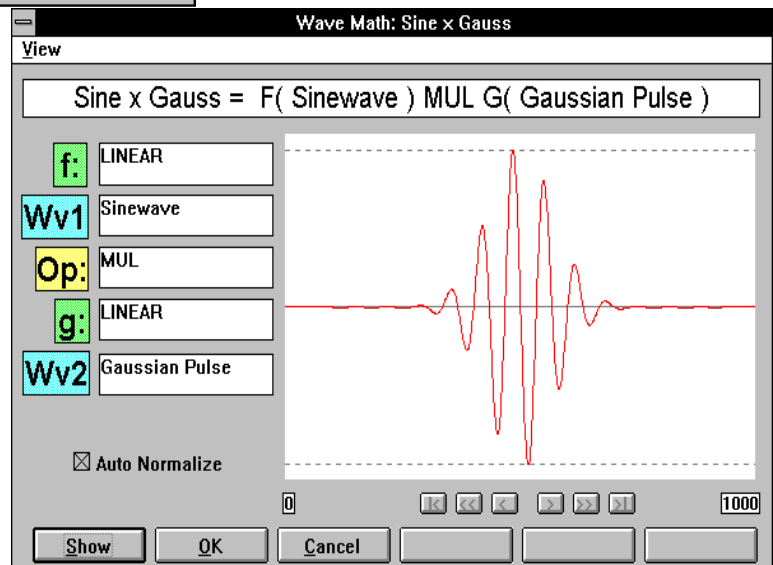
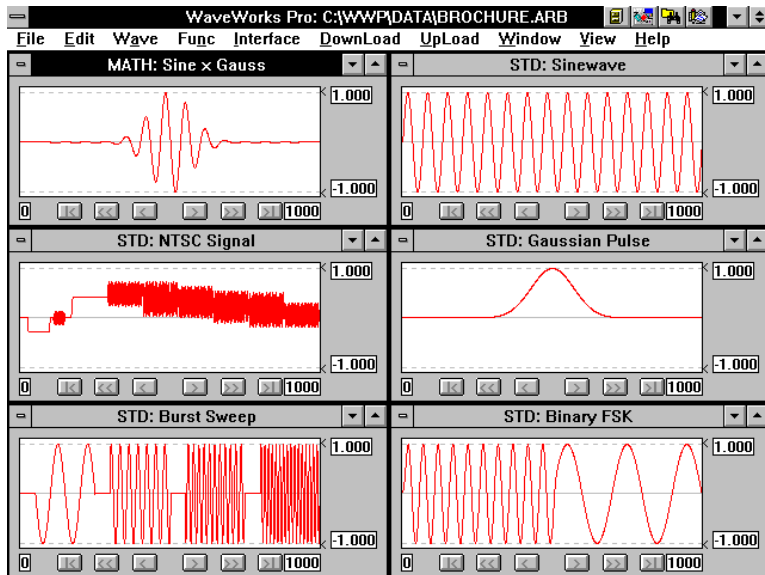


WaveWorks Pro™

Waveform Creation Software for Windows™

for
**Arbitrary
Waveform
Generators**



Pragmatic Waveform Generators Supported by WaveWorks Pro

2414A

High Sample Rate - Long Memory

- High Sample Rate - to 20 MHz
- Medium Resolution - 12 bits or 0.025%
- Large Waveform Memory - 160 k
- 20 Standard Waveforms
- Waveform Backup Software - ArbLink
- Serial Interface - RS232
- GPIB (option)
- 1000 Step Sequence Generator (option)

2416A

Very High Sample Rate - Low Cost

- Very High Sample Rate - to 100 MHz
- Medium Resolution - 12 bits or 0.025%
- Large Waveform Memory - 64 k
- 100 Step Sequence Generator
- Interface - GPIB

2205A

2-Channel High Sampling Synthesizer

- Two Independent Waveform Synthesizers
- Very High Sample Rate - to 50 MHz
- Medium Resolution - 12 bits or 0.025%
- Very Large Waveform Memory - 250k/ch
- Interfaces - GPIB and RS232
- Extended Waveform Memory Option (1M/ch)

2411A

High Resolution - Low Cost

- Very High Resolution - 16 bits or 0.0015 %
- Medium Sample Rate - to 2 MHz
- Large Waveform Memory - 64k
- 20 Standard Waveforms
- Serial Interface - RS232
- GPIB (option)
- 1000 Step Sequence Generator (option)

3511A

Low Distortion - Harmonics / Multi-Tone

- Harmonic Generation - to 100th or 500 kHz
- Multi-tone Generation - to 100 frequencies
- Very Low THD - 0.005 % at 1 kHz (typ.)
- 20 Standard Waveforms
- HarmonicLink Software (Windows)
- Full-featured Waveform Synthesizer
- Serial Interface - RS232
- GPIB (option)
- 1000 Step Sequence Generator (option)

2201A

3-Ch Very High Resolution Synthesizer

- Three Waveform Synthesizer
- Very High Resolution - 16 bits or 0.0015%
- Medium Sample Rate - 2 MS/s
- Large Waveform Memory - 64k/ch
- Interfaces - GPIB and RS232
- Extended Waveform Memory Option (256k/ch)

Scope of the WaveWorks Pro Demonstration Disk

Install this demo disk for a quick tour of our new Windows-based waveform creation software. In Quick Start, steer your way through the primary steps of the waveform creation process. After becoming familiar with the process, proceed full speed ahead in synthesizing your own waveform.

