# Model 2714A

**ARBITRARY WAVEFORM GENERATORS**

# Low Cost AWG with Extended Memory

- 0.1 S/s to 20 MS/s Adjustable Sample Rate
- 12-bit (0.025 %) Resolution
- Sync Trigger Output for Multi-Phase Operation
- Waveform Creation Software Included
- 10 Standard Waveforms
- 128 k Waveform Memory
- Stores 100 Custom Waveforms
- 0.06 % Waveform Distortion
- RS-232C and GPIB
- Options
  - 100 Step Sequence Generator
  - Rack Mount Kit

## Signal Integrity

Waveforms are always consistent and repeatable because the 2714A is a true arbitrary waveform generator. It uses the raster scan technique with sequential addressing of waveform memory and a variable sample clock rate to adjust the output frequency. Other generators use phase accumulator-based addressing, which can skip or repeat waveform data points. The typical THD (total harmonic distortion plus noise) of the 2714A is -65 dB. No other arbitrary waveform generator matches the 2714A's price and performance.

## Comprehensive Features

High-quality signal production and true arbitrary waveform generation make the 2714A an unmatched combination of price and performance for high sample rate, extended memory applications. The 2714A offers 12-bit vertical resolution with over 128 k of horizontal memory. It has a variable sample rate that ranges from 0.1 S/s to 20 MS/s. This product is ideal for testing I and Q modulation profiles, radar or sonar simulations, complex electromagnetic simulation, ultrasound detector emulation, and a host of other applications.

## Multiple Unit Operation

Each 2714A is equipped with a synchronous trigger output. The synchronous output allows external instruments, including two or more 2714A units, to be hardware triggered by a master 2714A unit. This produces multiple-phase signals with highly accurate phase offsets. Because the 2714A uses the raster scan technique and sequential addressing, there is no need to recalibrate phase offsets every time a frequency change is made. DDS-type generators require this recalibration.

## Systems Ready

The Model 2714A is a low cost version of the Model 2414B. It has the same basic performance capabilities but is designed specifically for systems applications where low cost and performance are valued higher than extended front panel functions. 2714A includes standard RS-232C and GPIB interfaces. WaveWorks™ Jr., wave creation software is also provided at no additional charge. Three multi-phase modes are available to synchronize multiple units for phase-sensitive applications.

## Function Generator Operation

Direct front panel access to 10 standard waveforms with adjustable parameters provides function generator operation for basic lab use. For test applications where custom signals are required, up to 100 user-defined waveforms may be stored in waveform memory. The waveforms may be recalled via the 2714A's front panel or the included WaveWorks™ Jr. wave creation software.

## Effective User Tools

Leverage the 2714A's memory capabilities by adding an optional sequence generator. Each sequence program can have up to 100 steps, which can link to any of the 2714A's 100 user-defined waveforms. Each waveform may be looped over one million times per step. Ten unique programs may be stored in the sequencer's non-volatile memory to produce transient-free output waveforms.

WaveWorks™ Jr. is a complete software solution for importing, exporting, creating, and editing waveform data in the common ASCII formats .CSV, and .PRN. Windows™ compatible, it allows full programming access to both the instrument and the sequence generator. WaveWorks™ Pro+, advanced wave creation software, is available as an upgrade. See the WaveWorks™ Pro+ data sheet for more details.

## Warranty

The Model 2714A is backed by a full 3-year warranty and TEGAM's 30-day no risk trial.

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## Specifications

### Output Waveforms

Up to 100 High-definition custom waveforms, Sine, Square, Trangle, Ramp, DC, Exponential, Haversine, Pulse, Gaussian, Sin x/x (Sinc).

