# 1 & 2 Channel Synthesized Function/Arbitrary Waveform Generator

- Log, linear, phase continuous sweeps
- Frequency to 31MHz
- 0.01µHz frequency resolution
- 16 to 16K points arbitrary waveform lengths
- Standard waveforms: Sine, Square, Triangle, Ramp and Noise
- Includes waveform design software
- Waveforms may be designed via front panel or software
- Dual independent channels (9302)
- Sweep times to 1000s
- AM, FM and phase modulation
- RS-232, GPIB and software interface



# SPECIFICATIONS

# Waveforms

Sine, Square, Triangle, Ramp Noise, Abitrary

# Frequency

Sine and Square: 0.01µHz to 31MHz Ramp and Triangle: 0.01µHz to 2MHz Noise: 10MHz

#### Output

Output: 9301: 1CH; 9302: 2CH Output Volts: 20mV to 20V P-P, no load 10mV to 10V P-P, into 50Ω

## Resolution: 3 digits

Best Accuracy: Sine wave: ±0.2dB (1µHz to 20MHz) Square Wave: ±3% (0.01µHz to 100kHz) Ramp, Triangle and Arbitrary: ±3%

# DC Offset

0 to  $\pm$ 10V (no load), 0 to  $\pm$ 5V DC (50 $\Omega$  load) Resolution: 3 digits Accuracy:  $\pm$ 1.5% + 0.2mVDC

#### Sine Wave

Sine Wave Spectral Purity Spurious: < -50dBc (non harmonic) Phase Noise: < -50dBc in a 30kHz band Subharmonics: < -50dBc Harmonic Distortion: -45dBc: DC to 1MHz -32dBc: 1kHz to 31MHz

## Square Wave

Rise/Fall Time: < 15ns from 10 to 90% of full amplitude Asymmetry: < 1% of period + 4ns Overshoot: < 5%

## Ramp, Triangle and Arbitrary Rise and Fall Time: <35ns Settling Time: <1µs Linearity: ±0.5% FS

### Arbitrary Waveforms

Standard: Sine, Square, Triangle, Ramp, DC, Exponential Fall, Noise, Freehand, Line, Damped Sine Sample Rate: 40MS/s (Max) Waveform Length: 16 to 16,384 points Amplitude Resolution: 12 Bit

## Phase

Range: 9999.99°; Resolution: 0.01°; Rate: 0.001Hz to 10kHz

# **Frequency Modulation**

Source: Internal Waveforms: Sine, Square, Ramp, Triangle, Ramp, Arbitrary Rate: 0.001Hz to 10kHz Span: 0.01Hz to 31MHz (2MHz for Triangle or Ramp)

#### **Amplitude Modulation**

Source: Internal or external Waveforms: Sine, Square, Ramp, Triangle, Arbitrary Depth: 0 to 100% Rate: Internal: 0.001Hz to 10kHz; External: 20kHz Max. Distortion: < -35dB DSB Carrier: < -35dB typical at 1kHz modulation rate Ext. Input: 5V for 100% modulation

## **Frequency Sweep**

Type: Linear or log, phase continuous Waveforms: Up, down, Up-down, Single sweep Sweep Time: 100µs to 1000s (0.001Hz to 10kHz) Span: 0.01µHz to 31 MHz (2MHz for Ramp and Triangle) Markers: Two markers may be set between any sweep point Sweep Output - 0 to 10V linear ramp signal synchronized to sweep

#### Burst

Waveforms: Sine, Square, Triangle, Ramp, Arbitrary Frequency: 2MHz Max for any waveform Count: 1 to 65,000 cycles/burst Phase Shift: ≤100kHz

### **Trigger Generator**

Source: CH 1: Single, Int rate, Pos Ext, Neg Ext 1, Line CH 2: Int CH 1, Int rate, Pos Ext 2, Neg Ext 2 (9302 only) Rate: 100µs to 999.99s

External: Positive or negative slope, TTL input Output: TTL Level

#### Timebase

Accuracy: ±3PPM (20 to 30°C)

Aging:  $\pm$ 3PPM/Yr Input: 10MHz/N  $\pm$ 2PPM where N=1 to 8.1V P-P Min. input level Output: > 1V P-P 10MHz sine wave into 50 $\Omega$ 

### General Specifications

Interface: RS-232 (baud rates from 2400 to 19.2k bps, DCE) and GPIB

Size: 14.0" W × 3.5" H × 13.5" D; Weight: 22 lbs. Power Consumption:  $46\Omega$  (9301);  $80\Omega$  (9302) Supplied Accessories: Manual, Line cord, Software, BNC cable

# 1 & 2 Channel Synthesized Function/Arbitrary Waveform Generator

# 9301 🛛 9302



SOFTWARE

The Protek Waveform composer software allows the user to design a waveform on a computer monitor and then download it to the ARB. The software has 8 standard waveforms: Sine, Square/Pulse, Triangle/Ramp DC, Exponential rise, Exponential fall, Noise and Damped Sine wave, plus Freehand and Line. These standard waveforms, selected from the tool bar are 2K points long and 5 Volts P-P. More complex waveforms of up to 16K points in length may be created using the Waveform and Math menu as shown below.



Waveform creation menu: Allows you to create a 16 to 16,384

point, multi cycle waveform with Phase Shift, DC Offset and Amplitudes of 0 to  $\pm$  5V P-P



Math menu for creating complex waveforms.



Waveform tool bar for selecting standard waveforms and drawing custom waveforms

Waveforms from 16 to 16,000 points width and amplitude of up to  $\pm$  5 volts may be created and edited.



WAVEFORMS

Example of a custom waveform