



Advanced Instruments for the World

GageScope[®]
World's Most Powerful Oscilloscope Software
User's Guide

ADDENDUM

For Version 3.5
For the Eighth Edition of the Guide

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GageScope® User's Guide

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Eighth Edition (May 2001)

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How to use this Addendum

This document is an addendum to the *GageScope® User's Guide* (Eighth Edition) and is intended to provide supplementary information specific to installing and using GageScope®. It also provides a list of errata that documents changes to certain features and functionalities. When applicable, section headings include a page number that refers to the page to which the changes belong in the manual.

At Gage we strive to always supply the best possible software. Users should keep in mind that software functionality is continually evolving. Considering the size of the *User's Guide*, it is possible that some images (screen grabs) do not exactly match the software as you will experience it. Such situations, when they occur, will not materially affect your use of the software or the instructions on how to use certain features.

Please read the ReadMe.txt file on the accompanying CD for the most up-to-date information on Enhancements, Bug Fixes and Known Bugs.

Changes to Multi-Instrument Support

In order to improve the inter-operability of its various products, Gage has changed the default support for multiple instruments in GageScope®. This change will be reflected in future editions of the *User's Guide*.

By default, GageScope® now only operates analog CompuScope acquisition cards.

Because the .SIG file format is hardware independent, GageScope® can still load .SIG signal files created for analog output CompuGen cards as well as from digital output CompuGen and digital input CompuScope cards.

It is also still possible to use GageScope® to control an analog CompuGen card so as to tightly integrate in a single application both CompuGen and CompuScope products. To do this, simply add “-generator” to the GageScope® command line within the “Target” field which appears in the Properties of the GageScope® desktop shortcut. This command line option may be used with any other command line option.

Everything in the manual concerning the CompuGen products remains valid, although you may prefer to use the CGWin application instead of GageScope® to set-up and control the AFG and AWG functionalities.

Changes to Probe Support

For regulatory and safety reasons, Gage does not recommend the use of probes with its CompuScope cards. This change will be reflected in the future editions of the *User's Guide*.

By default, GageScope® no longer allows you to specify the probe settings. Therefore, please note that the probe box on the CS Input Tab of the Channel Control has been removed.

This change affects the *User's Guide* in the following manners:

- Page C-137 is no longer valid.
- The images on pages B-46, B-47, B-62, B-63, B-65, B-67, B-70, B-71, B-72, B-118, B-132, B-133, B-134, B-136, B-137, B-138, B-139, B-142, B-143, B-144, B-145, B-148, B-150, B-151, B-153, B-154, B-156, C-137, C-138, C-139, C-140, C-141 are no longer identical to how they should appear on your screen. Please note that this in no way affects the functionality described on those pages; only the images are inaccurate.

Introduction (page viii)

Please note that a Lite Edition of GageScope[®] now exists. A table of features will follow.

GageScope[®] is a powerful software package which, finally, bridges the gap between oscilloscopes and computers, helping scientists and engineers get the most out of their measurements.

All this performance is available without writing a single line of code or drawing any diagrams. GageScope[®] starts being productive right out of the box.

GageScope[®] takes full advantage of the Windows operating system, making the user interface for CompuScope and CompuGen cards very easy to learn and use.

On-screen controls and toolbars give you complete control of all capture and display features, allowing you to change settings while data capture is in progress. As many as 60 channels can be viewed together on the screen, and signals can be saved to disk for future use.

Optional software advanced analysis tools allow the power of GageScope[®] to be further enhanced by allowing deep FFTs, unattended transient capture, averaging, waveform parameter calculations and correlation. Many more analysis tools will become available in the future, making GageScope[®] even more powerful.

GageScope® is now available in the *Lite, Standard and Professional Editions*.

- ***GageScope® Lite Edition***

Free Edition of GageScope® that provides basic functionality. See table of features on the next page.

- ***GageScope® Standard Edition***

GageScope® Edition for Intermediate Users

All advanced analysis tools, with the exception of the Extended Math tool, are included in the Standard Edition but with limited functionality. The limitations are listed as follows:

- AutoSave can only save a maximum of 4 files
- While Averaging, running average is not available and the maximum averaging depth is 8192
- Waveform Parameters tool supports only the following parameters:
 - Period
 - Frequency
 - Mean
 - RMS
- The maximum length of FFT is 4096 points
- Extended Math tool is not available

- ***GageScope® Professional Edition***

GageScope® Edition for Expert Users

This edition contains the following advanced analysis tools:

- AutoSave
- Averaging
- Waveform Parameters
- FFT
- Extended Math

	GageScope 3.5 LITE Edition	GageScope 3.5 Standard Edition	GageScope 3.5 Professional Edition
FEATURES/FUNCTIONS			

USER INTERFACE & CONTROL

Search for waveform point or segment	√	√	√
Graphical arbitrary waveform display window	√	√	√
InfoView Palette	√	√	√
Comprehensive Toolbars	√	√	√
Status Bar	√	√	√
Horizontal and Vertical Scroll Bars	√	√	√
Channel, System and Display Control Window	√	√	√

ACQUISITION

Export waveform file formats	ASCII	SIG, ASCII, EQU	SIG, ASCII, EQU
Import equation files and data values from other Microsoft Applications	√	√	√
Import DSO signal files from disk/PC	√	√	√
Import AWG/AFG files from disk/PC	√	√	√
Internal or external Trigger Control	√	√	√
Scope Mode		√	√
Min Max Decimation		√	√
Skip Sample Decimation		√	√
Sample Rate	Up to 5GS/sec	Up to 5GS/sec	Up to 5GS/Sec
External Clock support	√	√	√
2 GB Acquisition memory	√	√	√
Advanced Triggering control	√	√	√
Left and Right Trigger Alignment		√	√
Multiple independent triggers		√	√
2 trigger modes (single and continuous)	√	√	√
Averaging/Co-Adding		8192 maximum averaging depth	√
Decoupled Timebase and Sample Rate	√	√	√
Simultaneous input channel sampling	√	√	√
8, 12, 14, 16, and 32 bit vertical resolution	√	√	√
SuperRes mode		√	√
Multiple Channel Input	32	32	32
Multiple Record Mode		√	√

VISUALIZATION - DYNAMIC DISPLAY				
	Mixed signal display (marker display/edit)	√	√	√
	Real-time Data Display	√	√	√
	Deep Memory Zoom		√	√
	Numeric Display	√	√	√
	Compression utility (change clock rate) or Zoom	√	√	√
	Scrolling features	√	√	√
	Cursors with readings of amplitude and time		√	√
	Display waveforms in time and points	√	√	√
	Engineering Units		√	√
	Up to 30Hz display refresh rate	√	√	√
	Overlay Channels with independent vertical scale	√	√	√
	Simultaneous time and frequency domain display	√	√	√
	Multiple Displays of same signal		√	√
	Multiple channel capability	Up to 60	Up to 60	Up to 60
	Multiple Channel Display Windows	√	√	√
	Timed & Infinite Persistence Display Mode	√	√	√

DOCUMENT				
	Print Hardcopy		√	√
	Full print options and print previewing menu		√	√

ANALYSIS				
	Dual cursor with tracking mode		√	√
	Math Channel		√	√
	Waveform Analysis Parameters		Support for Period, Frequency, Mean, and RMS only	29
	FFT Analysis		4096 maximum record length	√
	Extended Math channel - function			√
	Sub-Channel		√	√

DATA MANAGEMENT				
	Save and Restore of Setup		√	√
	Save waveform files to different formats	ASCII	BIN, SIG, ASCII, FMT, EQU, PRN	BIN, SIG, ASCII, FMT, EQU, PRN
	Split File Save		√	√
	Store AWG signal files to PC		√	√
	Output frequency filter	√	√	√
	Create and Save Math channels		√	√
	Signal File comment field	√	√	√
	Share files via WWW, email, LAN, WAN	√	√	√
	AutoSave - Playback		√	√
	AutoSave - Unattended transient Capture		Maximum 4 Files	√

SCALABILITY				
	From 1 to 32 channel acquisition capability	√	√	√
	Windows 95/98/NT4.0/Win2000/WinXP/WinME compatible	√	√	√

HARDWARE SUPPORT				
	Support multiple CompuGen boards in same system	√	√	√
	Support for CompuScope Cards	√	√	√
	Automatic Hardware Detection and Configuration	√	√	√
	Single and Multi-card support	√	√	√

ARBITRARY WAVEFORM GENERATOR				
	Autoline function (autodraw)		√	√
	Stretch waveform by dragging points or segments		√	√
	Multiple paste segment every x points		√	√
	Graphical Waveform Editor			√
	Generate user defined waveforms		Up to 2,048 points	Up to 2,048 points
	Multi-channel waveform editor - up to 10 simultaneous channels		√	√
	Edit entire waveform		√	√
	Create waveform masks, envelopes		√	√
	Create jitter on waveform signal	√	√	√
	Variable clock rate	√	√	√
	Create waveform by selecting pre-defined waveform style	√	√	√
	Frequency range adjustment control	√	√	√
	Offset control	√	√	√
	Amplitude control	√	√	√
	Adjustable duty cycle	√	√	√
	Define waveform offset	√	√	√
	Define delay times	√	√	√
	Supply list of 30 standard waveforms/predefined signals (Sine, square, triangle, ramp) and user-defined waveforms	√	√	√
	Signal Calculator performs waveform math and user-defined functions	√	√	√
	Create and edit waveform by equation entry	√	√	√
	26 Math Transfer functions		8 basic functions	√
	6 Math Operations	√	√	√

Specifications (page xiii)

This section provides you with an updated list of System Requirements and Currently Supported Instruments. The list of Currently Supported Driver Versions has been added to this section, and will be included in future editions of the *GageScope® User's Guide*.

System Requirements

- PC with a Pentium 200 MHz processor; 266 MHz Pentium II or higher strongly recommended
- Microsoft Windows 95, Windows 98, Windows NT 4.0 or Windows 2000, Windows XP or Windows ME operating system
- 32 MB RAM with Windows 95/98, 48 MB RAM with Windows NT/Windows 2000/Windows XP/Windows ME; 128 MB RAM or more recommended on all systems
- Hard disk free space: 20 MB to install the GageScope® application; 40 MB for full install (includes Online Help facility and PDF version of User Manual). 128 MB minimum free space necessary for operation of the GageScope® program
- Virtual memory under Windows NT, 2000, XP, and ME: it is recommended that you increase the Swap File Size by 128 MB to operate GageScope®
- CD-ROM drive
- 15-inch monitor 800 x 600 (Super VGA); 17-inch 1024 x 768 Ultra VGA recommended. Note that your system must be set to 256 color display in order for the FFT capability to display results properly.
- PC keyboard and 2-button mouse (3rd button, if present, is not used)
- Internet Explorer 4.1 or higher; version 5.0 required for full functionality
- The drivers for the PC-based cards must be installed. The PC-based cards are the CompuScope and CompuGen card(s). You must run the Instrument Manager utility to configure the PC-based cards.

Supported Instruments

CompuScope Cards

CS85GC, CS85G, CS82GC, CS82G, CS8500, CS14100C, CS14100, CS1450,
CS12100, CS1250, CS1610C, CS1610, CS1602, CS3200

CompuGen Cards

CG1100, CG3250

Supported Driver Versions

CompuScope drivers for Windows 95, Windows 98, Windows NT, Windows 2000,
Windows ME and Windows XP.

3.60.02, 3.60.00, 3.50.02, 3.50.00, 3.48.00, 3.46.02, 3.46.00, 3.44.00, 3.42.04,
3.42.02, 3.42.00, 3.40.00, 3.32.00, 3.30.06, 3.30.04, 3.30.02, 3.30.00, 3.24.02,
3.24.00, 3.22.07, 3.22.06, 3.22.05, 3.22.03, 3.22.02, 3.22.00, 3.20.13, 3.20.12,
3.20.09, 3.20.08, 3.20.07, 3.20.06, 3.20.05.

CompuGen drivers for Windows 95, Windows 98, Windows NT, Windows 2000,
Windows ME and Windows XP.

1.28.02, 1.28.00

Installing GageScope[®] (page A-3)

The installation procedures outlined in the *GageScope[®] User's Guide* (Eighth Edition) pages A-3 to A-8 (Steps 1 through 13) have been changed to the following steps. Please note that the changes affect both the procedure and the graphics displayed.

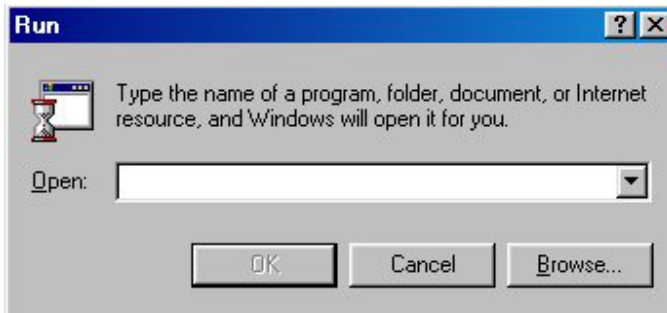
Step-by-step Installation

- 1 Insert the GageScope[®] CD-ROM into your CD-ROM drive.

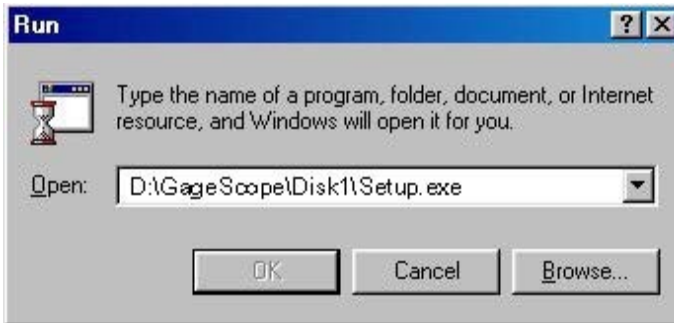
The installation program should start automatically after a few seconds.

- 2 ***In case the installation program does not start automatically, follow these steps to start the setup process:***

Click **Start** from your desktop and select **Run**. You will see the **Run** dialog box as follows:



- 3 Type **CDROM drive letter:\GageScope\Disk1\Setup.exe** in the **Open** text box. The CDROM drive letter depends on the settings in your PC.



Click **OK**.

- 4 If you are running a Windows 95 system that does not have the appropriate version of DCOM95 installed, you will be asked if you want to install DCOM95. You must select the installation of DCOM95.

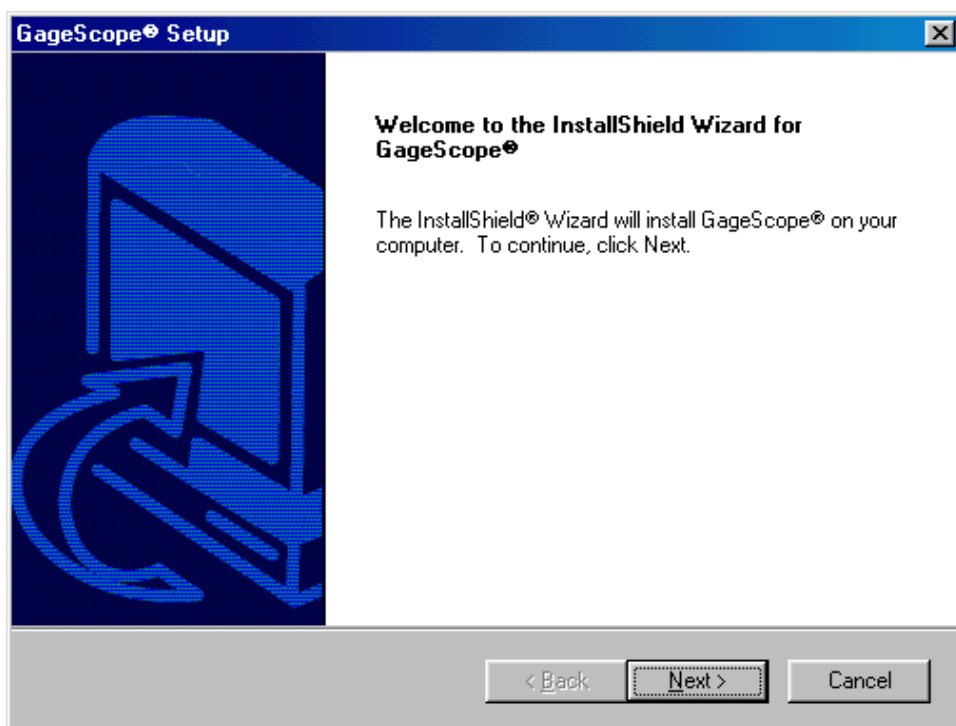
After DCOM95 has been installed, you will then have to reboot your PC and run the GageScope® installation program again.

If you are installing GageScope® under Windows 98, Windows NT, Windows 2000 or Windows XP, the **DCOM95** will not be installed as these operating systems come with all DCOM components required by GageScope®.

- 5 If your system does not have Internet Explorer 5.0 or equivalent installed, you will be asked to install Internet Explorer 5.0 from Microsoft's web site.

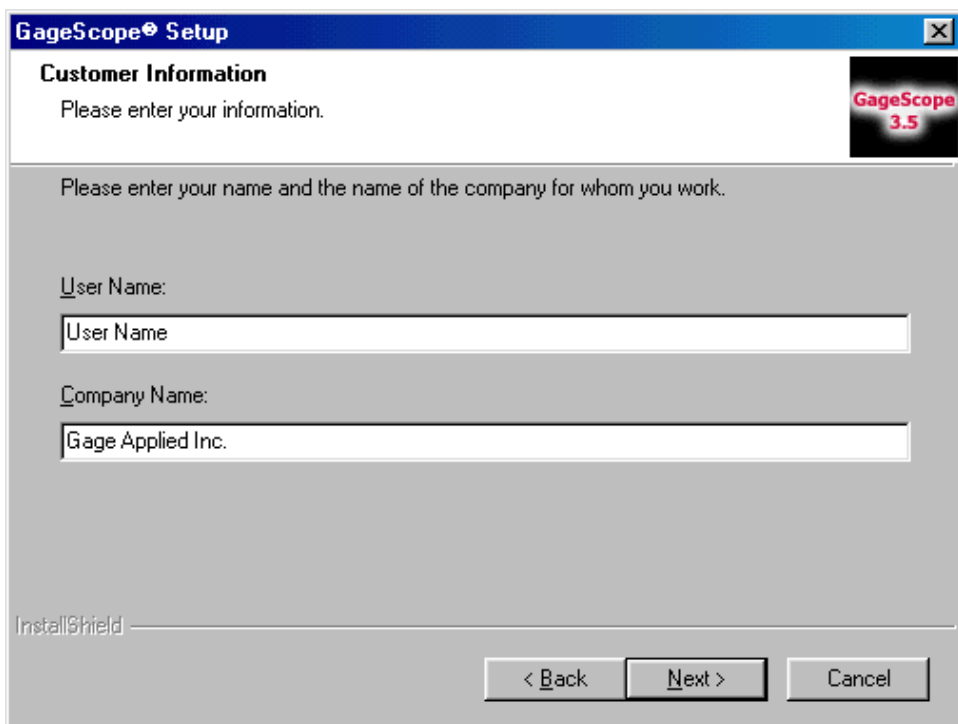
After Internet Explorer 5.0 has been installed, you will then have to reboot your PC and run the GageScope® installation program again.

