GaGe

GageBit®

Users Guide

For version 1.2

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GageBit®
Users Guide

Second Edition (February 2002)

How to reach Gage for Product Support

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Introduction

GageBit® is a powerful software package that allows digital data generation and acquisition from within the same software environment.

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

GageBit® takes full advantage of the Windows operating system, making the human interface for CompuScope and CompuGen cards very easy to learn and use.

On-screen controls give you complete control of all capture and display features, allowing you to change all hardware and software settings.

Data acquired and generated can be viewed simultaneously in two separate windows. Each window is capable of displaying up to 32 bits of data in List or State Diagram form.

All hardware settings for data acquisition can be set from one simple to use dialog box.

Similarly, all hardware settings for data generation can be set from one simple to use dialog box.

As many as 32 digital bits can be viewed together on the screen, and signals can be saved to disk for future use.

A powerful data comparison function is available to compare millions of bytes of acquired data against generated data for a complete stimulus-response testing application.

The new features introduced in version 1.16.10 of the software are:

- ASCII file saving has been added to the program. It is now possible to save the data from the Output or Input windows in decimal format and a column of Time Stamps can be included in the file.
- Multiple pattern loading and generation has been added.
- It is now possible to load a very large SIG file with full read/write access. In the last version this was a read-only functionality.
- The manual is now supplied as a PDF format file, replacing the on-line help of previous versions.

Features

- **No Programming Required – Works Out of the Box.** GageBit® brings all the advantages of the Pentium processor, Windows operating system and the Internet to the CompuScope and CompuGen cards without requiring the user to write a single line of programming code or draw diagrams. It works straight out of the box!
- **Automatic Detection of CompuScope or CompuGen Cards.** GageBit® automatically detects the presence of CompuScope and CompuGen Cards in the system, bringing true Plug-n-Play functionality to the Test and Measurement user.
- **Simple Interface, Complete Control.** All hardware settings for CompuScope and CompuGen cards can be viewed in and controlled from two simple dialog boxes.
- **Scroll Through the Signal Using Familiar Windows Scroll Bars.** Now you don't have to scroll through large sets of data using a slow and ineffective scroll knob on a traditional Logic Analyzer. You can use standard Windows horizontal and vertical scroll bars to view different portions of the signal.
- **Import Signals into Reports and Manuals.** Capturing signals in the Windows environment allows you to effortlessly bring the waveform plots into word processing documents such as project reports and product manuals.
- **Remote Control of your CompuScope or CompuGen Cards.** GageBit® can be run remotely using standard Windows utility programs. This allows you control over your CompuScope or CompuGen cards even when you are not physically in the laboratory.
- **Simultaneous Digital Data Generation and Acquisition.** Now you can simultaneously generate and capture streams of digital signals for true stimulus-response testing.
- **Save Signals and Setups to Disk.** An infinite number of signals can be saved using GageBit®. Saving signal files in binary or ASCII format allows you to post-process the data using analysis packages such as MATLAB, Excel, Mathcad etc. Setup files can also be saved, allowing you to easily go back to a previously set up experiment.

How to Use this Manual

To get the most out of GageBit®, it is recommended that you read through this manual.

- Part A, *Getting Started,* provides detailed instructions on installing GageBit®, running the program, and configuring your CompuScope and CompuGen cards with the Gage Config utility.
- Part B, *Reference*, lists every feature of GageBit® along with detailed descriptions on how they work.

Specifications

System Requirements

- PC with a Pentium 200 MHz processor; 266 MHz Pentium II or higher recommended
- Microsoft Windows 95, Windows 98, Windows ME, Windows NT 4.0 (SP3+), Windows 2000 or Windows XP operating system
- 64 MB RAM with Windows 95/98/ME, 128 MB RAM with Windows NT/Windows 2000/Windows XP
- Hard disk free space: 25 MB minimum; 64 MB recommended for optimal operation of the GageBit® program
- CD-ROM drive
- 15-inch monitor 800 x 600 (Super VGA); 17-inch 1024 x 768 Ultra VGA recommended.
- PC keyboard and 2-button mouse (3rd button, if present, is not used)
- The drivers for CompuScope and CompuGen card(s) cards must be installed. You must run the Gage Config utility to configure the PC-based cards.

Supported Instruments

Currently supported instruments include:

CompuScope Cards

CS3200

CompuGen Cards

CG3250

Getting Started

Follow the simple, 4-step procedure outlined below to properly install GageBit® and start running within minutes of opening the GageBit® software package:

- Install and verify the Windows Drivers for your CompuScope or CompuGen card.
- Install GageBit®.
- Configure GageBit® to work with your CompuScope and CompuGen card(s) using the Gage Config utility.
- Launch GageBit®.

Note :

1. It is assumed that you have already installed CompuScope and/or CompuGen cards in your system. Instructions for this installation accompany the hardware.
2. The procedure outlined in this section assumes that you are installing the software using a CD.
3. If you have downloaded GageBit® software off the Gage web site, please extract the SETUP and data files to a folder on your hard disk and run the SETUP program from that folder.

Installing the Windows Device Drivers for your CompuScope or CompuGen Card

In order to operate your CompuScope or CompuGen card under GageBit®, you must install the appropriate Windows driver for your CompuScope or CompuGen card before launching GageBit®.

For instance, if you have a CS3200 card and want to operate GageBit® under Windows NT, you must install the CompuScope Win NT Drivers in addition to installing GageBit® under the same operating system.

Failure to install the appropriate driver will result in GageBit® not being able to communicate with the cards installed in your system.

For complete instructions on installing the Windows Driver for your CompuScope, consult the Driver Installation Guide that came with the CompuScope or CompuGen hardware.

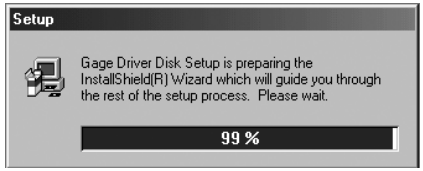
Installing GageBit®

GageBit® software is included on the Gage Driver Disk that accompanies all CompuScope and CompuGen cards.

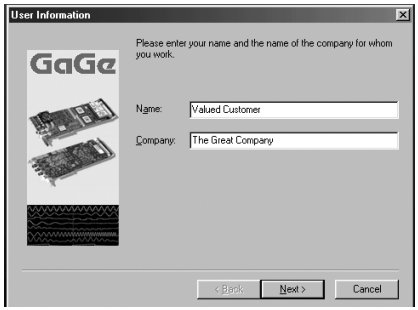
In order to install GageBit® software, you must follow the instructions listed below.

Step-by-step Installation

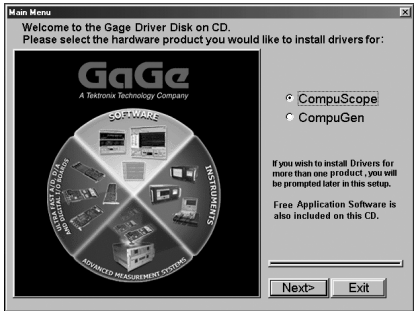
1 Insert the Gage Driver Disk in your CD ROM. A setup program will start automatically and will display a splash screen.



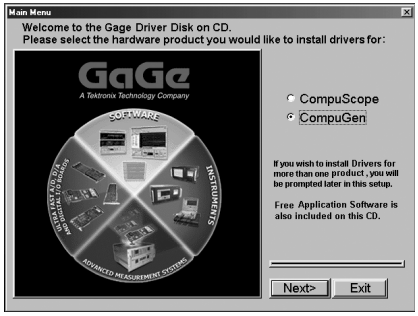
2 Immediately after the splash screen, you will be asked to enter your personal name and your company name in order to register this license. Enter this information and click on **Next**.



