GaGe

CompuGen SDK for LabVIEW for Win 95/98 and Win NT

CompuGen Driver Version 1.23+

For LabVIEW 5.0+

P/N: 0045027
Reorder #: MKT-SWM-CGLV2
0404

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Preface

This manual is meant to serve as an aid to engineers using the CompuGen series of high speed data generation cards in the LabVIEW 5.0+ for Windows environment.

Given the nature of LabVIEW programming, this manual describes only the high level VI's and how they can be used within a larger VI. Low level programming is not covered in this manual. If you need information on DLL level programming of CompuGen products, please purchase the CompuGen Windows SDK.

Please note that this manual is not intended as a reference for any software other than the CompuGen 1100, T30 and 3250 ISA SDK for LabVIEW for Win 95 98 and NT.

If you did not receive the correct manual, please contact the factory for a replacement.

It is assumed that the reader is familiar with using PCs, MS-DOS, Windows and ISA cards. No description is included for these topics. If you are not comfortable with these areas, it is strongly recommended that you refer to guides such as the IBM PC AT reference manual before starting.

Throughout this manual, it is assumed that you are familiar with the LabVIEW graphical programming environment. If you do not feel comfortable with LabVIEW, it is highly recommended that you go through the "G Programming Reference Manual" supplied to you by National Instruments, before starting any program development for the CompuGen cards.

To maintain the accuracy of the information contained herein, we reserve the right to make changes to this manual from time to time.

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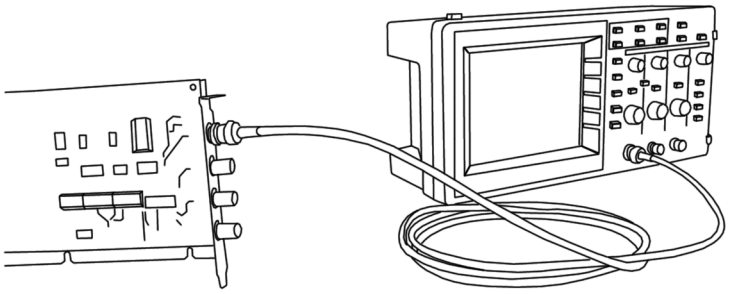
Chapter 1: Running Your First CompuGen Sample Virtual Instrument - CgSample.vi

In this chapter we will show you step by step instructions on how to run the **CgSample.vi** that is provided with **CompuGen 1100 ISA SDK for LabVIEW for Win 95 98 Nt**.
For this tutorial we are assuming that you are using CompuGen 1100.

To run this sample program your CompuGen hardware and software should be properly installed (Please refer to CG1100 Hardware Manual and Installation Guide).

Now connect the BNC cable to the output on CG1100 to one of the channels of an oscilloscope.

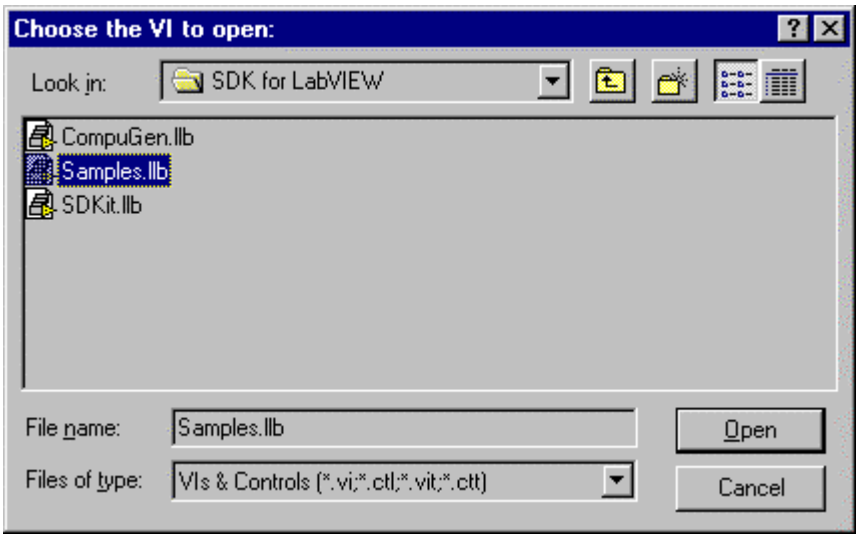


Remember, the output expects a 50 Ohm termination at the end of the co-axial cable. If it is not there, the output voltage is doubled (i.e. +/- 1 Volt range outputs +/- 2 Volt signal). This is normal behavior for an unterminated transmission line.

To run **CgSample.vi** follow the following steps:-

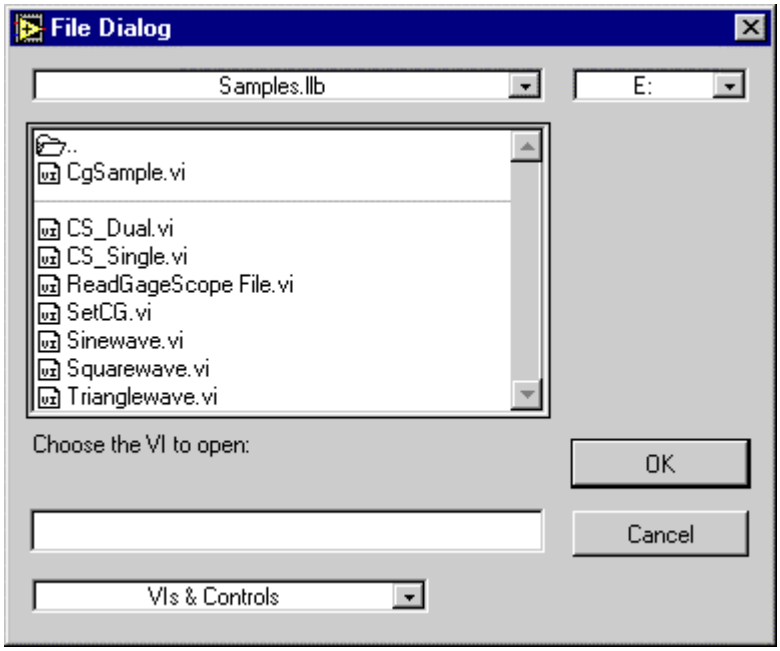
1. Run LabVIEW.

2. Open **Samples.llb** which resides in the **C:\Gage\CompuGen1100 ISA SDK for Win 95 98\SDK for LabVIEW** folder.



Select **Samples.llb** then double click on **Sample.llb** or click on 

3. You will see the following **File Dialog** window.

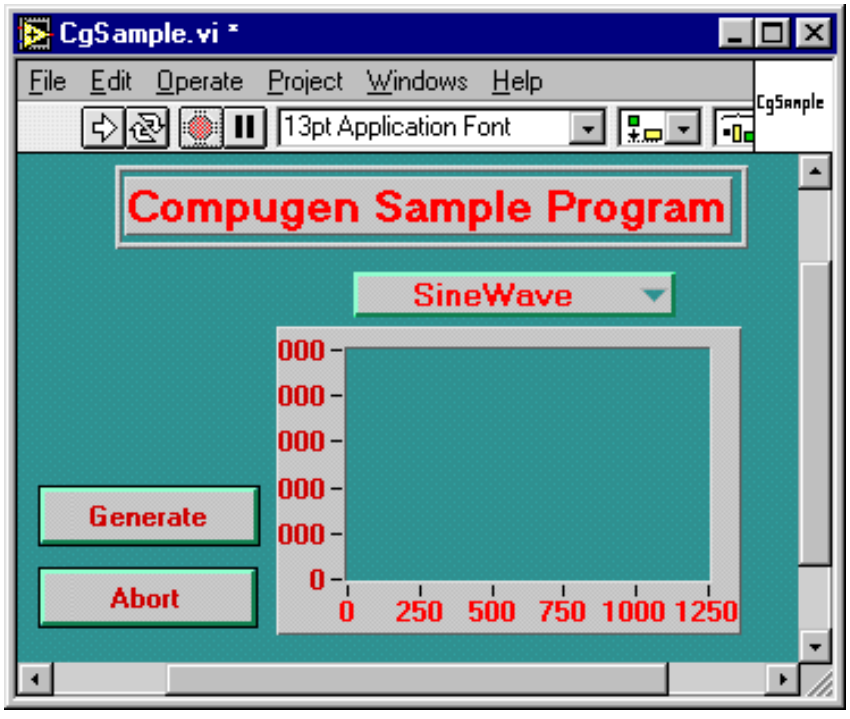


Where,

CgSample.vi	Main sample program VI.
CS_Dual.vi	Used by **ReadGageScope File.vi**
CS_Single.vi	Used by **ReadGageScope File.vi**
ReadGageScope File.vi	Creates and Scales the pattern captured by GageScope signal file.
Sinewave.vi	Creates and Scales the Sine wave pattern for CompuGen 1100.
Squarewave.vi	Creates and Scales the Square wave pattern for CompuGen 1100.
Trianglewave.vi	Creates and Scales the Triangle wave pattern for CompuGen 1100.

