



GPS-1000B+ series

Digital Storage Oscilloscope

GPS-1072B+ · GPS-1102B+ · GPS-1152B+

Quick Start Guide

70, 100 and 150 MHz · Issue 1

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1 Safety

Read this section before connecting anything to the instrument.

This oscilloscope is not rated for installation measurement. It must not be used for measurements in categories CAT II, CAT III or CAT IV, and must not be used on mains circuits. Measuring a mains supply with it is dangerous to you and to the instrument.

- Use the supplied mains lead and make sure the instrument is earthed. The instrument earths through the protective conductor of that lead, and the earth must be connected before anything is connected to the inputs or outputs.
- The probe ground lead is at earth potential. Do not connect it to anything that is not at earth potential, and never to a live conductor.
- Do not exceed 400 V on any input.
- Keep your fingers behind the guard on the probe body, and do not touch exposed metal on the probe head while it is connected to a source.
- Do not operate the instrument in damp conditions, in an explosive atmosphere, or with a cover removed.
- Use only probe assemblies that meet the instrument's specification. There are no user-serviceable parts inside.

If the instrument is used in a way the manufacturer has not specified, the protection it provides may be impaired.

2 In the box

- GPS-1000B+ oscilloscope
- Two passive probes, 1:1 and 10:1 switchable, bandwidth matched to the model
- Mains lead
- USB cable
- CD containing EasyScopeX software
- Quick start guide and calibration certificate

Check the contents against this list before you begin, and keep the packaging until you are satisfied the instrument works.

3 The three models

Model	Bandwidth	Sampling	Fastest timebase	Rise time
GPS-1072B+	70 MHz	1 GSa/s	5.0 ns/div	3.5 ns typical
GPS-1102B+	100 MHz	1 GSa/s	2.5 ns/div	3.5 ns typical
GPS-1152B+	150 MHz	1 GSa/s	2.5 ns/div	2.3 ns typical

The models differ in bandwidth, and on the 70 MHz model in the fastest timebase. Everything else in this guide applies to all three.

4 First power-on

Connect the mains lead and switch on. The instrument runs a self-test and reaches its home screen in a few seconds.

Checking it works

Press DEFAULT SETUP. Set the switch on one probe to 1X, connect it to CH1, and clip the tip and the reference lead to the PROBE COMP terminals. Press AUTO. Within a couple of seconds you should see a square wave of about 3 V peak to peak at 1 kHz.

Press CH1 twice to turn that channel off, press CH2, and repeat with the same probe on channel 2.

5 The probe

More wrong measurements come from the probe than from the instrument, and both of the reasons are avoidable.

The switch on the probe and the setting in the menu must agree

Press CH1, then Probe, and select the factor that matches the switch on the probe. If they disagree, every voltage the instrument shows is wrong by that factor, and it will look perfectly reasonable.

At 1X the probe limits the instrument to 6 MHz. To use the full bandwidth of the oscilloscope, set the probe switch to 10X and the menu to match. A 100 MHz signal measured at 1X will appear smaller and slower than it is.

Compensating the probe

A new probe, or a probe moved to a different channel, should be compensated before it is trusted.

Set the probe switch and the menu to 10X, connect the probe to the PROBE COMP terminals and press AUTO. Look at the top of the square wave: it should be flat. If it slopes up the probe is over-compensated, and if it slopes down it is under-compensated. Adjust the trimmer in the probe body until the top is flat, and repeat on the other channel.

6 The controls you need first

AUTO

Sets the vertical scale, timebase and trigger to produce a usable display of whatever is connected. The first thing to press when a signal is not showing, and usually the fastest route to a starting point.

DEFAULT SETUP

Returns the instrument to its factory configuration. It does not change the language, saved waveforms and setups, the display contrast, or the calibration data.

The Universal knob

The general-purpose control. It moves cursors, sets holdoff and pulse widths, chooses storage locations and selects menu options. Pressing it confirms.

RUN/STOP and SINGLE

RUN/STOP acquires continuously, or freezes what is on screen. SINGLE captures one acquisition and stops, which is what you want for an event that happens once.

SET TO 50% and FORCE

SET TO 50% puts the trigger level halfway between the highest and lowest points of the signal, which stabilises most displays immediately. FORCE completes an acquisition whether or not a trigger has occurred, which is useful in single and normal trigger modes.

The vertical and horizontal knobs

Volts/div scales the waveform, Position moves it. Pressing either knob returns that setting to zero. Pressing the Volts/div knob also switches between coarse steps in a 1-2-5 sequence and fine steps between them.