3 Setup will now ask you to select either **CompuScope** or **CompuGen** hardware cards to install software for.



It is essential that you select **CompuGen** hardware. If you select **CompuScope** hardware, you will not be able to install GageBit® software.



Select **CompuGen** and click on **Next**.

4 Setup will now ask you to select the software product you want to install

Click on **GageBit Software** in the **Free Application Software** section.

You should see **GageBit Software** listed in the **Selected Gage Software to be installed** area of the screen.

Click on **Next** to run GageBit® installation program

5 Follow the instructions on the screen to install GageBit® software.

Configuring CompuScope and CompuGen Cards with Gage Config

The Gage Config utility configures one or more CompuScope and CompuGen cards in your system.

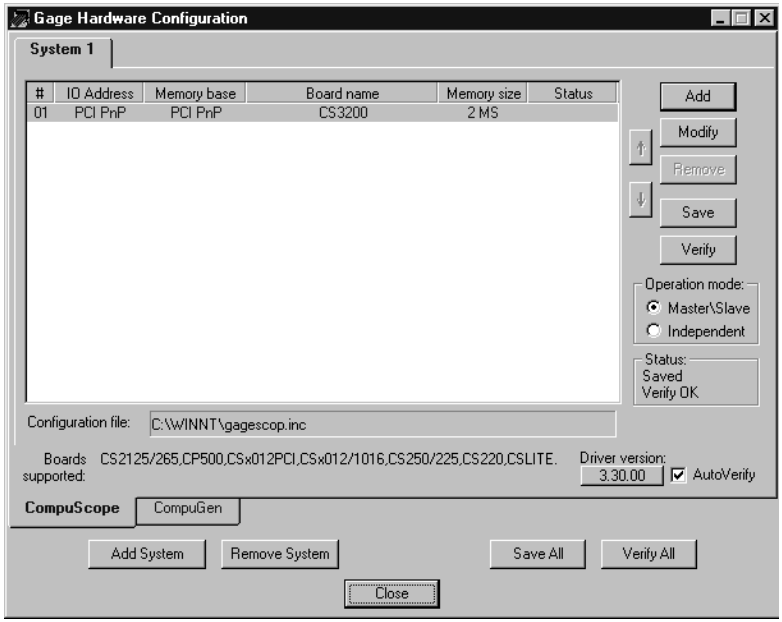
It is very important to install the appropriate Windows drivers for your CompuScope or CompuGen cards before attempting to use Gage Config.

For example, if you have a CompuScope 3200 present in your PC, you must install the PCI drivers first before using the Gage Config utility.

Refer to the CompuScope driver installation guide for step-by-step PCI driver installation procedure for the PCI-based CompuScope cards.

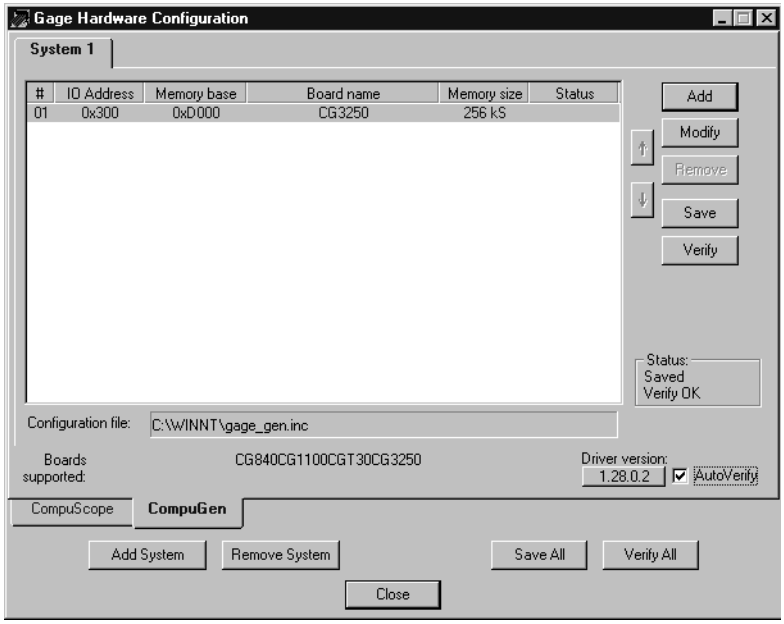
1 Launch Gage Config utility using the following sequence of left mouse clicks: **Start --> Programs --> Gage --> Config.**

2 If you have properly configured CompuScope card(s) in your system, the following dialog box will appear:



3 Click on **CompuGen** tab to view the configuration for CompuGen card(s).

If you have properly configured CompuGen card(s) installed in your system, the following screen will be displayed:



4 For a more detailed description of the operation of Gage Config, refer to the Windows driver manual that accompanied your hardware.

Launching GageBit® for the First Time

If your system consists of a CompuScope 3200 and a CompuGen 3250, we recommend that you connect the cable supplied with CompuScope 3200 in between the two.

Also make sure that the cards are properly fastened to the chassis using backplate screws. This ensures that CompuScope 3200 does not pick up any noise.

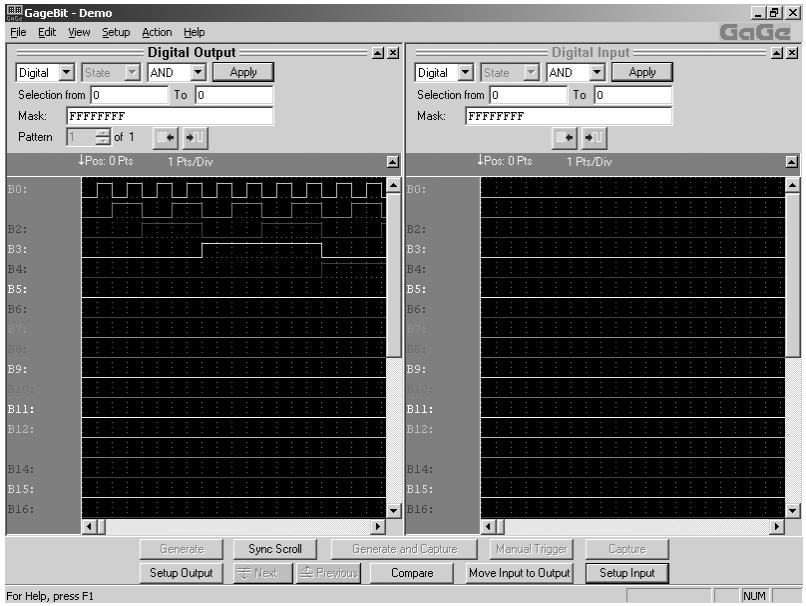
This will allow you to capture the same signals as are shown in this section.

Launching GageBit®

1. You can run GageBit® by clicking on the icon installed on your desktop

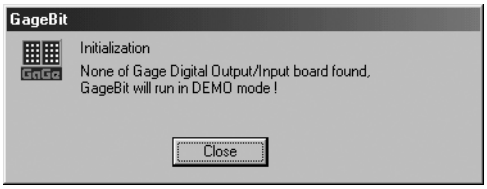
   You can also run GageBit® through the Start menu. Click on **Start, Programs, Gage, GageBit**.

2. If your CompuScope or CompuGen card is configured properly, GageBit® will start immediately.



No Hardware Detected?

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



You will be asked if you want to run GageBit® in Demo Mode.

As you are not connected to a live instrument, some features will be disabled. You can, however, load and save disk-based GageBit® files. To load a file, click on **File > Open**.