- 6 The installation program will begin the setup procedure. You should then see the following Welcome screen.



Click **Next**.

- 7 In the Customer Information screen, enter your **User** and **Company** name.



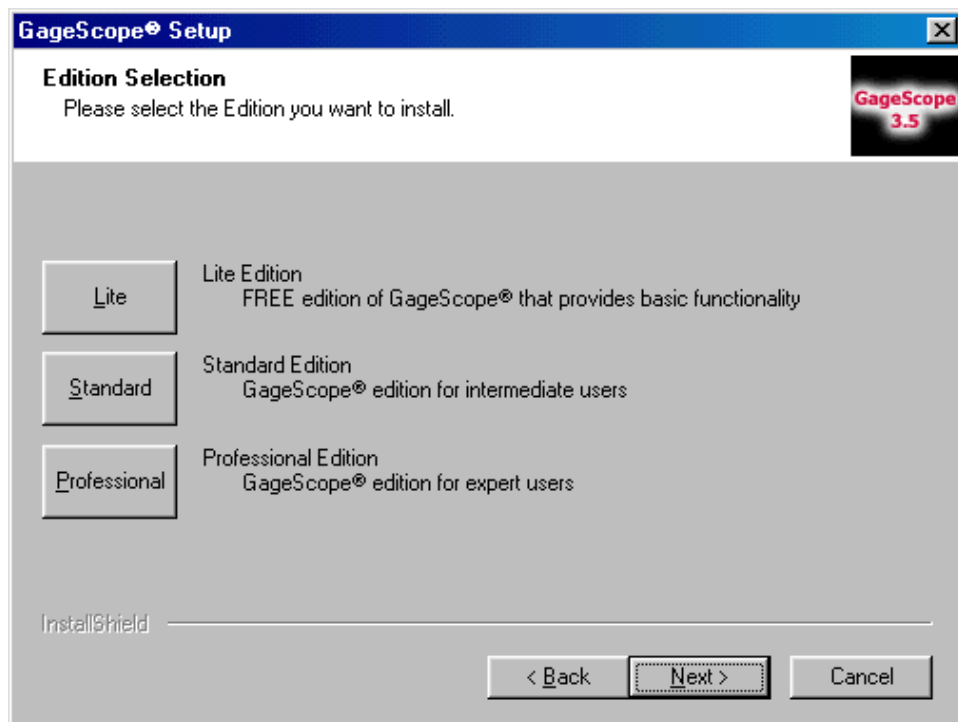
The image shows a Windows-style setup window titled "GageScope® Setup". The window has a blue title bar with a close button in the top right corner. Below the title bar, the text "Customer Information" is displayed in bold, followed by the instruction "Please enter your information." In the top right corner of the window, there is a small logo that says "GageScope 3.5". The main area of the window is gray and contains the instruction "Please enter your name and the name of the company for whom you work." Below this instruction, there are two text input fields. The first field is labeled "User Name:" and contains the text "User Name". The second field is labeled "Company Name:" and contains the text "Gage Applied Inc.". At the bottom left of the window, the text "InstallShield" is visible. At the bottom right, there are three buttons: "< Back", "Next >", and "Cancel".

Now click **Next**.

- 8 The following selection menu will then appear.

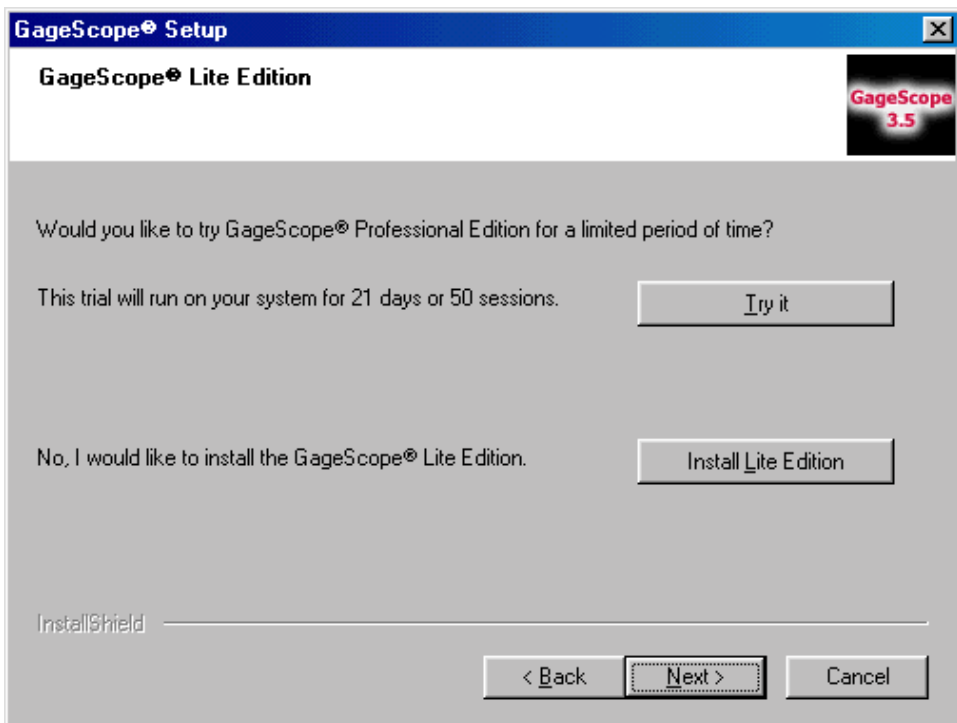
GageScope® 3.5 is available in 3 different editions. A detailed description of each Edition is listed within this Addendum, and is also available on our website at www.gagescope.com.

Please select the Edition that is most appropriate to suit your needs.



- 9 If you select either the Lite or Standard Editions, you will be given the choice to evaluate GageScope® Professional Edition for a limited time.

In this example, it is assumed that you have chosen to install the Lite Edition. However, the steps are similar when installing the Standard Edition.



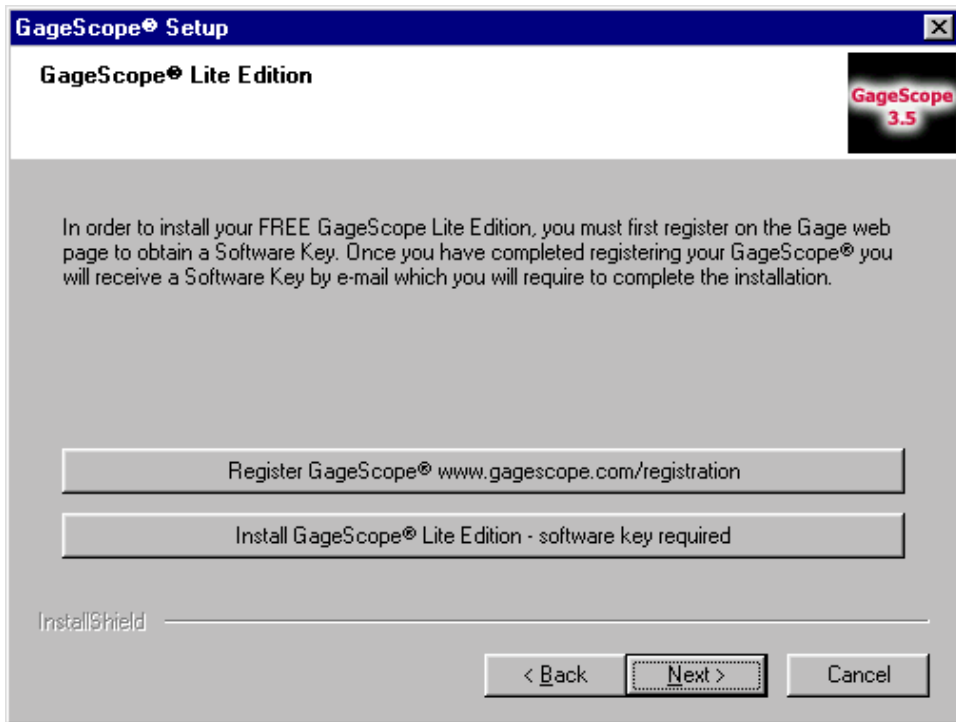
If you choose to install the Lite Edition then proceed with the following steps.

If you choose to try the GageScope® Professional Edition for 21 days or 50 sessions, then skip to step 12.

- 10 In order to proceed with the installation of GageScope® Lite edition, you will need a Lite Edition Software key.

You must register on-line at www.gagescope.com/registration to obtain the GageScope® Lite Edition software key. Once you have registered, the Lite Edition Software Key will be e-mailed directly to you.

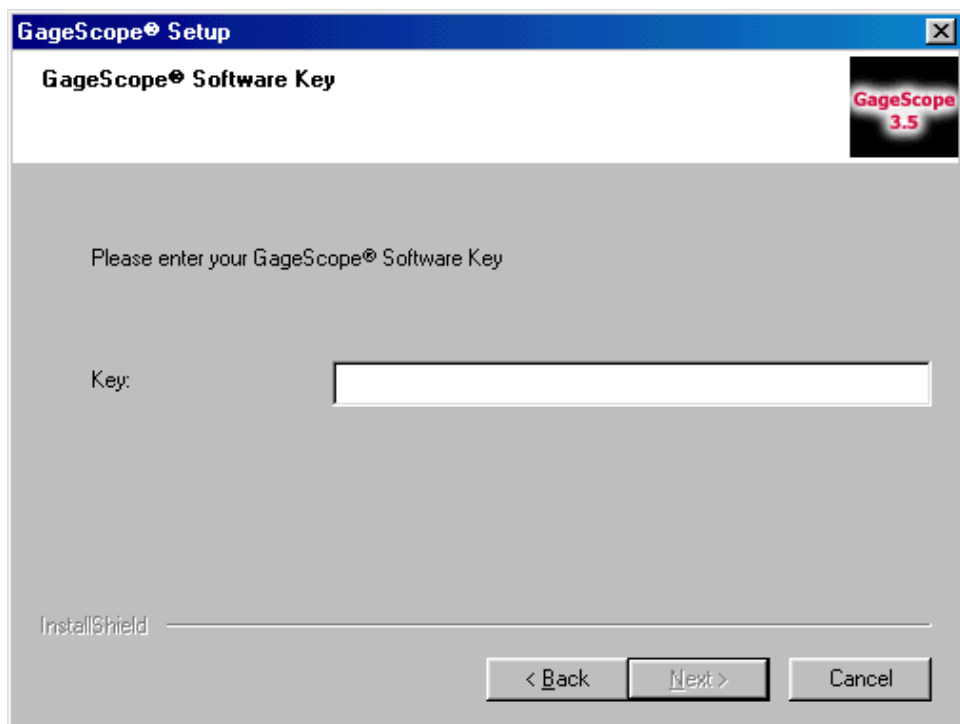
A GageScope® Lite Edition software key cannot be obtained by contacting Gage or its representatives by telephone, fax or e-mail.



Click on the **NEXT** button or simply click on the **Install GageScope® Lite Edition – software key required** dialog box.

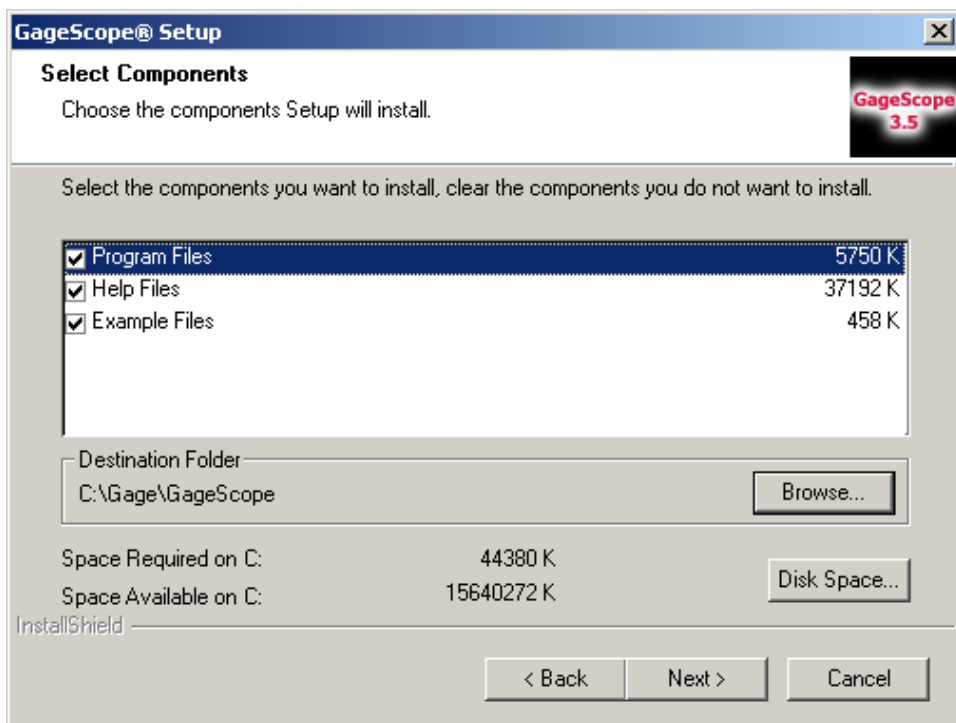
If you are installing GageScope® Standard or Professional Edition, you will be asked to enter your software key which has been provided to you with your GageScope® order.

- 11 You will then be prompted to enter your GageScope® Software key.



Click **NEXT**.

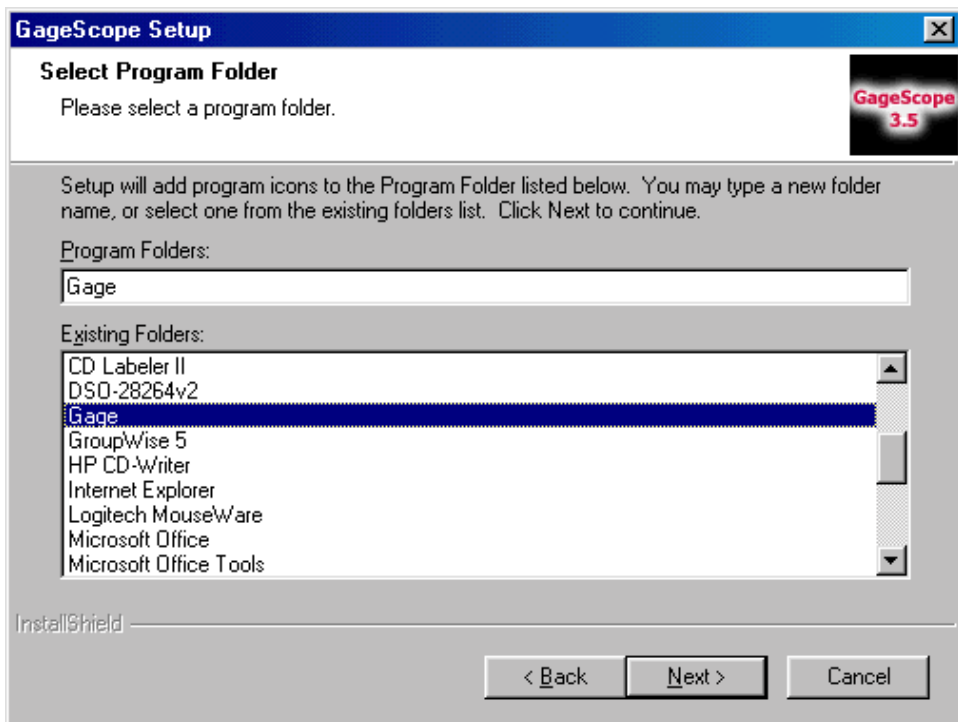
- 12 Select the components that you wish to install and their destination location.



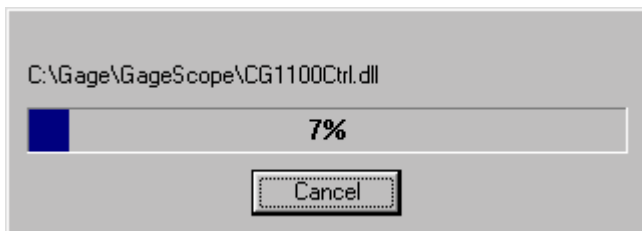
Click **NEXT**.

- 13 Then select a Program Folder.

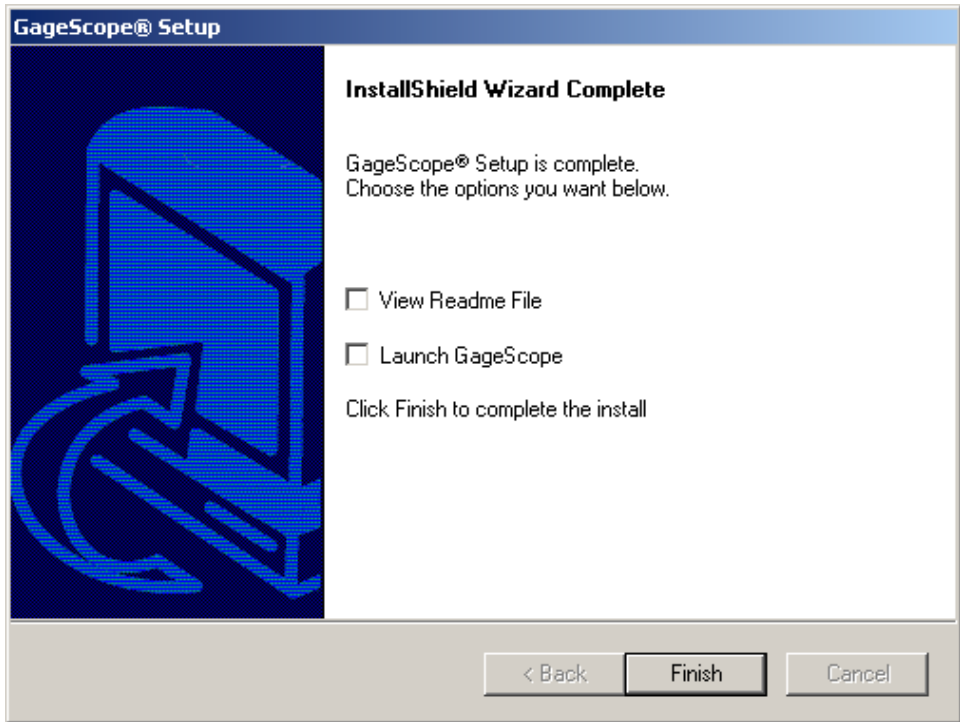
It is recommended that you accept the **Gage** program folder and click **Next**; otherwise, type in another name and click **Next**.



