Portable signal source for calibrating electronic equipment and machinery monitoring systems.

1510A PRECISION SIGNAL SIMULATOR

- Voltage Signals
- Charge Signals
- Machinery Speed Signals
- Dual outputs
- Direct Digital Synthesis
- Wide Frequency range
- 40 Built-in memories
- Sweep Generator
- Battery powered
Achieve the highest accuracy with the most advanced calibrator ever offered

Inspired by the popular 1500CS, the New 1510A Precision Signal Simulator from MTI Instruments combines high precision voltage and charge mode signal generation in a single portable device with new features. Use the 1510A in the laboratory, in test cells, on the flight line, in the calibration shop, on the factory floor or any place that precision signals are required for equipment maintenance or calibration. Initially designed for machinery and gas turbine maintenance, the 1510A produces accurate and precise voltage, charge, and speed signals necessary for system testing and calibration. In addition to being easy to use, the portable 1510A has a large internal memory to store and recall frequently used settings. The 1510A also features a USB interface to allow remote control and programming of the unit.

**DIRECT DIGITAL SYNTHESIS** - The 1510A combines the precision of Direct Digital Synthesis with an effective 20 bit digital-to-analog accuracy to provide state-of-the-art performance.

**PRECISION SIGNALS** - The 1510A provides voltage and charge signals with accuracies to 0.05% - rarely found even in high-cost laboratory instruments.

**DUAL CHANNEL OUTPUT** - The 1510A features two independent signal output channels. Set them for different output levels, wave shapes, frequencies, and phase. For other testing needs you can synchronize the two channels. This unique capability and flexibility makes testing and calibration fast and easy.

**FULL FUNCTIONALITY** - The 1510A produces SINE, SQUARE, TRIANGLE, and PULSE waveforms from 0.1 HZ to 100KHz in 0.1 Hz increments. Output levels can range from 1 µvolt up to 10 volts peak and can also include programmable DC offsets in 0.1 millivolt steps.

**THERMAL COMPENSATION** - The 1510A features automatic thermal compensation to ensure accuracy in laboratory, control room and factory environments.

**PRECISION CHARGE SIGNALS** are produced by the 1510A. Differential and single-ended signals are produced to simulate accelerometers and other charge mode devices.
Special functions for machinery and instrumentation systems

Testing and calibrating machinery monitoring and control systems is difficult when vibration, speed and other signals must be simulated simultaneously. The 1510A has two output channels to simplify your testing and calibration processes, and they may be synchronized or run independent of each other. Special tachometer and signal phase functions enable versatile test strategies to check balancing systems, gas turbine engine monitoring systems, and other machinery support equipment.

**SPEED SIGNAL GENERATION** is a snap with the 1510A. Machinery speed signals from tachometer generators, multi-tooth gears and even odd tooth generators are easily produced. The signals can also be generated at a fixed ratio of the other signal channel to produce true machinery vibration and speed signals.

**SPEED SIGNAL GENERATION**

![Tach Generator Signal](image1)

![Pulse Signal](image2)

![Long Tooth Signal](image3)

**SYNCHRONIZED SWEEPS** are useful when testing a variety of system performance parameters. Set the START frequency, the STOP frequency, the sweep TIME, and press GO.

**SYNCHRONIZED SWEEPS**

![0 Degrees Phase](image4)

![90 Degrees Phase](image5)

**VARIABLE PHASE** between the two output signals is easily adjusted using the 1510A controls. Use this feature to calibrate balancing and other data acquisition systems.

**VARIABLE PHASE**

![Charge Output](image6)

**CHARGE OUTPUT** is used to simulate the signals from piezoelectric accelerometers. Either Single-ended or Differential signals are available to calibrate and test vibration circuits in machinery monitoring systems. A wide range of charge signals may be produced at constant and varying frequencies.

**CHARGE OUTPUT**

**THE LOW VOLTAGE BRIDGE** mode is a unique feature of the 1510A that generates accurate low voltages to simulate bridge type sensors. With 24-bit closed loop control, you can easily command MICROvolts for measurement system testing and calibration.