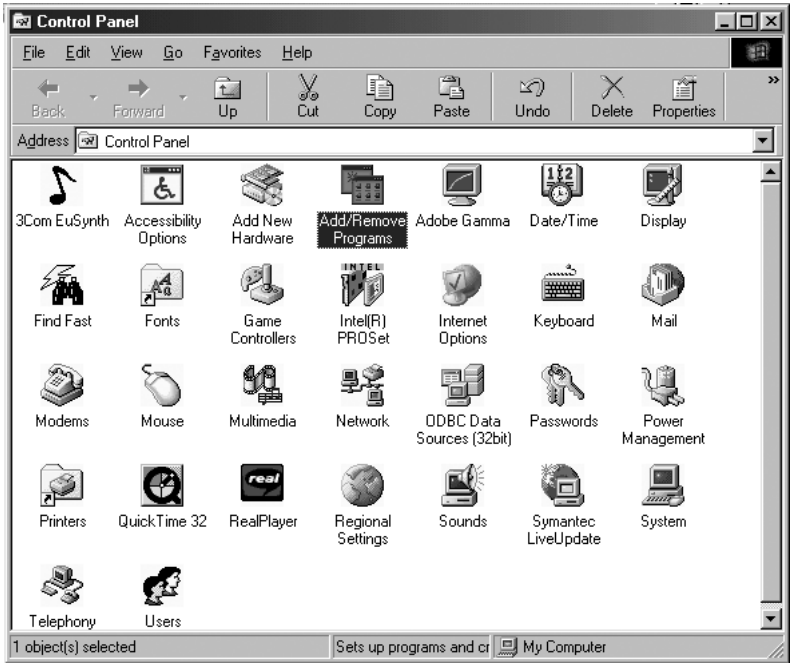
Uninstalling GageBit®

Use standard Windows methodology to uninstall GageBit®.

As in any Windows program, it is important that you not delete the GageBit.EXE file in order to uninstall GageBit®. This will create problems in the future when you try to re-install GageBit®.

1 In your Windows Start menu, select **Settings → Control Panel**.

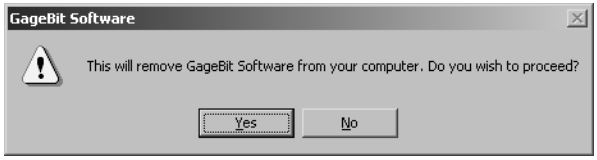
2 Double-click on **Add/Remove Programs**.



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

In the list of programs, select GageBit®. Click **Add/Remove**.

4 The standard Windows Confirm File Deletion dialog box will appear:

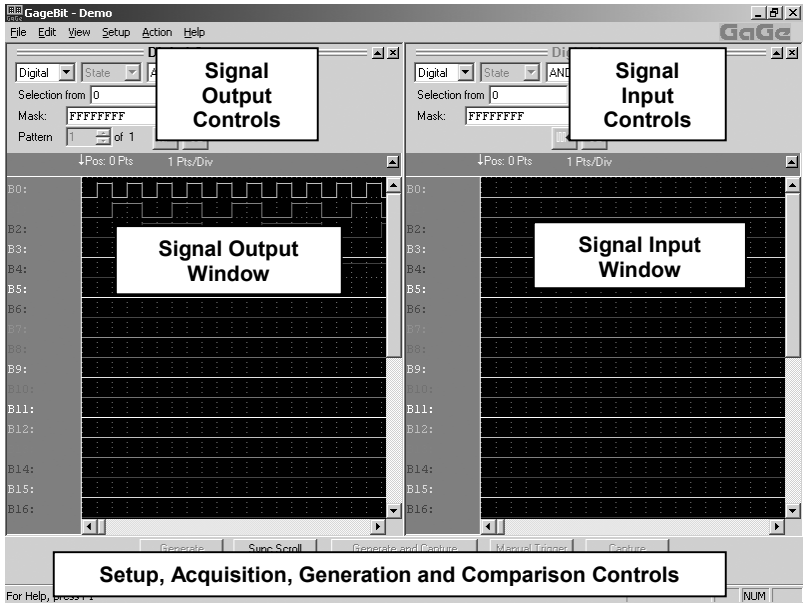


Confirm by clicking on **Yes**.

5 GageBit® software will be removed from your system.

Reference

The Reference section contains information on every feature of GageBit®.



Note that the GageBit® screen is divided into five distinct portions, shown above.

The following sections will describe each of the menu items, control buttons and dialog boxes available to the user.

File Menu

This menu consists of 7 items, as well as a list of the most recently opened data files.

Open
Save
Save As
Open Setup
Save Setup
Save Setup As
List of most currently opened data files
Exit

File: Open

The Open command allows you to load an existing digital pattern into the Digital Output window for output via a CompuGen card.

GageBit® uses a standard Windows® File: Open dialog box.

The entire digital pattern, as well as the corresponding CompuGen hardware settings, is loaded into the Digital Output window.

In case the signal originated from a CompuScope card that featured sample rates not supported by the CompuGen card in use, GageBit® automatically selects a CompuGen clock rate closest to the CompuScope sample rate.

It is also possible to load GageScope® signal files into GageBit®.

By definition, GageScope® signal files are analog in nature. The digital data stored represents an analog waveform.

When this data is loaded into GageBit®, it appears as a purely digital data stream. Analog rendition of this stream is not possible in GageBit®.

File: Save

The Save command allows you to save the digital pattern currently present in either the Digital Output or the Digital Input window.

User can select to save the Digital Output or Digital Input data by clicking in the Signal Output Window or the Signal Input Window, respectively. The label at the top of the window will change to red to signify its selection. The unselected window's label will turn black.

GageBit® uses a standard Windows® File: Save dialog box.

For Digital Output, GageBit® saves the entire digital pattern, as well as the corresponding CompuGen hardware settings.

For Digital Input, GageBit® saves the entire digital pattern captured in the CompuScope acquisition memory, as well as all the acquisition parameters.

File: Load Setup

The Load Setup command loads a previously saved Setup file. A Setup file contains the GageBit® settings which were current at time of saving. The Setup file has the extension .SET.

File: Save As

The Save As command allows you to save the digital pattern currently present in either the Digital Output or the Digital Input window as a different file name.

User can select to save the Digital Output or Digital Input data by clicking in the Signal Output Window or the Signal Input Window, respectively. The label at the top of the window will change to red to signify its selection. The unselected window's label will turn black.

GageBit® uses a standard Windows® File: Save As dialog box.

For Digital Output, GageBit® saves the entire digital pattern, as well as the corresponding CompuGen hardware settings.

For Digital Input, GageBit® saves the entire digital pattern captured in the CompuScope acquisition memory, as well as all the acquisition parameters.

File: Open Setup

The Open Setup command loads a previously saved Setup file.

A Setup file contains the GageBit® settings which were current at time of saving. The Setup file has the extension .SET.

File: Save Setup

The Save Setup command saves current GageBit® settings in a Setup file with the .SET extension.

Upon startup, GageBit® chooses several default settings in order to display a signal. As so many settings can be changed, it can be tedious to have to repeatedly fix everything to your liking. To solve this problem, GageBit® offers the ability to save all the current settings in a Setup file.

File: Save Setup As

The Save Setup As command saves current GageBit® settings in a new Setup file with the .SET extension.

Upon startup, GageBit® chooses several default settings in order to display a signal. As so many settings can be changed, it can be tedious to have to repeatedly fix everything to your liking. To solve this problem, GageBit® offers the ability to save all the current settings in a Setup file.

File: Exit

The Exit command quits GageBit®.

GageBit® will not ask you if you wish to save any unsaved data. If you exit without first saving unsaved data, that data will be lost.

View Menu

This menu consists of 5 items.