- 14 The installation process will commence. You will see the installation progress indicators during this installation process.



- 15 Once the installation process is finished, the **Setup Complete** screen will appear.



Click **Finish** to complete the Setup process. Installation is now complete.

IMPORTANT:

- If you have not already done so, you must now proceed to Install the Windows device drivers for your CompuScope and CompuGen card(s).
- After installing the drivers, use the Instrument Manager utility to configure these PC-based cards.

Registering GageScope®

Please note that this is a new section that will be included in future editions of the *GageScope® User's Guide*, in the Getting Started chapter.

Trial of GageScope® Professional Edition

If you are installing GageScope® Lite Edition or GageScope® Standard Edition, upon installation of GageScope®, you will be asked if you would like to run a free 21 day, 50 session Trial which will allow you access to all features of the Professional Edition for a limited time. You do not need to enter any software key to run the Trial.

Once the trial period has expired, GageScope® will no longer run unless you:

1. Purchase the Standard or Professional Edition Software Key from Gage. Please refer to the “Upgrading GageScope” section of this Addenda

Or

2. Register to obtain a FREE “GageScope® Lite Edition Software Key” to convert the software to a Free GageScope® Lite Edition. The GageScope® Lite Edition provides basic functionality. The steps below illustrate how GageScope® will prompt you to register to obtain your GageScope® Lite Edition key.

Launching GageScope® Trial

- 1 Upon launching the Trial of GageScope® Professional Edition, a menu will prompt you to either register the current version of the software or to purchase the Standard or Professional Edition upgrade.



Select **Continue** to launch the Free 21 day, 50 session trial of GageScope® Professional Edition.

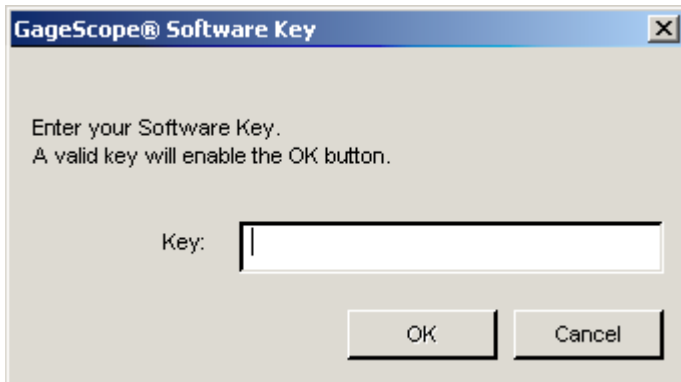
If you have a software key and do not want to run the trial of GageScope® Professional Edition, select **Enter Software Key**.

GageScope® Software Keys

- 2 The GageScope® Software Key dialog box will appear and will prompt you to enter your software key. If you have purchased a Standard or Professional Edition software key, you were provided a key with your order. Enter your software key here. See “Upgrading GageScope®” section in this addenda for more information.

To obtain a free GageScope® Lite software key, you must register on-line at www.gagescope.com/registration. Once you have registered, the Lite Edition software key will be e-mailed directly to you.

A GageScope® Lite Edition software key cannot be obtained by contacting Gage or its representatives by telephone, fax or e-mail.



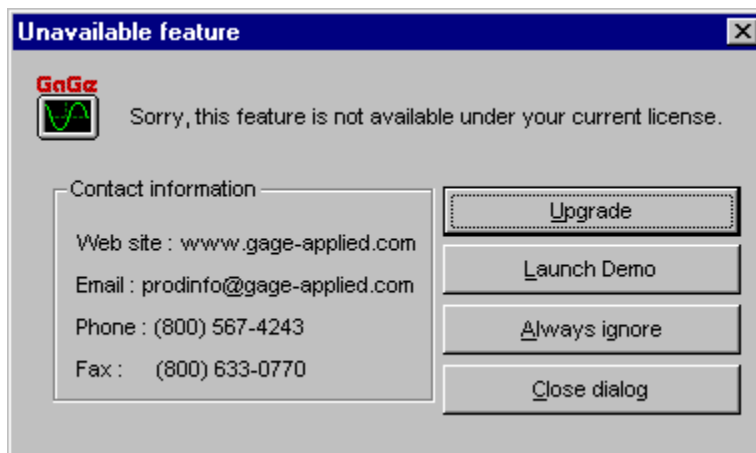
Upgrading GageScope®

This section explains how to go about upgrading your software to either a Standard or a Professional Edition. This is a new section that will also be included in future editions of the *GageScope® User's Guide*.

The upgrade options are as follows:

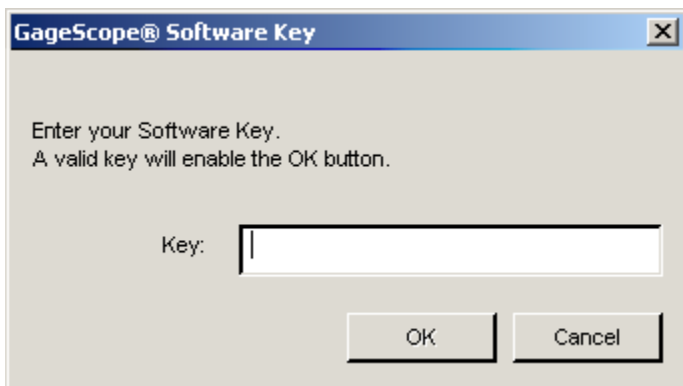
1. From the Lite Edition, you have the choice to upgrade to either the Standard or the Professional Edition.
 2. From the Standard Edition, you may upgrade to the Professional Edition.
- 1 If you are using either the Lite or Standard Edition of GageScope®, you may upgrade your software at anytime by clicking on any of the features that are normally not available for that particular Edition. For instance, click on the Extended Math button on the toolbar (third button from the left).

The Unavailable feature dialog box will appear.



Simply click on the **Upgrade** button.

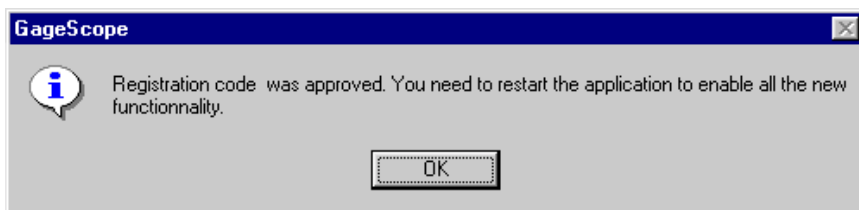
-
- 2 The GageScope® Software Key dialog box will appear, prompting you to enter a GageScope® Standard or Professional software key.



You will need to purchase a GageScope® Standard or Professional key in order to upgrade your current edition of GageScope®.

For upgrade information, you may contact Gage at: 1-800-567-4243, or +1-514-633-7447 if outside North America. You may also visit www.gagescope.com for more information on the Standard and Professional editions of GageScope®.

-
-
- 3 The following dialog box will then appear, confirming that the software key has been accepted.



You will need to restart the application for the upgrade to take effect.

Launching GageScope[®] for the First Time (page A-15)

Please note that the procedure section describing “No Instruments Detected” has been changed to include and reflect the use of the new Demo modes. It also includes the description of the sample signal data files that are incorporated in the new Advanced Demo mode.

Before you run the program, connect a signal (from a signal generator or other source) to the Channel A input of your CompuScope card.

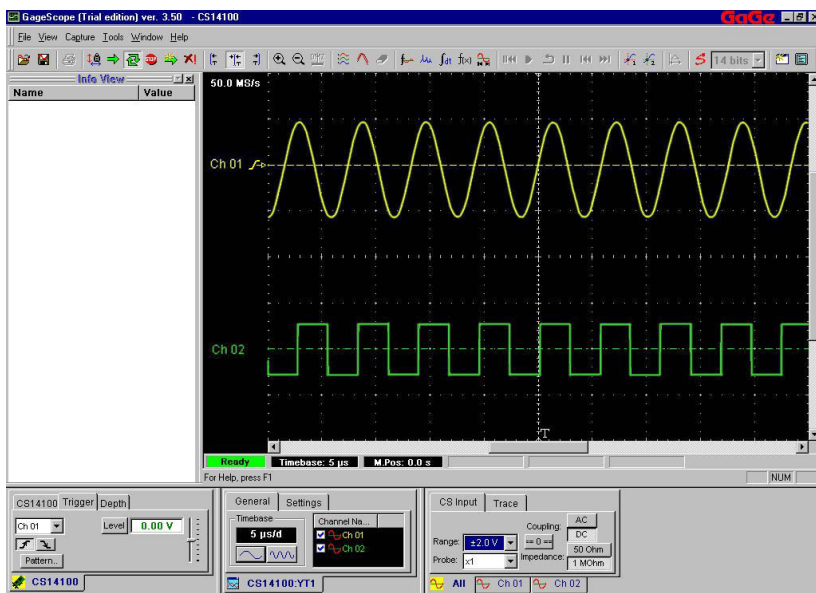
Launching GageScope[®]

- 1 A Windows shortcut icon was placed on the desktop during installation. Double-click this icon to run GageScope[®].



You can also access GageScope[®] through the Start menu. Click on **Start** → **Programs** → **Gage** → **GageScope** → **GageScope**.

- 2 If your CompuScope card is configured properly, GageScope[®] will start.



In the above example, two signals are being acquired using a CompuScope 14100. Your screen may differ. If you are not feeding any signals into the input channel(s), you will

see a flat line.

Demo Mode - No Instruments Detected?

The dynamic demo mode of GageScope® allows you to evaluate GageScope® software even if you do not own any Gage hardware. Input signals are simulated using signal files supplied with GageScope®.

There are two different Demo modes, Basic and Advanced. You can start the GageScope® demo by going to the Help menu in GageScope®. This demo also starts if you do not have any Gage hardware and drivers installed in your computer.

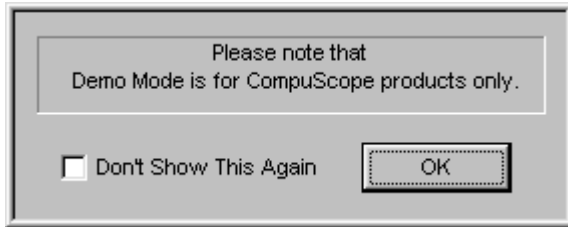
- If you do not have any instrument installed in your system, you will see the following message at launch:



- Click on the **Yes** button.
- As you are not connected to a live instrument, the software will launch the Demo Mode, which simulates several signals allowing full analytical features of GageScope® to be tried.

Both Demo modes demonstrate functionality that is available with CompuScope products only. Furthermore, the implementation simulates one CompuScope card (similar to CS14100-1M) with two or four channels and displays a predetermined signal on each of these channels.

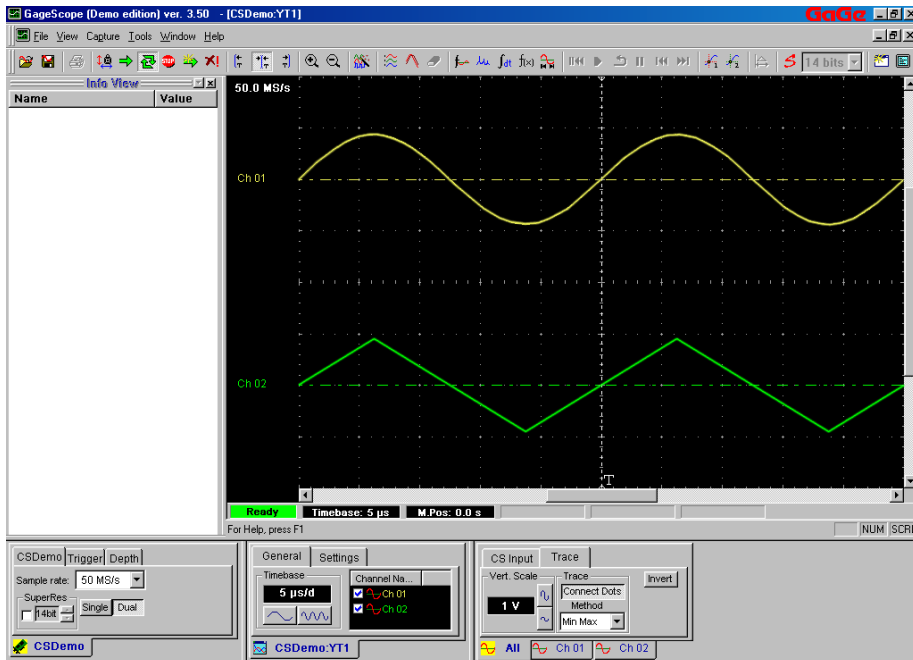
The signals look and behave just like real inputs, allowing you to perform operations and extract values from the signals. This dynamic demonstration and evaluation mode is one of many unique features of GageScope®.



Click **OK**.

The Basic Demo Mode emulates the following signals:

1. Sine Wave of 870 mV amplitude, 40 kHz frequency with 8 LSB RMS noise
2. Triangle wave of 900 mV amplitude 40 kHz frequency with 17 LSB RMS

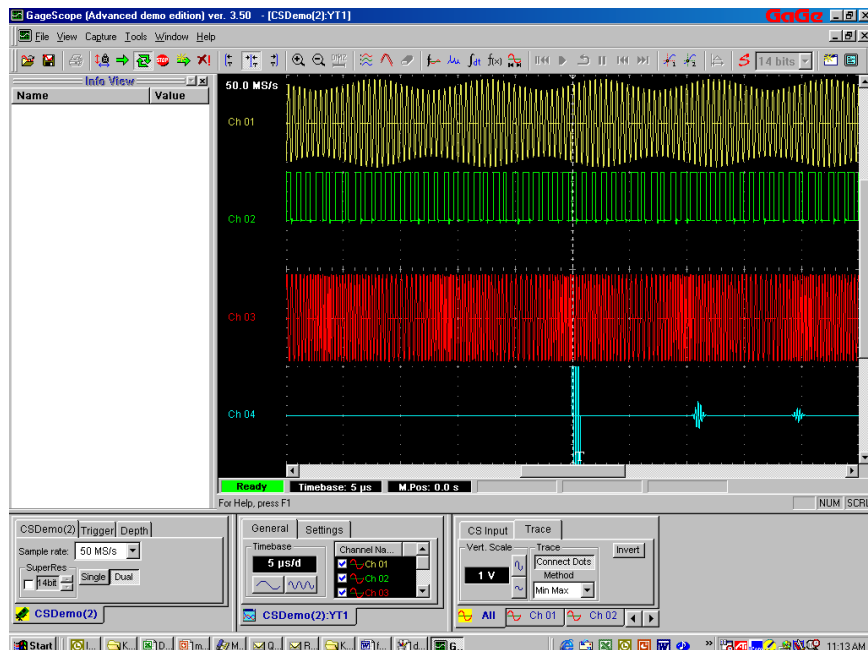


Should you choose not to use these files, you can, however, also load and save disk-based GageScope[®] files (extension .SIG). To load a file, click on **File** → **Load Channel**. Sample .SIG files are located in the **Signal Files** folder inside the **C:\Gage\GageScope** folder.

This ability to load .SIG files means that the Demo Mode of GageScope[®] can be used as a powerful viewing tool to share acquired data with your colleagues.

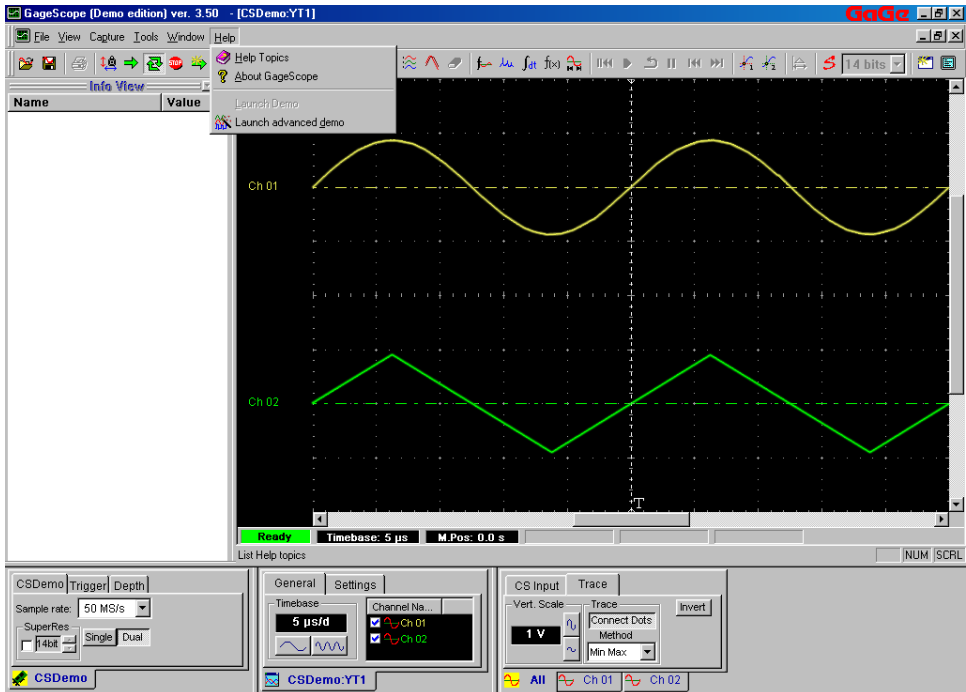
The Advanced Demo Mode (available from the **Help** menu) emulates the following signals:

1. Amplitude modulated sine wave of 2.13 MHz carrier frequency, 800 mV carrier amplitude, 44.73 MHz modulation frequency, 110 mV modulation amplitude and 17 LSB RMS noise.
2. Pulse with ring down. Frequency of 1.16 MHz, duty cycle 50% +/- 20% and amplitude of 1.7V. Ring Amplitude is 120mV
3. Frequency modulated sine wave of 3.54 MHz carrier frequency, 900 mV carrier amplitude, modulation amplitude of 370 KHz with 3 LSB RMS noise.
4. Ultrasound signal consisting of a stimulus followed by two echoes.
Stimulus: three pulses of a clipped 100 V signal
First echo: Amplitude 300mV fixed @ 11 μ S
Second echo: Amplitude 160 mV @19 +/- 3 μ S
Noise 7 LSB RMS



Switching from Basic to Advanced Demo Mode

You may at any time switch to the Advanced Demo Mode by clicking on the **Help** menu → **Launch Advanced demo** option.



