

# 1500CS PRECISION CALIBRATOR

A portable signal source for calibrating electronic equipment and machinery monitoring systems.



- Voltage Signals
- Charge Signals
- Machinery Speed Signals
- Dual outputs
- Direct Digital Synthesis
- Wide Frequency range
- 40 Built-in memories
- Sweep Generator
- Battery powered

***Never before have all these features been  
available in a single instrument***

**mti instruments**

# Achieve the highest accuracy with the most advanced calibrator ever offered

The New 1500CS Precision Calibrator from MTI Instruments is the first instrument to combine high precision voltage and charge mode signal generation in a single portable device. Use the 1500CS in the laboratory, in test cells, on the flight line, in the factory, or any place that precision signals are required for equipment maintenance or system calibration in the test lab. Initially designed for machinery and gas turbine maintenance, the 1500CS produces accurate and precise voltage, charge, and speed signals necessary for system testing and calibration. In addition to being easy to use, the portable 1500CS has a large internal memory to store and recall frequently used settings. The 1500CS also features an RS-232 interface to allow remote control and programming of the unit.

**DIRECT DIGITAL SYNTHESIS** - The 1500CS combines the precision of Direct Digital Synthesis with 16 bit digital-to-analog accuracy to provide state-of-the-art performance.



**PRECISION SIGNALS** - The 1500CS provides voltage and charge signals with accuracies to 0.05% - rarely found even in high-cost laboratory instruments.

**DUAL CHANNEL OUTPUT** - The 1500CS 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 1500CS produces SINE, SQUARE, TRIANGLE, and PULSE waveforms from 0.1 HZ to 100KHz in 0.1 Hz increments. Output levels can range up to 10 volts peak and can also include programmable DC offsets in 0.1 millivolt steps.

**PRECISION CHARGE SIGNALS** are produced by the 1500CS. Differential and single-ended signals are available to simulate accelerometers and other charge mode devices.

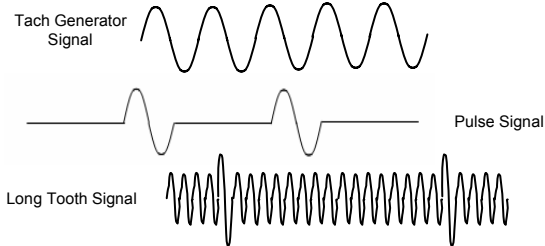


*The 1500CS provides unsurpassed features and capabilities for calibration and repair personnel*

# 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 1500CS has two output channels to simplify the testing and calibration process, 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.

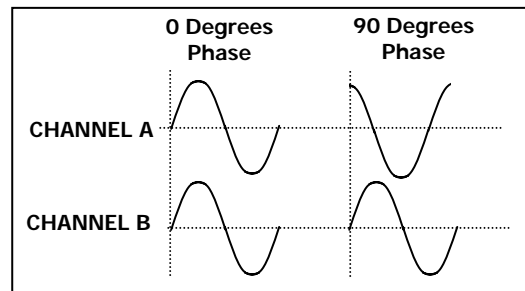
**SPEED SIGNAL GENERATION** is a snap with the 1500CS. Machinery speed signals from tachometer generators, multi-tooth gears and even odd tooth generators are easily produced. The signals can also be generated at a fixed ratio of the other signal channel to produce true machinery vibration and speed signals.



**SYNCHRONIZED SWEEPS** are useful when testing a variety of system performance parameters. Sweeps are produced by the 1500CS between a user specified range of frequencies and over a user programmed period of time. Set the SWEEP TIME, the START and STOP frequencies, and then press GO.



**VARIABLE PHASE** between the two outputs signals is easily adjusted using the 1500CS controls. Use this feature to calibrate balancing and other data acquisition systems.



**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.

**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.

*Remarkable functionality and accuracy in an easy to use instrument*

# Designed to improve productivity

The 1500CS 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 1500CS has features to make the job easier.



**MEMORY for PRODUCTIVITY** - All signal settings can be saved and retrieved from the 1500CS's 40 location memory to reduce programming and test time, and to ensure test repeatability.

**PORTABLE** - The 1500CS 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 1500CS is designed for the factory and shop environment. The spill-proof keypad, the bright protective boot and the back-lighted display all make the 1500CS reliable in the toughest working environments.

**EASY TO USE** - The 1500CS 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.

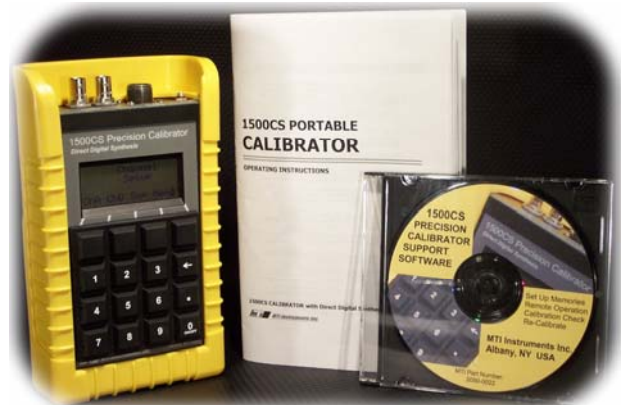


## Support Accessories

The 1500CS 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 1500CS.