Status Bar
Output
Input
Zoom In
Zoom Out

View: Status Bar

The Status Bar command allows the user to choose whether or not to display the status bar in the bottom right corner of the screen.

This status bar shows the current state of the acquisition and generation systems.

View: Output

The Output command allows the user to choose whether or not to display the Digital Output display window in the left half of the screen.

If there is no checkmark beside the Output item in the menu, the entire screen will be used for Digital Input.

It is important to note that the signal generation command buttons at the bottom of the screen do not disappear, even if the Digital Output window is not being displayed.

View: Input

The Input command allows the user to choose whether or not to display the Digital Input display window in the right half of the screen.

If there is no checkmark beside the Input item in the menu, the entire screen will be used for Digital Output.

It is important to note that the signal acquisition command buttons at the bottom of the screen do not disappear, even if the Digital Input window is not being displayed.

Setup Menu

This menu consists of 3 items.

Setup Output
Setup Input
Compare

Setup: Setup Output

Setup Output command brings the user into the Setup Output dialog box.

All parameters that need to be set up for proper operation of a digital output CompuGen card are available in this dialog box.

For more details on the specific controls in this dialog box, please refer to the section *Setup Digital Output Dialog Box*.

Setup: Setup Input

Setup Input command brings the user into the Setup Digital Input dialog box.

All parameters that need to be set up for proper operation of a digital input CompuScope card are available in this dialog box.

For more details on the specific controls in this dialog box, please refer to the section *Setup Digital Input Dialog Box*.

Setup: Compare

Selection of Setup Compare menu item brings the user into the Compare Setting dialog box.

All parameters that need to be set up for proper comparison of digital data in the Digital Input and Digital Output windows are available in this dialog box.

For more details on the specific controls in this dialog box, please refer to the section *Compare Setting Dialog Box*.

Action Menu

This menu consists of 9 items.

Generate
Generate & Capture
Capture
Manual Trigger
Compare
Next Difference
Previous Difference
Sync Scroll
Input to Output ←

Action: Generate

Selecting the Generate item in the Action menu has the same effect as clicking on the Generate button.

The data loaded in the CompuGen hardware is output over the output connectors based on the trigger conditions selected.

It is important to note that the Generate command simply tells the hardware to start looking for a trigger and data is output only once a valid trigger has been received.

Action: Generate and Capture

Selecting the Generate and Capture item in the Action menu has the same effect as clicking on the Generate and Capture button.

First, the CompuScope card in the system is armed for a trigger and then the data loaded in the CompuGen hardware is output over the output connectors based on the trigger conditions selected.

It is important to note that the Generate command simply tells the hardware to start looking for a trigger and data is output only once a valid trigger has been received.

It is also important to note that the Capture command simply tells the CompuScope hardware to start looking for a trigger and then capture pre- and post-trigger data based on the settings in the Setup Input Dialog Box.

Action: Capture

Selecting the Capture item in the Action menu has the same effect as clicking on the Capture button.

The CompuScope card in the system is armed for a trigger.

It is important to note that the Capture command simply tells the CompuScope hardware to start looking for a trigger and then capture pre- and post-trigger data based on the settings in the Setup Input Dialog Box.

Action: Manual Trigger

Selecting the Manual Trigger item in the Action menu has the same effect as clicking on the Manual Trigger button.

The only time this item is available for use is when the CompuScope card has been armed and is waiting for a manual trigger. At all other times, this menu item, and the corresponding button, is grayed out.

Action: Compare

Selecting the Compare item in the Action menu has the same effect as clicking on the Compare button.

Once this command is issued, GageBit® compares the data in the Digital Output window against the data in the Digital Input window.

If the record length of the two datasets is not equal, GageBit® compares the maximum number of points that it can. For example, if the Digital Output window only has 1024 words, whereas the Digital Input window has 17,000,000 words, GageBit® will compare 1024 words only.

Comparison is performed based on parameters set in the *Compare Setting* dialog box.

For more details on Compare command, please refer to the section *Compare Command*.

Action: Clear

Selecting the Clear item in the Action menu has the same effect as clicking on the Clear button.

Both the Clear menu item and the Clear button do not appear until a comparison is done and resulting data mismatches are highlighted.

Once a Clear command is issued, GageBit® removes the highlights from the mismatched words.

Action: Next Difference

Selecting the Next Difference item in the Action menu has the same effect as clicking on the Next button.

Both the Next Difference menu item and the Next button do not appear until a comparison is done and resulting data mismatches are highlighted.

Selecting the Next Difference menu item results in the display data being changed to the location of the next data mismatch. This is extremely valuable in experiments that require comparison of long sets of data.

One simple click of the mouse allows the user to find a needle in a haystack!

Once a Clear command is issued, GageBit® removes the highlights from the mismatched words and the Next Difference menu item and the Next button are grayed out.

Action: Previous Difference

Selecting the Previous Difference item in the Action menu has the same effect as clicking on the Previous button.

Both the Previous Difference menu item and the Previous button do not appear until a comparison is done and resulting data mismatches are highlighted.

Selecting the Previous Difference menu item results in the display data being changed to the location of the previous data mismatch. This is extremely valuable in experiments that require comparison of long sets of data.

One simple click of the mouse allows the user to find a needle in a haystack!

Once a Clear command is issued, GageBit® removes the highlights from the mismatched words and the Previous Difference menu item and the Previous button are grayed out.

Action: Sync Scroll

Selecting the Sync Scroll item in the Action menu has the same effect as clicking on the Sync Scroll button.

Sync Scroll is automatically selected when a comparison is performed using a Compare command.

Selecting the Sync Scroll menu item results in simultaneous scrolling of data in the Digital Input and Digital Output windows. This is very useful when data is being compared visually, or when data mismatches resulting from a Compare command are being inspected.

Action: Input to Output

Selecting the Input to Output item in the Action menu has the same effect as clicking on the Move Input to Output button.

Selecting the Input to Output menu item results in a seamless transfer of data that is currently being displayed in the Digital Input window, to the Digital Output window.

If the record length of the dataset in Digital Input window is longer than what the Digital Output CompuGen card can handle, GageBit® only transfers the number of points the CompuGen has a capacity for.

For example, if the Digital Input window has 77,000,000 words, but the Digital Output CompuGen can only handle 8,000,000 words, GageBit® will transfer only 8,000,000 words.

Control Buttons

Generate Button

Selecting the Generate button has the same effect as selecting the Generate menu item in the Action menu.

The data loaded in the CompuGen hardware is output over the output connectors based on the trigger conditions selected.

It is important to note that the Generate command simply tells the hardware to start looking for a trigger and data is output only once a valid trigger has been received.

Sync Scroll Button

Selecting the Sync Scroll button has the same effect as selecting the Sync Scroll item in the Action menu.

Sync Scroll is automatically selected when a comparison is performed using a Compare command.

Selecting the Sync Scroll menu item results in simultaneous scrolling of data in the Digital Input and Digital Output windows. This is very useful when data is being compared visually, or when data mismatches resulting from a Compare command are being inspected.

Generate and Capture Button

Selecting the Generate and Capture button has the same effect as selecting the Generate and Capture item in the Action menu.

First, the CompuScope card in the system is armed for a trigger and then the data loaded in the CompuGen hardware is output over the output connectors based on the trigger conditions selected.

It is important to note that the Generate command simply tells the hardware to start looking for a trigger and data is output only once a valid trigger has been received.

It is also important to note that the Capture command simply tells the CompuScope hardware to start looking for a trigger and then capture pre- and post-trigger data based on the settings in the Setup Input Dialog Box.

Manual Trigger Button

Selecting the Manual Trigger button has the same effect as selecting the Manual Trigger item in the Action menu.

