.001 Hz to 200 kHz
 $\pm 0.5\%$ from 20 Hz to 20 kHz

AMPLITUDE PRECISION

Amplitude Change With Frequency

Sine variation less than:
 ± 0.1 dB for 0.001 Hz to 200 kHz
 ± 0.5 dB for 200 kHz to 2 MHz
 ± 3.0 dB for 2 to 20 MHz

Step Attenuator Accuracy

± 0.3 dB per 20 dB step at 2 kHz.

WAVEFORM CHARACTERISTICS

Sine Distortion

$< 0.5\%$ on $\times 100$ Hz to $\times 10$ kHz.
 $< 1.0\%$ on $\times .01$ to $\times 10$ Hz and $\times 100$ kHz.

All harmonics 34 dB below fundamental on $\times 1$ MHz.

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

Square Wave Rise/Fall Times

At FUNCTION OUT < 20 ns for 15V p-p output into 50 Ω load.

PULSE GENERATOR

Pulse Outputs

Variable amplitude pulse, and simultaneous fixed ECL, ECL, TTL and TTL pulses and TTL sync pulse. All outputs can drive 50 Ω terminations.

Operational Modes

Continuous, triggered and gated plus the following.

Normal Pulse: Adjustable width pulse in phase with sync signal.

Delayed Pulse: Pulse delayed with respect to normal pulse. Pulse delay and pulse width adjustable.

Double Pulse: Two pulses for every period. Time between pulses and pulse width adjustable. Minimum period 100 ns.

Pulse Period Range

50 ns to 10,000s in 10 overlapping ranges with approximately 1% vernier control.

Pulse Width

25 ns to 1 ms in 5 overlapping ranges with vernier control. Includes OFF and square wave.

Pulse Delay

50 ns to 10 ms in 6 overlapping ranges with vernier control.

Duty Cycle

Duty cycles to 70% for periods > 100 ns (< 10 MHz); for periods < 100 ns (> 10 MHz) duty cycles are approximately 50%.

Function Output

Variable to 30V p-p (15V p-p into 50 Ω). DC offset and attenuation are same as for function generator.

Pulse Rise/Fall Times

At FUNCTION OUT, < 20 ns for 15V p-p output into 50 Ω load.

GENERAL

Stability

Short Term: $\pm 0.05\%$ for 10 min.
Long Term: $\pm 0.25\%$ for 24 hours.
Percentages apply to amplitude, frequency and dc offset.

Environmental

Specifications apply at $25^\circ\text{C} \pm 5^\circ\text{C}$. Instrument will operate from 0°C to 50°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

5 kg (11 lb) net; 6.6 kg (14 $\frac{1}{2}$ lb) shipping.

Power

90 to 105V, 108 to 126V, 198 to 231V and 216 to 252V selectable; 48 to 400 Hz; less than 30 watts.

NOTE: All specifications apply from 0.1 to 2.0 on frequency dial when FUNCTION OUT output is at maximum and 50 Ω terminated. Function generator specifications apply when PULSE WIDTH control is OFF.