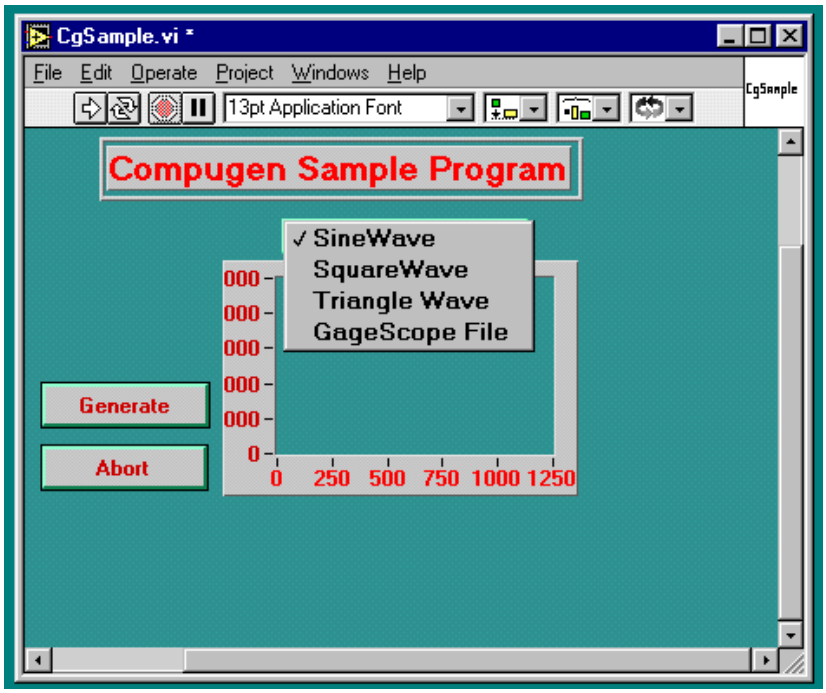
Select **CgSample.vi** and click on 

4. The following window will appear on the screen.



Click on  or from main menu select Operate → Run.

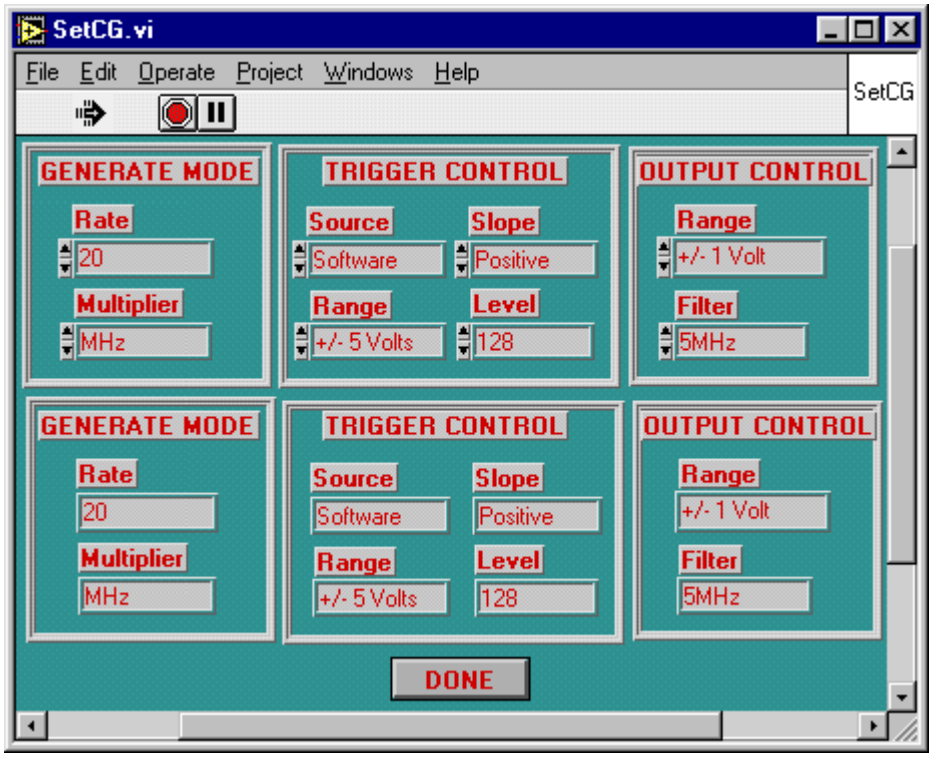
The default pattern is **SineWave**. Other available patterns are **SquareWave, TriangleWave or GageScope File,** as shown below.



Keep the default pattern **SineWave**. Click on 

to load and generate the pattern.

The following window will appear.



Where,

` **GENERATE MODE:**

Rate and **Multiplier** are combined to create the sample rate.

TRIGGER CONTROL:

Source	Trigger source..
Range	Trigger Range.
Slope	Trigger slope.
Level	Trigger level.

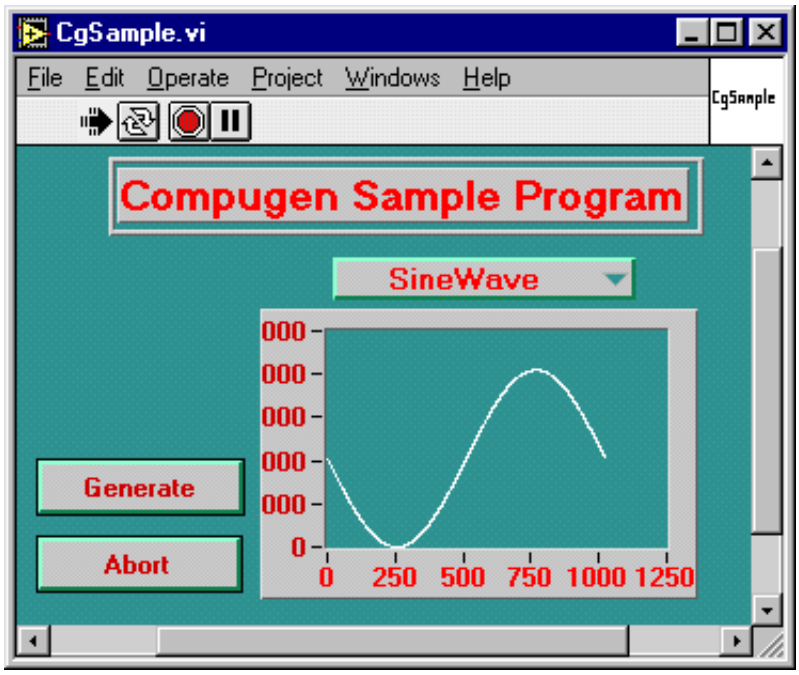
OUTPUT CONTROL:

Range	Output range.
Filter	Output filter on 1100.

Values allowed for the above mentioned parameters are described in the following chapters.

Keep the default settings and then click on 

You will see the following:



You will also see the corresponding sine wave on an oscilloscope. For CompuGen 1100 the output frequency will be the sample rate divided by the number of points. Since we have selected the default sample rate which is 20 MHz and the number of points are 1024, the output frequency will be as follows:

Output frequency = Sample Rate / Number of points
= 20,000,000 / 1024
= 19.531 KHz.

Click 

to stop generating the pattern and it also ends the sample program.

5. To load another pattern for example a **SquareWave,** repeat step 4 and instead of **SineWave** select **SquareWave**.

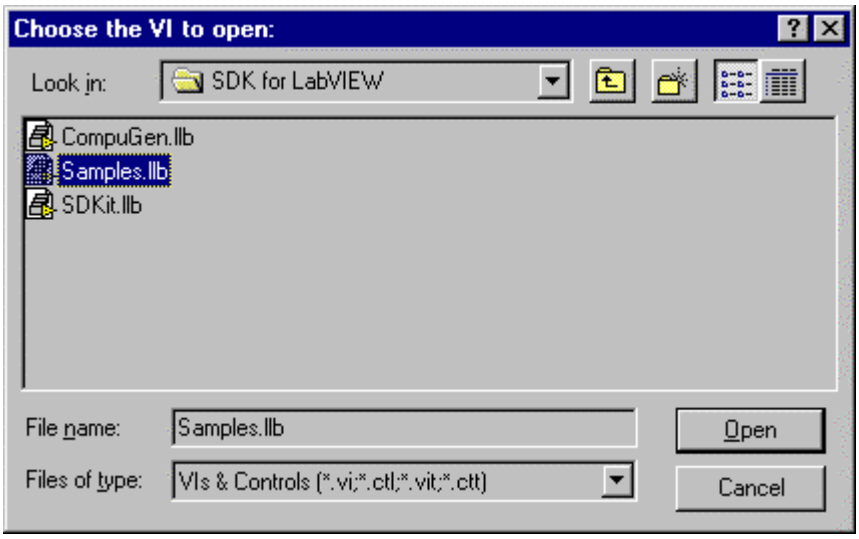
Chapter 2: Introduction to CompuGen Sample Virtual Instruments and Sub Virtual Instruments

In this chapter we will explain all the VIs and sub VIs of **CompuGen.llb** that is provided with **CompuGen 1100 ISA SDK for LabVIEW for Windows 95 98**. We will also explain the various CompuGen board parameters and also the differences between the CompuGen 1100, T30 and 3250.