The only time this item is available for use is when the CompuScope card has been armed and is waiting for a manual trigger. At all other times, this menu item, and the corresponding button, is grayed out.

Capture Button

Selecting the Capture button has the same effect as selecting the Capture item in the Action menu.

The CompuScope card in the system is armed for a trigger.

It is important to note that the Capture command simply tells the CompuScope hardware to start looking for a trigger and then capture pre- and post-trigger data based on the settings in the Setup Input Dialog Box.

Setup Output Button

Setup Output command brings the user into the Setup Output dialog box.

All parameters that need to be set up for proper operation of a digital output CompuGen card are available in this dialog box.

For more details on the specific controls in this dialog box, please refer to the section *Setup Digital Output Dialog Box*.

Next Button

Selecting the Next button has the same effect as selecting the Next Difference item in the Action menu.

Both the Next Difference menu item and the Next button do not appear until a comparison is done and resulting data mismatches are highlighted.

Selecting the Next Difference menu item results in the display data being changed to the location of the next data mismatch. This is extremely valuable in experiments that require comparison of long sets of data.

One simple click of the mouse allows the user to find a needle in a haystack!

Once a Clear command is issued, GageBit® removes the highlights from the mismatched words and the Next Difference menu item and the Next button are grayed out.

Previous Button

Selecting the Previous button has the same effect as selecting the Previous Difference item in the Action menu.

Both the Previous Difference menu item and the Previous button do not appear until a comparison is done and resulting data mismatches are highlighted.

Selecting the Previous Difference menu item results in the display data being changed to the location of the previous data mismatch. This is extremely valuable in experiments that require comparison of long sets of data.

One simple click of the mouse allows the user to find a needle in a haystack!

Once a Clear command is issued, GageBit® removes the highlights from the mismatched words and the Previous Difference menu item and the Previous button are grayed out.

Compare Button

Selecting the Compare button has the same effect as selecting the Compare item in the Action menu.

Once this command is issued, GageBit® compares the data in the Digital Output window against the data in the Digital Input window.

If the record length of the two datasets is not equal, GageBit® compares the maximum number of points that it can. For example, if the Digital Output window only has 1024 words, whereas the Digital Input window has 17,000,000 words, GageBit® will compare 1024 words only.

Comparison is performed based on parameters set in the *Compare Setting* dialog box.

For more details on Compare command, please refer to the section *Compare Command*.

Move Input to Output Button

Selecting the Move Input to Output button has the same effect as selecting the Input to Output item in the Action menu.

Selecting the Input to Output menu item results in a seamless transfer of data that is currently being displayed in the Digital Input window, to the Digital Output window.

If the record length of the dataset in Digital Input window is longer than what the Digital Output CompuGen card can handle, GageBit® only transfers the number of points the CompuGen has a capacity for.

For example, if the Digital Input window has 77,000,000 words, but the Digital Output CompuGen can only handle 8,000,000 words, GageBit® will transfer only 8,000,000 words.

Setup Input Button

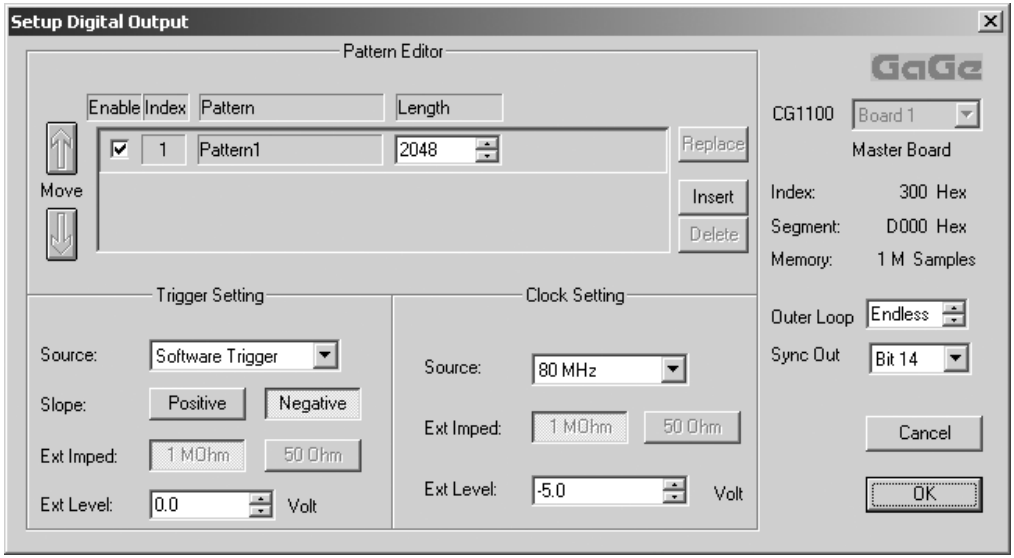
Setup Input command brings the user into the Setup Digital Input dialog box.

All parameters that need to be set up for proper operation of a digital input CompuScope card are available in this dialog box.

For more details on the specific controls in this dialog box, please refer to the section *Setup Digital Input Dialog Box*.

Setup Output Dialog Box

This dialog box is at the heart of GageBit® software design. It allows the user to simply and effectively set and control all parameters of the CompuGen hardware in use.



The dialog box is divided into the following sections:

- Pattern Editor
- Trigger Setting
- Clock Setting
- Information Section
- Looping and Sync Output Setting

Pattern Editor

This section allows the user to select the pattern that is to be output from the CompuGen card.

Move Arrows
The Move arrows on the left hand side of the Pattern Editor allow you to change the order in which multiple patterns are to be loaded in CompuGen 3250 memory.

Enable Checkbox
The Enable checkbox can be used by the user to enable or disable the pattern. It is recommended that the user not disable the pattern.

Pattern Field
The Pattern field displays the pattern number or the signal file name from which the pattern is loaded. For example, the default pattern is **Pattern 1**, which is a 32 bit counter. The user cannot directly change this field.

Length Field
Length field displays the number of 32 bit words contained in this pattern. For example, the default pattern has 2048 double-word length. User can modify this field by either typing in the desired value or by using the up and down arrows adjacent to the field. For CompuGen 3250, pattern length must be more than 8 double-words and can be set with a resolution of 2 double-words.

Replace Button
Replace button allows the user to select a different pattern for output. The choices available to the user are

Pattern Name	Description
Empty	Loads a pattern with all bit values set to zero
Sine Wave	Loads a pattern that is a digital representation of a sine wave. One full cycle of a sine wave is loaded. The cycle length is set by the pattern length specified in the Length field.
Triangle	Loads a pattern that is a digital representation of a triangular wave. One full cycle of a triangular wave is loaded. The cycle length is set by the pattern length specified in the Length field.
Square	Loads a pattern that is a digital representation of a square wave. One full cycle of a square wave is loaded. The cycle length is set by the pattern length specified in the Length field.

TTL	Loads a pattern that is a digital representation of a unipolar, TTL square wave. One full cycle of a square wave is loaded. The cycle length is set by the pattern length specified in the Length field.
Counter	Loads a counter pattern. The number of states loaded is set by the pattern length specified in the Length field. Counter always starts at zero and counts up.
Open *.sig File	Allows the user to load a *.sig file that was previously saved by either GageBit® or GageScope® software. If the length of the file is longer than what the CompuGen card can handle, only the first N words are loaded, where N is the maximum memory of the CompuGen card in the system.

By default, the first 2048 double-words of a 32 bit counter pattern are loaded into the Output Display window.

Insert Button
Insert button allows the user to insert a pre-defined pattern into the list of patterns to be output.

When the user clicks on this button, the system presents him or her with a list of patterns to select from.

Delete Button
Delete button allows the user to delete a pattern from the list of patterns to be output.