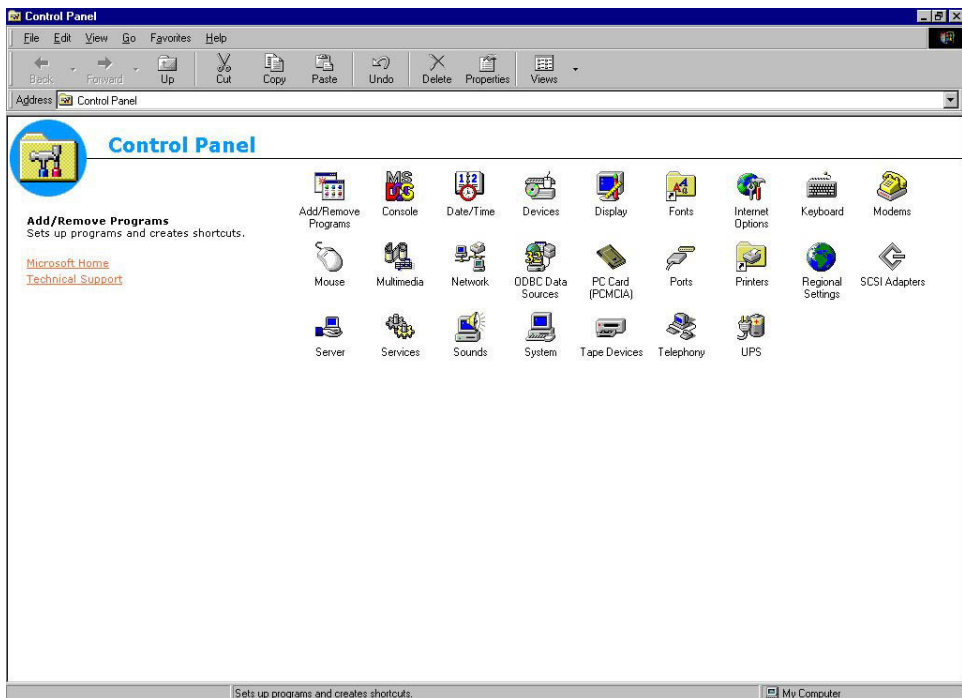
Uninstalling GageScope® (page A-19)

Note that this section in the “Getting Started” chapter has been modified to reflect a new procedure in uninstalling GageScope®.

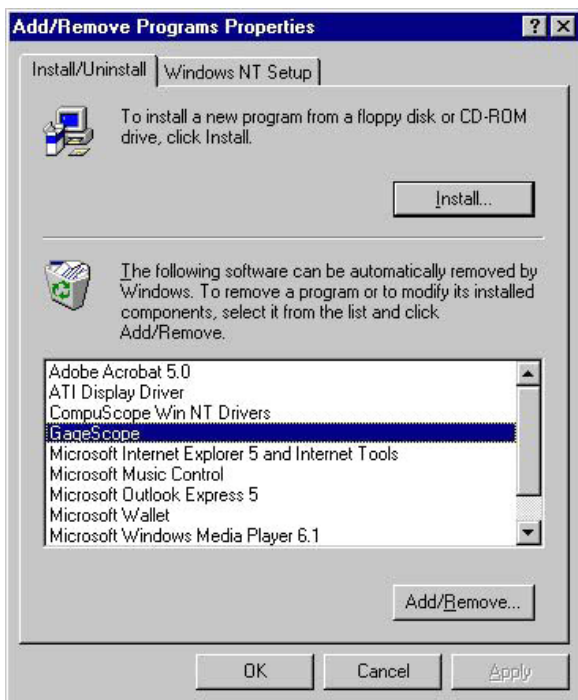
GageScope® is equipped with a special uninstall program, allowing you to uninstall all components at once. To uninstall, simply follow these steps:

Note: Depending on the OS installed on your system, the process of removing GageScope® may be different and will not necessarily appear the same as the following.

- 1 In your Windows Start menu, select **Settings → Control Panel**.
- 2 Double-click on **Add/Remove Programs**.



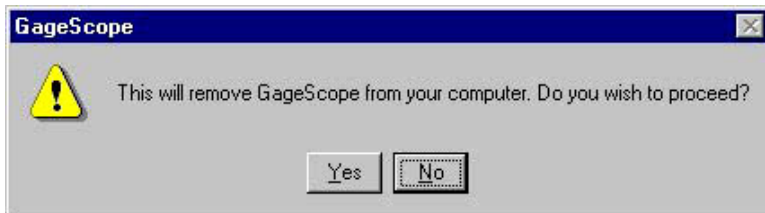
- 3 The Add/Remove Program Properties dialog box will appear:



In the list of programs, select GageScope[®]. Click **Add/Remove**.

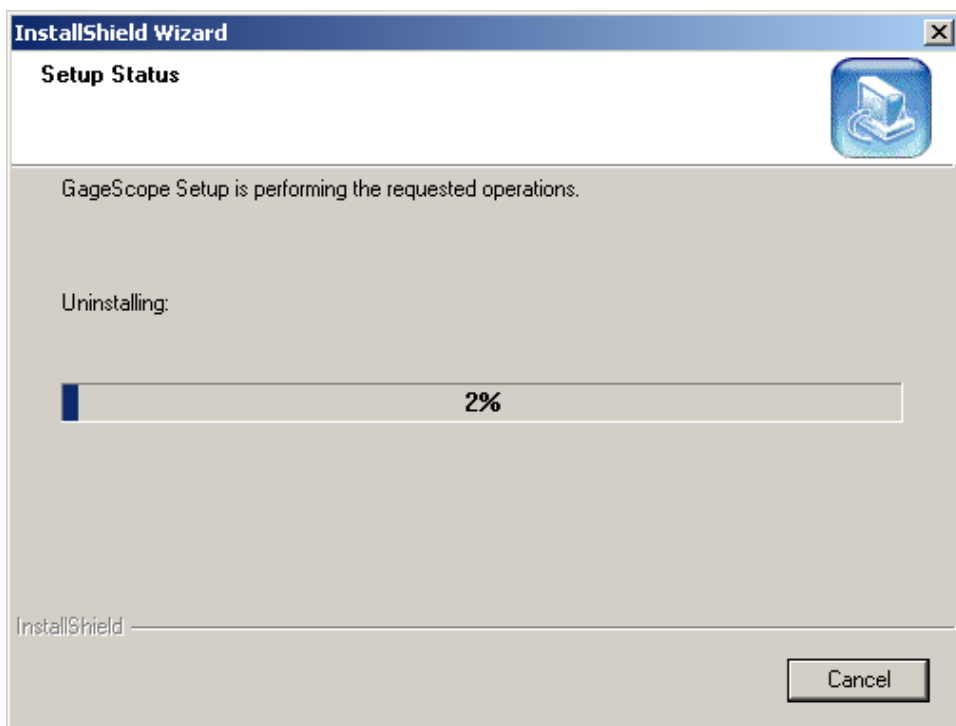
Note: This screen may differ depending on which OS you are running.

- 4 The **Select Components** dialog will appear.



Click **Yes**.

- 5 The Uninstall process will begin. You will see the uninstall progress indicators during this uninstall process.



- 6 All components will be uninstalled as soon as you confirm by clicking **OK**.



Decimation Mode (pages B-140 to B-154)

This section on Decimation is intended to replace the one found in Tutorial 4 of the *GageScope® User's Guide*.

Scientists and engineers working with Gage A/D and Scope cards equipped with very large acquisition memories encounter a singular problem: how to display a large amount of data using the much smaller memory typically found in personal computers. In order to solve this problem, GageScope® uses a special mode of operation called Decimation Mode.

In essence, Decimation Mode offers the user various ways of summarizing the acquired data. This summary of the captured data can then be displayed in GageScope® as a form of preview called “decimated data.” For this reason, and to simplify the task of working with large quantities of data, Decimation Mode is comprised of a few key functionalities:

- Decimation (and display of decimated data)
- **Deep Memory Zoom (DMZ)**
- Saving of un-decimated data as large signal files
- **Split File Saving** and Replay
- Loading of large signal files

Because of the characteristics described above, Decimation Mode must be understood as a tool that works in conjunction with large acquisitions only. GageScope® has been designed to prevent normal users (those equipped with boards of up to 16MS of acquisition memory) from ever having to use decimation. This is achieved chiefly by limiting the range of **Deep Memory (DM) Buffer** that can be used with each board.

For deep acquisition memory boards, users control the decimation through the value given to the DM Buffer and the type of decimation performed (**MinMax** or **Mean**). GageScope® therefore offers a relatively simple decimated view of the data, but more than makes up for this previewing technique by offering a powerful way to zoom-in and display specific portions of the data acquired.

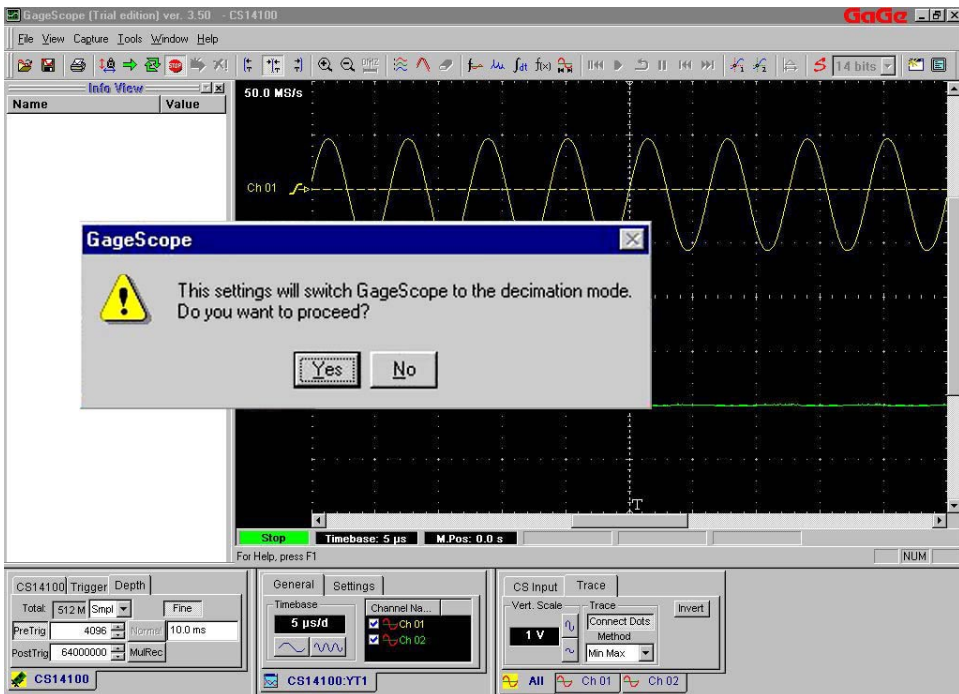
After capture, decimation, previewing the data and zooming-in on some of the data, users can elect to save the entire acquisition in one large file or to literally chop the large acquisition into any number of smaller files that are then easier to analyze and/or share with other.

The rest of this section will describe in details how each of the Decimation Mode operations function, and provide more information on the particulars of working with large acquisitions.

How Decimation Works

- 1 Prior to setting up a capture requiring decimation, it is recommended that you go to **Stop Mode**. This ensures that no lengthy acquisition is launched before all the parameters are set to the desired values.

In the **System Control**, combine **PreTrig** and **PostTrig** depths so as to set the total acquisition depth to any value greater than 16 MS, up to the full depth of the board. GageScope® will give you a warning to let you know that you are entering Decimation Mode:



The Decimation Mode is enabled as soon as the size of acquisition per channel is more than $\frac{1}{4}^{\text{th}}$ of the size of the **DM Buffer**. For instance, let us assume that you have allocated 8 MB for the **DM Buffer**. In this case, the Decimation Mode will be automatically activated whenever you specify more than 2 MB of total acquisition length in GageScope®. The total acquisition length is the sum of the pre- and post-trigger data sizes.

Click on the YES button.

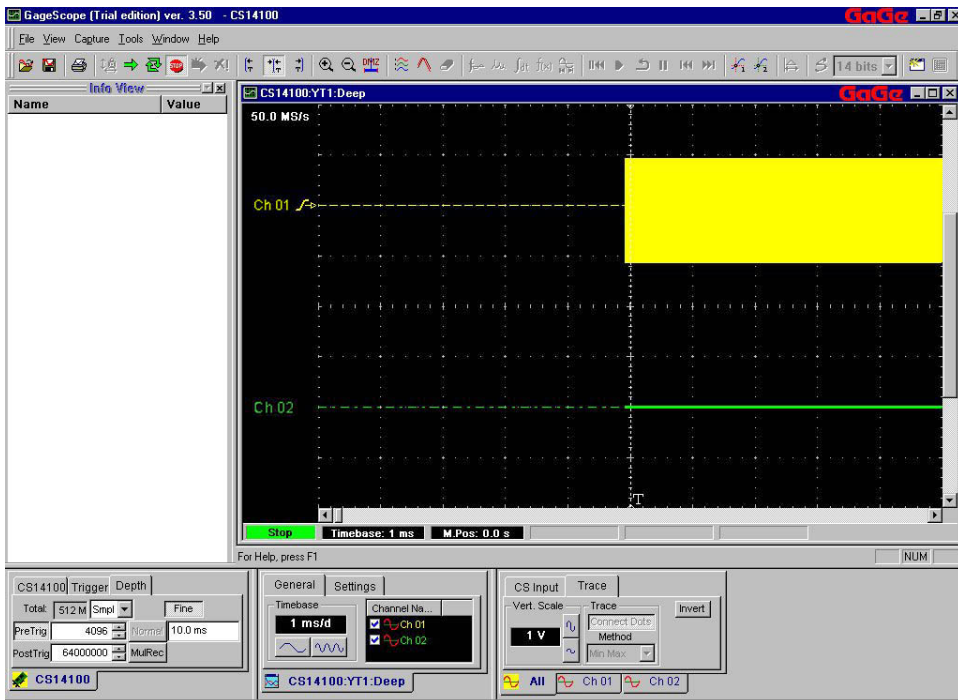
You can now acquire a signal. Click on the CAPTURE icon to begin capturing data.

- 2 You will see the “Decimation in Progress” dialog box pop up indicating that GageScope® has captured the data and is now in the process of decimating it before displaying in the display window. The status and time remaining to complete the required decimation task will be shown.

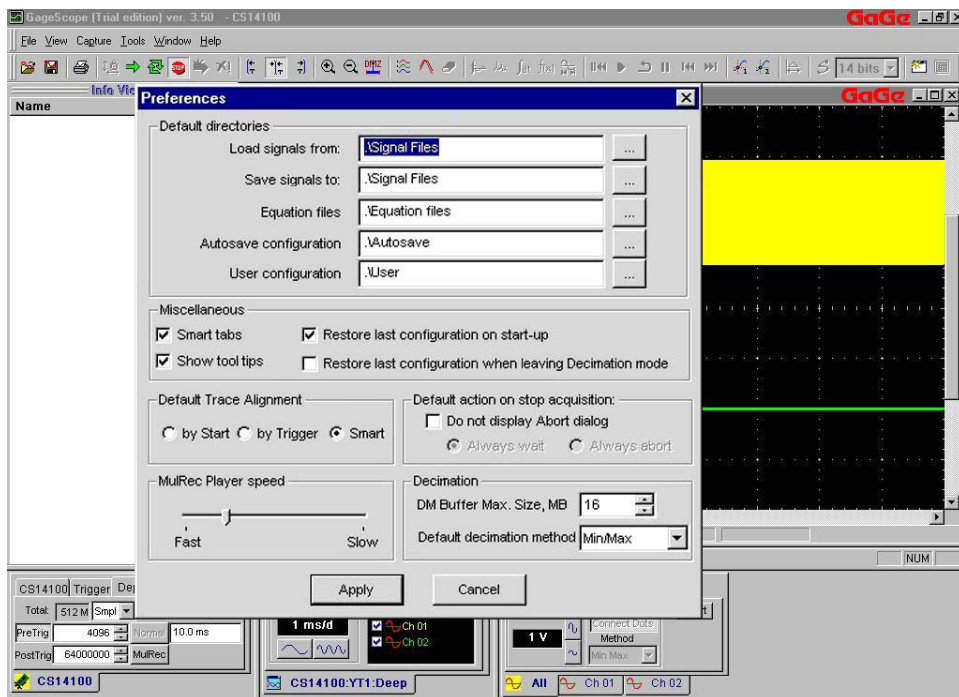
You may choose to continue or abort the decimation at any time during this operation by simply clicking on the buttons located in the “Decimation in Progress” dialog box.



- 3 The decimated channels, in the “YT1: Deep” display, will appear:

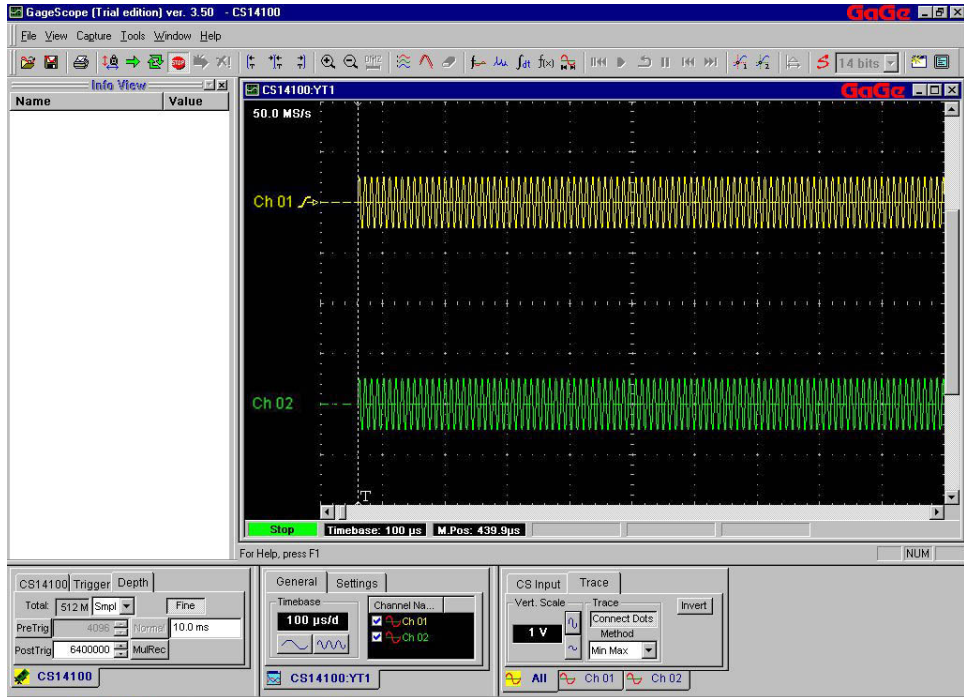


You can now open the **Preferences** dialog box by clicking on **Tools → Preferences**. The Preferences dialog box will appear as follows:



- 4 Set the **DM Buffer** to 64 MB, then select the decimation method (**MinMax** or **Skip Sample**) and click **Apply**.