7 Making a first measurement

With a signal connected and AUTO pressed:

- Press MEASURE, then Voltage or Time, choose the source channel, choose the parameter, and press Add. The value appears at the bottom left and stays there.
- Five parameters can be shown at once. All of them can be displayed together from the All Mea menu.
- For a measurement you place yourself, press CURSORS and set the mode to Manual for independent cursors, or Track to follow the waveform.

Automatic measurements use the waveform record rather than the screen, so they are more accurate than reading the graticule or placing cursors by eye.

8 Memory depth, and when long memory applies

Long memory keeps the resolution of a waveform when the timebase is expanded. It is not available at every sampling rate, and this is the constraint most likely to surprise you.

How you are sampling	Normal memory	Long memory
One channel at 1 GSa/s	40 kpts	Not available
One channel at 500 MSa/s or below	20 kpts	2 Mpts
Two channels at 500 MSa/s or below	20 kpts	1 Mpts

Press HORI MENU and set MemDepth to Long Mem to enable it. At the full 1 GSa/s on a single channel the instrument uses 40 kpts and long memory is not offered.

9 Saving, and connecting to a PC

Twenty instrument setups, ten waveforms and two reference waveforms are held internally. Setups, waveforms, screen images and CSV files can be written to a USB drive in the front panel socket. Images and CSV files cannot be read back into the instrument, but they open on a computer.

For remote control, set Back USB to USBTMC in the Utility menu and connect the USB cable to a PC. The instrument accepts SCPI commands, and the supplied EasyScopeX software will drive it. LAN is also fitted, using VXI-11.

The pass/fail output on the rear panel gives a 3.3 V TTL signal, for driving a go/no-go indicator or a production fixture.

10 Self calibration

Self calibration optimises the signal path for accuracy. Run it when the instrument is new to you, whenever the ambient temperature has changed by more than 5 °C, and after the instrument has been running for more than thirty minutes if accuracy matters.

Disconnect every probe and lead from the inputs first, then press UTILITY, select Do Self Cal, and follow the prompts on screen.

11 Specification

Item	Specification
Channels	2, plus external trigger

Item	Specification
Sampling	Real time to 1 GSa/s • equivalent time to 50 GSa/s
Vertical	8-bit • 2 mV/div to 10 V/div in a 1-2-5 sequence
Input	1 M Ω $\pm$ 2% in parallel with 18 pF $\pm$ 3 pF • 400 V maximum • probe attenuation 1X to 1000X
Timebase	2.5 ns/div to 50 s/div on the 100 and 150 MHz models, 5.0 ns/div on the 70 MHz • accuracy $\pm$ 50 ppm
Trigger	Edge, pulse, video, slope and alternate • auto, normal and single • holdoff 100 ns to 1.5 s
Acquisition	Normal, peak detect and average of 4 to 256 • sin(x)/x interpolation
Measurement	32 automatic parameters, 5 shown at once • manual, track and auto cursors • hardware counter to 1 Hz
Maths	Add, subtract, multiply, divide and FFT with four windows
Display	7 inch TFT-LCD, 800 $\times$ 480, 24-bit colour
Storage	20 instrument setups, 10 waveforms and 2 reference waveforms internally • setups, waveforms, BMP and CSV to a USB drive
Interfaces	USB host, USB device (USBTMC), LAN (VXI-11) and pass/fail at 3.3 V TTL
Power	100 to 240 Vrms 50/60 Hz, or 100 to 120 Vrms 400 Hz • 50 W maximum
Environment	Operating 10 $^{\circ}$ C to 40 $^{\circ}$ C • storage -20 $^{\circ}$ C to 60 $^{\circ}$ C • 85% RH at 40 $^{\circ}$ C • to 3000 m
Size and mass	323.1 $\times$ 135.6 $\times$ 157 mm • 2.5 kg

12 Where to go next

This guide covers getting started. The user manual documents the whole instrument: every trigger type and its settings, the maths and FFT functions, reference waveforms, the digital filter, the pass/fail system, the waveform recorder, the storage system, self test, firmware updating and remote control, together with prompting messages and troubleshooting.

It is available from GPS and from the product page. For programming, ask for the programming manual, which carries the SCPI command reference.

13 Care and warranty

- Clean the case and the display with a soft cloth, dry or barely damp. Do not use solvents, and do not let liquid enter the instrument.
- Do not store or leave the instrument where the display is exposed to direct sunlight for long periods.
- Disconnect the mains lead before cleaning, and make sure the instrument is dry before switching it on again.

One year warranty from the date of purchase, subject to product registration with GPS. For service, calibration or technical support contact GPS at sales@gpslimited.com or +44 (0) 203 093 0914.