Trigger Setting

This section allows the user to set the trigger conditions under which a pattern will be output.

It should be noted that unless a trigger has been received, a pattern generator such as CompuGen 3250 shall not output any data.

Source Drop-Down Field
The Source drop-down field allows the trigger source to be selected.

The choice of trigger sources available to the user is limited by the pattern generator hardware being used. For CompuGen 3250, the choices are:

Trigger Source	Description
Software Trigger	When Software Trigger is selected as the trigger source, GageBit® will issue a trigger via software immediately after arming the CompuGen for output.
External Trigger	When External Trigger is selected as the trigger source and a Generate command is issued, CompuGen hardware will wait for the external trigger conditions to be met before outputting any data.
Manual Trigger	When Manual Trigger is selected as the trigger source and a Generate command is issued, CompuGen hardware will wait for the user to click on the Manual Trigger button before outputting any data.

Slope Buttons
The two Slope buttons, labeled Positive and Negative, allow the user to set the trigger slope for the external trigger signal.

When Positive slope is selected, the CompuGen 3250 is triggered on the rising edge of the external trigger signal.

When Negative slope is selected, the CompuGen 3250 is triggered on the falling edge of the external trigger signal.

These buttons have an effect only when External Trigger is selected as a trigger source.

Ext. Imped. Buttons
The External Impedance buttons allow the user to select the input impedance of the External Trigger signal.

The choices available are:

- 1 MΩ
- 50 Ω

Clock Setting

This section allows the user to setup the clocking system for digital pattern generation.

Source Drop-Down Field
The Source drop-down field allows the user to select the clock source and set the clock rate for internal clocking.

The following clock sources are available

Clock Source	Description
External	When External Clock is selected as a clock source, pattern generation is controlled by the clock signal connected to the External Clock input of the CompuGen 3250.
Internal Clock	A fully programmable, internal clock is included with each CompuGen 3250 card. This drop-down field allows the user to select the sample rate from the following values: 50 MHz, 25 MHz, 10 MHz, 5 MHz, 2 MHz, 1 MHz, 500 KHz, 200 KHz, 100 KHz, 50 KHz, 20 KHz, 10 KHz, 5 KHz, 2 KHz, 1 KHz, 500 Hz, 200 Hz, 100 Hz, 50 Hz, 20 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz.

Ext. Imped. Buttons
The External Impedance buttons allow the user to select the input impedance of the External Clock signal.

The choices available are:

- 1 MΩ
- 50 Ω

Ext. Level Field
The External Clock Level field is an informational field and cannot be set by the user. Due to hardware design of the CompuGen 3250, the External Clock level is set at +2.4 Volts. This value is displayed as “TTL” in this field.

Information Section

This section provides the user with information regarding the hardware being used.

In case of multi-card systems, this section also allows the user to select the CompuGen board to be controlled.

Board Number Field
The Board Number field allows the user to select the exact CompuGen board that is to be addressed with this dialog box.

In a single card system, this field is grayed out.

Index
The Index field displays the base I/O address of the selected CompuGen 3250 card.

Segment
The Segment field displays the base memory address of the selected CompuGen 3250 card.

Memory
The Memory field displays the amount of pattern memory on board the selected CompuGen 3250 card. This is the maximum pattern length that this model of CompuGen 3250 can output.

Looping and Sync Output Setting

This section allows the user to set the loop count as well as the Sync Output.

Outer Loop Field
The Outer Loop field allows the user to set the loop count for the pattern loaded in the Pattern Editor section.

The following choices are available:

Loop Count	Description
Endless	When Endless looping is selected, the pattern is repeated endlessly. The pattern generation would stop only if the user presses the **Stop** button.
Multi-Shot	User can select the loop count to be any integer between 1 and 65536

Sync Out Field
The Sync Output field allows the user to select the source of the Sync signal that will be output by the CompuGen card.

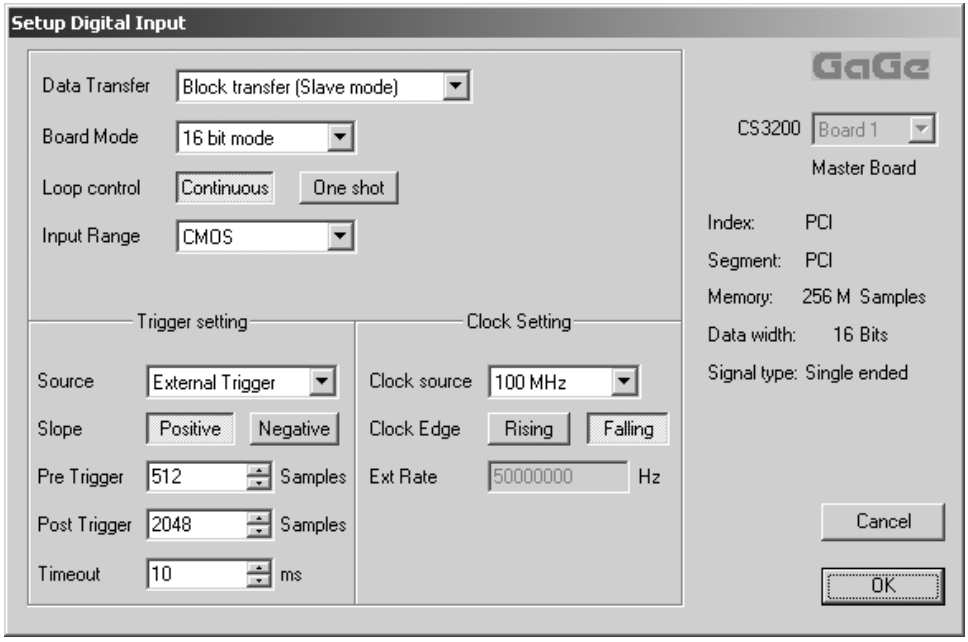
The following choices are available:

Sync. Source	Description
Bit 31	Bit 31 of the 32 bit pattern is output from the Sync. Out connector of the CompuGen 3250. This allows the user to set the exact pattern that is to be output. Sync Output is very useful in applications that require a single, programmable digital output signal.
Trigger	When Trigger is selected as the source for the Sync Output, CompuGen 3250 routes the internally synchronized trigger signal to the Sync Output.

	Note that the Sync output may lag behind the internal or external trigger received by the CompuGen, by a few clock cycles. The lag is not deterministic, so this output should not be used as a precise indication of the occurrence of a trigger event.

Setup Input Dialog Box

This dialog box is at the heart of GageBit® software design. It allows the user to simply and effectively set and control all parameters of the CompuScope hardware in use.



The dialog box is divided into the following sections:

- Input and Data Transfer Control
- Trigger Setting
- Clock Setting
- Information Section

Data Transfer and Input Control

This section allows the user to set input controls and select the method to be used for transferring data from the on-board acquisition memory of the CompuScope card to the PC memory.

Data Transfer Drop-Down Field
The Data Transfer drop-down field allows the user to select the method to be used when transferring data from on-board acquisition memory to PC memory.

The following choices are available:

Transfer Method	Description
Memory Read	This method results in the slowest transfer rates, since data is transferred one word at a time. For each word, the software has to make a separate Windows driver call, so the overhead of a Windows driver call is added to the time it takes to read each word. This selection has been included so that the user can compare the transfer speeds between this and the other methods.
Block Transfer (Slave Mode)	This method uses a block transfer to increase the transfer rate. Only one Windows driver call is made for the entire block, making the transfer rate faster than Memory Read. However, the transfer is still CPU mediated, so the optimum PCI bus transfer rate is not achieved.
Block Transfer (Bus Mastering)	This method uses a scatter-gather bus mastering DMA mechanism to transfer data from the on-board CompuScope memory to the Windows buffer allocated by GageBit®. Naturally, this results in the fastest possible transfer rate.