The result of the capture and **MinMax** decimation of a sine wave captured by a CompuScope 14100 card on two simultaneous channels will look like this:

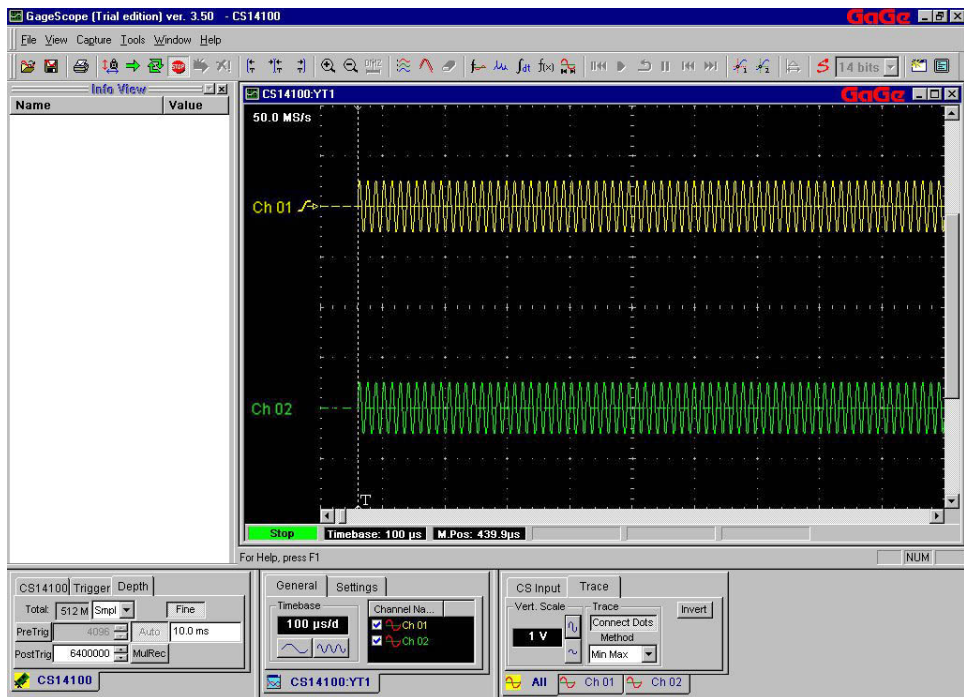


While computers may have a varying amount of RAM, in GageScope® the **DM Buffer** size must be between 1 and 64 megabytes so as to ensure smooth operation on the vast majority of PCs. Because the DM Buffer implicitly controls the decimation factor used by GageScope®, care must be exercised in specifying a value for the **DM Buffer** size.

Decimation can be best understood as a way of creating a summary of the real data. The smaller the amount of memory is given to creating the summary (the **DM Buffer**), the shorter and less representative the summary. Conversely, the maximum **DM Buffer** size, 64 MB, will also give the least decimation and a more accurate depiction of the captured data.

Note: The physical RAM present in the PC limits the **DM buffer** size by a factor of ¼.

- 5 A **Skip Sample** decimation of the same signal would look like this:



The decimated view is useful to identify the location of peaks in the signal (particularly when using the **MinMax** method) or large-scale patterns in the data. From this summary view, GageScope® provides a powerful way of “zooming-in” on the areas of the captured data that may be of particular interest.

On the other hand, the decimated view cannot be used to calculate Waveform Parameters or to perform mathematical operations on the signal.

The **Skip Sample** method reads the captured data and extracts 1 value for each group of x digitized samples. The **MinMax** method calculates the minimum and maximum values of an entire group of $x/2$ samples and then displays both values at the same time value. Hence the **MinMax** method stores 2 values for each group of $x/2$ digitized samples.

The x quantity of the previous paragraph is given by the equation:

$$x = (\text{Total Samples} * 8) / \text{DM Buffer}$$

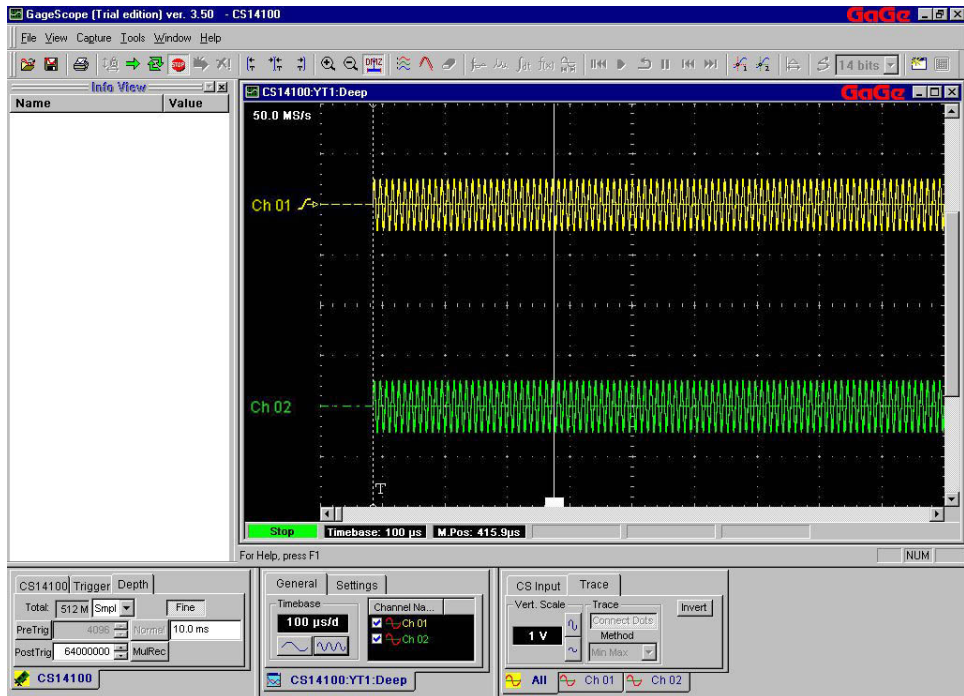
Note: The factor that is used will be rounded to the next integer value, i.e. if $x=2.5$, the result will be rounded to 3.

How the Deep Memory Zoom Works

- Continuing our work with a large acquisition, now that we have a decimated view we wish to zoom-in on an area of interest. We call-up the **Deep Memory Zoom (DMZ)** by

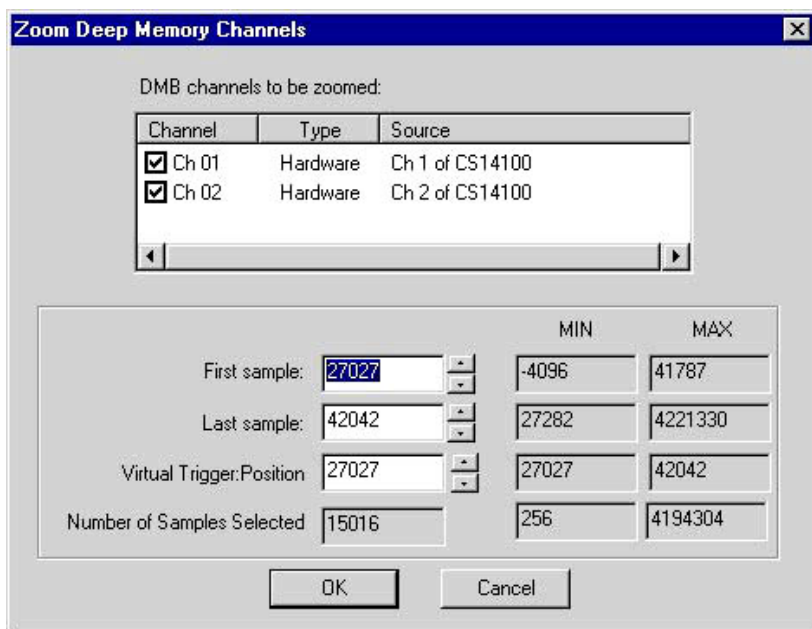
clicking on the **DMZ** button: 

This action brings up a special cursor in the decimated view:



The **DMZ** cursor behaves mostly like a normal cursor: you can move it to the desired position by moving the mouse. You can scroll through the decimated data while the cursor is active by using the window's scroll arrows as usual.

- 7 Once the **DMZ** cursor is in the desired location, left-click to bring up the **DMZ** dialog:



The dialog box is titled "Zoom Deep Memory Channels" and contains a table of DMB channels to be zoomed. Below the table are input fields for sample ranges and a table of MIN/MAX values. At the bottom are "OK" and "Cancel" buttons.

DMB channels to be zoomed:

Channel	Type	Source
<input checked="" type="checkbox"/> Ch 01	Hardware	Ch 1 of CS14100
<input checked="" type="checkbox"/> Ch 02	Hardware	Ch 2 of CS14100

	MIN	MAX
First sample:	-4096	41787
Last sample:	27282	4221330
Virtual Trigger: Position	27027	42042
Number of Samples Selected	256	4194304

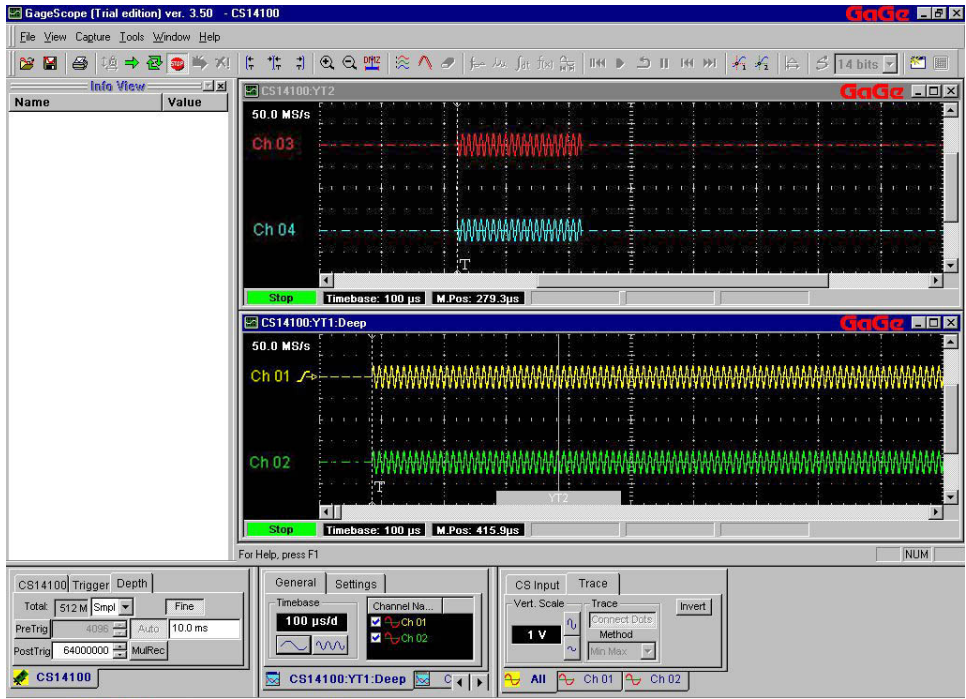
OK Cancel

8 The **DMZ** dialog box options are as follows:

Channels	Shows the channels being decimated and the name of the CompuScope card. These are the channels from which captured (not decimated) data can be fetched from the CompuScope memory by the DMZ .
First and Last Sample	<p>The starting and ending samples of the data to be displayed in the Zoom window.</p> <p>First sample is the starting point from which captured data will be fetched from the CompuScope memory.</p> <p>Last sample is the end point of the range of captured data that will be fetched from the CompuScope memory.</p>
Virtual Trigger Position	The Virtual Trigger Position is a feature GageScope [®] uses to co-ordinate a small segment of captured data with other signals or math channels. It consists of assigning a specific sample the role of Trigger Sample, but solely for the purpose of displaying and performing operations on the signal.
# of Samples Selected	The total number of samples to be displayed. The minimum default value is 256 samples (cursor width) and the maximum is 16,777,216 samples.

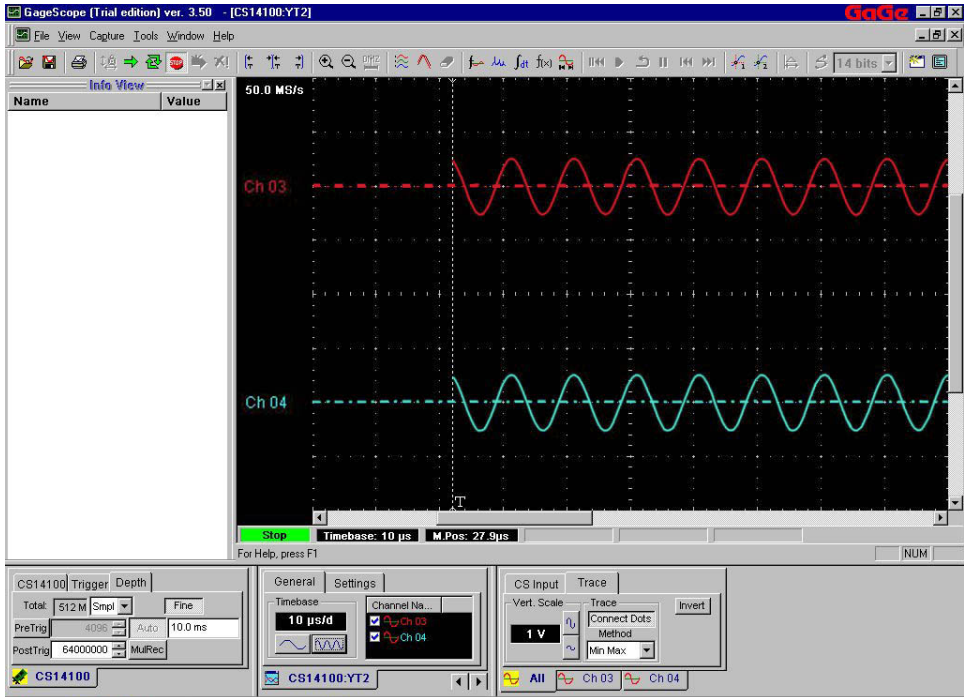
- 9 Select the channel(s) from which to fetch captured (not decimated) data, then adjust the First Sample and Last Sample values to fine-tune the range of data to display. Finally, select a value for the Virtual Trigger sample number (see below for more details). Click **OK**.

The selected range of data is fetched from the CompuScope and displayed in a normal display window:



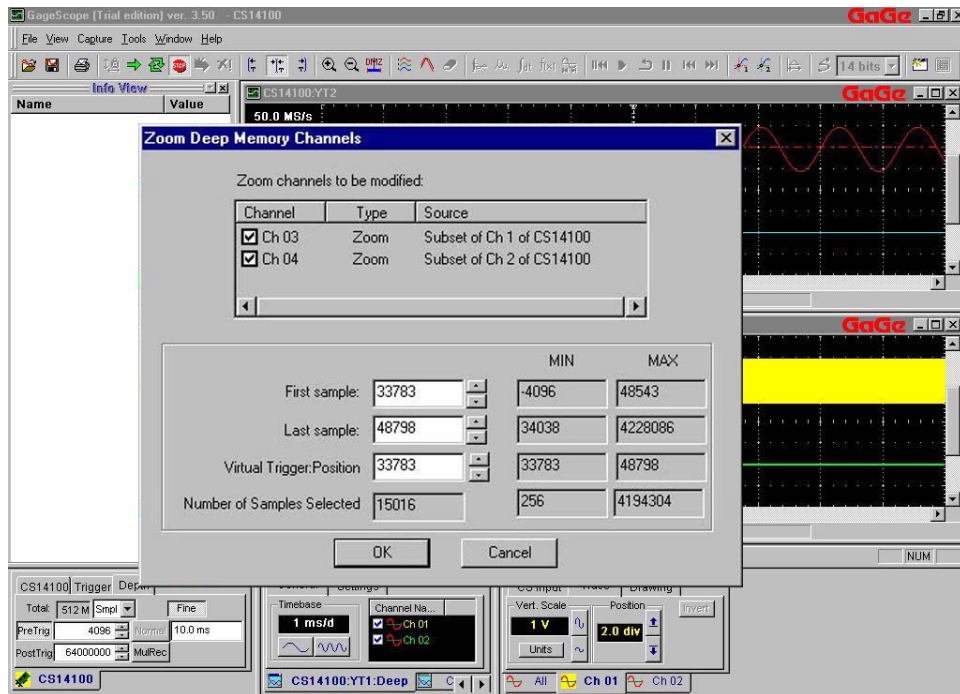
Note the presence of the cursor in the decimated view, with the name ‘YT2’ displayed in the gray ‘range’ bar at the bottom. This allows you to quickly identify which position and range of the decimated signal has been zoomed into.

- 10 Maximizing the CS14100:YT2 display and expanding the Timebase, we can see that it is as if the data was obtained from a ‘normal’ short acquisition. Note also that all the usual operations can be performed on the displayed signals.



The **DMZ** is used to query the CompuScope board for a segment of captured data without requiring decimation. For this reason, the segment to be fetched and displayed is limited in size to 16 MS and appears disconnected from the complete signal and particularly from the real trigger location. Thus the importance of assigning a position to the **Virtual Trigger**.

- 11 You can put more **DMZ** cursors in the decimated view, or you can modify the existing cursor to select a different range or different options. To modify an existing cursor, double-click on it. A slightly different **DMZ** dialog window appears:



This dialog works exactly the same way except that it only modifies the existing signals already displayed in the case of our example, the CS14100:YT2.

The **DMZ** has an important limitation to keep in mind when working in Decimation Mode: GageScope® can only support 4 zoom cursors at the same time.

Saving Large Acquisitions: Un-decimated and Split File Saving

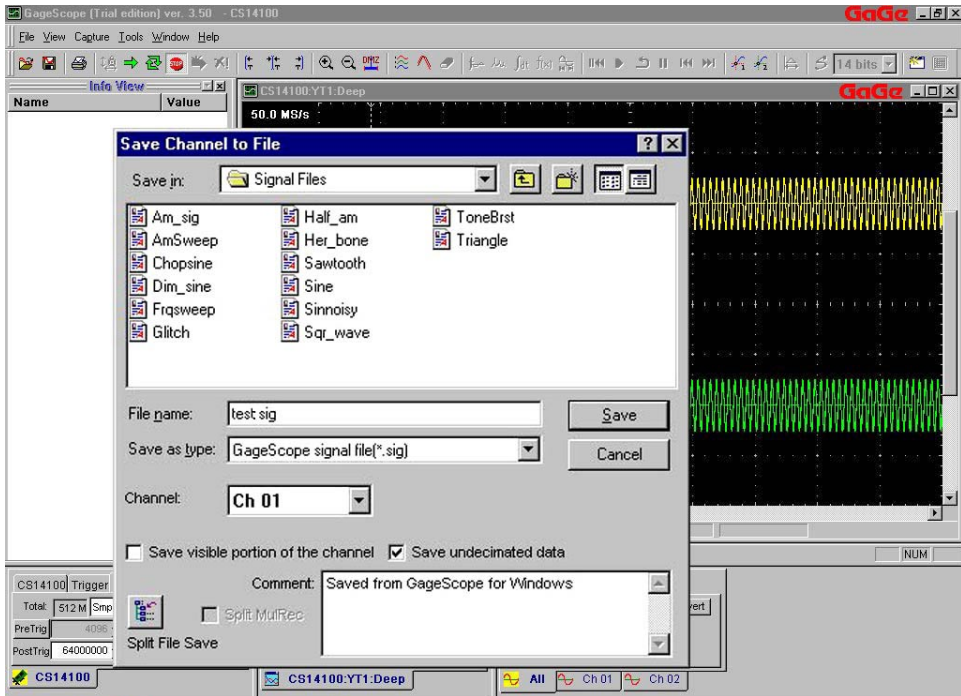
12

Once a large acquisition has been made and looked at in detail with the **Deep Memory Zoom**, we typically want to save the data for later use, either with another software application for analysis purposes, or with GageScope® for more processing.

