**ARBITRARY WAVEFORM GENERATORS**

- **Variable Sample Rate – 0.1 S/s to 20 MS/s**
- **12-bit (0.025 %) Resolution**
- **4 Fully Programmable Sync Outputs**
- **20 Standard Waveforms**
- **128 k Waveform Memory**
- **Stores 1000 Custom Waveforms**
- **Summing Input**
- **0.06 % Waveform Distortion**
- **RS-232C**
- **Options**
  - **4,096-Step Sequence Generator**
  - **WaveWorks™ Pro+ Waveform Creation Software**
  - **GPIB Communications**
  - **Rack Mount Kit**

## Signal Integrity

Waveforms will always be consistent and repeatable because the 2414B 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 compromises waveform integrity by skipping or repeating waveform data points. Phase-shifted and amplitude-varied waveforms used in complicated sequences are easily generated with the 2414B.



# AWG with Extended Memory

## Comprehensive Features

The 2414B has an independently variable sample clock that ranges from 0.1 S/s to 20 MS/s. It offers 12-bit vertical resolution and 128 k of active waveform memory. Standard or arbitrary waveforms are created through the front panel or optional WaveWorks™ Pro+ software. High-quality signal production and true arbitrary waveform generation make the 2414B an ideal solution for high sample rate, precise-signal applications including MEMS actuators and micro engines, bearing failure assessment, I and Q modulation, biofeedback simulation, multi-phase signal generation, conventional signal generation, and much more.

## Function Generator Simplicity

Direct front panel access to 20 standard waveforms with user-definable parameters provides function generator simplicity for general lab applications. For test applications where custom signals are required, up to 1,000 unique waveforms may be stored in waveform memory. Once programmed, all waveforms are available for direct recall and editing from the front panel or RS-232C or GPIB (optional) interfaces.

## Programmable Synchronous Outputs

Each 2414B is equipped with four independently-controlled synchronous outputs. Sync outputs allow external instruments, including additional 2414B units, to be hardware triggered by waveform events. Because each output is fully programmable, multiple sync pulses can be defined at any width or location within waveform memory. Hardware sync is more precise than software sync, enhances system performance, and reduces development time. TEGAM is the only manufacturer that offers programmable synchronous outputs.

## Extensive User Tools

Expand the 2414B's memory up to 30,000 times with the optional sequence generator. Each sequence program can have up to 4,096 steps, which can link to any of the 2414B's 1,000 user-defined waveforms. Each waveform may be looped up to one million times per step. Up to one hundred unique sequence programs may be stored in the sequencer's non-volatile memory.

WaveWorks™ Pro+ software (optional) is a total software solution for importing, exporting, creation and editing waveform data in up to seven formats including the common ASCII formats .CSV, and .PRN. See the WaveWorks™ Pro+ data sheet for more information.

## Facilitates the Design of Complex Test Systems

The RS-232C and optional IEEE-488.2 offer direct, easy, programming capability. The 2414B has numerous triggering and timing inputs/outputs for precise, multi-phase operation of several instruments. Up to four slave arbs may be triggered by a single master 2414B. With four sync outputs available from each slave (16 total outputs), numerous instruments can be simultaneously triggered by a single waveform event. Further expansion is limited only by propagation delay.

## Warranty

The Model 2414B is backed by a full 3-year warranty and TEGAM's 30-day no risk trial.

TEGAM ®

*YOUR GLOBAL SOURCE FOR TEST AND MEASUREMENT SOLUTIONS*

## Specifications

### Output Waveforms

Up to 1,000 custom waveforms, Sine, Square, Triangle, ±Sawtooth, DC, ±Pulse, ±Exponential, AM, SCM, FM, Lin/Log Sweep, Sin x/x (Sinc), Gaussian, Haversine, Circle, Noise. Four programmable sync signals per waveform.

### Sequence Generator (Optional)

| | |
|---|---|
| Waveform: | Transient-free Loop-and-Link |
| Repetitions: | Loop: 1,048,575 times |
| | Link: 1,000 waveforms |
| Program: | 4,096 Steps total |
| File: | 100 Sequences |

### Waveform

| | |
|---|---|
| Storage: | 1,000 Waveforms |
| Resolution: | Horizontal Points: 128 k (131,040) max |
| | Vertical Points:12 bits, 4,096 (+2,047,-2,048) |
| Sample Rate: | 0.1 Hz to 20 MHz (10 s to 50 ns) 4-1/2 digit resolution ±10 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, 1,000 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 sine wave plus DC offset.*

### Analog Filter

User-selectable 7 MHz 7th order, low-pass filter

### Operational Modes

Continuous, Triggered, Gated, Burst (1 to 1,048,575), Toggled, Hold, RTS (Return to start)

### Outputs

| | |
|---|---|
| Main Output: | Front-panel/50 Ω impedance. |
| Sync Outputs: | SYNC 1-SYNC 4; All fully programmable addresses & widths |
| SYNC 1 OUT: | Front-panel (TTL)/50 Ω |
| SYNC 2 OUT: | Rear panel BNC (TTL) |
| SYNC 3 OUT: | Rear panel BNC (TTL) |
| SYNC 4 OUT: | Rear panel BNC (TTL) |
| CLOCK IN/OUT: | Rear panel sample clock I/O (TTL) |
| REF IN/OUT: | Rear panel internal or external 10 MHz reference (TTL) |
| Sync Trigger Out: | Rear-panel BNC (TTL) for multiple unit operation |

### Inputs

| | |
|---|---|
| SUM IN: | SUM IN allows external signal to be added to output. Gain = -2 open circuit and -1 with 50 Ω output termination and 50 Ω input Z. |
| TRIG IN: | Rear-panel TTL trigger input for triggered, gated, toggled, and burst 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. |
| HOLD IN: | Rear-panel TTL input to stop waveform. |
| RTS IN: | Rear-panel TTL input to initiate RTS mode. |

### Trigger Sources

| | |
|---|---|
| Internal Trigger: | 0.02 to 10 seconds |
| Manual Trigger: | Front-panel button |
| Ext. Trigger Input: | Rear-panel BNC connector |

### Creation Tools (Internal)

| | |
|---|---|
| Waveform Editing: | Point Mode, Line Mode, Vertex Mode; Insert Function, Sum Function, Dump Function, Digital Amplitude/Offset, Smooth, Copy/Paste, Waveform Math (A+B, A-B, AxB). |
| Pointing Device: | Front-panel keys and knob. |
| Software: | WaveWorks™ Pro+ (Optional) |

### Stored Settings

| | |
|---|---|
| Setups: | 20 instrument settings |

### Computer Interface

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

### 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. |