**DIGITAL CONTROL INTERFACE** - The 1500CS includes an RS-232 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.



# 1500CS Specifications

## Channel A

### Waveform: Sine Wave

Voltage Range (0.1 Hz to 50 kHz)	0 to 9.0000 Volts pk
Voltage Range (50 kHz to 100 kHz)	0 to 5.0000 Volts pk
Charge Range (0.1 Hz to 50 kHz)	0 to 9,000.0 pC pk
Charge Range (50 kHz to 100 kHz)	0 to 5,000.0 pC pk
Voltage Resolution	0.1 mV
Charge Resolution	0.1 pC
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz-99999.9 Hz
Distortion	0.1 Hz to 10 kHz - 0.25% 10 kHz to 100 kHz- 0.75%

Frequency Accuracy of setting	±0.0005%
Level Set Accuracy of setting (Low Range 1mv to 1volt)	
0.1 Hz to 20kHz	0.1% or better
20 kHz to 50kHz	0.20% or better
50 kHz to 100kHz	0.50% or better
Level Set Accuracy of setting (High Range 1 volt to 9 volts)	
0.1 Hz to 20 kHz	0.1% or better
20 kHz to 50 kHz	0.20% or better
50 kHz to 100 kHz	0.75% or better

### Waveform: Square Wave

Voltage Range	0 to 9.0000 Volts pk
Charge Range	0 to 9,000.0 pC pk
Voltage Resolution	0.1 mV
Charge Resolution	0.1 pC
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz - 20 kHz
Rise/Fall Time	(10% - 90%) ±1.5 µsec.
Asymmetry	Less than 5% at 10 kHz
Overshoot	Less than 5%
Level Set Accuracy of setting	0.1% typical, 0.25% max

### Waveform: Triangle Wave

Voltage Range	0 to 9.0000 Volts pk
Charge Range	0 to 9,000.0 pC pk
Voltage Resolution	0.1 mV
Charge Resolution	0.1 pC
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz - 20 kHz
Level Set Accuracy of setting	0.1% typical, 0.25% max

### Waveform: Saw-Tooth Wave

Voltage Range	0 to 9.0000 Volts pk
Charge Range	0 to 9,000.0 pC pk
Voltage Resolution	0.1 mV
Charge Resolution	0.1 pC
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz - 20 kHz
Level Set Accuracy of setting	0.1% typical, 0.25% max

### DC Output

Voltage Range	0 to 9.0000 V DC full scale
Level Set Accuracy of setting	0.05% typical, 0.25% max
Resolution	0.1 mV

DC voltage can be generated alone or in conjunction with AC signal to simulate offsets

### Output Connectors

Connector Impedance	50 ohms
Voltage Connector	BNC
Full Differential Charge Connector	MS3102A-10SL-3P
Single Ended Charge Connector	50 Ohm 10-32 MicroDot

## Other Features

### Controls and features

User Display	4 Line x 16 character LCD EL backlight for readability
Computer Port	RS232 for remote control, programming, and calibration RJ-12 connector
Battery Charger Port	For battery charging and operation. 115 VAC power

### Key Pad Functions

Numbers	0 through 9
Function 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
Save Settings	Save program setups (40 max)

### Dimensions

3.5"H, 19"W, 13"D

### Power

Operates from 115 VAC, 50-60Hz  
Approx 5 watts.  
Battery Pack – NiMH, size AA (qty 4)

## Channel B

### Waveform: Sine Wave

Voltage Range	0 to 9.0000 Volts Pk
Resolution	0.1 mV
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz-99,999.9 Hz
Distortion	0.1 Hz to 10 kHz 0.25% 10 kHz to 100 kHz 0.75%

Frequency Set Accuracy of setting	±0.0010%
Level Set Accuracy of setting	0.30%

### Waveform: Square Wave

Voltage Range	0 to 9.0000 Volts Pk
Resolution	0.1 mV
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz - 20 kHz
Rise/Fall Time	(10% - 90%) ±1.5 µsec.
Asymmetry	Less than 5% at 10 kHz
Overshoot	Less than 5% full scale output
Level Set Accuracy of setting	0.30%

### Waveform: Saw-Tooth Wave

Voltage Range	0 to 9.0000 Volts Pk
Resolution	0.1 mV
Level Types	RMS, peak or pk-pk units
Freq. Range	0.1 Hz - 20 kHz
Level Set Accuracy of setting	0.30%

### Impedance

50 ohms

### Connector

BNC

## Channel B Speed Synthesizer

### Ratio Speed Signal Function

Signal Type	Sine, Square, Single pulse, Odd Pulse
Signal Range	0 to 9.000 Volts Pk
Resolution	1.0 mV
Freq. Range (ratio)	0.1 to 100X Chan A frequency, Step 0.1
Units	RMS, peak, or pk-pk

### Single Pulse Signal Function

Signal Type	Sine or Square
Signal Range	0 to 9.000 Volts Pk
Resolution	1.0 mV
Pulse Duty Cycle	12% to 100%
Freq. Range (ratio)	0.1 to 100X Ch. A frequency, Step 0.1
Freq. 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
Freq. Range (ratio)	0.1 to 100X Ch. A frequency, Step 0.1
Freq. Range (fixed)	1 Hz to 99,999.9 Hz
Range	0 to 9.000 Volts Pk
Resolution	1.0 mV
Voltage Units	RMS, peak, or pk-pk
Waveform	Sine wave

### Speed Signal Sweep Function

Sweep time	1 to 999 sec
Step Size	1 Second
User Controls:	Set START Freq, Set STOP Freq, Set SWEEP time, GO, PAUSE, CANCEL
Channels	A alone or A & B together Ch. B can be swept with Ch. A if Ch. B frequency is a Ratio