### Waveform

| | |
|---|---|
| Storage: | 100 Waveforms |
| Resolution: | Horizontal Points: 131,036 max |
| | Vertical Points:12 bits, 4,096 |
| | (-2,048 to +2,047) |
| Sample Rate: | 0.1 Hz to 20 MHz (10 s to 50 ns) |
| | 4-digit resolution |
| | ±50 ppm accuracy |
| Transition Time: | < 20 ns |

*(Tested with square wave, filter off, 10 Vp-p, 50 Ω termination.).*
Spectral Purity:  (THD + Noise): -65 dB typical
*(Tested with 80 kHz measurement bandwidth, 20 MHz clock, 20 kHz sine wave, 1000 points, filter on, full amplitude, 50 Ω termination.)*

### Amplitude and Offset

| Range | Resolution | Accuracy |
|---|---|---|
| ±1.00 to 10 V | 10 mV | 1 % of setting + 20 mV |
| ±100 mV to 999 mV | 1 mV | 3 % of setting + 5 mV |
| ±10 mV to 99.9 mV | 100 µV | 5 % of setting + 1 mV |

*Note: 50 Ω source impedance, measured at open circuit tested with l kHz sinewave plus DC offset.*

### Analog Filter

User-selectable 7 MHz 7th order

### Sequence Generator (Optional)

| | |
|---|---|
| Waveform: | Transient-free Loop-and-Link |
| Repetitions: | Loop: 1,048,575 times |
| | Link: 100 waveforms |
| Program: | 100 Steps total |
| File: | 10 Sequences |

### Operational Modes

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|---|---|
| Continuous: | Output runs continously between selected memory address locations. |
| Triggered: | Output at start point until triggered, then runs once. |
| Gated: | As triggered except output is continous until gate signal ends. |
| Burst: | Each trigger outputs a preprogrammed number of waveforms from 1 to 1,048,575. |
| Toggled: | Alternate triggers gate the output waveform. |
| Master-Slave: | For multi-unit operation. |
| Cont-Sync: | Multiple units run continuously in sync with the master unit. |
| Trig-Sync: | Multiple units run in sync with the master unit for one cycle when the master unit is triggered. |
| Trig-Seq.: | A tail-chasing mode between the master and the slave unit initiated by triggering the master unit. |

### Outputs

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|---|---|
| Main Output: | Front-panel/50 Ω impedance. |
| Sync Output: | Front-panel TTL sync output, 50 Ω impedance. |
| Clock Out: | Rear panel AWG waveform sample clock output (TTL). X2 sample clock. |
| Reference Out: | Rear panel internal 10 MHz reference output (TTL). |
| Sync Trigger Out: | Rear-panel BNC (TTL) for multiple unit operation. |

### Inputs

| | |
|---|---|
| TRIG IN: | Rear-panel TTL trigger input for triggered, gated, toggled, burst, and master slave modes. |
| CLOCK IN: | Rear-panel sample clock input (TTL, £ 20 MHz). |
| REF IN: | Rear-panel 10 MHz reference input. The internal crystal-controlled oscillator will phase-lock to the input. |

### Trigger Sources

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|---|---|
| Manual Trigger: | Front-panel button |
| Ext. Trigger Input: | Rear-panel BNC connector |

### Creation Tools

WaveWorks™Jr. for Windows™

| | |
|---|---|
| Operating System: | Windows 95, 98, XP, & 2000. |
| PC Requirements: | 486DX or better with 4 MB RAM. |
| Interfaces: | COM port or National Instruments AT-GPIB card or equivalent. |
| Standard Functions: | 21 |
| Math Operation: | 6 Operators, 12 Transfer Functions |
| Sequence Creation: | Optional hardware required |
| Waveform Analysis: | |
| Frequency Domain: | FFT and IFFT; up to 500th harmonic, graphic display, and tabulation. |
| Time Domain: | Waveform and digital pattern. |
| Edit: | Point, Vertex, and Harmonics (FFT and IFFT). |

### Computer Interface

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|---|---|
| RS-232C: | 19.2 kBaud, max. |
| GPIB: | IEEE Std. 488.2-1987 |

### General

| | |
|---|---|
| Temperature Range: | 23 ºC +/-3 ºC (73.4 ºF +/-5.4 ºF) for specified accuracy |
| Operates: | 0 ºC to +50 ºC (+32 ºF to +122 ºF) |
| Storage: | --20 ºC to +60 ºC (+4 ºF to +140 ºF) |
| Dimensions: | 25.8 X 11.5 X 30 cm W x H x D (10.14 in X 4.53 in X 11.81 in) |
| Weight: | 5.0 kg (11 lb) |
| Power: | 55 VA; 45 W (max) 100/120/220/240 VAC, +5 %, -10 %; 48 to 63 Hz. |