To open **Gage CompuGen.vi** follow the following steps:-

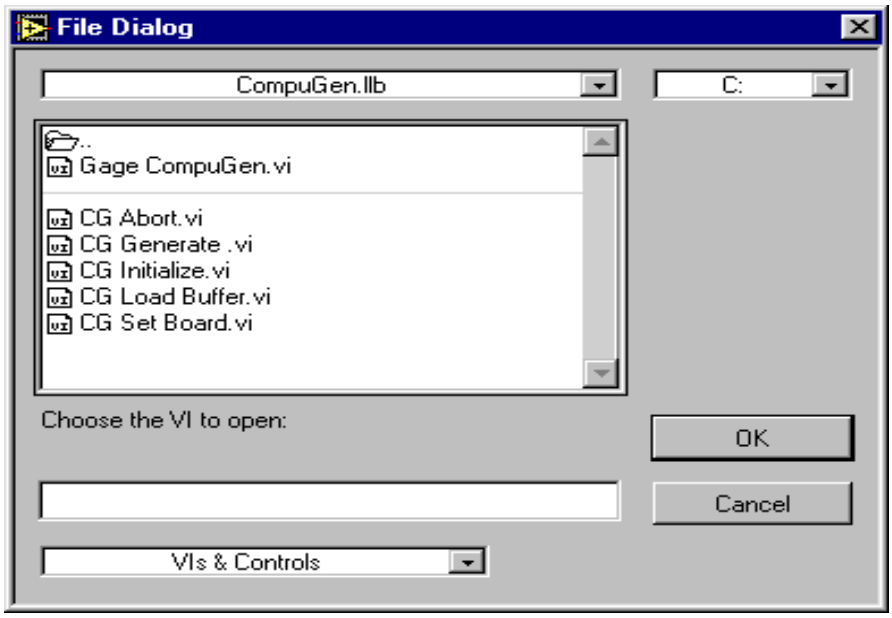
1. Run LabVIEW.

2. Open **CompuGen.llb** which resides in the **C:\Gage\CompuGen1100 ISA SDK for Win 95 98\SDK for LabVIEW** folder.



Select **CompuGen.llb** then double click on **CompuGen.llb** or click on 

3. You will see the following **File Dialog** window.



Where,

Gage CompuGen.vi Main sample program VI. The various input/output controls are described in the next step.

CG Abort.vi Used to abort the current generated pattern, primarily when the CompuGen is in continuous mode.

CG Generate.vi It sets the CompuGen hardware to allow data generation as soon as a trigger has been received.

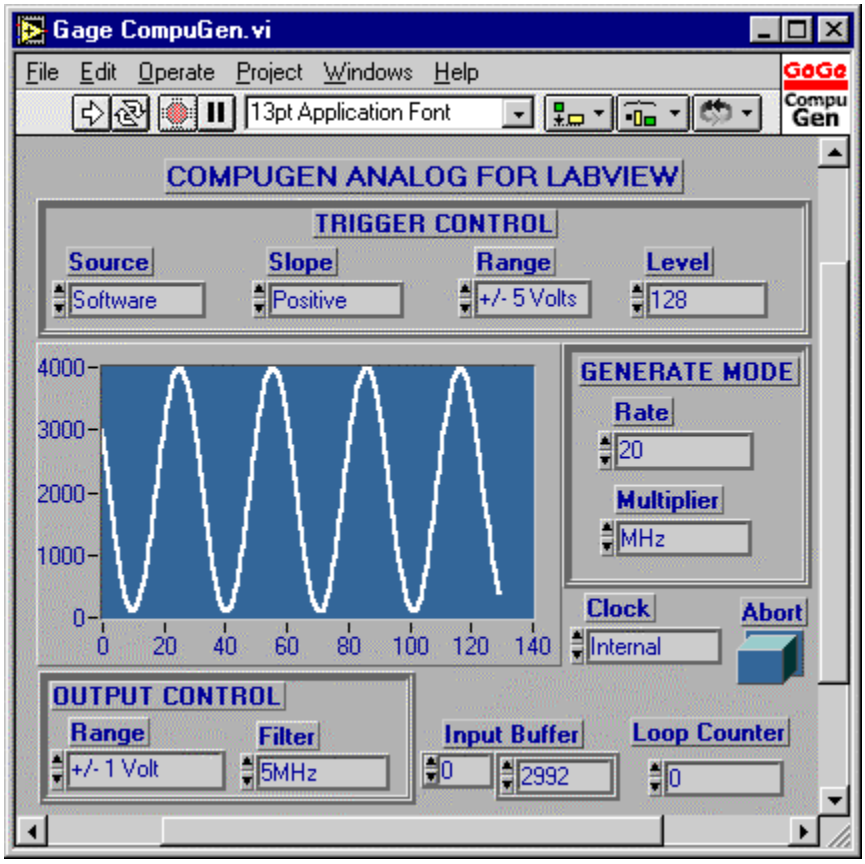
CG Initialize.vi Initializes the CompuGen board and the driver.

CG load Buffer.vi Loads the CompuGen internal buffer with the data passed to it.

CG Set Board.vi Sets up the various CompuGen boards parameters discussed in the next step.

Select **Gage CompuGen.vi** and click on 

4. The following window will appear on the screen.



Where,

Parameters	Description	Allowed Values.
Source	Sets the trigger source.	Software (1) External (0)
Slope	Sets the trigger slope.	Positive (0) Negative (1)
Range (Trigger Control)	Determines the range of the external trigger. The **Range** parameter has no effect if the trigger source is set to external.	+/- 5 Volts (0)
Level	Trigger level. This **Level** parameter has no effect if the trigger **Source** is set to software. The CompuGen T30 and 3250 has only a TTL range for external trigger. This parameter makes no difference on CompuGen T30 and 3250.	Any value between 0 and 255, with 0 equal to the lowest voltage in the current trigger range and 255 equal to the highest voltage in the current trigger range.
Rate	The **Rate** to use for the sample rate. It is combined with **Multiplier** to form the sample rate.	1, 2, 5, 10, 20, 40, 50, 80,100, 200, 500 80 MHz is valid only for CG1100.
Multiplier	The sample rate **Multiplier** to use. It is combined with **Rate** to form the sample rate.	MHz, KHz, Hz
Range (Output Control)	Sets the gain of the generated signal. The CompuGen T30 and 3250 has only TTL.	+/- 5 Volts (0) +/- 2 Volts (1) +/- 1 Volts (2) +/- 500 mVolts (3) +/- 200 mVolts (4) +/- 100 mVolts (5)
Filter	Controls which analog **Filter** is used. The filter values has no effect on CompuGen T30 and 3250.	20 MHz (1) No Filter (0) 5 MHz (3)

Parameters	Description	Allowed Values.
Clock	Defines what is the clock source.	External (0) Software (1) Internal (2)
Abort	Stops generating the pattern.	N/A
Input Buffer	The CompuGen 1100 uses a uInt16 buffer to load the pattern onto the on-board memory. The CompuGen T30 and 3250 use a 32 bit buffer.	The CG1100 expects a buffer with values ranging from 0 to 4095. A 0 value represents the highest voltage in the current output range. A value of 4095 represents the lowest voltage in the current output range. The CompuGen T30 and 3250 use a 32 bit buffer.
Loop Counter	The **Loop Counter** is used to tell the driver how many times to generate the current pattern before stopping. A value of 0 means continuous.	Any value between 0 and 65535.