GageScope® provides a number of methods for saving data: Saving a Channel (for saving a portion of the data viewed with the **DMZ**), **Save Un-decimated** (for saving the entire acquisition as a single .SIG file) and **Save Split File** (about which this section will be mostly concerned).

Saving a channel displayed from a **DMZ** is exactly the same as saving a channel acquired with a normal acquisition. The only difference consists in the reference to the Trigger location: from the **DMZ** channel, the Virtual Trigger value is saved as an absolute trigger and all references to the real trigger of the large acquisition are lost. To learn how to save a channel, see **File: Save Channel** also in this manual.

Partially because of this loss of trigger information, it is often better to simply save all of the data as a single signal file. To save the data as un-decimated, go to **File → Save Channel**. The following dialog appears:



As already indicated on the dialog, click the “Save undecimated data” checkbox, choose which channel to save (Ch. 01 in this case), enter a name for the file (‘test’ in the case of the example), select a location for the file, and then click on Save.

This operation results in a single, large file being save for later use.

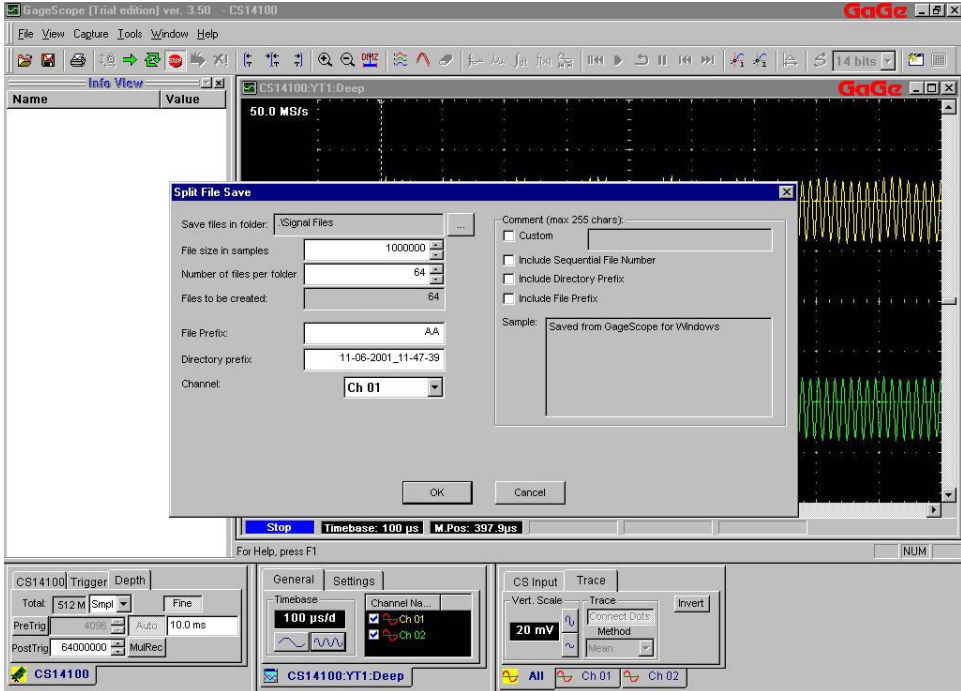
Some analysis software tools find it difficult to use such a large file and perform operations on it. GageScope® offers a very practical alternative to saving a single large file.

- 13 Instead of selecting the “Save undecimated data” option in the Save Channel dialog, we

could have pressed the **Split File Save** button:



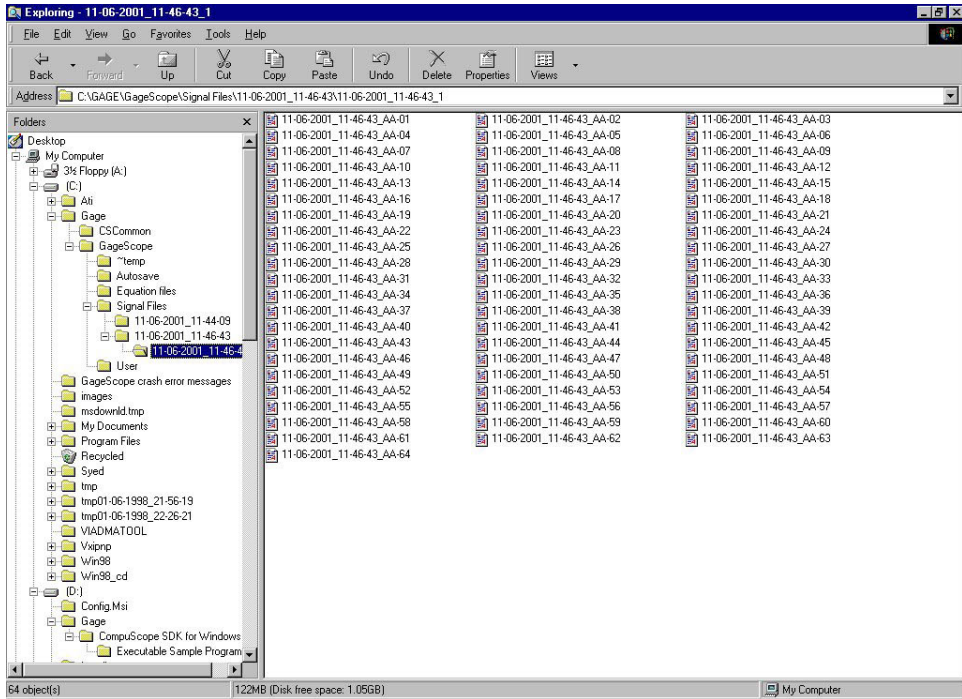
Alternatively, we could get directly to the Split File Save dialog by selecting **File → Split File Save**. Either way, we get to the following dialog:



This dialog allows you to separate the acquired signal into any number of files, and even to group the files in series to be saved in separate folders.

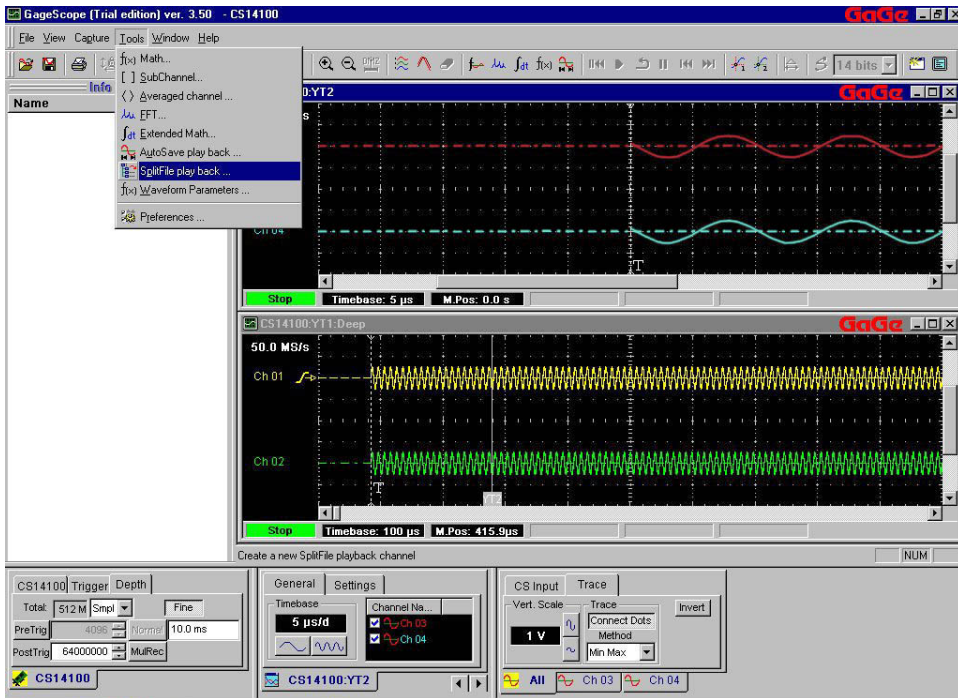
- 14 The example displayed above will save the content of Channel 01 as 64 files of 1,000,000 samples each. The files will be named using the Directory Prefix, File Prefix and a Sequential File Number. Clicking **OK** will save these 64 files.

In Windows Explorer, the saved files would look like this:

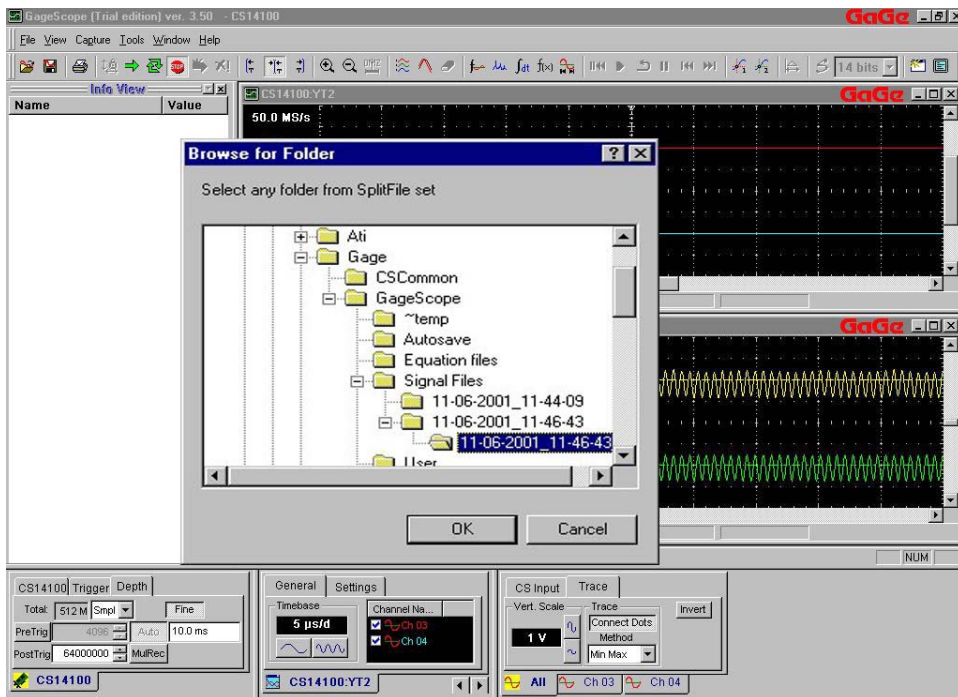


The Windows operating system has an intrinsic limitation of 64,000 files per folder. When saving a large acquisition as a large number of very small files, care must be taken to not exceed this limit. This is why GageScope[®] allows for the selection of both the number of samples to save per file as well as the number of files to put in each folder. In the example above, selecting 1,000 samples per file and 64 files per folder would result in 1,000 folders being created, each with 64 files.

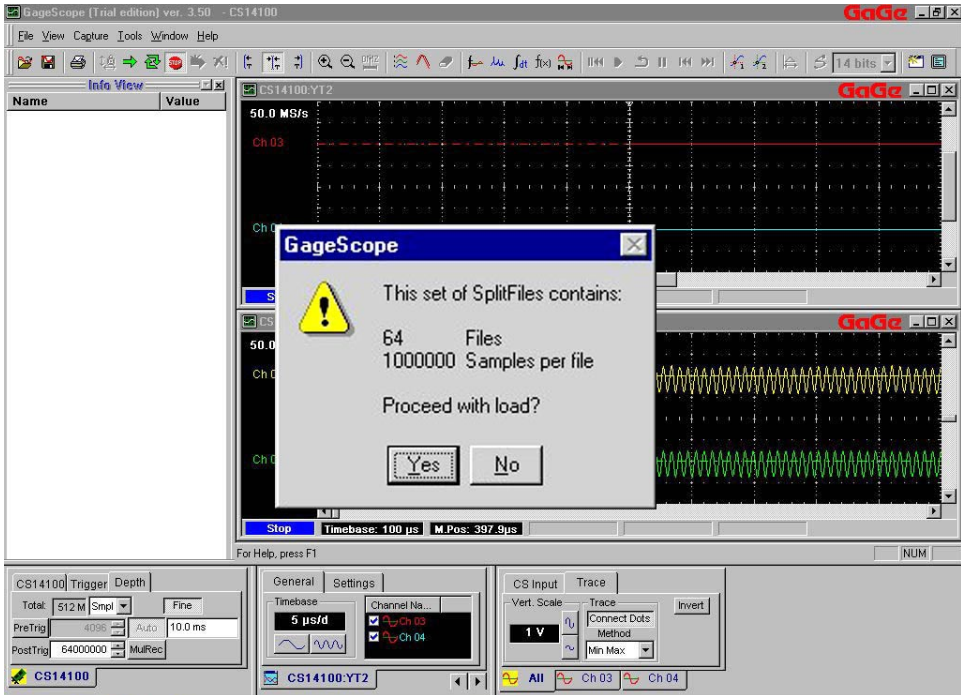
- 15 Saving large acquisitions as Split Files would be of limited use if GageScope® did not allow for opening and displaying the files again. You can access the Split Files through **Tools → SplitFile play back...**



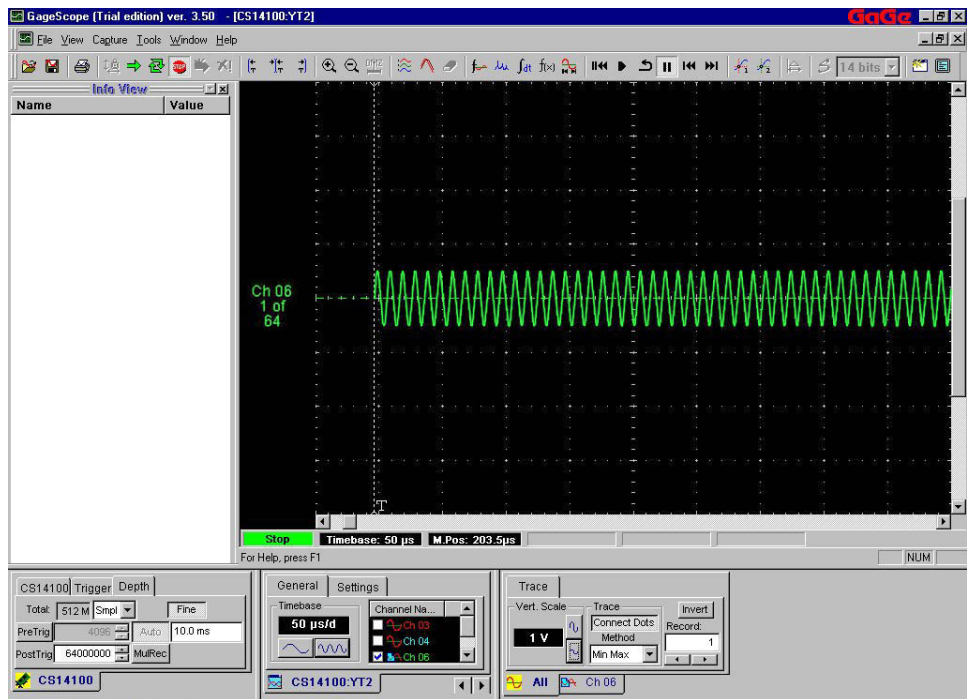
... and then selecting the appropriate files, starting with the first folder of the Split File structure:



- 16 GageScope® confirms the Split File structure and asks for confirmation:



As can readily be observed, the replay of Split Files is exactly like the playback of AutoSave files:

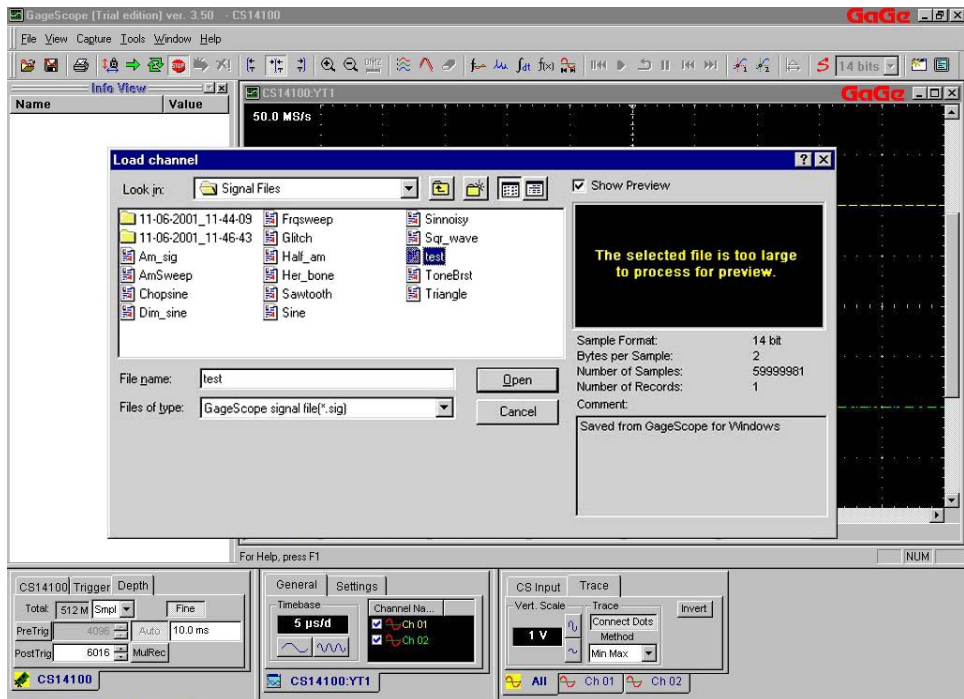


Loading Large Files

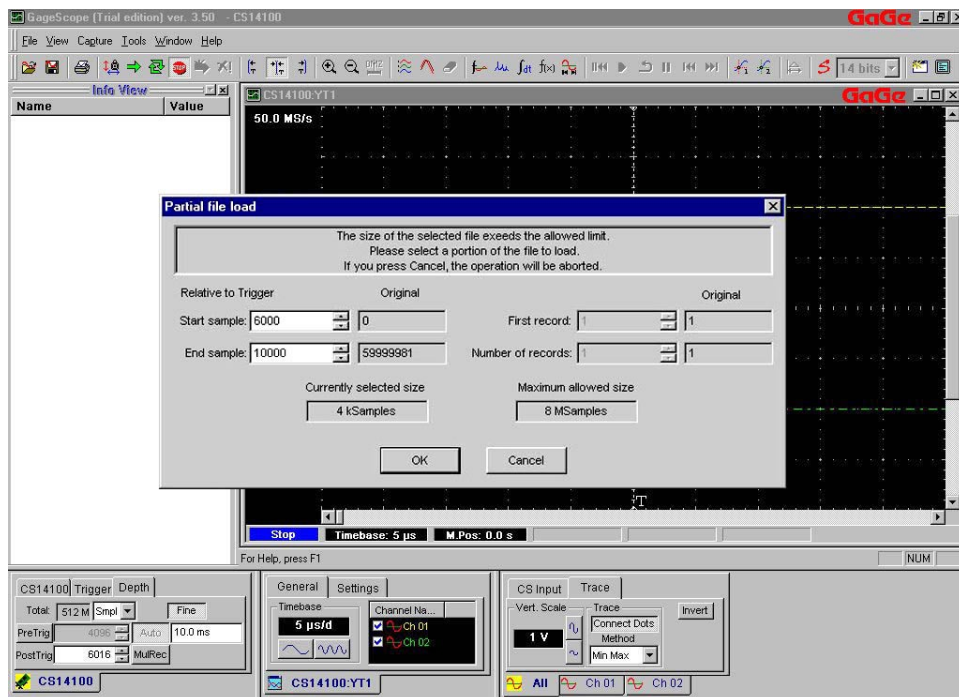
- 17 Since GageScope[®] allows the saving of a single data file from a large acquisition, it must be possible to load such a file to verify its content and perform analysis.

