

# 12 MHz Function Generator

- Half-Rack Width Package
- 0.01 Hz to 12 MHz Frequency Range
- GPIB (IEEE 488) Standard
- 200V Output Protection
- 200 Stored Settings Standard

## Compact and Versatile

Model 270 Programmable Function Generator is a light-weight, half-rack instrument for bench or ATE use. The 270 can generate precise sine, triangle, square, and external width controlled waveforms from 0.01 to 10 Vp-p, and dc offsets within a  $-5V$  to  $+5V$  range into  $50\Omega$ . Waveforms can be continuous, gated or triggered.

## Easy to Program

The GPIB entry sequence is identical to front panel entry and the ASCII character, for GPIB programming, appears with each key on the front panel. This makes it easy to transfer

a manual setup to a controller program and vice versa. To help the operator even more, "command recall" can display up to 40 previous characters entered either at the front panel or by GPIB. The 270 also features free-format numeric entry, parameter independence until a final execute command, and front panel GPIB address selection (which can, however, be locked out for security).

## Protected Outputs

All 270 outputs are protected against short circuits and excessive voltages between  $\pm 15V$ . The main output is further protected against voltage inputs of up to 140 Vac or

$\pm 200Vdc$ . If a voltage greater than  $\pm 15V$  is applied to the main output, the 270 generates an audible alarm, a front panel error message, and a GPIB service request. Inputs are protected from voltages up to  $\pm 50V$ .

## Stored Settings

The 270 can store up to 200 complete operational settings in memory for fast recall. Battery backup is standard. In addition, stored setting 0 recalls the last executed setup of the instrument, even after the instrument has been turned off. A warning message will be displayed when the long-life, non-rechargeable battery needs to be replaced.



**MODEL 270**

**PROGRAMMABLE FUNCTION GENERATORS**

**VERSATILITY**

**Waveforms**

Programmable sine  $\sim$ , triangle  $\nabla$ , square  $\square$ , square complement  $\square$ , external width or dc.

**Operational Modes**

**Continuous:** Output continuous at programmed frequency.

**Triggered:** Output quiescent until triggered by an external signal, GPIB trigger or manual trigger, then generates one cycle at programmed frequency.

**Gated:** As triggered mode except output oscillates for the duration of the gate signal. The last cycle started is completed.

**Frequency Range**

10 mHz to 12 MHz.

**Outputs**

**Function Output:** Waveforms from 0.01 to 10 Vp-p into 50 $\Omega$  (0.02 to 20 Vp-p into  $\geq 50$  k $\Omega$ ). DC or offset programmable from -5V to +5V into 50 $\Omega$  (-10V to +10V into  $\geq 50$  k $\Omega$ ).

Programmable Control Provides: Output On (50 $\Omega$  source impedance); Output Off, High Z (>500k $\Omega$ ); Output Off, Low Z (approx 50 $\Omega$  termination).

Absolute peak amplitude plus offset may not exceed 5V into 50 $\Omega$  (10V into  $\geq 50$  k $\Omega$ ).

Source Impedance: 50 $\Omega$ .

Protection: Output protected to 140 Vac or  $\pm 200$  Vdc without replacement of internal fuse.

**Sync Output:** TTL level square wave into 50 $\Omega$  at programmed frequency. TTL Compatible:  $\leq 0.4$ V to  $\geq 2.4$ V into 50 $\Omega$ ,  $\leq 0.8$ V to  $\geq 4.8$ V into  $\geq 50$  k $\Omega$ .

Source Impedance: 50 $\Omega$ .

Timing: Concurrent with main output in square; lags sine and triangle by 90 $^\circ$ .

Over/Undershoot: <10% into 50 $\Omega$ .

Protection: Output protected against  $\pm 15$ V input minimum.

**Inputs**

**VCG In:** 0.01 to 12V into 10 k $\Omega$ , for up to 1200:1 frequency change. 10V gives range max. 12V gives 20% overrange. Slew Rate: 1V/ $\mu$ s.

**Trig In:** Level programmable: -10 to +10V, 20 mV resolution,  $\pm 500$  mV accuracy. Programmable to trigger on - or + signal slope.

Impedance: 10 k $\Omega$ .

Maximum Rate: 12 MHz (24 MHz for External Width).

Minimum Width: 20 ns.

Minimum Amplitude: 500 mVp-p to 1 MHz, 1 Vp-p to 24 MHz.