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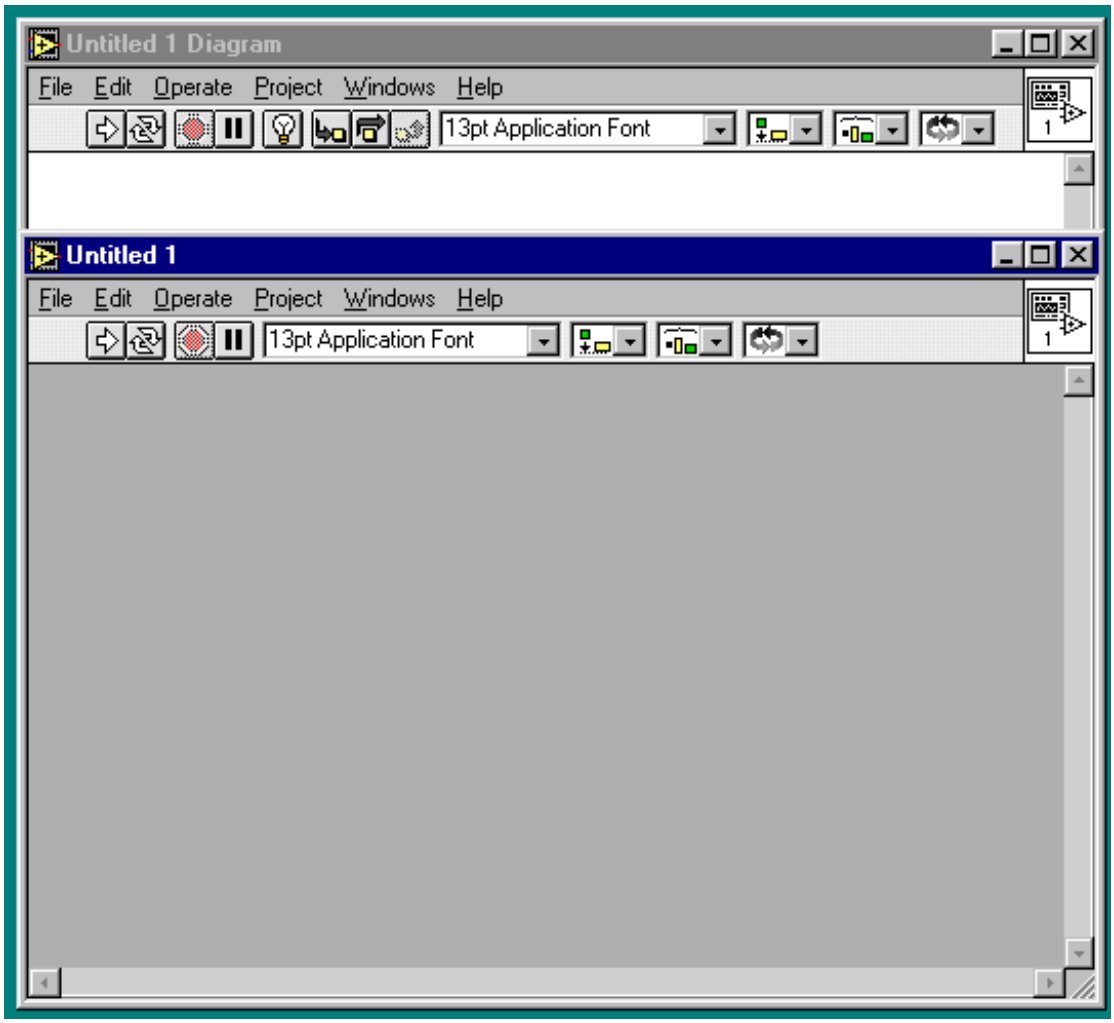
Chapter 3: Creating Your First CompuGen Sample Virtual Instrument

Creating SIMPLE.VI

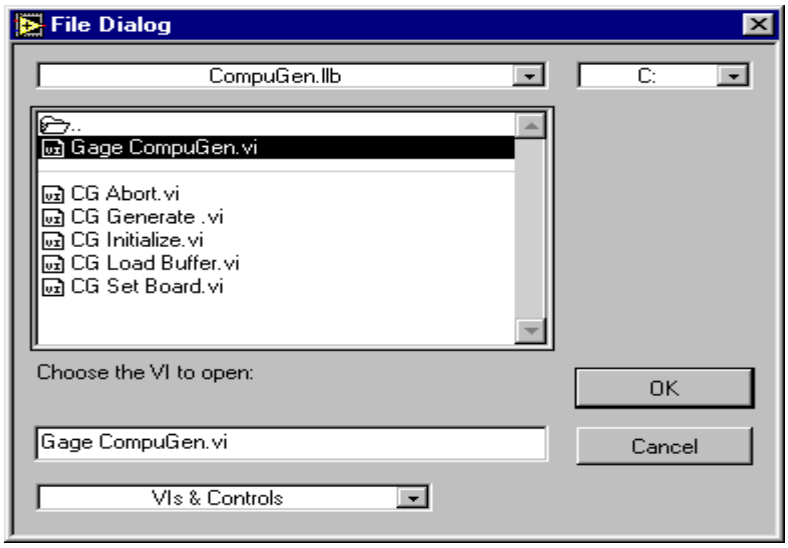
To create your own VI using **Gage CompuGen.vi** and one of the sample patterns from **Samples.llb**, please follow the following steps:

Run LabVIEW

Open a new vi, you will see the following windows **Untitled 1 Diagram** and **Untitled 1** on your screen.

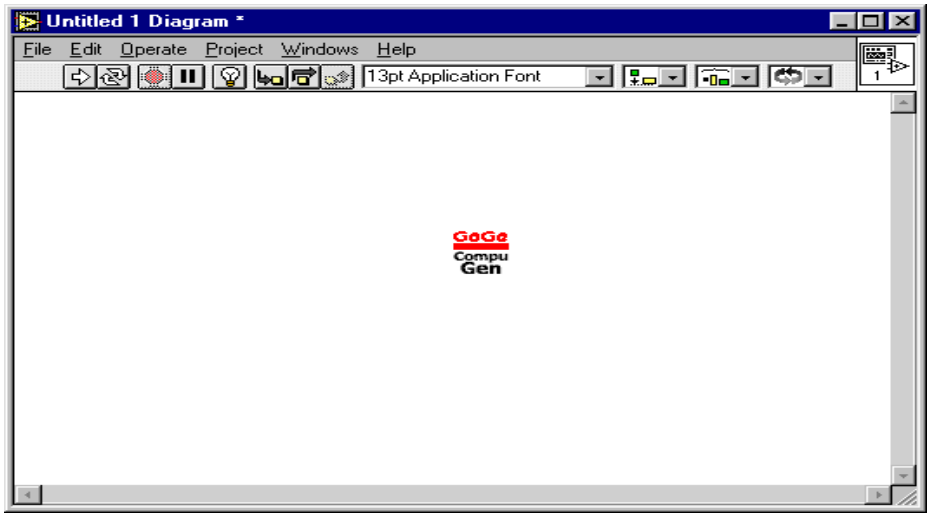


Select **Untitled 1 Diagram** window and from the **Functions Palette** click on **Select a VI**. Select **Gage CompuGen.vi** which is the sub vi of **CompuGen.llb** in the directory **C:\Gage\CompuGen1100 ISA SDK for Win 95 98\SDK for LabVIEW** as shown below.

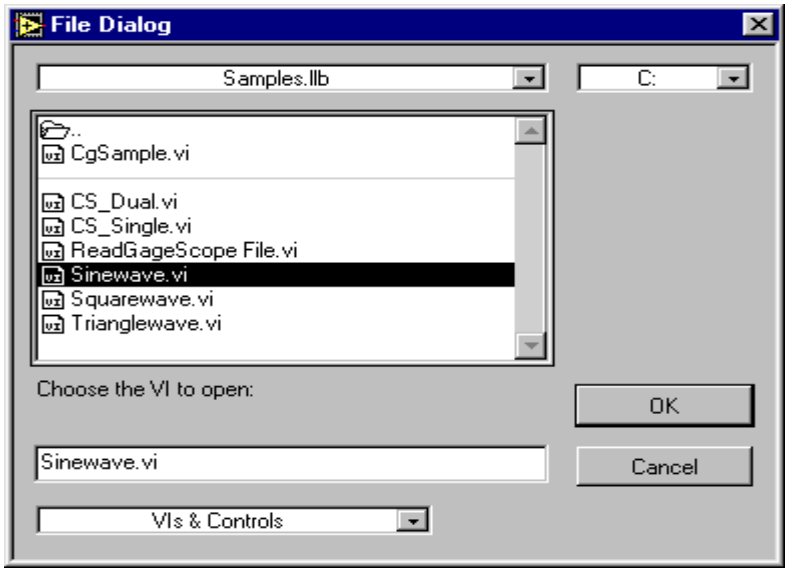


Click 

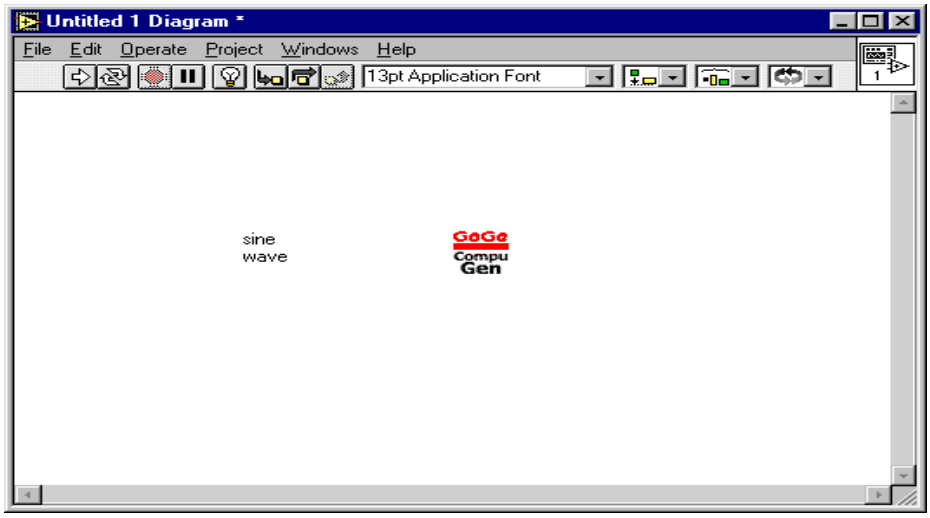
Now place the selected **Gage CompuGen.vi** in the **Untitled 1 Diagram** panel as shown below.