Board Mode Drop-Down Field
The Board Mode drop-down field allows the user to set the input word width of the CompuScope 3200.

The following choices are available:

- 8 bit
- 16 bit
- 32 bit

Loop Control Buttons
The Loop Control buttons allow the user to set the CompuScope 3200 to capture in one-shot or Continuous mode.

Input Range Drop-Down Field
The Input Range allows the user to set the inputs to a particular logic family.

The following choices are available:

- TTL
- CMOS

It is recommended that the user leave this selection as CMOS.

Trigger Setting

This section allows the user to set the trigger conditions under which a pattern will be acquired.

Source Drop-Down Field
The Source drop-down field allows the trigger source to be selected.

The choice of trigger sources available to the user is limited by the acquisition card being used. For CompuScope 3200, the choices are:

Trigger Source	Description
Software Trigger	When Software Trigger is selected as the trigger source, GageBit® will issue a trigger via software immediately after arming the CompuScope.
External Trigger	When External Trigger is selected as the trigger source and a Capture command is issued, CompuScope hardware will wait for the external trigger conditions to be met before starting to count down the post-trigger words being captured. It should be noted that CompuScope hardware keeps on acquiring pre-trigger data in between the time the card is armed and when a trigger event occurs.
Manual Trigger	When Manual Trigger is selected as the trigger source and a Capture command is issued, CompuScope hardware will wait for the user to click on the Manual Trigger button before starting to count down the post-trigger words being captured. It should be noted that CompuScope hardware keeps on acquiring pre-trigger data in between the time the card is armed and when a trigger event occurs.

Slope Buttons
The two Slope buttons, labeled Positive and Negative, allow the user to set the trigger slope for the external trigger signal.

When Positive slope is selected, the CompuGen 3200 is triggered on the rising edge of the external trigger signal.

When Negative slope is selected, the CompuGen 3200 is triggered on the falling edge of the external trigger signal.

These buttons have an effect only when External Trigger is selected as a trigger source.

Pre-Trigger Field
The Pre-Trigger field allows the user to set the minimum number of pre-trigger words that must be captured during this acquisition.

For the CompuScope 3200, pre-trigger can be set to any integer value between 0 and the maximum memory depth.

Post-Trigger Field
The Post-Trigger field allows the user to set the number of words to be acquired after a trigger event has been detected.

CompuScope hardware counts down from this value down to zero and then causes the acquisition to stop.

Timeout Field
The Timeout field allows the user to select whether or not to set a specific timeout for the trigger.

The following choices are available:

- No Timeout
- Timeout Value in milliseconds

GageBit® waits for the timeout specified and, if a trigger event has not yet occurred, issues a software trigger for the CompuScope.

Clock Setting

This section allows the user to setup the clocking system for digital pattern acquisition.

Clock Source Drop-Down Field
The Source drop-down field allows the user to select the clock source and set the clock rate for internal clocking.

The following clock sources are available

Clock Source	Description
External	When External Clock is selected as a clock source, pattern acquisition is controlled by the clock signal connected to the External Clock input of the CompuGen 3200.
Internal Clock	A fully programmable, internal clock is included with each CompuGen 3200 card. This drop-down field allows the user to select the sample rate from the following values: 100 MHz, 50 MHz, 25 MHz, 10 MHz, 5 MHz, 2 MHz, 1 MHz, 500 KHz.

Clock Edge Buttons
The two Clock Edge buttons, labeled Rising and Falling, allow the user to select the specific edge of the external clock signal that will cause new data to be output from the CompuScope.

When Rising edge is selected, the CompuGen 3200 outputs new data on the rising edge of the external clock signal.

When Falling edge is selected, the CompuGen 3200 outputs new data on the falling edge of the external clock signal.

These buttons have an effect only when External Clock is selected as a clock source.

Ext Rate Field
The Ext Rate field allows the user to provide GageBit® with the lower limit of the frequency of the external clock being supplied to the CompuScope 3200.

This information is needed by GageBit® to ensure that software timing pulses created for arming and aborting the CompuScope 3200 are at least one clock cycle wide.

The value of having this frequency information increases as the clock frequency decreases. For example, if the external clock frequency is in the 50 to 100 MHz range, the natural delay between two successive software commands is sufficient to guarantee that the width of a software-generated pulse will be greater than one clock cycle (10 to 20 nanoseconds).

If, on the other hand, the external clock frequency is in the 100 KHz range, deliberate delays would have to be inserted between software commands that generate the initialization pulses.

It should be noted that GageBit® does not need the exact frequency of the external clock. As long as the frequency entered in this field is lower than the lowest expected clock frequency, GageBit® will be able to successfully arm the CompuScope card.

Entering a frequency number much lower than the actual frequency does not affect the acquisition in any way. The only impact is seen at the start of the acquisition, when the acquisition takes at least 16 clock cycles of the frequency entered in this field.

Information Section

This section provides the user with information regarding the hardware being used.

In case of multi-card systems, this section also allows the user to select the CompuScope board to be controlled.

Board Number Field
The Board Number field allows the user to select the exact CompuScope board that is to be addressed with this dialog box.

In a single card system, this field is grayed out.

Index
The Index field displays the base I/O address of the selected CompuScope 3200 card. This should always be "PCI"

Segment
The Segment field displays the base memory address of the selected CompuScope 3200 card. This should always be "PCI"

Memory
The Memory field displays the amount of pattern memory on board the selected CompuScope 3200 card. This is the maximum pattern length that this model of CompuScope 3200 can store with a word width selected in the **Board Mode** field.

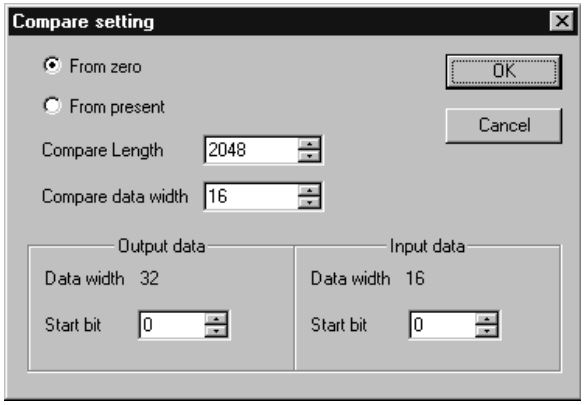
Data Width
The Data Width field displays the word width selected in the **Board Mode** field.

Signal Type
The Signal Type field displays the type of input this model of CompuScope 3200 can handle. Different models of CompuScope 3200 can handle either single-ended CMOS/TTL or differential ECL signals.

Compare Setting Dialog Box

This dialog box allows the user to set all of the parameters required for comparing data in the Digital Output window against that in the Digital Input window.

Such comparison capability saves enormous amounts of time and lets the user handle complex digital design and troubleshooting applications.



The following five settings can be specified in this dialog box:

- Compare Start Point
- Compare Length
- Compare Data Width
- Output Data Compare Bit Selection
- Input Data Compare Bit Selection

Compare Start Point
This control is in the shape of two radio buttons.

The two choices are:

Start Point	Description
From Zero	When selected, comparison starts from address zero of both the input and the output pattern.
From Present	When selected, comparison starts from the addresses that are at the start of the pattern displayed on the screen. This selection provides the user with the ability to do cross correlation of digital data sets.

Compare Length Field
The Compare Length field specifies the number of words that will be compared, starting from the Start Point specified.

The minimum length is 1 and the maximum length is the lesser of the Input and Output pattern lengths.

Compare Data Width
The Compare Data Width field specifies the number of bits in each word that have to be compared.