Creating Waveforms provides access to the entire highway of waveform possibilities. You'll cruise with the graphical nature and ease-of-use of each utility in the program. Virtually any waveform you can envision, you can create in WaveWorks Pro. Put yourself in the driver's seat.

Go ahead! Challenge the software and amaze yourself.

Venture out! Try the Sample Files and note the versatility of the system.

For a hands-on test drive of WaveWorks Pro and your choice of Pragmatic Instruments waveform generator, **CALL TOLL-FREE: 1-800-772-4628 (1-800-PRAGMATIC).**

The Pragmatic WaveWorks Pro™ Software allows you to create, edit and analyze waveforms in a Windows™ environment. The software package provides a communications link between a personal computer (PC) and Pragmatic Arbitrary Waveform Generators. In addition, you may retrieve and modify the data you have captured on a digital storage oscilloscope (DSO) using this software. Pragmatic WaveWorks Pro's key features allow you to:

- Create, edit and analyze arbitrary waveforms up to 32000 points in length.
- Access 32 commonly-used standard waveforms with parameters.
- Create new waveforms using a graphical and comprehensive waveform math package.
- Create new waveforms using a sequence generator. Repeat and link waveforms.
- Analyze and edit waveforms in the frequency, time or digital data domain.
- Import and export data files in 7 formats including popular spreadsheet formats.
- Transfer waveforms to all Pragmatic Arbitrary Waveform Generators.
- Save waveforms to a project file for later use.
- Print waveforms to use in your documentation.

NOTICE

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Conventions Used in this Manual

Throughout this manual the following typeface or abbreviations are used to improve the readability and enable you to find the information you need.

Ver	software version of WaveWorks Pro
AWG	Arbitrary Waveform Generator
DSO	Digital Storage Oscilloscope
WWP	WaveWorks Pro

CANCEL This typeface is used to indicate the label on a button or other control.

b:\setup This typeface indicates that input from the keyboard can be typed or indicates a menu command to be selected.

For example:

“Type **b:\ setup**” or “Select **File | Open...** from the Menu Bar”. **File | Open...** is separated by a bar because you must first select the File menu, then select Open.

Recommended Reading

Please review the Microsoft Windows User’s Guide. This manual assumes that you have some experience using Microsoft Windows 3.1. You must know how to use the basic features of Windows or are familiar with terms such as click, double click, resizing, and dragging.

In This Manual

Installation describes how to install WaveWorks Pro, the computer requirements and specific interface requirements to allow you to work with any Pragmatic AWG.

Quick Start provides an overview of WaveWorks Pro. Display components and how to start and close the software are illustrated. A complete example is given demonstrating the steps used to create, save, and output an arbitrary waveform.

About Arbitrary Waveforms offers an introduction to waveform generator operation. Data files are discussed and the significance of sample clock rates is reviewed. Amplitude resolution and range operations are outlined followed by a brief sequence generator explanation.

Creating Waveform gives the detail descriptions for creating waveforms in WaveWorks Pro.

Sample Waveforms provide real-world examples of arbitrary waveforms. These waveform files are included in your WaveWorks Pro demo disk.

Equipment Required

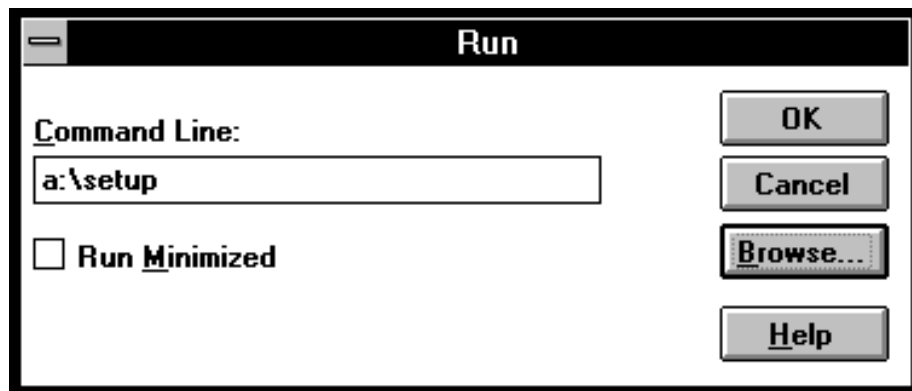
Personal Computer Requirements

- IBM® (or compatible) 386 PC with math coprocessor or IBM (or compatible) 486-DX PC or better. 486DX2-66 or better PC recommended.
- 3.5" 1.44 MB floppy disk drive (high density).
- Microsoft (or compatible) mouse.
- Color VGA or SVGA display.
- 8 MB memory.
- 2 MB free disk space (additional space may be required for waveform storage)
- Microsoft® Windows version 3.1 or higher.
- Microsoft MS-DOS version 6.20 or higher.