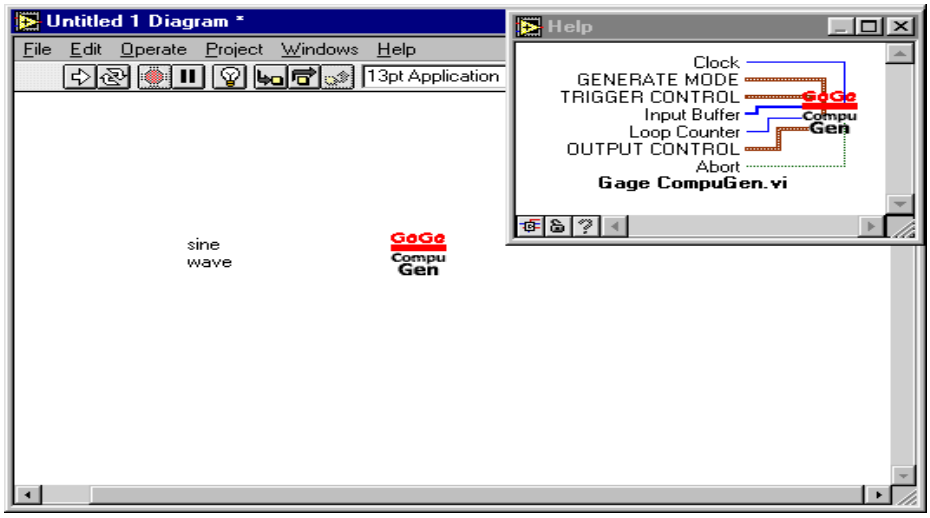
Next. select **Sinewave.vi** which is the sub vi of **Samples.llb** in the directory **C:\Gage\CompuGen1100 ISA SDK for Win 95 98\SDK for LabVIEW** as shown below.



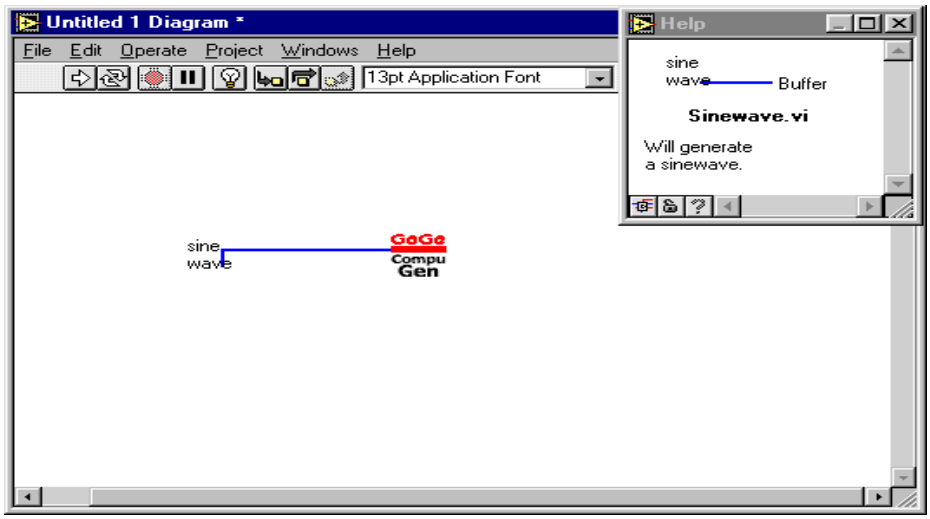
Now place the selected **Sinewave.vi** in the **Untitled 1 Diagram** panel as shown below.



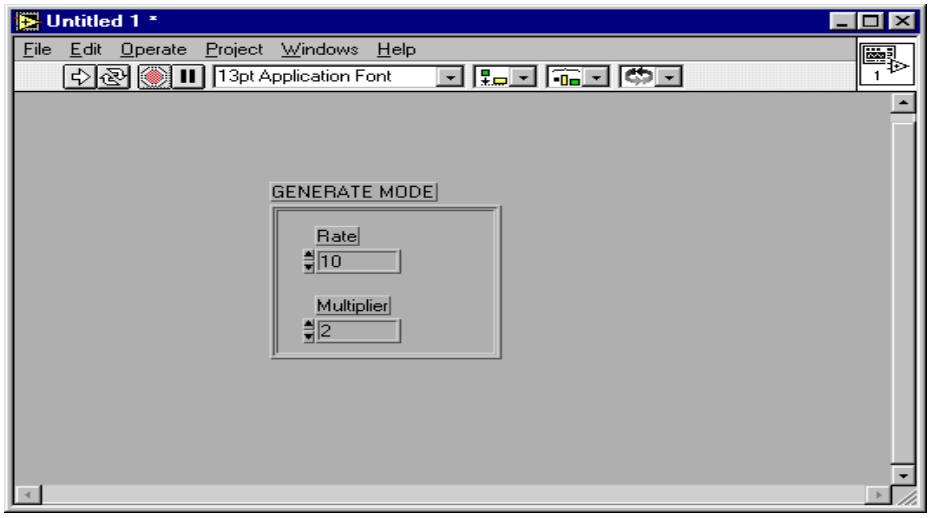
Turn on the Help by selecting from the main menu Help→Show Help and clicking the mouse on the **Gage CompuGen.vi**.



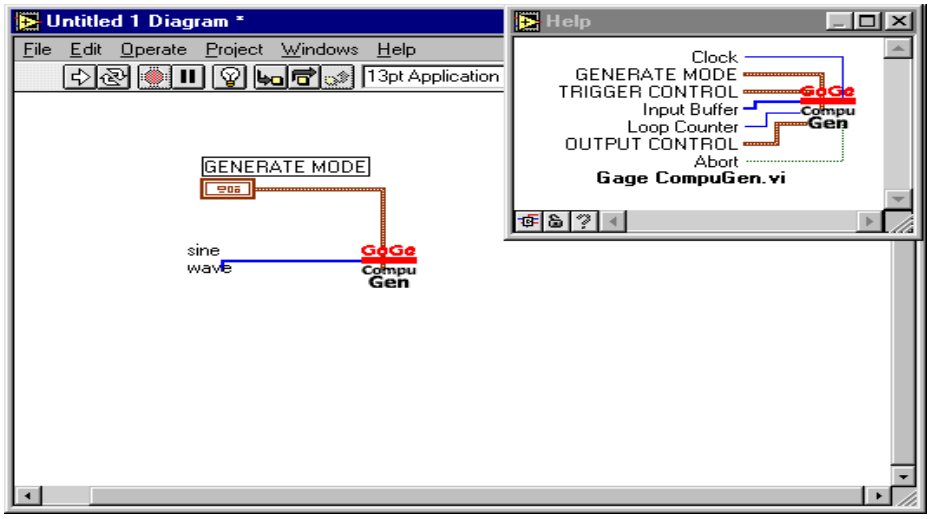
Now connect the output of **Sinewave.vi** to the **Input Buffer** of **Gage CompuGen.vi** as shown below.



Select **Untitled 1** window and create a cluster with the fields **Rate** and **Multiplier** as shown below.



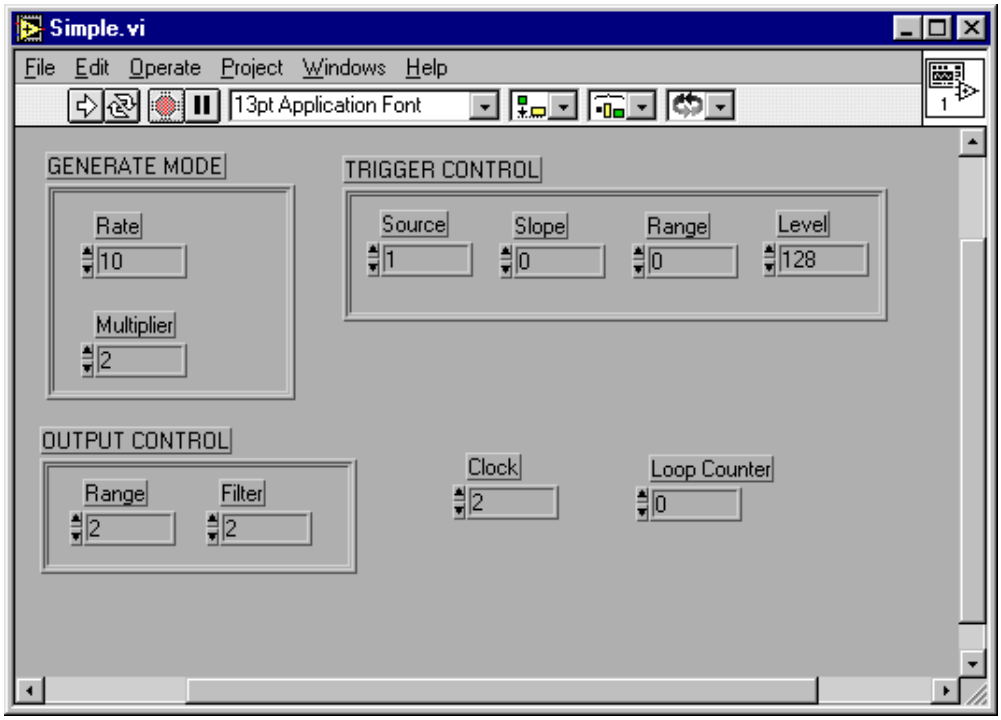
Now **select Untitled 1 Diagram** window and connect the cluster GENERATE MODE to the appropriate input of **Gage CompuGen.vi** which is GENERATE MODE as shown below.