This allows for specific bit patterns in the data to be compared.

The minimum word width is 1 and the maximum is the lesser of the Input and Output word widths.

Output Data Word Width
This field displays the width of the output data. For CompuGen 3250, this is fixed at 32.

Output Data Start Bit
If less than the full word width is being compared, this field specifies the bit in the Output data from which the comparison should be started.

Input Data Word Width
This field displays the width of the Input data. For CompuGen 3200, this can be 8, 16 or 32.

This field is for informational purposes only and cannot be modified by the user.

Input Data Start Bit
If less than the full word width is being compared, this field specifies the bit in the Input data from which the comparison should be started.

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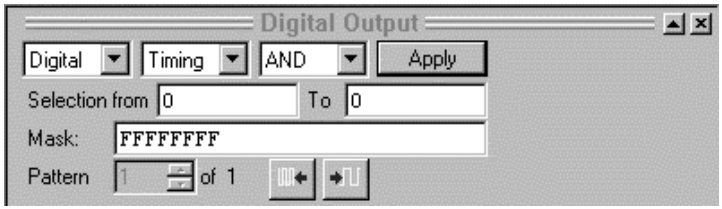
Digital Output Controls

Digital Output controls allow the user to manipulate the data in the Digital Output window.

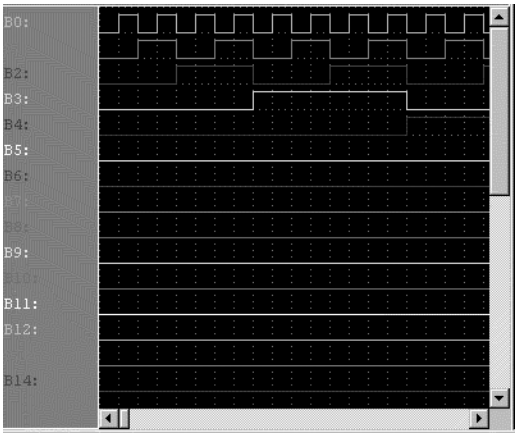


The following controls are available:

- Display Method
- Horizontal Scaling
- Block Selection
- Masking Pattern
- Logical Operator
- Timebase Control
- List Display Control
- Pattern Selector

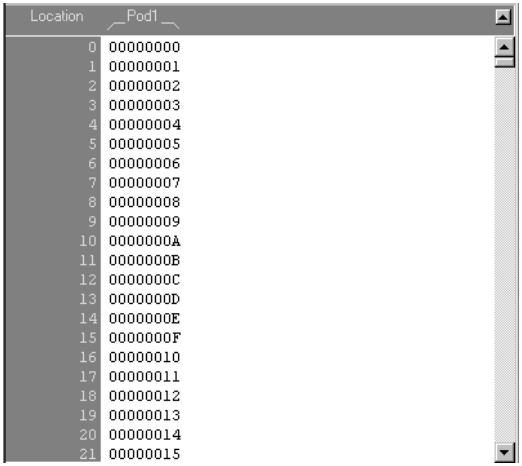
Display Method Drop-Down Field
The user can select one of two display methods:

Digital



Digital display provides a graphical representation of data on the screen. A state or timing diagram is displayed for each of the bits in the pattern.

List



A List display provides a non-graphical list of data on the screen. Scroll bars allow the user to navigate to different parts of the data.

Horizontal Scaling
Horizontal scaling is available when the Digital (graphical) display method is selected.

The following choices are available:

- Timing
  Data is displayed with horizontal scale in time per division, e.g. 20 ns/div.

- State
  Data is displayed with horizontal scale in number of points per division, e.g. 1 Pts/div.

Block Selection
GageBit® allows the user to select a specific block of data for logical manipulation.

There are two methods of selecting this block:

- Using **Selection From** and **To** fields.
  The user can enter the start and end addresses of the data block that should be selected in the **Selection From** and **To** fields.
- Click and Drag in List Mode
  The user can simply click and drag the mouse starting from one end of the block to the other. Using this method, the user can also select partial words, e.g. only the third nibble of the 32 bit word.

Masking Pattern
To maximize the flexibility of data manipulation, the user is also allowed to specify a mask that can control exactly which bits in the pattern are to be manipulated.

For example, if only bits 4 through 7 need to be filled with 0's in the specified block, the mask should be set to FFFFFF0F and then a logical AND should be performed.

Logical Operator
A number of logical operators are available to make it easier to manipulate the data.

These operators are described in the following table:

Operator	Description
AND	Performs a logical AND between the data block selected and the specified mask.
OR	Performs a logical OR between the data block selected and the specified mask.
NOT	Logically inverts the data in the specified data block. The specified Masking Pattern has no effect.
XOR	Performs a logical XOR between the data block selected and the specified mask.
FILL	Fills the data in the specified data block with the Masking pattern.
SHL	Shifts the selected data left by the number of bits specified in the Masking Pattern.
SHR	Shifts the selected data right by the number of bits specified in the Masking Pattern.
Counter	Fills the data block with a counter pattern. Masking Pattern specifies the starting value of the counter pattern.

Timebase Control
In the Digital display mode, two buttons are provided to increase or decrease the timebase.

Clicking on the button on the left causes the timebase to increase, e.g. change from 20 ns/div to 40 ns/div.

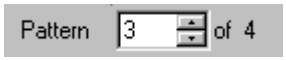
Clicking on the button on the right causes the timebase to decrease, e.g. change from 40 ns/div to 20 ns/div.

List Display Control
In the List display mode, a drop-down field is provided that allows the user to set the display pattern.

The following choices are available:

Display Pattern	Description
DWORD	Displays data as a 32 bit double-word in hexadecimal numbers.
WORD	Displays data as two 16 bit words in hexadecimal numbers.
BYTE	Displays data as four 8 bit bytes in hexadecimal numbers.
BINARY	Displays data as a 32 bit word in binary numbers.
DECIMAL	Displays data as a pattern of decimal numbers.

Pattern Selector
If the user has defined more than one pattern, the Pattern Selector Control becomes active. If only one pattern has been defined, the Pattern Selector Control is grayed out.



Use the Up and Down arrow keys to select a pattern. Once selected, the pattern can be edited in the Signal Output Window.

Multiple Pattern Output

It is possible to simultaneously load many patterns into a CompuGen 3250 card and have them output as one consecutive stream. GageBit® fully supports this hardware feature.

New patterns may be inserted, deleted and reordered by using the buttons in the Setup Output dialog box. When the dialog box is dismissed, each of the patterns that are marked as "enabled" is loaded onto the memory of the CompuGen 3250 card.

Each enabled pattern is loaded once and the resultant data in the memory of the generator card will contain all the enabled patterns in the order that they are listed in the Setup Output dialog box.

When multiple patterns are available, the Pattern Selector Control in the Signal Output Controls area becomes active and it is possible to scroll through each pattern.

ASC2GS Utility

ASC2GS is a utility that can be used to convert single column ASCII files into GageScope® format SIG files. Such a SIG file can then be loaded into GageBit® for generation by a CompuGen 3250.

ASC2GS utility is automatically copied onto your machine when you install CompuGen Windows Drivers. This file typically resides in the following folders:

For Windows 95/98/ME machines:

C:\GAGE\CompuGen Win 95 98 Drivers\Executable Sample Programs

For Windows NT machines:

C:\GAGE\CompuGen Win NT Drivers\Executable Sample Programs

The user must specify the **/32** command line option when generating a 32 bit data file for use with CompuGen 3250. This is also documented in the ASC2GS.TXT file that accompanies this utility.

This utility allows GageBit® to use even the most complex digital patterns, as long as they exist in ASCII format.

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