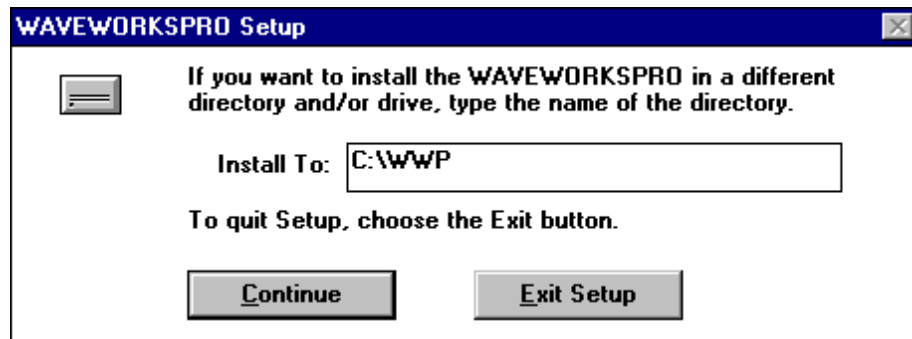
Installation

Installing the Pragmatic WaveWorks Pro Software

1. Insert the Pragmatic WaveWorks Pro software in your computer disk drive.
2. Save any work in progress. Close unneeded applications.
3. Select **File | Run** at the Program Manager. Type **A:\setup** in the COMMAND LINE text box and press ENTER or click OK. Change the drive letter if needed (i.e., **B:\setup**).



During the installation process, the setup program will prompt you for the directory to receive the files. Press ENTER to accept the default installation directory. Type a new drive and directory in the INSTALL TO: text box if needed.



The installation program will create a new program group in the Program

Quick Start

This chapter provides an overview of Pragmatic WaveWorks Pro and gives you a few examples to help you get started using the demo software.

Pragmatic WaveWorks Pro Screen Components

Title Bar

In the Title Bar, WWP displays WaveWorks Pro and the name of the project and the file directory.

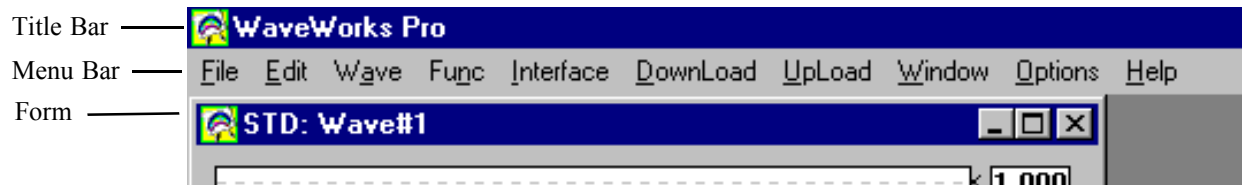
Menu Bar

The Menu Bar offers the following pull-down menus:

- **File** Menu - contains commands for opening, closing, saving projects and waveforms, importing and exporting data, and printing WWP waveform windows.
- **Edit** Menu - contains commands for copy and paste between the waveform windows, and editing and analyzing waveforms such as Point, Vertex, Digital Pattern and Harmonics Editors.
- **Wave** Menu - contains commands for new, delete, setup, and list of WWP waveform windows.
- **Func** Menu - contains extensive commands for creating waveforms with standard functions, math operations, and sequences.
- **Interface** Menu - contains commands for configuring and testing the PC to AWG interface. (*disabled*)
- **Download** Menu - contains commands for sending the contents of the waveform window and the parameter controls to the arbitrary waveform generator. (*disabled*)
- **Upload** Menu - contains commands for reading the contents of the specified waveform data and the parameter settings of the arbitrary waveform generator. (*disabled*)
- **Windows** Menu - contains commands for standard Windows operations such as cascade, tile, and arrange icons.
- **Options** Menu - contains unzoom, span, x-increment, y-axis labels, and pointers commands for the waveform window's operations.
- **Help** Menu - contains helpful information to operate WaveWorks Pro.

Quick Start

Pragmatic WaveWorks Pro Components



Title Bar

The Title Bar provides the standard Windows Control-menu box and sizing buttons.

Menu Bar

The Menu Bar contains pull-down menus. Position your cursor over a menu item and click the mouse button to view the menu choices. You can also select the menus by holding the Alt key and typing the underlined letter of the menu choice (for example, *Alt + E* will display the Edit menu).

Waveform Windows

Waveforms created in Pragmatic WaveWorks Pro are displayed in waveform windows. Waveforms consist of one or more segments which can be created by inserting standard functions, point editing, line drawing, and performing extensive mathematical operations. In addition, waveforms may be linked and repeated by using sequence edit to create a long complex waveform. Waveform editing of digital pattern is also available. You can create virtually any arbitrary waveform you need in the graphical comfort of the Windows environment.

Starting and Closing Pragmatic WaveWorks Pro

Starting. Pragmatic WaveWorks Pro can be started in one of three ways:

- From the WaveWorks Pro program group, double-click on the Pragmatic WaveWorks Pro icon.
- From the Windows File menu, choose **Run...** and assuming Pragmatic WaveWorks Pro was loaded in a directory named 'WWP', enter:
c:\wwp\wwp. Once started, the Pragmatic WaveWorks Pro screen can be positioned, sized, maximized, or reduced to an icon using the standard Windows controls in the Title Bar.
- From the DOS prompt, assuming Pragmatic WaveWorks Pro was loaded in a directory named 'wwp', type: `win c:\wwp\wwp`