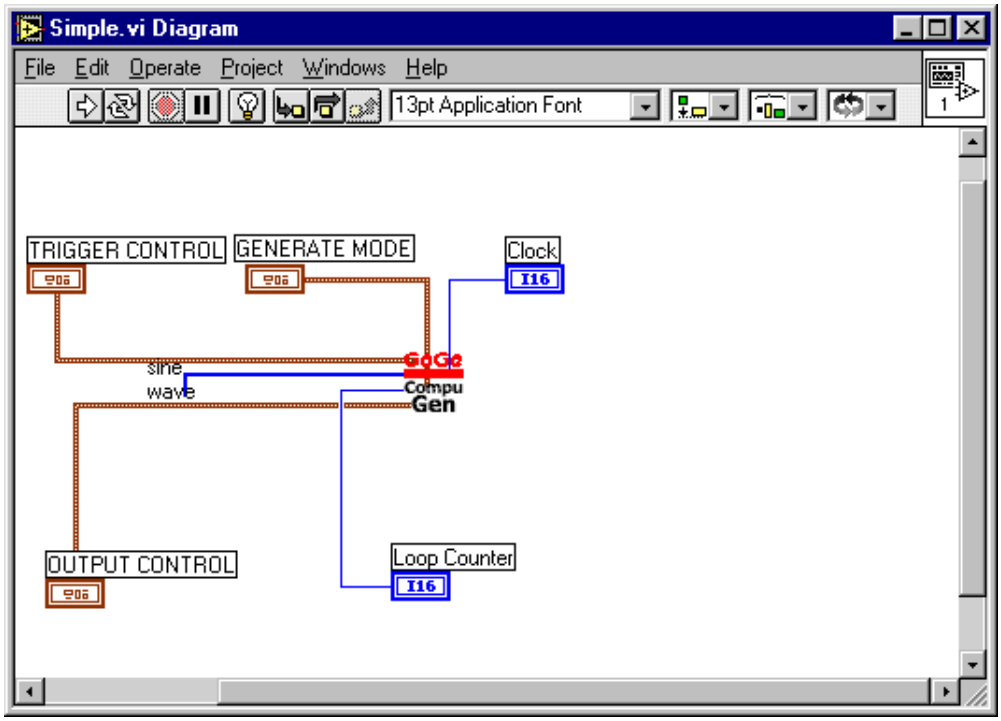
You can run this vi with the default values (See Chapter 3). For **Rate** and **Multiplier** we can change the values since we added controls for it.

Save this VI with the name **SIMPLE.VI**

Similarly, we can add more input controls to the **SIMPLE.VI** as shown below. Please see Chapter 3 for more information on the below mentioned parameters.



Following is the diagram for **SIMPLE.VI**.



Creating COMPLEX.VI

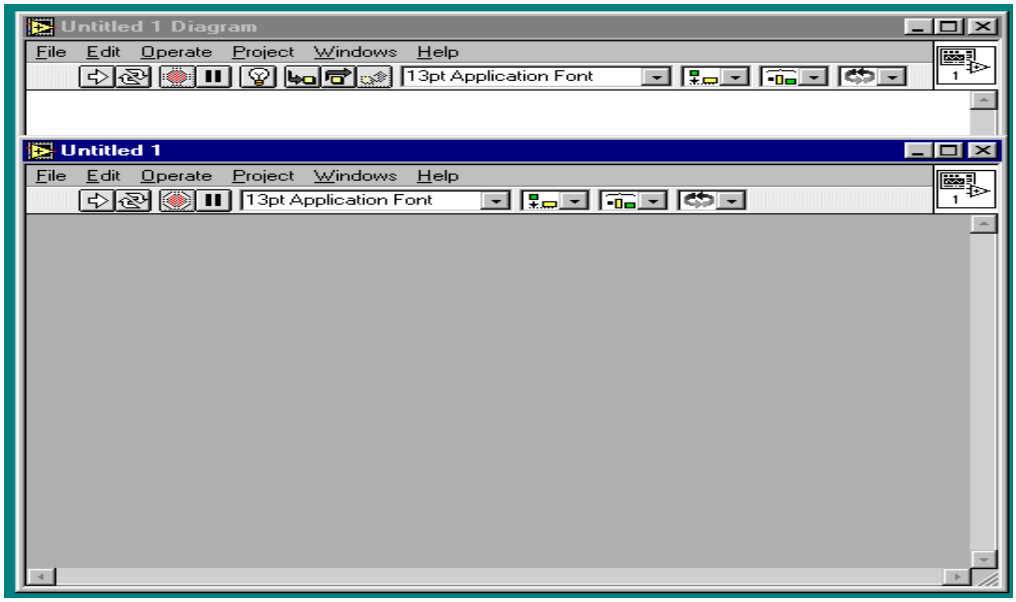
To create your own vi using sub VI's of **CompuGen.llb** and one of the sample patterns from **Samples.llb**, please follow the following steps:

One of the ways we can accomplish this is to create a sequence of the following VI's in order:

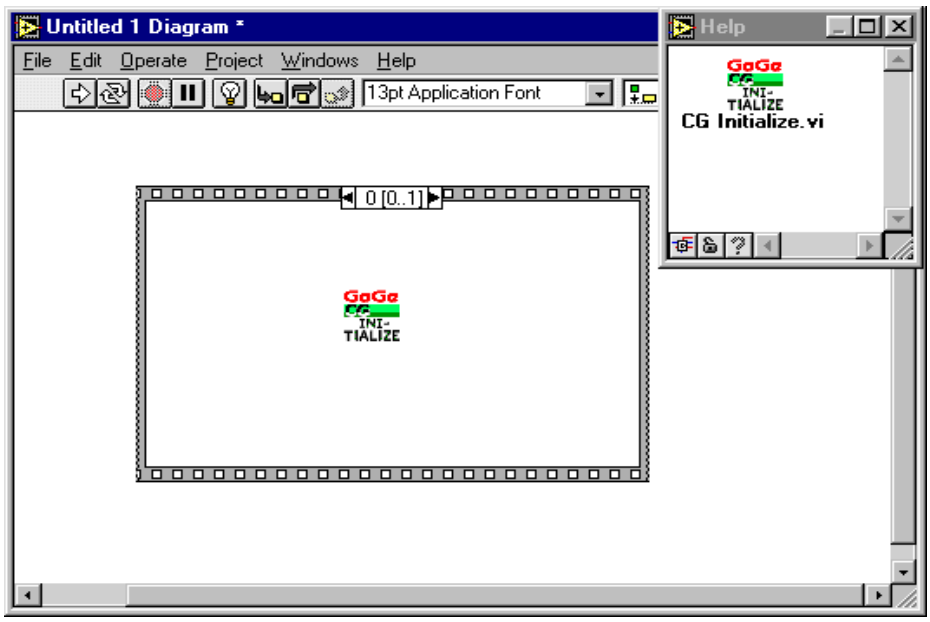
- CG Initialize.vi	Initializes the CompuGen board and the driver.
- CG Set Board.vi	Sets up the various CompuGen boards parameters. Please see chapter 3 for the detailed description on these parameters.
- CG load Buffer.vi	Loads the CompuGen internal buffer with the data passed to it.
- CG Generate.vi	It sets the CompuGen hardware to allow data generation as soon as a trigger has been received
- CG Abort.vi	Used to abort the current generated pattern, primarily when the CompuGen is in continuous mode.

Run LabVIEW.