Due to memory management issues under the Windows family of operating systems, GageScope[®] limits the amount of data that can be loaded from a single file. To compensate for this limitation, however, GageScope[®] offers added flexibility in selecting the portion of a file that is to be loaded. Here is how this is done.

Go to **File → Load Channel** and select a large file (in this example, we use the previously saved 'test' file):



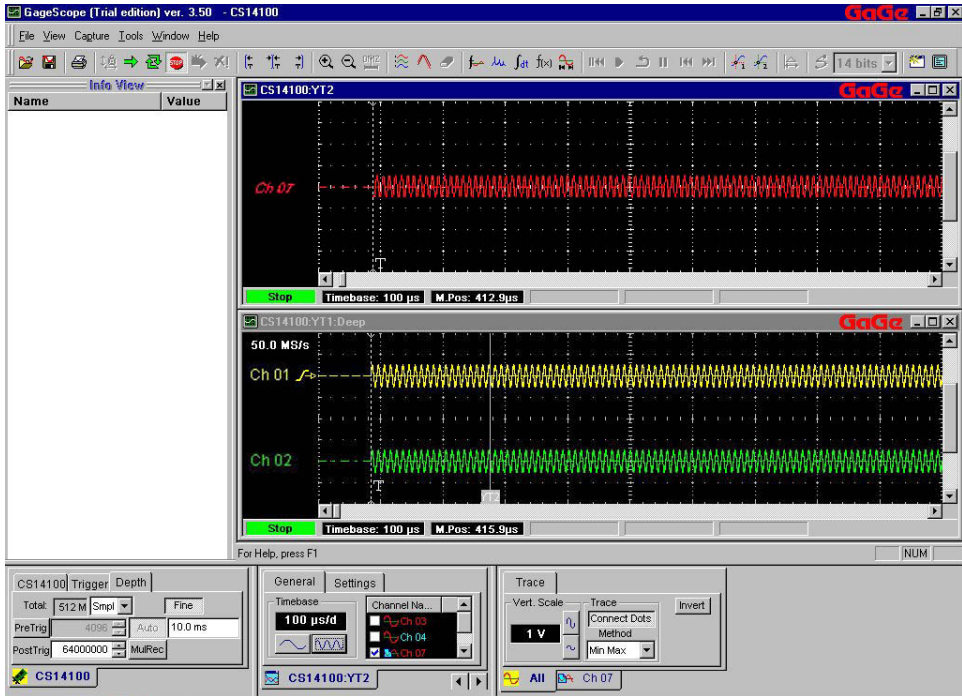
- 18 Select the large file and click **Open**. A new dialog appears:



From this **Partial file load** dialog, GageScope® allows for the selection of the **Start Sample** and **End Sample** of the portion to load. GageScope® automatically calculates the size selected and indicates if the file can be loaded as specified by enabling the **OK** button.

The **Partial file load** dialog seen earlier also includes options for loading MulRec files. The right-hand side of the dialog allows the selection of the **First record** as well as the **Number of records** to be loaded.

- 19 In our continuing example, we are attempting to load 4,000 samples, starting with sample 6,000 and ending with sample 10,000. The result is what appears like any other signal file loaded in GageScope[®], channel 05 in the “CS14100:YT2” display below:



File: Save Setup (page C-7)

Please note that the Save and Load functionalities have been changed, and so the following two sections are intended to replace those found in the Reference chapter within the *GageScope® User's Guide*.

Since so many settings can be changed, and because users may wish to perform various complex tasks at different times, GageScope® provides a convenient way of preserving favorite settings. The Save Setup command saves current GageScope® settings in a Setup file with the extension .INI. This Setup file can later be restored manually (see **File: Load Setup**).

What is Saved in the Setup file

In summary, the Setup files record the following information:

- CompuScope card Display Settings: Channel mode, sample rate, etc.
- Channel Settings: input range, coupling, position, vertical scale, polarization, channel name, comments, etc.
- Trigger Settings: Trigger type, trigger level, timeout, trigger slope, depth units, post-trigger depth, pre-trigger depth, etc.
- Display Settings: Timebase, channel visibility, etc.

For a detailed list of parameters saved, see Appendix F.

How it Works

- 1 Choose **Save Setup** from the File menu. The Save Setup dialog appears.
- 2 In the “File name” field, type in a file name.
- 3 Browse to, or specify, the folder where you would like to save your Setup file.
- 4 Click **Save** to save the Setup file

GageScope® for DOS Setup File Compatibility


The GageScope® setup file format (.INI) is not compatible with the GageScope® for DOS setup file format (.SET).

File: Load Setup (page C-8)

When launching GageScope[®], the last setup parameters that were being used are automatically restored.

The Load Setup command allows the user to manually load a previously saved Setup file. A Setup file contains the GageScope[®] settings which were current at time of saving (see **File: Save Setup**). The Setup file has the extension .INI.

How to Load a Setup Manually

- 1 If not already in Stop Mode, click **Stop**  in the Toolbar to stop the current acquisition.
- 2 Choose **Load Setup** from the File menu. The Load Setup dialog appears.
- 3 Go to the folder where you saved your Setup files and choose a file from the list.

Exceptions

Upon starting-up for the first time, GageScope[®] chooses several default settings. These default settings are saved in the Key Registry of the Windows operating system and cannot be modified by the user. They remain available as a way to restore GageScope[®] from a situation that may cause problems.

Should the hardware configuration of the system be changed between sessions, GageScope[®] will fail to restore the previously used settings. In such cases, the user is prompted to provide an alternative Setup file from which to load settings, or to revert to the default GageScope[®] settings.

Error Trapping When Loading Setups

- 1 If a setup parameter being read does not match the current hardware configuration, the user is given a warning and details as to which condition and parameter do not match.

- 2 The user is then given the following options:
 1. Continue loading all other parameters, ignoring the current error,
 2. Ignore all errors while loading, which causes only the settings that can be loaded to be extracted from the Setup file, and the rest to be set to default values,
 3. Stop loading from the Setup file and return to the GageScope[®] defaults,
 4. Choose another Setup file to be loaded instead.

Multiple Record Mode (Pages B-114 and C-88)

The introduction of Pre-Trigger Multiple Record capabilities on some CompuScope cards has caused the description of *User's Guide's* description of Multiple Record Mode to become incomplete. This section replaces pages C-88, the description of the feature, as well as page B-114, the first page of the tutorial on Multiple Record found in Tutorial 4.

Multiple Record Mode takes advantage of the CompuScope card's deep memory buffers by allowing the hardware to stack captures in on-board memory, so that many small acquisitions can occur in a very short amount of time, with near-zero re-arm time. This feature is invaluable in applications in which trigger events are happening rapidly or unpredictably and A/D down-time must be minimized.

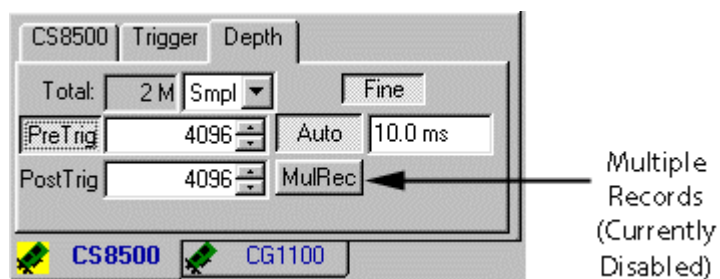
When Multiple Record Mode is enabled, the CompuScope card looks for a trigger event, acquires data, then automatically re-arms itself to look for another trigger event. Data collected from each successive acquisition is "stacked" on top of the previous acquisition until the on-board buffer fills up.

For example, if an acquisition depth of 1024 points is specified, the first acquisition stores data in addresses between 0 and 1023, the next acquisition from 1024 to 2047, and so on until the buffer is full.

Important Notes

- With most currently available CompuScope cards, you can only capture post-trigger data in Multiple Record mode. When you click on the **MulRec** button, pre-trigger capture is disabled. For those CompuScope cards with Pre-Trigger Multiple Record acquisition, the pre-trigger is not disabled when clicking on the **MulRec** button. For the sake of brevity we will only describe post-trigger data acquisition. The case with pre-trigger data is completely analogous.
- The number of records you can capture will depend on the amount of on-board memory your CompuScope card has, as well as other settings, such as the post-trigger depth and channel mode.
- Multiple Record Mode comes as a standard feature or as an option on most CompuScope cards, but is not available on the CompuScope LITE. If your CompuScope card does not have this capability, the **MulRec** button will not be available.

The Multiple Record setting is located in the Depth tab of the System Control.

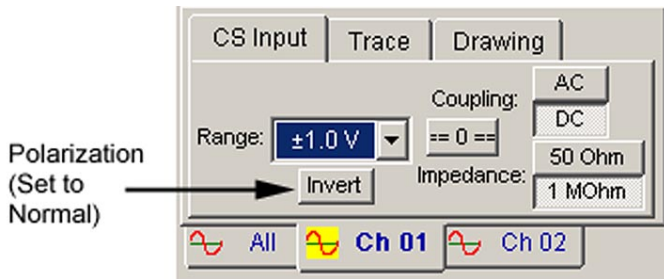


Channel Control: CS Input Tab: Polarization

(Page C-148)

The Polarization settings and controls have been modified. This page replaces page C-148 of the Reference section of the *User's Guide*.

The Polarization setting is labeled “Invert” and is located in the CS Input tab of the Channel Control.



This setting is available whether **All Channels** or an individual channel is current.

Polarization refers to how the trace is displayed relative to the X axis. When polarization is normal, the channel is displayed exactly as captured. Inverting the polarization inverts the signal about the X axis, modifying the digital values of the captured data.

If a channel is inverted, the color of the channel identifier at the far left of the signal will be reversed as well. For example, if channel 1 is inverted and its color is yellow, then the channel identifier will be black text in a yellow box.

Toggling the Polarization via the CS Input Tab

- 1 Click on the **CS Input** tab in the Channel Control.
- 2 Click on the **Invert** button to toggle this option on and off. If the **Invert** button is enabled, polarization is inverted; otherwise it is normal.

Changing the Polarization via the Channel Context Menu

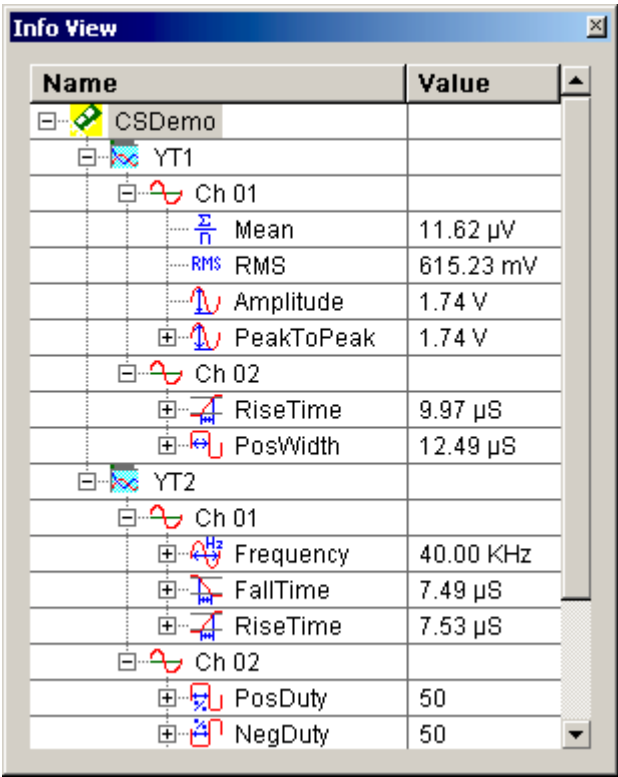
- 1 Position the mouse pointer on a channel's zero line. The channel will turn white to indicate that it has the current focus, and the mouse pointer will change to a drag pointer.
- 2 Click on the right mouse button to bring up the channel context menu.
- 3 Click on **Invert** to toggle this setting. If **Invert** has a checkmark next to it, polarization is inverted; otherwise it is normal.

InfoView (page C-176)

The InfoView window in GageScope® 3.5 has been changed. What follows is intended to replace page C-176 of the *GageScope® User's Guide*.

The InfoView Window truly differentiates GageScope® from all other oscilloscope programs on the market. Using the advanced analysis tools, GageScope® can analyze the signal data and display the results in the InfoView window. InfoView is what the marriage of instruments and computers is all about.

Any results calculated in GageScope® are displayed in InfoView. Below is a sample of what the Waveform Parameters tool displays. For more information on advanced analysis tools, see page C-177 of the *GageScope® User's Guide*.



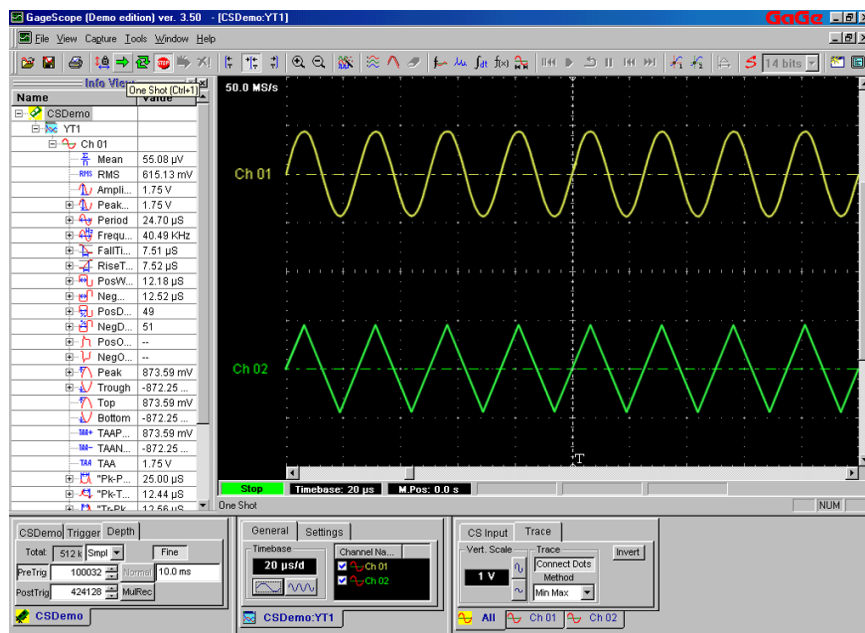
Waveform Parameters (pages C-205 to C-210)

The Waveform Parameters dialogue has been changed in GageScope® 3.5. The following pages are intended to replace pages C-205 to C-214 of the *GageScope® User's Guide*.

The Waveform Parameters tool automatically calculates various voltage and time parameters of a signal, such as mean, amplitude, and rise time. In all, 21 parameters are available:

- | | | |
|----------------|------------------|----------------------|
| • Top Value | • Frequency | • Positive Duty |
| • Bottom Value | • Time Stamp | • Negative Duty |
| • Mean | • Time Interval | • Positive Overshoot |
| • RMS | • Fall Time | • Negative Overshoot |
| • Amplitude | • Rise Time | • Peak |
| • Peak to Peak | • Positive Width | • Trough |
| • Period | • Negative Width | • Num Cycles |

Parameters are displayed in the InfoView window at the far left of the GageScope® screen.



For definitions of what each parameter measures, see About the Parameters below.

GageScope® now also features the ability to save Waveform Parameters to a binary file. A Waveform Parameter file viewer is included in the GageScope® package. Using the Waveform Parameter viewer, Waveform Parameter measurements can be re-saved in ASCII format. (The direct save from GageScope® to ASCII of the waveform parameters is not supported.)

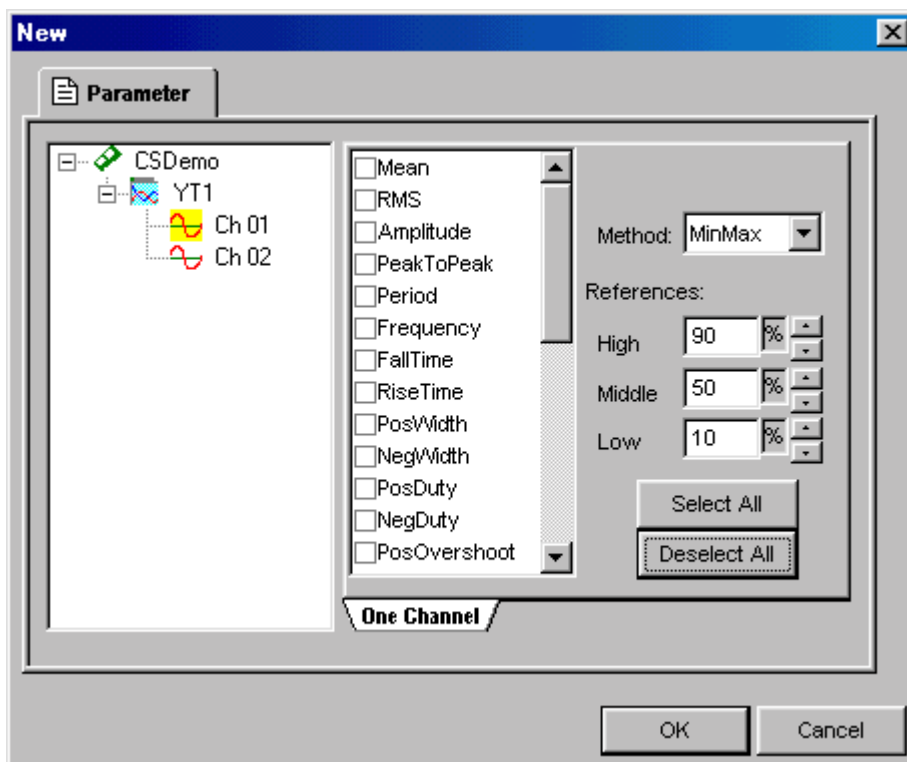
Adding Parameters to the InfoView

- 1 To display a parameter, right-click on the InfoView window and choose **Edit Waveform Parameters**. You can also choose Waveform Parameters from the Tools menu or the $f(x)$ button in the Toolbar.

