12 MHz Sweep/Function Generator

- **User Definable Sweep Shape**
- **Six Standard Sweep Shapes**
- **Twelve Sweep Modes**
- **Three Frequency Markers**
- **GPIB (IEEE-488) Standard**

Compact and Versatile
Model 273 Programmable Sweep/Function Generator is a light-weight, half-rack instrument for bench or ATE use. The 273 can generate precise sine, triangle and square waveforms from 0.01 to 10 Vp-p, and dc offsets within a −5 to +5V range into 50Ω. Waveforms can be continuous, gated, triggered or burst; all waveforms may be swept.

Exceptional Sweep Capability
Up to 1200:1 sweep range, 12 sweep modes and 6 standard sweep shapes (plus your own GPIB programmable sweep shape) provide exceptional sweep capabilities in a programmable function generator. Three simultaneous, active markers are available with polarity selection. Sweep start and stop frequencies are easily programmed with a front panel key or GPIB.

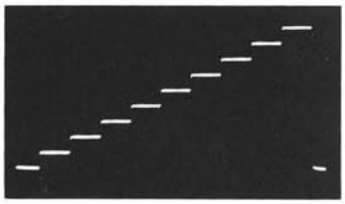
Ease of Programming
The GPIB entry sequence is identical to front panel entry and the ASCII character for GPIB programming appears on most keys on the front panel. This makes it easy to transfer a manual setup to a controller program or vice versa. To help the operator even more, "command recall" can display up to 40 previous characters entered either at the front panel or via the GPIB. The 273 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 273 outputs are protected against short circuits and excessive voltages between ±15V. The main output is further protected against voltage inputs of up to 140 Vac or ±200 Vdc. If a voltage greater than ±15V is applied to the main output, the 273 generates an audible alarm, a front panel error message, and a GPIB service request.

MODEL 273 PROGRAMMABLE FUNCTION GENERATORS

User Defined Sweep Function

This feature allows you to define your own unique sweep shape. It provides you with a 12 bit by 1K memory and is programmable over the GPIB.

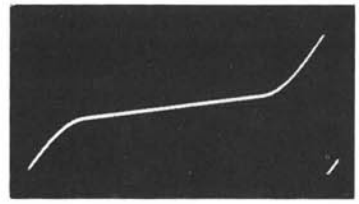


Example of "User Defined" Sweep

Applications: This capability is very useful in such applications as tone testing, digital frequency modulation, vibration testing and providing trigger signals to measurement devices.

Filter Sweep Function

Provides a slower sweep rate near the mid-frequency point for higher resolution when sweeping high-Q circuits.

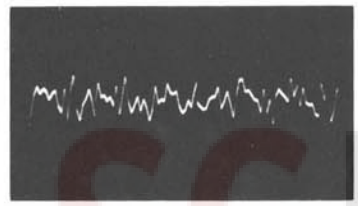


Filter Sweep Function

Applications: This sweep shape can save you valuable time when testing very narrow filters where the sweep must be slowed dramatically in order to describe the characteristics.

Noise Sweep Function

A noise pattern with a Gaussian distribution characteristic is used to FM modulate the generator signal.



Noise Sweep Function

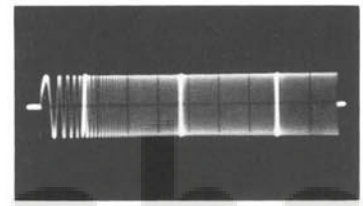
Applications: Jitter testing is greatly simplified when using this mode. The built-in pseudo-random noise pattern allows you to test for FM noise rejection and jitter susceptibility.

Other Sweep Functions

Linear, Logarithmic, Sine and Square.

Frequency Markers

Three simultaneous, individually programmable frequency markers are present at the Marker Output. These selectable polarity markers allow convenient identification of filter center frequency and upper and lower cutoff frequencies. Up to 500 markers can be generated with the *User Defined* sweep shape.



Swept Waveform with Markers

WAVEFORMS (FUNCTIONS)

Programmable sine ∿, triangle △, square ⊓, external width, and dc.