Quick Start

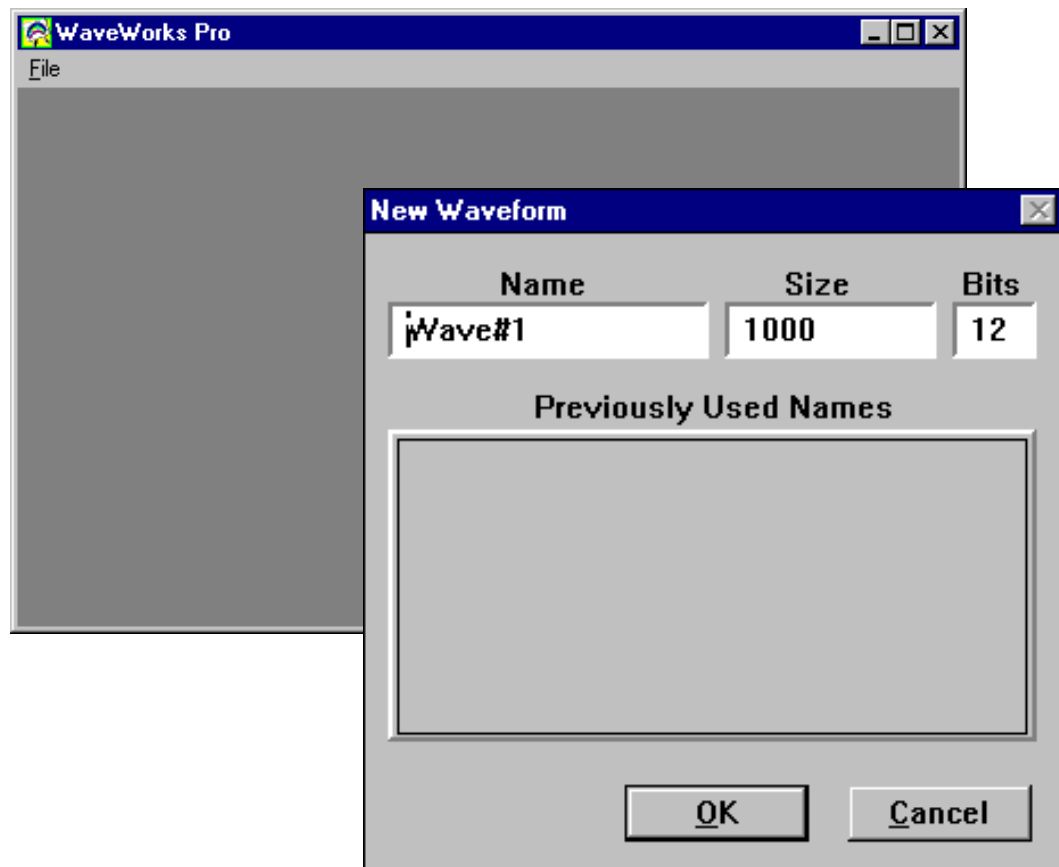
Closing. You can exit from Pragmatic WaveWorks Pro in one of two ways:

- Double-click the Windows Control-menu box on the Main form.
- From the Pragmatic WaveWorks Pro Menu Bar, choose **File | Exit**.

To Create, Save, and Output an Arbitrary Waveform

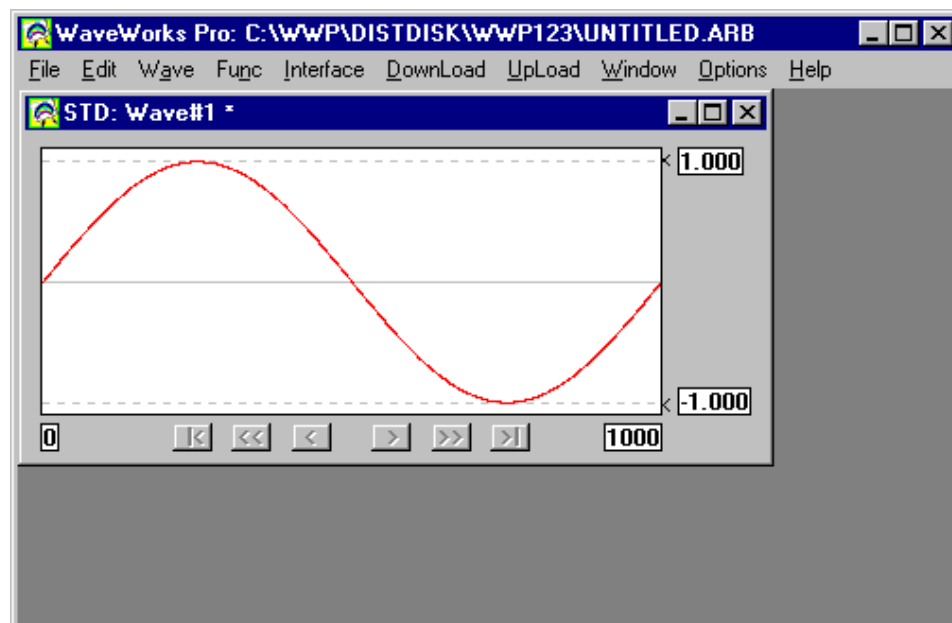
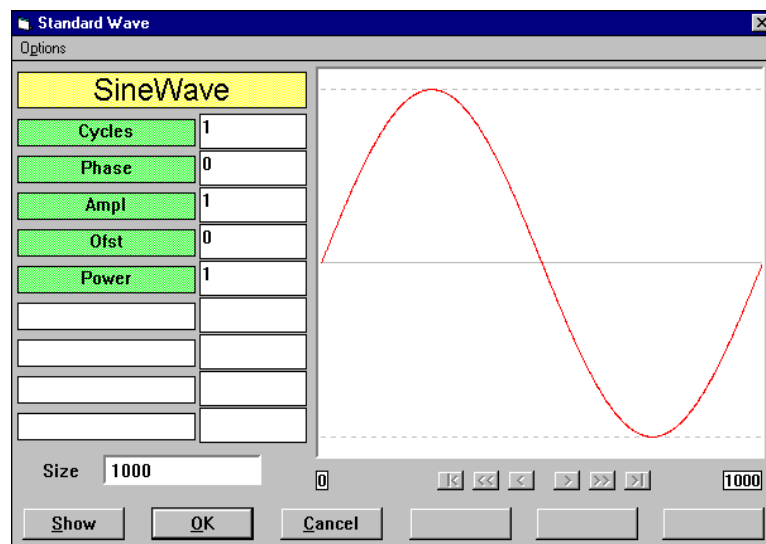
This example demonstrates how to use Pragmatic WaveWorks Pro. An arbitrary waveform is created, edited, saved, and output to the selected Pragmatic arbitrary waveform generator.

