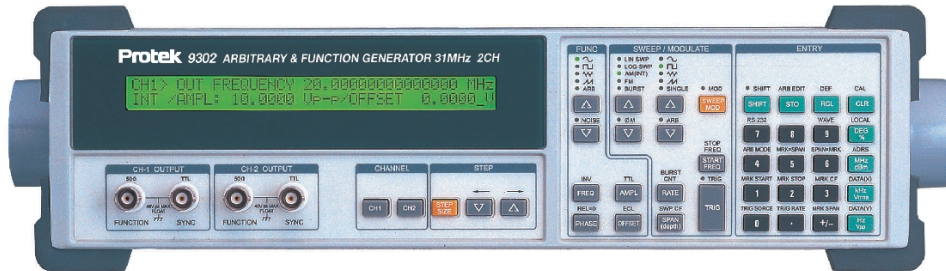


# Arbitrary & Function Generator Protek 9301 / 9302



#### Main function BNC (CH1/CH2 Output)

- This output has an impedance of 50Ω
- If it is terminated into an impedance other than 50Ω, the output amplitude will be incorrect, and it may cause increased distortion



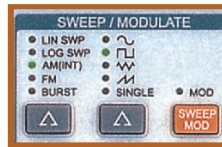
#### Step Keys

- The step keys permits the operator to increase or decrease the displayed parameter value.
- Every parameter key has an associated step size, pressing the STEP UP arrow key adds the step size to the current value. While pressing the STEP DOWN arrow key subtracts the step size from the current value.
- Pressing [STEP SIZE] key again returns the display to the previous parameter.



#### Function Keys

- These keys select the main waveform output. The FUNCTION up/down arrow keys select the output waveform.
- If the output frequency is set beyond the allowable range of the waveform, (<) 2MHz for triangle and ramp) a message will be displayed and the frequency will be set to the maximum allowed for that function.



#### Function Keys

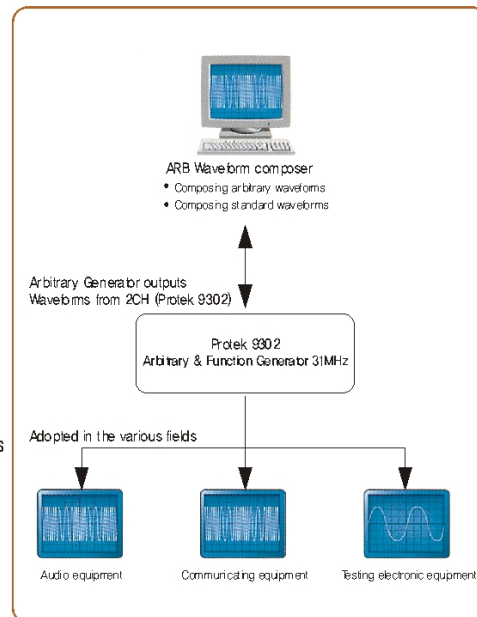
- These keys control the MIT 9302's modulation and sweep capabilities. The left hand up/down arrow keys select the type of modulation or sweep.
- The Right hand up/down arrow keys select the modulating or sweep waveform.
- The [SWEEP MOD] key selects modulation ON and OFF. When the modulation is turned on the SWEEP MOD LED will light.
- If the modulation parameters are not permitted for the selected output function, an error message will be displayed and modulation will not be turned on.

## ■ Features

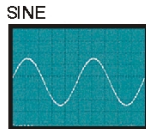
- DDS(Direct Digital Synthesizer) technology
- Function : Sine, Square, Triangle, Ramp, Noise and Arbitrary waveform
- Frequency Range : 0.00000001Hz to 31MHz
- Frequency Resolution : 0.00000001Hz
- Frequency Accuracy :  $\pm 3$ ppm
- Modulation : AM, FM, PM, Burst
- Arbitrary Waveform of 40M sample/sec, up to 16k sample point
- RS232 Interface (standard)
- GPIB Interface (option)
- Arbitrary Waveform Composer (option)

## ■ Applications

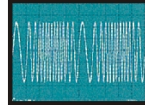
- Test of sounds, images, communication equipments and electronic parts
- Test of construction, civil engineering, machines and materials
- Standard generator of communication facilities
- Test of electronic equipments and measuring instruments
- Automotive, Industrial, Biomedical, Sensor simulation
- Manufacturing test