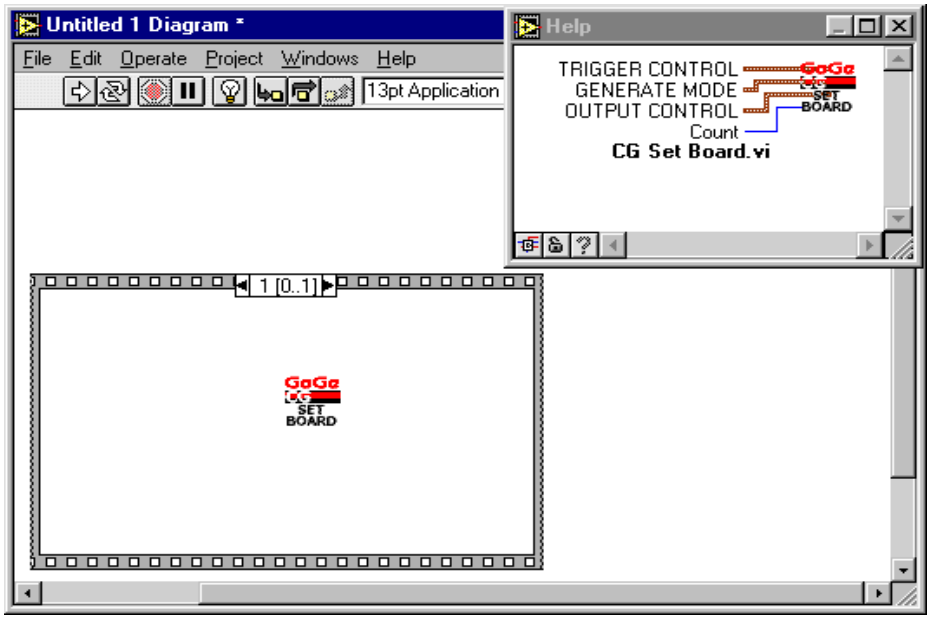
Open a new vi, you will see the following windows **Untitled 1 Diagram** and **Untitled 1** on your screen.



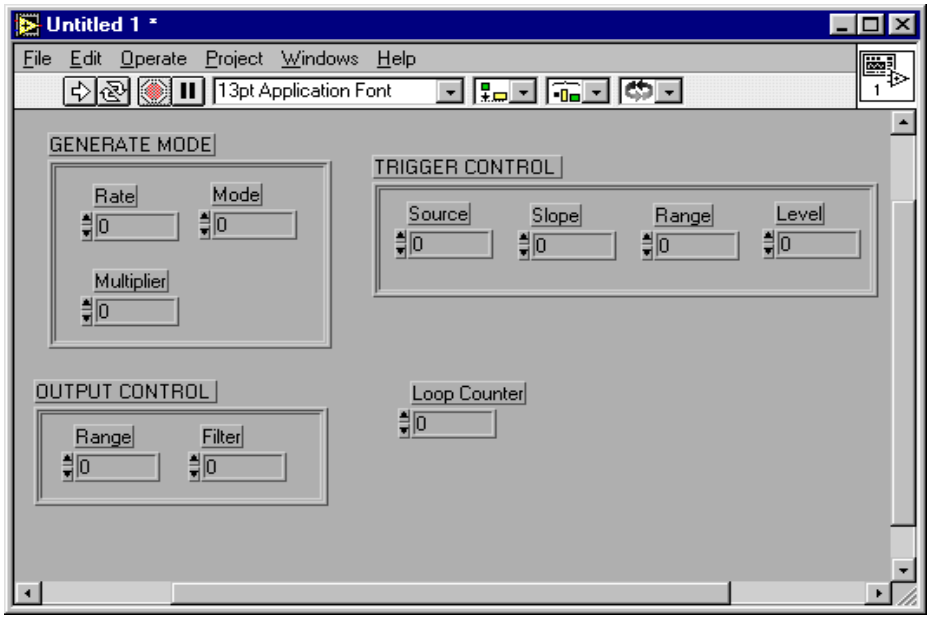
Select **Untitled 1 Diagram** window and create a sequence. Add **CG Initialize.vi** to the sequence 0 as shown below.



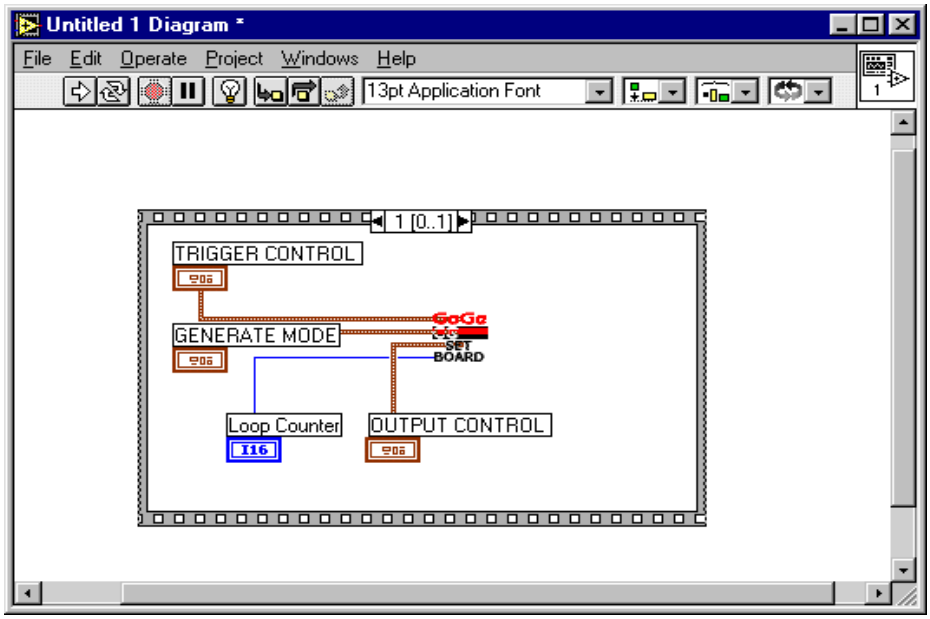
Now add **CG Set Board.vi** to the sequence 1 as shown below.



Since **CG Set Board.vi** requires Trigger Control, Generate Mode, Output Control and Count as it's inputs, let us now create the front panel with the following parameters. (For the detailed description on these parameters please see chapter 3).

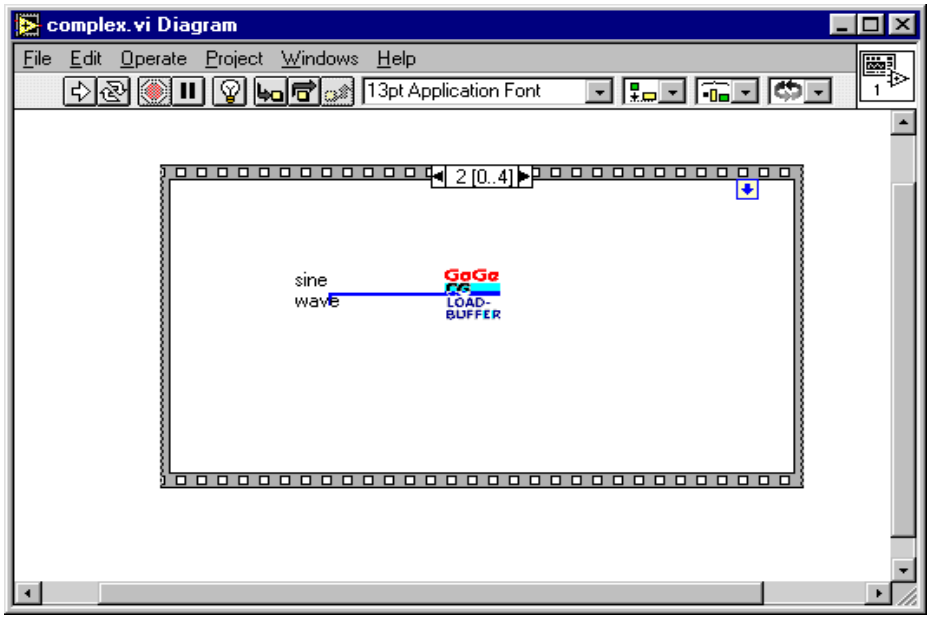


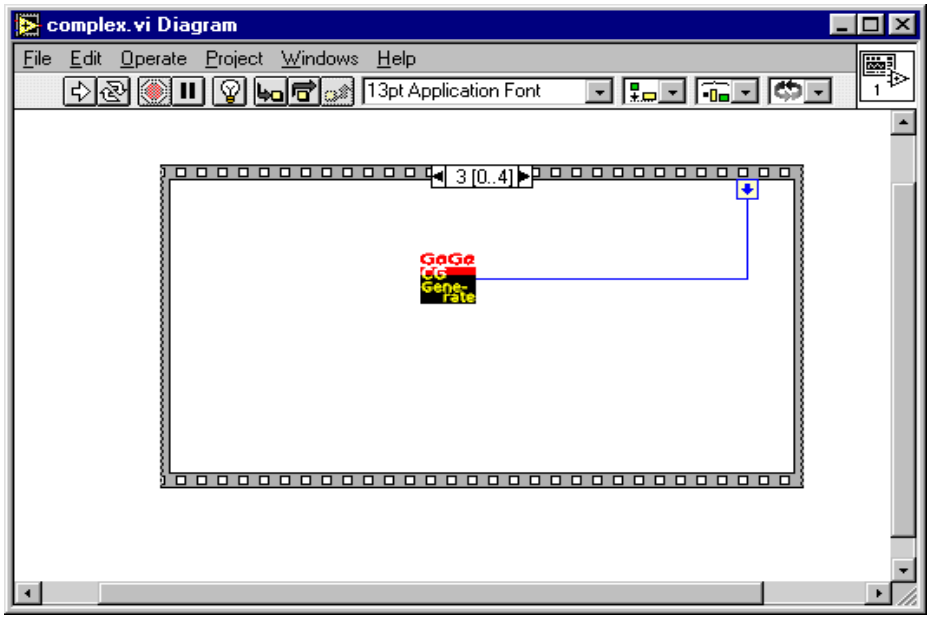
The **Untitled 1 diagram** for sequence 1 is as follows.