1. Start WaveWorks Pro as described on the previous page. You should have an empty waveform window #1 displayed if the default setting is chosen. The waveform length is set to 1000 points. Click **OK**.



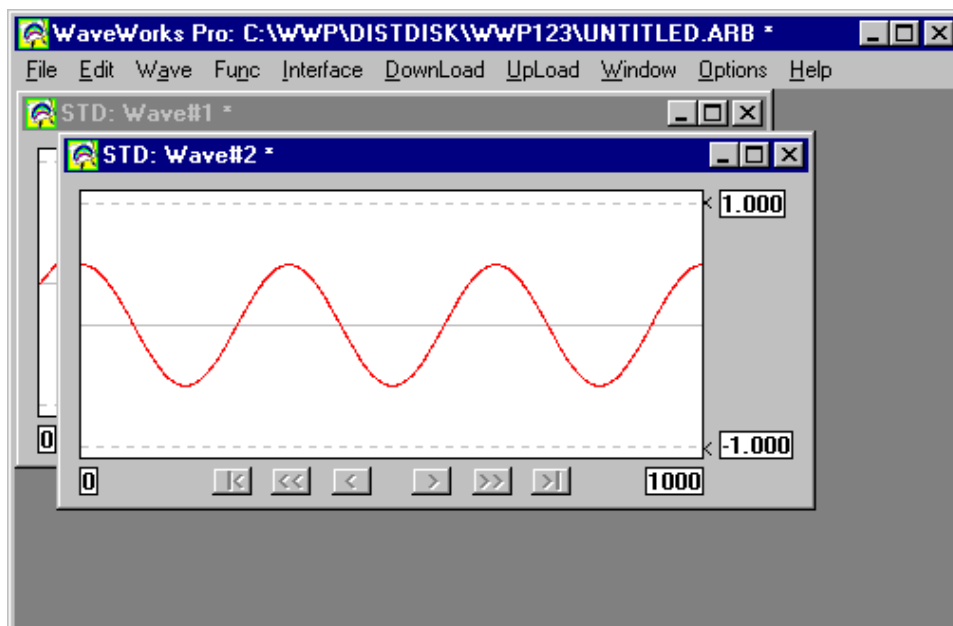
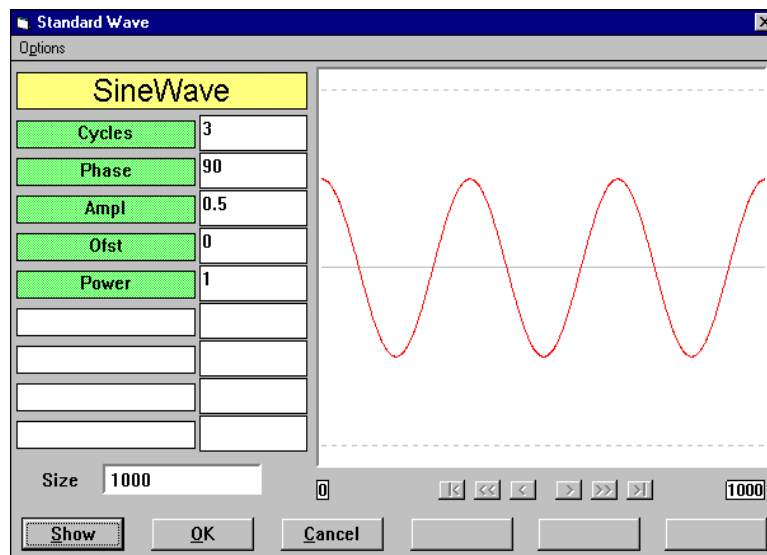
Quick Start

2. Place a sine wave in the waveform window by choosing **Func | Stdwave**. Select **SineWave** and then click **SHOW** to view and **OK** to accept the waveform. If you used the default parameters, the waveform is a one cycle sine wave starting at 0° with 100% amplitude.