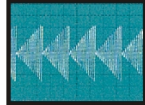
## Protek 9301/9302 Various Waveforms



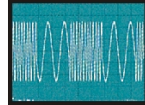
SWEEP



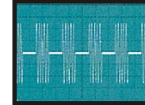
AM



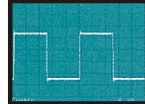
FM



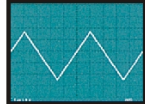
BURST



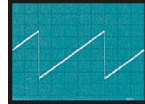
SQUARE



TRIANGLE



RAMP



ARBITRARY



## Specifications

Waveform Specifications	
Standard Function	Sine, Square, Triangle, Ramp, Noise, Arbitrary
AWC Software	Windows 95, 98, 2000, NT, ME
AWC Function	Sine, Square, Triangle, Ramp, Damped Sine, Exponential Rise, Exponential Fall, DC, Noise, Freehand, Line
Waveform Length	16 to 16, 383 points
Amplitude Resolution	12 bits
Sampling Rate	40 M samples/sec
Frequency Characteristics Specifications	
Sine, Square	0.01μHz to 31MHz
Ramp, Triangle	0.01μHz to 2MHz
Noise	10MHz (64BITS M type)
Output Characteristics Specifications	
Output	Protek9301 [1 Channel], Protek9302 [2 Channel]
Source Impedance	50Ω Floating
Output Units	Vpp, Vrms, dBm, %
Sync Output	Front – Panel TTL Output for each channel
Inter Channel Crosstalk	< 0.05% [Protek9302 only]
DC Offset	
Range	±5V (limited such that  Vac peak  +  Vdc  < 5V)
Accuracy	±2% of setting + 1 mV (DC only)
	±80mV depending on AC and DC settings
Amplitude Range	0.05Vp-p to 10Vp-p into 50Ω
1. Sine Wave Amplitude Accuracy (0 V DC Offset)	
	0.01μHz ~ 100kHz    100kHz ~ 20MHz    20MHz ~ 25MHz    25MHz ~ 31MHz
5-10Vpp	±0.2dB    ±0.3dB    ±0.6dB    ±0.9dB
0.05-5Vpp	±0.4dB    ±0.4dB    ±0.8dB    ±0.8dB
2. Square Wave Amplitude Accuracy	
	0.01μHz ~ 100kHz    100kHz ~ 20MHz    20MHz ~ 31MHz
5-10Vpp	±3%    ±6%    ±15%
0.05-5Vpp	±5%    ±8%    ±16%
3. Triangle, Ramp, Arbitrary Amplitude Accuracy	
	0.01μHz ~ 100kHz    100kHz ~ 2MHz
5-10Vpp	±4%    ±8%
0.05-5Vpp	±5%    ±9%
Sine Wave Spectral Purity Specifications	
Spurious Components	DC to 2MHz : < -65dBc [non-harmonic] 2MHz to 31MHz : < -65dBc + 6dBc/octave [non-harmonic]
Subharmonic	< -50 dBc [Sine, 5Vpp]
Harmonic Distortion	: Harmonically related signals will be less than :
	DC to 1MHz [Sine, 1Vpp] : < -45 dBc
	1MHz to 31MHz [Sine, 1Vpp] : < -32 dBc

Signal Characteristics Specifications	
Rise / Fall Time	< 16 ns (10% to 90%)
Asymmetry	< 1% of period + 4 ns
Overshoot	< 5%
Rise / Fall Time	35 ns
Linearity	0.5% of full scale output
Modulation Characteristics Specifications	
Source	Internal (sine, square, triangle, ramp or arbitrary) or External
Depth	0 to 100% AM or ±100% DSBSC
Rate	0.001Hz to 10kHz internal, 20kHz max external
Distortion	< -35dB at 1kHz, 80% depth
DSB Carrier	< -35dB typical at 1 kHz modulation rate (DSBSC)
External Input	±5 V for 100% modulation, 100kΩ impedance
Frequency Modulation	
Source	Internal (sine, square, triangle, ramp or arbitrary)
Rate	0.001 Hz to 10 kHz
Span	0.01μHz to 31MHz (2MHz for triangle, ramp)
Phase Modulation	
Source	Internal (sine, square, triangle, ramp or arbitrary)
Rate	0.001Hz to 10kHz
Span	9999.99°
Pulse Modulation	
Waveform	sine, square, triangle, ramp or arbitrary
Frequency	2MHz to sine, square, triangle, ramp, ARB
Count	1 to 65,000 cycles / burst
Phase Shift	≤ 100 kHz
Frequency Sweep	
Type	Linear or Log
Time	0.001Hz to 10kHz
Span	0.01μHz to 31MHz (2MHz for triangle, ramp)
Marker Output	Two markers may be set at any sweep point (TTL output)
Sweep Output	0-10 V linear ramp signal, synchronized to sweep
Triggering	
Source	CH1 : INT RATE, Single, POS EXT1, NEG EXT1, Line CH1 : INT Ch1, INT RATE, POS EXT2, NEG EXT2
Rate	0.0001s ~ 999.99s
External Input	± edge, TTL Output
Output	TTL Output
Accuracy	± 3 ppm (20°C to 30°C)
Aging	± 3 ppm/year
Input	10MHz/N ±2 ppm, N=1 to 8, 1Vp-p minimum input level
Output	10MHz, > 1Vp-p sine into 50Ω
Operating Temperature	5°C to 40°C
Operating Humidity	35% to 80%
Weight	Protek9301 : 8.2kg, Protek9302 : 8.7kg
Dimensions	363mm [W] × 109mm [H] × 386mm [D]
Interfaces	RS-232 (2400 to 19,200 bps) and GPIB (Optional)
Power Supply	100 / 120 / 220 / 230 VAC (±10%) 50 / 60 Hz
Power Consumption	Protek9301 : 46W, Protek9302 : 80W