Sine Distortion (THD at 5 Vp-p): <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: ±1% ±8 ns.

Square Transition Time: <15 ns.

Square Overshoot: <4% at full amplitude.

Triangle Linearity: 99% to 100 kHz.

OPERATIONAL MODES

Continuous: Output continuous at programmed frequency.

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

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

Burst: As triggered mode for programmed number of cycles.
Count Range: 1 to 1,048,200.
Burst Rate: 12 MHz maximum.

FREQUENCY

Range: 10 mHz to 12 MHz (>15 MHz in external width mode).

Resolution: 3 digits.

Accuracy: ±2%.

Repeatability (24 hr): ±1%.

Jitter: ≤0.1% ±100 ps.

Control: Frequency may be controlled by programmed value or external VCG input.

Value: Frequency value is keyboard or GPIB programmable with automatic range selection.

VCG (Voltage Controlled Generator): AC or dc input controls frequency. +0.01 to +12V into 10 kΩ for up to 1200:1 frequency change in each of 9 frequency ranges (ranges must be programmed). Slew rate is limited to 1V/μs.

AMPLITUDE

Range: 0.01 to 10 Vp-p into 50Ω (0.02 to 20 Vp-p into ≥50 kΩ) from main output. Absolute peak amplitude plus offset may not exceed 5V into 50Ω (10V into ≥50 kΩ).

Resolution: 3 digits or 10 mV when absolute peak amplitude plus offset >0.5V; 3 digits or 1 mV when absolute peak amplitude plus offset ≤0.5V.

Accuracy: ±2% of programmed value and: ±5 mV for 0.1 to 1V (peak amplitude + offset <0.5V), ±20 mV for 1.01 to 10V, ±50 mV for all other.

Repeatability (24 hr): ±1% ±10 mV.

Flatness (At 5 Vp-p): 0.1 dB to 100 kHz, 1.5 dB to 12 MHz.

OFFSET

Range: DC or offset programmable from −5V to +5V into 50Ω (−10V to +10V into ≥50 kΩ). Absolute peak amplitude plus offset may not exceed 5V into 50Ω (10V into ≥50 kΩ).

Resolution: 3 digits or 10 mV when absolute peak amplitude plus offset >0.5V, 3 digits or 1 mV when absolute peak amplitude plus offset ≤0.5V.

Accuracy: ±40 mV in dc function.

Repeatability (24 hr): ±20 mV.

OUTPUTS

Function Output: Source of primary waveforms.

Programmable Control Provides:
Output On, (50Ω source impedance);
Output Off, High Z (>500 kΩ);
Output Off, Low Z (approximately 50Ω termination).

Source Impedance: 50Ω.

Protection: Output protected to 140 Vac or 200 Vdc without internal damage.

Sync Output: Sync signal is at programmed frequency and TTL level.

Level: ≤0.4V to ≥2.4V into 50Ω, ≤0.8V to ≥4.8V into ≥50 kΩ.
Source Impedance: 50Ω.
Timing: Concurrent with function output in square; lags sine and triangle by 90°.
Over/Undershoot: <10% into 50Ω.
Protection: Output protected from short circuit to any voltage between ±15 Vdc input minimum.

INPUTS

External Trigger: Trigger of input circuit is programmable for a + or − signal slope and required threshold level.
Level: −10 to +10V.
Resolution: 20 mV.
Accuracy: ±500 mV.
Input Impedance: 10 kΩ.
Maximum Trigger Rate: 12 MHz (15 MHz for External Width).
Minimum Trigger Width: 40 ns.
Minimum Amplitude: 500 mVp-p to 1 MHz, 1 Vp-p to 15 MHz.
VCG In: Voltage control of generator frequency. See frequency.
Range: 0.01 to 12V.
Impedance: 10 kΩ.
Protection: Inputs protected to ±50V.

INTERNAL TRIGGER

Range: 0.0025 Hz to 2.5 MHz.
Resolution: 4 digits.
Accuracy: 0.2%.