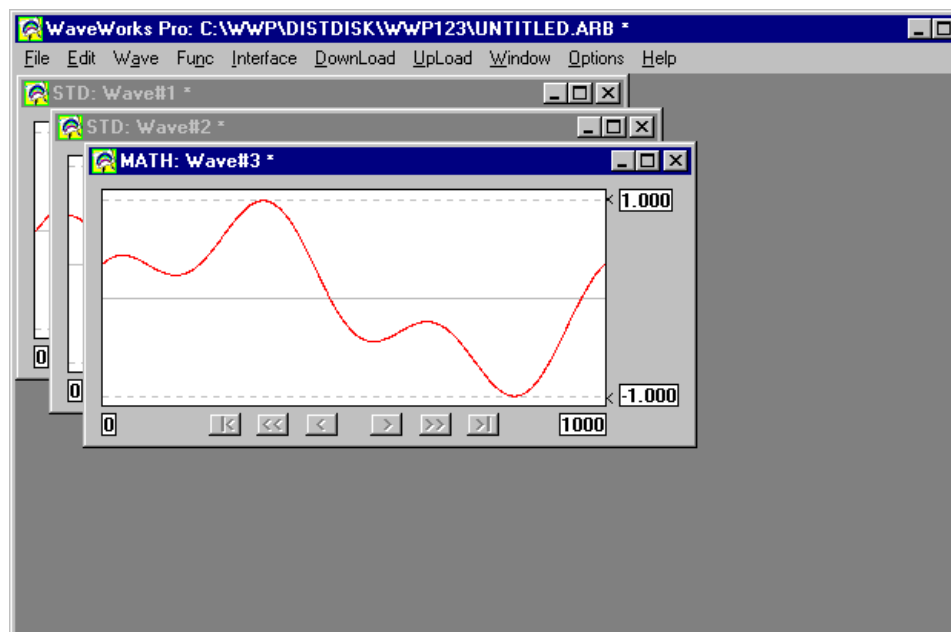
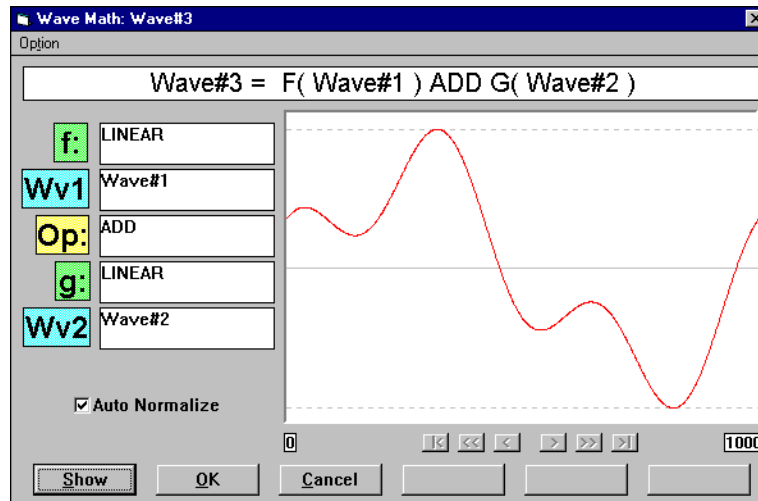
Quick Start

3. Choose **Wave | New**. Click **OK** to create waveform window #2.
4. Choose **Func | Stdwave**. Click **SineWave**. Choose **Parameter** to set the sinewave parameters. Select Cycles = 3, Phase = 90, Ampl = 0.5 and then click **SHOW** to preview the waveform in the parameter form. You now have a 3 cycle sinewave starting at 90° with 50% amplitude. Click **OK** to transfer the waveform to waveform window #2.