**THE LOW VOLTAGE BRIDGE**

**THE JOG FUNCTION** is a unique feature of the 1500CS that permits small changes to many of the control parameters. Use the JOG feature to slowly vary the signal frequency to determine filter response or vary the signal amplitude in increments to determine system gain.

**THE JOG FUNCTION**

Remarkable functionality and accuracy in an easy to use instrument
Designed to improve productivity

The 1510A is a tool that improves productivity as well as ensuring equipment and system accuracy. From the high visibility protective boot and the internal signal setting memory to the easy to use keyboard interface, the 1510A has features to make the job easier.

MEMORY for PRODUCTIVITY - All signal settings can be saved and retrieved from the 1510A’s 40 location memory to reduce programming and test time, and to ensure test repeatability.

PORTABLE - The 1510A can be used anywhere. It is small, lightweight, portable, and operates from internal NiMH batteries or the included charger/power supply.

DESIGNED FOR RUGGED USE - The 1510A is designed for the factory and shop environment. The spill-proof keypad, the bright protective boot and the back-lit display all make the 1510A reliable in the toughest working environments.

EASY TO USE - The 1510A guides users through the process of programming the instrument. All settings including signal type, amplitude, and frequency are defined using the keypad. “Soft” function keys on the keypad assume different functions depending upon the mode of operation lending added flexibility to the instrument.

Support Accessories

The 1510A is complimented by a number of accessories designed to ease the task of calibrating and testing your equipment. Included in the list of accessories is a software package specifically developed to help you program and control your 1510A.

DIGITAL CONTROL INTERFACE - The 1510A includes a USB interface. Optional software allows setup, operation, maintenance and calibration of the unit via this port.

CONNECTION CABLES - Several different cables are available for connecting directly to charge amplifiers, and other machinery monitoring equipment. Consult with your MTI Instruments representative for all available options.

Bring the calibration lab to the equipment with the 1510A
## Channel A

### Waveform: Sine Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Waveform: Square Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Waveform: Triangular Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Waveform: Saw-Tooth Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### DC Output (and DC offset)
- **Voltage Range**: ±9.9999 VDC
- **Voltage Accuracy**: 0.05%±0.1mV
- **Resolution**: 0.1 mV

**Microvolt DC Output – Bridge Mode**
- **Voltage Range**: ±1 µvolt to ±99.999 mVDC
- **Voltage Accuracy**: 0.05%±5 µvolt
- **Resolution**: 0.1 µvolt

**Output Connectors**
- **Connector Impedance**: 50 ohms
- **Voltage**: BNC coaxial
- **Differential Change (DE)**: MS3102A-18SL-3P
- **Single-ended Change (SE)**: 50 Ohm 10-32 MicroDot coaxial

Operating range temperature is 0-50°C. Specifications are stated at 25°C under open load conditions, after minimum 30 minute warm-up.

### Channel B

#### Standard signal types
*(for speed synthesizer signals, see next page)*

### Waveform: Sine Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Waveform: Square Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Waveform: Triangular Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Waveform: Saw-Tooth Wave
- **Voltage Range**: 0 to 9.9999 Volts pk
- **Charge Range**: 0 to 9,999.9 pC pk
- **Resolution**: 0.1mV or 0.1 pC
- **Frequency Accuracy**: ±0.005%
- **Overshoot**: Less than 2%
- **Asymmetry**: Less than 3% at 10 kHz
- **Rise/Fall Time**: 3.0 µsec

### Output Connectors
- **Impedance**: 50 ohms
- **Connector**: BNC coaxial

Bridge Mode Microvolt DC Signal: accuracy is based on use of RG58/U coaxial cable, 2 ft long, non-RoHS composition. NOTE: Connector metallic dissimilarity can cause false readings at low microvolt signal levels.