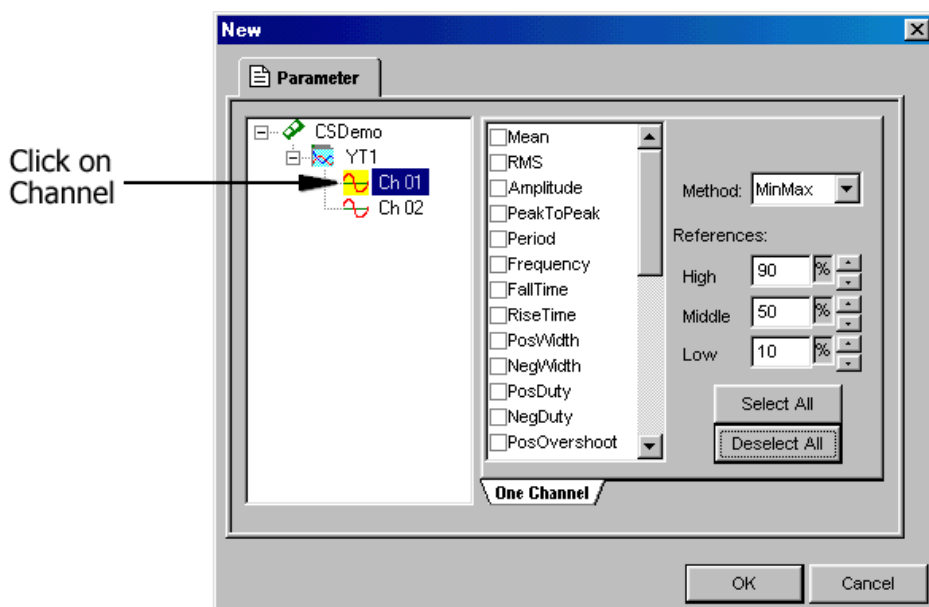


Edit Waveform Parameters

The Parameters dialog box appears.

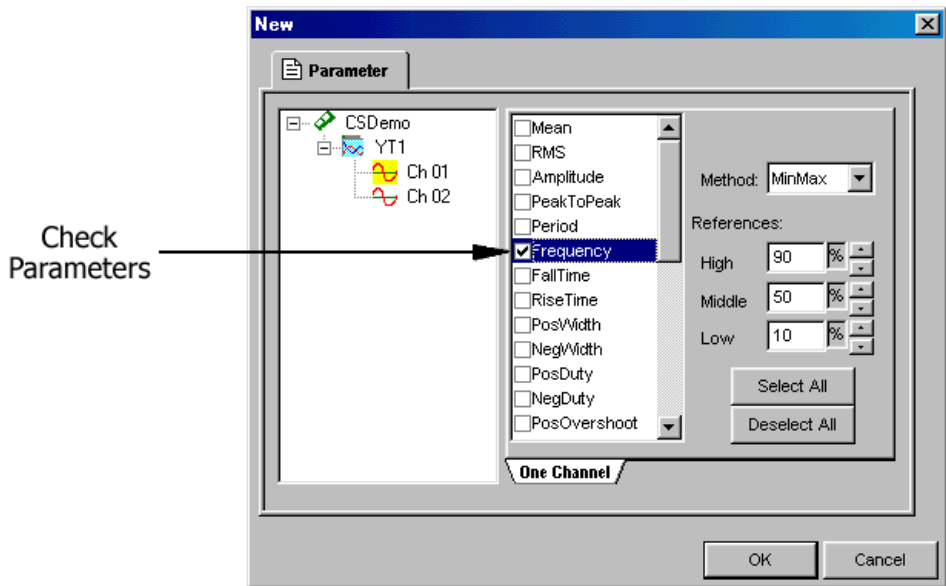


- 2 Click on the channel number you want to measure.



- 3 Click on the checkbox of each parameter you want to display in the InfoView window. You may have to scroll down the list to find the parameter you want.

A checkmark indicates the parameter will be shown; the lack of a checkmark indicates the parameter will not appear.



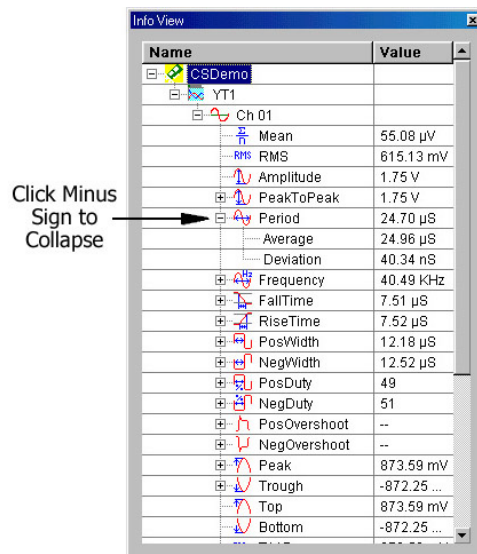
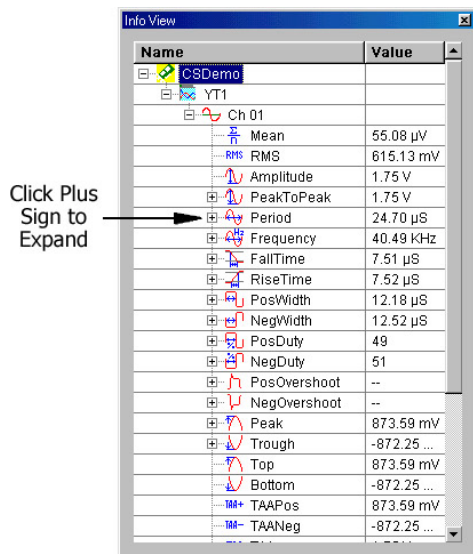
To enable all parameters, click on the **Select All** button. To disable all parameters, click on the **Deselect All** button.

- 4 Click **OK** when finished or **Cancel** to abort the changes.

Once you click **OK**, the parameters appear in the InfoView window.

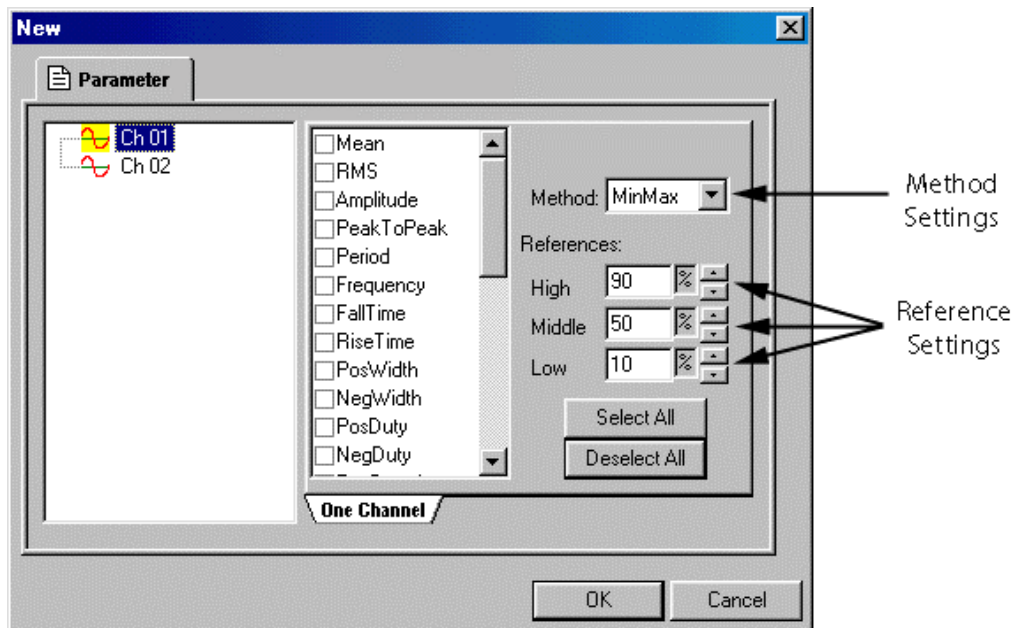
Expanding and Collapsing Parameters

Many of the parameters can display the average value and standard deviation. Such parameters have a plus sign to the left of their name in the list. To expand a parameter and see the average values and standard deviations, click on the plus sign to the left of a parameter. To collapse the parameter back to its original state, click on the minus sign.



Method and Reference Settings

When calculating certain parameters, the Waveform Parameters tool relies on the **Reference** and **Method** settings located in the Parameters dialog.



For information on how particular parameters are affected by these settings, see About the Parameters below. Not all parameters make use of these settings.

The Method Setting

The options for Method are **MinMax** and **Histogram**. To change the **Method** setting, select a value from the drop-down menu. The default is MinMax.

The Histogram Method is preferred for pulse-based signals such as digital logic (CMOS, TTL, ECL, etc.).

The MinMax Method is preferred for other signals, such as sine waves.

The Reference Settings

The reference settings **High**, **Middle** and **Low** are used to determine the High Level, Middle Level, and Low Level when calculating certain time parameters. For example, the **Rise Time** is the length of time for a signal's rising edge to go from the low level to the high level.

To change the **Reference** settings, click on the Increment buttons next to High, Middle and Low.

The definitions for High Level, Middle Level, and Low Level are shown below.

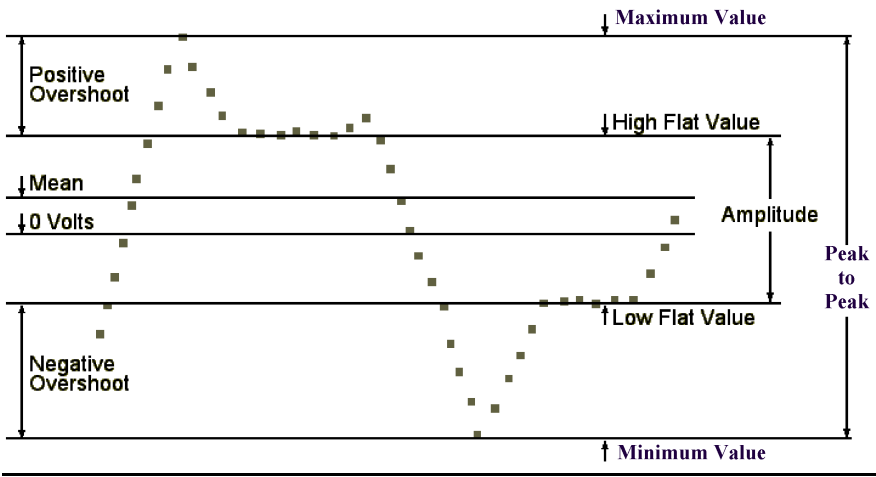
Reference:High%, Reference:Middle%, Reference:Low% refer to the values in the Reference settings in the Parameters dialog box.

High Level = $\text{LowFlatValue} + (\text{HighFlatValue} - \text{LowFlatValue}) \times \text{Reference:High\%}$
Middle Level = $\text{LowFlatValue} + (\text{HighFlatValue} - \text{LowFlatValue}) \times \text{Reference:Middle\%}$
Low Level = $\text{LowFlatValue} + (\text{HighFlatValue} - \text{LowFlatValue}) \times \text{Reference:Low\%}$

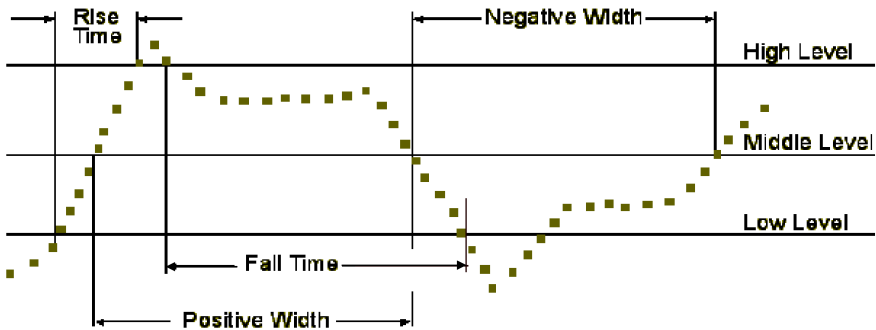
About the Parameters

Use the diagrams below to get an idea of what each parameter measures. More detailed explanations are offered on the pages following the diagram.

Voltage Parameters



Time Parameters



Calculating the Parameters

All parameters are calculated based on the information displayed on the screen, as opposed to the entire data acquisition buffer (which is stored on the computer but not necessarily displayed all at once). Hence you may notice that certain measurements change as the time base of the display is modified; this is simply because more or less of the signal is displayed and some features of the signal can cause the waveform parameter values to change.

This feature of GageScope® can sometimes lead to confusion but in fact it is a very powerful way of performing comparisons between various portions of a long acquisition, especially for non-repetitive signals.

As discussed previously, some waveform parameters can be expanded (by clicking on the + sign) to display the average and standard deviation values. Such parameters are measured on a per-cycle basis; one value is calculated for each cycle. The average and standard deviation values are therefore the average and standard deviation of the per-cycle values, over the cycles displayed on the screen.

Definitions

The parameters are defined as follows:

Top	Top is the average of the highest values recorded for all the cycles in the displayed signal.
Bottom	Bottom is the average of the lowest values recorded for all the cycles in the displayed signal.
Mean	Mean is the average of all the points in the displayed signal.
RMS	RMS is the Root Mean Square voltage.
Amplitude	When the MinMax method is chosen, Amplitude is equal to the Peak to Peak value. When the Histogram method is chosen, the Amplitude is the difference between the High Flat and Low Flat values, in Volts.
Peak To Peak	Peak-to-Peak is the absolute difference between the Maximum and Minimum values, in Volts.
Period	Period is the time it takes for a signal to complete one cycle and is equal to the sum of the Positive and Negative Widths .
Frequency	Frequency is the number of cycles per second in a signal, measured in Hz, with 1 Hz equaling 1 cycle per second, and is equal to 1 / Period .

Time Stamp	Time Stamp displays the time stamp of the record. This parameter is only active with the use of a Trigger Marker Board.
Time Interval	Time Interval displays the time difference between two successive records. This parameter is only active with the use of a Trigger Marker Board.
Fall Time	Fall Time is the length of time for a signal's falling edge to go from the High Level to Low Level . (These two levels are specified in the Reference:High and Reference:Low settings in the Parameters dialog box.)
Rise Time	Rise is the length of time for a signal's rising edge to go from Low Level to High Level . (These two levels are specified in the Reference:High and Reference:Low settings in the Parameters dialog box.)
PosWidth	Positive Width is the length of time between the rising and falling edge of the portion of the signal above the Middle Level . (This level is specified in the Reference:Middle setting in the Parameters dialog box.)
NegWidth	Negative Width is the length of time between the falling and rising edge of the portion of the signal below the Middle Level . (This level is specified in the Reference:Middle setting in the Parameters dialog box.)
PosDuty	Positive Duty is a percentage of the time it takes for the positive portion of a signal to complete, compared to one whole cycle. It is defined as: $(\text{Positive Width} \div \text{Period}) \times 100$
NegDuty	Negative Duty is a percentage of the time it takes for the negative portion of a signal to complete, compared to one whole cycle. It is defined as: $(\text{Negative Width} \div \text{Period}) \times 100$
PosOvershoot	Positive Overshoot is measured in Volts and is defined as: Maximum Value - High Flat Value When the method is set to MinMax, Positive Overshoot is 0.

NegOvershoot	Negative Overshoot is measured in Volts and is defined as: Minimum Value - Low Flat Value When the method is set to MinMax, Negative Overshoot is 0.
Peak	Peak is the highest voltage value recorded for each cycle.
Trough	Trough is the lowest voltage value recorded for each cycle.
NumCycles	Number of cycles is the total number of complete cycles in the displayed signal.

Appendix F: Setup Parameters Saved and Loaded

System Settings

Setting	Default Value (if applicable)	Values Available (if not all possible)
Path for user-defined INI files		
Directory for loading SIG files		
Directory for saving SIG files		
Directory for saving and restoring EGG files		
Use Smart Tabs	YES	
Show ToolTips	YES	
Ask user to abort long captures	YES	Yes or Take Default Action
Default action on stopping long captures	Abort	Abort or Wait
Deep memory buffer size per channel	64 MB	32 or 64 MB

Card Settings

Setting	Default Value (if applicable)	Values Available (if not all possible)
Capture Mode	Continuous Mode	Continuous or Stopped
Channel Mode	Dual (if 2 ch. avail.)	
Sample Rate	Highest Available	
SuperRes Mode	OFF	
Scope Mode	NO	
Window Count	1	
External Clock	NO	
Clock Rate	10 MHz	
MulRec Mode	NO	
MulRec Record Count		
Pre-Trigger Depth	4 kS	Max. 1 MS
Post-Trigger Depth	4 kS	Max. 1 MS

Trigger Settings

Setting	Default Value (if applicable)	Values Available (if not all possible)
Trigger Source	Channel 1	
Trigger Level	0	
Trigger slope	Positive	
Timeout	10 ms	
Number of Trigger Sources	1	
Sources of Triggers	Channel 1	
Levels of Triggers	0	
Slopes of Triggers	Positive	
Timeouts of Triggers	10 ms	

Display Settings

Setting	Default Value (if applicable)	Values Available (if not all possible)
Timebase	20 * tbs / div	
Trigger Alignment	Mid-Window	
Persistence	OFF	
Cursors	OFF	
Engineer Units	Volts	
Grid	ON	
Grid Color	ON	
X/Y Axis		
X/Y Axis Color		
Zero Lines	ON	
Zero Lines Color		
Color of Window		
Window Position	(0,0)	
Window Size	Full	
Printing Colors		

Channel Settings

Setting	Default Value (if applicable)	Values Available (if not all possible)
Channels Shown	All Visible	
Channel Name		
Channel Position	Evenly distributed	
Default Trace Alignment		
Trace Connect Dots	YES	
Trace Line Thickness	Thinnest	
Trace Line Linetype	Continuous	
Input Range	+/- 1 V	
Vertical Scale	biggest value smaller than [(4/NumOfChan) * input range /div]	
Polarization	Normal (not inverted)	
Probe	x1	
Coupling	DC	
Decimation Method	Skip Sample	
Decimation Factor	Min (Card, Display) See DMB specs in section 5.2.	

Analysis Setting

Setting	Default Value (if applicable)	Values Available (if not all possible)
Waveform Parameters	NONE	
FFT Parameters	1024, exact Blackman- Harris	



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