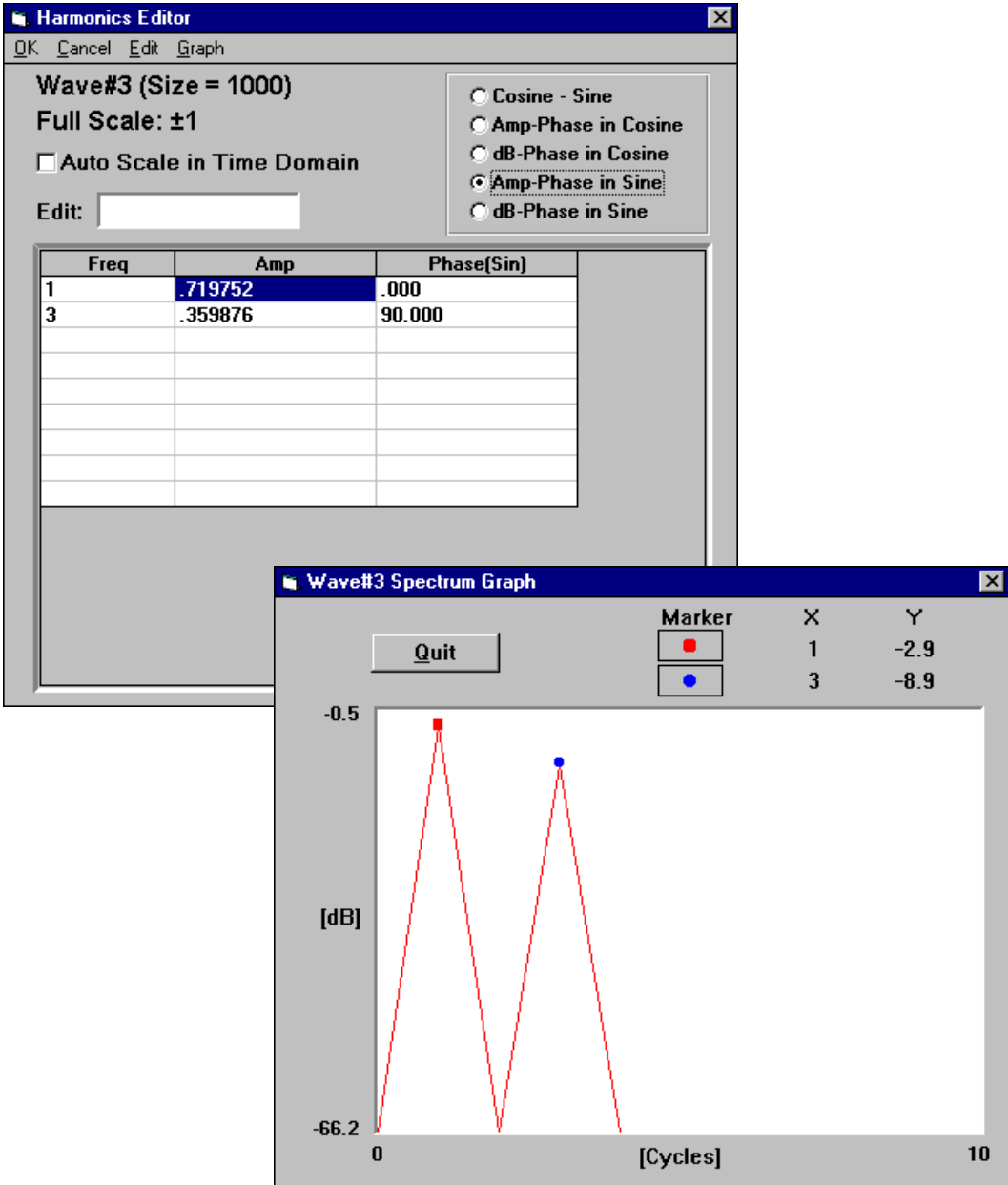
Quick Start

5. Choose **Wave | New**. Click **OK** to create waveform window #3.
6. Choose **Func | Math**. Click **Wv_1** and select Wave#1. Click **Wv_2** and select Wave#2. Click **Op** and select **ADD**. Use the default selection (Linear) for the transfer function (F and G). Click **SHOW** to preview the computed waveform--a saturated waveform. Check **Normalize** and then click **SHOW** to preview the normalized waveform. Click **OK** to transfer the waveform to waveform window #3.



Quick Start

- 7. Choose **Edit | Harmonics**, while waveform window #3 is selected. You can view the frequency components of waveform #3. Click **Amp_Phs in sine** to list the two frequency components of the waveform. You may view the list in graphic form by choosing **Graph** on the Menu Bar. Click **Quit** to return to the harmonic listing. Click **CANCEL** or **OK** to return to the main form.



About Arbitrary Waveforms

In an arbitrary waveform generator, you will define a waveform, using either the standard functions or custom profile data files to load waveform memory. An address generator sequentially presents data values to the digital-to-analog converter (DAC), which converts the data into analog voltage values. This series of sequential voltage levels describes the output waveform with the frequency determined by the sample clock rate divided by the number of samples in the waveform. Changing the sample clock rate causes the address generator to change the speed at which the data is presented to the DAC, thereby changing the output frequency.

In WaveWorks Pro, the waveforms you create are a series of data points consisting of X- and Y-axis values. For 12-bit generators, such as the Pragmatic 2414A, the Y values between +2047 and -2047 are used. For 16-bit generators, such as the Pragmatic 2411A, the Y values between +32767 and -32767 are used. You may also use the normalized values between +1 and -1 or custom limits in this software. All waveform data file calculations are made using 24-bit resolution in WaveWorks Pro. In describing the first point, 0, is given a Y value. The next point has another Y value, and so on up to the last address in your waveform. This series of points make up the waveshape.

All the data points in the waveform memory window make up one waveform generator cycle. When you send the data file to the waveform generator, it will output all the points in the waveform at the sample clock rate specified. The resulting frequency is equal to the sample clock rate divided by the number of data points in the waveform memory window. If more than one cycle of the waveshape is entered into one waveform memory window, the output frequency will be a multiple of one waveform generator cycle. For example, if you create a waveform with 3 sinewave cycles using the same number of data points and the sample clock rate the frequency will be 3 times higher.

Pragmatic arbitrary waveform generators may sample the data points at a maximum of 2 MS/s to 100 MS/s depending on the model. The maximum frequency of the output is determined by the sample rate divided by the number of points. For a 20 MHz arbitrary waveform generator, such as Pragmatic 2414A, with the waveform length of 1000 points, the upper frequency limit appears to be 20 kHz, since $20 \text{ MS/s} / 1000 = 20 \text{ kHz}$. However, if you repeat the segment, such as a sinewave, up to the minimum required number of samples (4 samples/segment), you can repeat up to 250 segments within the

About Arbitrary Waveforms

waveform length of 1000 points. Then, the output frequency of the sinewave will be 5 MHz, since $20 \text{ kHz} \times 250 = 5 \text{ MHz}$. This concept is also applicable in understanding the frequency components of the harmonic analysis (FFT) feature. Harmonic analysis uses the total waveform length and defines this as the fundamental or the first (1) harmonic. Based on this interpretation all higher harmonics are a multiple of the fundamental. Because of this criteria certain restrictions are placed on the length of the complete waveform to obtain integer value lengths for all higher harmonics. Both the graph and the tabular presentation of the harmonic profile follow this rule using the total waveform length to determine the fundamental.