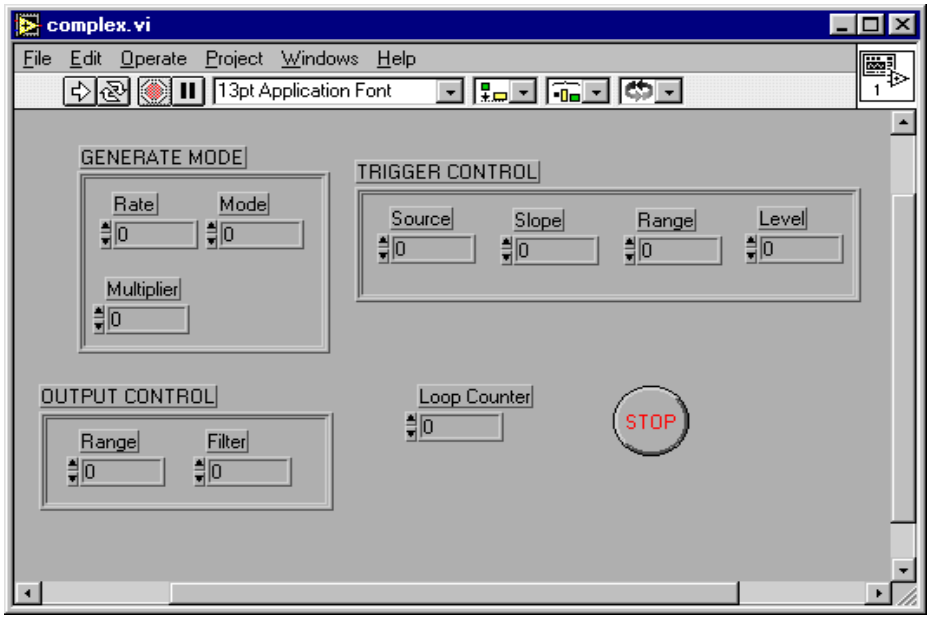
Now save this vi with the name **COMPLEX.VI**.

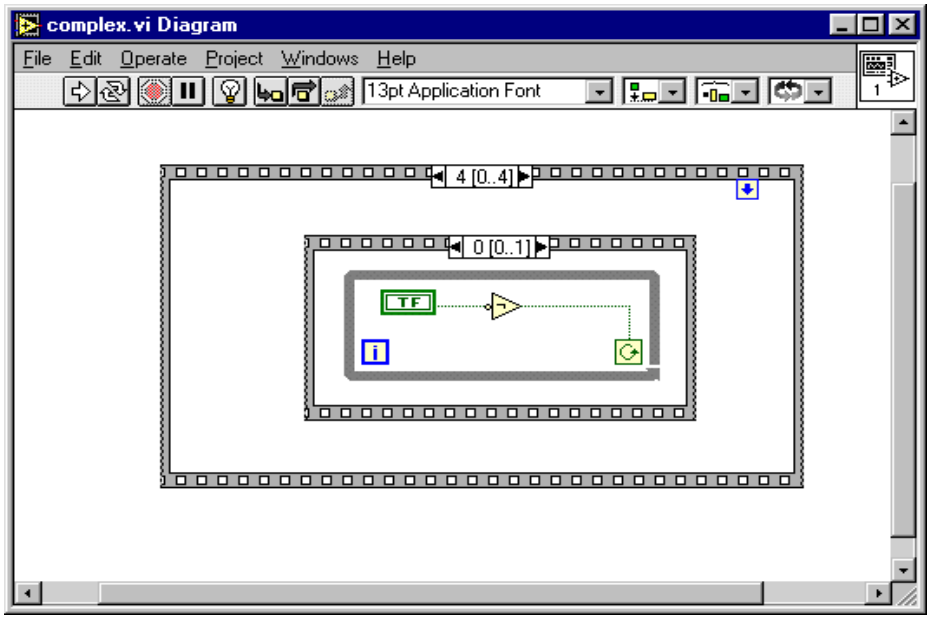
Till now we have added sequences for **CG Initialize.vi** and **CG Set Board.vi** in **COMPLEX.VI**. Similarly add **CG Load Buffer.vi**, **CG Generate.vi** and **CG Abort.vi** to this. The screen grabs of the diagrams and the front panel for these sequences are shown below.

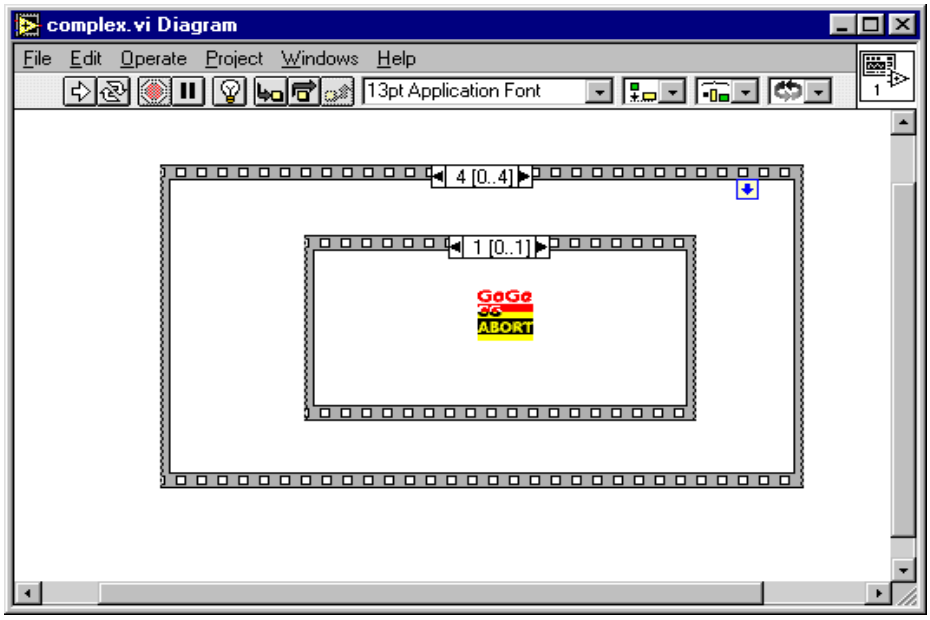




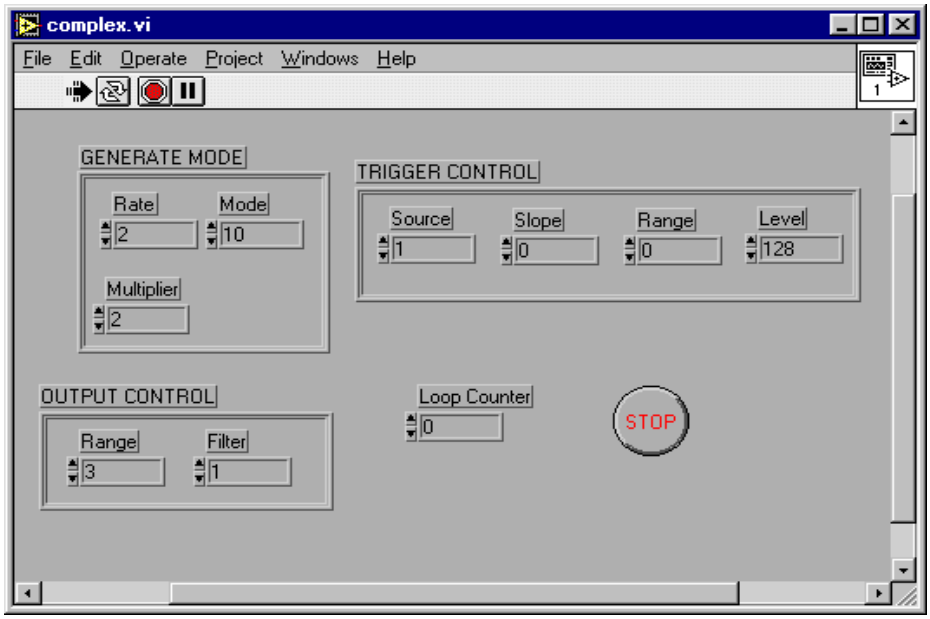
Add a Boolean Control **STOP** to the front panel.







Once all the sequences are added, you can run **COMPLEX.VI** . Please see chapter 3 for the allowable values of all the parameters in the front panel.



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