SWEEP MODES

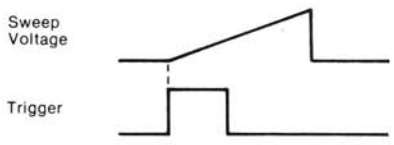
Continuous Sweep and Reset

Main generator sweeps from start frequency to stop frequency, resets to start frequency and continues.

Continuous Sweep and Reverse

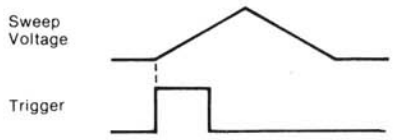
Main generator sweeps from start frequency to stop frequency, reverse sweeps to start frequency and continues.

Triggered Sweep and Reset



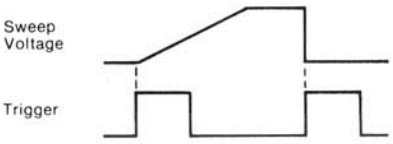
When triggered, main generator sweeps from start frequency to stop frequency and resets to start frequency until next trigger.

Triggered Sweep and Reverse



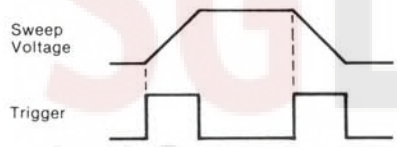
When triggered, main generator sweeps from start frequency to stop frequency, reverse sweeps to start frequency and remains until next trigger.

Triggered Sweep and Hold with Triggered Reset



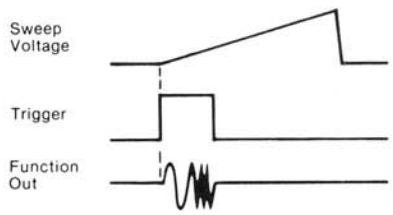
When triggered, main generator sweeps from start frequency to stop frequency until next trigger. When triggered again, resets to start frequency and remains.

Triggered Sweep and Hold with Triggered Reverse



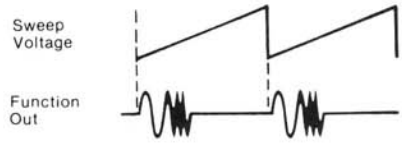
When triggered, main generator sweeps from start frequency to stop frequency. When triggered again, main generator reverse sweeps to start frequency.

Triggered Sweep and Reset with Burst



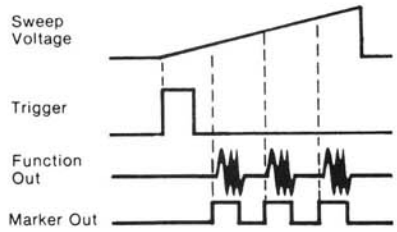
Main generator quiescent until triggered. When triggered, sweep and programmed burst counter run simultaneously for programmed number of waveform cycles. Output quiescent upon completion of cycle count.

Continuous Sweep and Reset with Burst



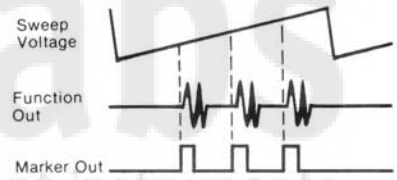
Main generator sweeps from start frequency to stop frequency, resets to start frequency and continues. Start of sweep triggers burst counter. Main generator output is quiescent until triggered by the start of sweep, and returns to quiescent state after completion of programmed number of cycles.

Triggered Sweep and Reset with Burst on Markers



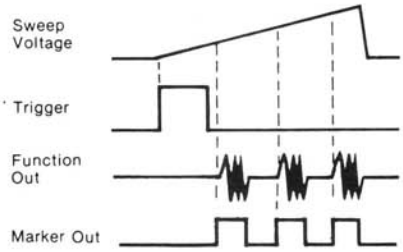
When triggered, main generator sweeps from start frequency to stop frequency , resets and is held until next trigger. Main generator output is quiescent until triggered by markers and returns to a quiescent state after completion of the programmed number of cycles.

Continuous Sweep and Reset with Burst on Markers



Main generator sweeps from start frequency to stop frequency, resets to start frequency and continues. Burst counter is triggered by markers. Main generator output is quiescent until triggered by markers and returns to a quiescent state after completion of programmed number of cycles.