Specifications are subject to change without notice.
### Channel B
**Speed Synthesizer Signals**

| Ratio Speed Signal Function |  
|------------------------------|---------------------------------|
| Signal Type                  | Sine, Square, Single pulse, Odd Pulse |
| Signal Range                 | 0 to 9.9999 Volts Pk             |
| Resolution                   | 0.1 mV                           |
| Frequency Range (ratio)      | 0.1 to 100X Ch. A frequency, Step 0.1 |
| Units                        | RMS, peak, or pk-pk              |

| Single Pulse Signal Function |  
|------------------------------|---------------------------------|
| Signal Type                  | 1-cycle sine or ½ cycle square (TTL) |
| Signal Range                 | 0 to 9.9999 Volts Pk             |
| Resolution                   | 0.1 mV                           |
| Pulse Duty Cycle             | 3% to 100%                       |
| Frequency Range (ratio)      | 0.1x to 100x Ch. A frequency, Step 0.1 |
| Frequency Range (fixed)      | 1Hz to 100kHz                    |
| Units                        | RMS, peak, or pk-pk              |

| Odd Pulse Signal Function    |  
|------------------------------|---------------------------------|
| Odd Pulse Type               | Long or Short                    |
| Odd Pulse Size               | 0 to 999% of Base Pulse         |
| Number of Base Pulses between Odd Pulse | 1 - 100  |
| Frequency Range (ratio)      | 0.1x to 100x Ch. A frequency, Step 0.1 |
| Frequency Range (fixed)      | 1 Hz to 99,999.9 Hz              |
| Range                        | 0 to 9.9999 Volts Pk             |
| Resolution                   | 0.1 mV                           |
| Voltage Units                | RMS, peak, or pk-pk              |
| Waveform                     | Sine wave                        |

| Sweep Function (Channels A & B) |  
|---------------------------------|---------------------------------|
| Sweep time                     | 1 to 999 sec (16.67 min)        |
| Sweep time Step                | 1 Second                        |
| User Controls:                 |                                 |
| Set START Frequency            |                                 |
| Set STOP Frequency             |                                 |
| Set SWEEP time (seconds)       |                                 |
| GO                              |                                 |
| PAUSE                           |                                 |
| CANCEL                         |                                 |
| Channels                       | A alone or A & B together        |

*Channel B can be swept synchronously with Channel A, if Channel B frequency is set to any Ratio of Channel A frequency. Phase between Channel A and Channel B is preserved during sweep.*

### Other Features

**User and features**
- **User Display**: Graphical, 128x64 pixel, B&W transflective LCD white backlight
- **Computer Port**: USB 1.0 for remote control, programming, and calibration
- **Battery Charger Port**: For battery charging and operation. 115/230VAC power

**Key Pad Functions**
- **Numbers**: 0 through 9
- **Function Keys (soft keys)**: 4 (functions change depending upon operating mode)
- **On/Off**: Momentary Hold *“soft”* button
- **Set-Up Memory**: 40 locations to save settings for all outputs and functions
- **Memories (non-volatile)**
  - Save program setups (any combination of instrument settings)

**Dimensions**
- 7.5"H x 4.25"W x 2.25"D (19cm x 11cm x 5.7cm)

**Power**
- External charger operates from 115/230VAC, 50-60Hz
  - Approx 5 watts.
- Battery Pack – NiMH, size AA (qty 4), 2500mAH

**MTI Instruments** is a leader in advanced technology products for manufacturing, metrology and aerospace industries.

Contact MTI Instruments for more information about the 1510A.
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Operating range temperature is 0-50°C. Specifications are stated at 25°C under open load conditions, after minimum 30 minute warm-up.

**Accuracy specifications** are expressed in terms of ranges, which leads to points of discontinuity in the specified performance. At such points of discontinuity, the wider tolerance applies.

**Performance** is verified with measurement instrumentation that is traceable to N.I.S.T., having a TAR (Test Accuracy Ratio) of at least 4:1, although that is not guaranteed for all settings.

**Bridge Mode Microvolt DC Signal**: accuracy is based on use of RG58/U coaxial cable, 2 ft long, non-RoHS composition. *NOTE:* Connector metallic dissimilarity can cause false readings at low microvolt signal levels.

**Specifications are subject to change without notice.**