**Protection:** Inputs protected against  $\pm 50$ V input minimum.

**PRECISION**

**Frequency**

**Resolution:** 3 digits.

**Accuracy:**  $\pm 2\%$ .

**Repeatability:**  $\pm 1\%$  for 24 hr.

**Jitter:**  $\leq 0.1\% \pm 100$  ps.

**Amplitude**

**Resolution:** 3 digits or 10 mV when absolute peak ampl plus offset  $>0.5$ V; 3 digits or 1 mV when absolute peak ampl plus offset  $\leq 0.5$ V.

**Accuracy:**  $\pm 2\%$  of programmed value and:  $\pm 5$  mV for 0.1 to 1V (pk ampl + ofst  $<0.5$ V),  $\pm 20$  mV for 1.01 to 10V,  $\pm 50$  mV for all other.

**Repeatability** (24 hr):  $\pm 1\% \pm 10$  mV.

**Flatness:** 0.1 dB to 100 kHz, 1.5 dB to 12 MHz for output at 5 Vp-p.

**Offset**

**Resolution:** 3 digits or 10 mV when absolute peak ampl plus offset  $>0.5$ V, 3 digits or 1 mV when absolute peak ampl plus offset  $\leq 0.5$ V.

**Accuracy:**  $\pm 40$  mV in DC function.

**Repeatability** (24 hr):  $\pm 1\% \pm 20$  mV.

**Waveform Quality**

**Sine Distortion (at 5 Vp-p):** THD

$<0.5\%$ , 10 mHz to 99.9 kHz.

**No Harmonics Above**

-40 dBc, 100 kHz to 999 kHz.

-30 dBc, 1 MHz to 12 MHz.

**Time Symmetry:**  $\pm 1\% \pm 8$  ns.

**Square Transition Time:**  $<15$  ns.

**Square Over/Undershoot:**  $<5\%$  of pk-pk amplitude  $\pm 20$  mV.

**Triangle Linearity:** 99% to 100 kHz.

**GENERAL**

**GPIB Programming**

IEEE 488-1978 compatible. Non-isolated. Double buffered.

**Address:** 0-30, keyboard or internal switch selectable. Internal switch can lock out keyboard selection. Power-up address is internal setting.

**Subsets:** SH1 Complete source handshake, AH1 Complete acceptor handshake, T6 Basic talker, TE0 No extended talker, L4 Basic listener, SR1 Complete service request (software selectable), RL1 Remote/local and local lockout, PP0 No parallel poll capability, DC1 Complete device clear/selective device clear, C0 No controller capability, E2 Tri-state drivers.

**Interface Timing**

Parameter	Time
Frequency	11 ms
Amplitude	14 ms
Offset	14 ms
Mode	4 ms
Waveform	5 ms
Execute	8 ms
Other	4 ms

**Stored Settings**

Nonvolatile memory for 200 stored settings. Battery back-up with minimum 6 mo. retention (typ. 5 yr.), battery check and status display.

**Environmental**

**Temperature Range:** 25 $^\circ$ C  $\pm 10$  $^\circ$ C for spec operation, operates 0 $^\circ$ C to 50 $^\circ$ C, -50 $^\circ$ C to +75 $^\circ$ C for storage.

**Warm-up Time:** 20 minutes for specified operation.

**Altitude:** Sea level to 10,000 ft for operation. Sea level to 40,000 ft for storage.

**Relative Humidity:** 95% at 25 $^\circ$ C and sea level (non-condensing).

**Dimensions**

21.7 cm (8.54 in.) wide (half-rack); 13.3 cm (5.25 in.) high; 39.4 cm (15.5 in.) deep.

**Weight**

5.9 kg (13 lb) net; 6.8 kg (15 lb) shipping.

**Power**

90 to 105, 108 to 126, 198 to 231, or 216 to 252 volts rms; 48 to 66 Hz; 1 phase;  $<40$  watts.

**OPTIONS**

**002: Rear Panel Connectors**

Front panel BNCs relocated to rear panel.

**003: Burst Option**

Programmable number of waveform cycles in a burst.

**Burst Length:** 1,048,200 max.

**Burst Rate:** 12 MHz.

**FACTORY/FOB**

San Diego, CA

**PRICE**

Model 270	\$2600
Option 002	\$125
Option 003	\$295