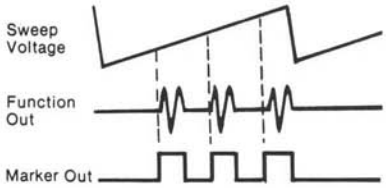
Triggered Sweep and Reset with Gate on Markers



When triggered, main generator sweeps from start frequency to stop frequency, resets to start frequency and is held until next trigger. Main generator output is quiescent until gated on by markers going high, and returns to a quiescent state when markers are low.

MODEL 273 PROGRAMMABLE FUNCTION GENERATORS

Continuous Sweep and Reset with Gate on Markers



Main generator sweeps from start frequency to stop frequency, resets to start frequency and continues. Main generator output is quiescent state when markers are low.

SWEEP CHARACTERISTICS

Sweep Time: 400μs to 400,000s, 3 digits resolution, 0.2% accuracy.

Start/Stop: Maximum ratio 1200:1. Both start and stop frequency must be contained within a single sweep range. Sweep ranges are listed below.

Markers: 0.01 Hz to 12 MHz, 3 digits resolution, 3% of programmed value +0.2% of top of sweep range selected.

Sweep Ranges

10 mHz	—	12 Hz
100 mHz	—	120 Hz
1 Hz	—	1.2 kHz
10 Hz	—	12 kHz
100 Hz	—	120 kHz
1 kHz	—	1.2 MHz
1 kHz	—	12 MHz

SWEEP OUTPUTS

Marker Output: Three independent, simultaneously active markers. 0 to 5V into 600Ω. Programmable polarity control: RCL 4000 EXEC initiates positive marker, RCL 4001 EXEC initiates negative marker.

Horizontal Output: 0 to +5V ±5%. 250 point synthesized ramp. 600Ω source impedance. RCL 3000 EXEC initiates Horizontal Out.

GCV Output: 0 to +6V ±10%. 1000 point synthesized GCV the same wave shape as that sweeping the main generator. Source impedance: 600Ω. RCL 3001 EXEC initiates GCV. GCV output voltage level is proportional to main generator frequency.

Protection: Output protected against ±15V input minimum.

SWEEP FUNCTIONS

Linear: Linear variation of frequency with respect to time during active sweep.

Log: Logarithmic variation of frequency with respect to time during active sweep.

Sine: Sinusoidal variation of frequency with respect to time. Sweeps from −90° to +90°.

Square: Impulse variation of frequency between start and stop during active sweep.

Noise: Pseudo-randomized Gaussian variation of frequency between start and stop during active sweep. Start and stop are 2.5 standard deviations from midfrequency point.

Filter: Sweep rate slows towards midfrequency point allowing higher resolution.

User Defined: User programmable variation of frequency between start and stop during active sweep. Unique user defined sweep function is stored in non-volatile memory.

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, AH1, T6, TE0, L4, SR1, RL1, PP0, DC1, C0, E2.

Interface Timing:

Frequency	16 ms
Amplitude	13 ms
Offset	14 ms
Mode	6 ms
Function	5 ms
INT/EXT	5 ms
Execute	20 to 500 ms
Store	11 ms
Output	10 ms
Slope	5 ms
Burst Count	10 ms
Rate	35 ms
Recall	185 ms
Reset	185 ms

GENERAL

Stored Setting: Non-volatile memory will store 25 settings.

Environment:

Temperature Range: 25°C ± 10°C for specified operation; operates 0°C to 50°C; −50°C to +75°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°C and at 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; 7.2 kg (16 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.

ACCESSORIES

Style 12: Single Rack Adapter Kit: Allows any 270 series instrument to be right or left mounted in a standard 19 inch rack. 5¼ inches high.

Style 13: Dual Rack Adapter Kit: Allows any 270 series instrument to be mounted side-by-side in a standard 19 inch rack. 5¼ inches high.

FACTORY/FOB

San Diego, CA

PRICE

Model 273	**$3295**
Option 002	**$125**
Style 12	**$75**
Style 13	**$125**