The amplitude values of your waveforms have several options in the way they may be displayed. For simplicity using a range of -1 to +1 to represent the minimum and maximum values is the more straight forward. Likewise, these limits will always correspond to the minimum and maximum values produced by the DAC and corresponds to the resolution of the waveform output by the waveform generator. Using this approach guarantees maximum resolution of the waveform and uses the scaling properties of the generator output amplifier to produce the required peak-to-peak output voltage.

Whenever possible range the waveform between -1 to +1 in the waveform window to obtain maximum resolution and to maintain the desired dc integrity of the signal. WaveWorks Pro allows you to normalize any waveform in its Y values by this simple command. For instance, if you have a sinewave in the waveform window that ranges from -1 to +1 you can specify the output at 5 volts peak-to-peak. Automatically the -1 relative amplitude will be scaled to -2.5 volts and the +1 relative amplitude will be scaled to +2.5 volts. The sinewave will be centered around zero volts. The desired output voltage may be set on the front panel of the generator or on the Download Setup form when the waveform is sent to the AWG.

The Y values of the starting and ending points in your waveform can cause unexpected discontinuities if they are not the same value. The waveform generator output will jump from the ending value to the starting value each cycle. If you are using the sequence generator in an arbitrary waveform generator or in this software, the ending value of a waveform will jump to the starting value of the next waveform in the sequence. For a smooth, transient-free waveform output, be sure the starting and ending values are the same for a single waveform and the starting and ending values of adjacent waveforms are the same for a sequenced waveform.

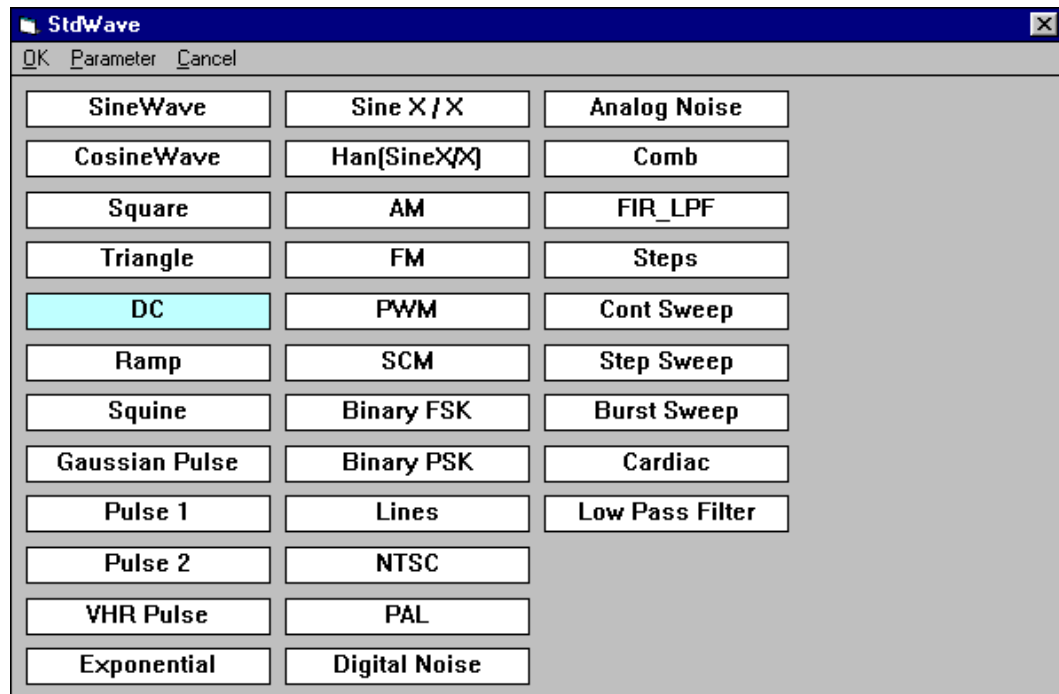
Creating Waveforms

Creating Waveforms

The general file system of WaveWorks Pro consists of two types. The project file contains the instrument setup (.STP) and all the waveforms needed to create the application. You may save any waveform as a single waveform file (.W##, .M##, .S##, .D##, or .T##) or as a project file (.ARB). In general it is easier to keep track of your project using the project file system.

To open a new project, select **File | New Project** from the Menu Bar. To open a waveform window, choose **Wave | New** from the Menu Bar. New Waveform dialog box will appear, allowing you to specify the waveform length and name. Click **OK** after you have specified the parameters. Then the new waveform window will be displayed.

Form - Standard Waveform List



The image shows a screenshot of a software dialog box titled "StdWave". The dialog box has a title bar with a close button (X) and a menu bar with "OK", "Parameter", and "Cancel". The main area contains a grid of buttons for selecting different waveform types. The "DC" button is highlighted in light blue.

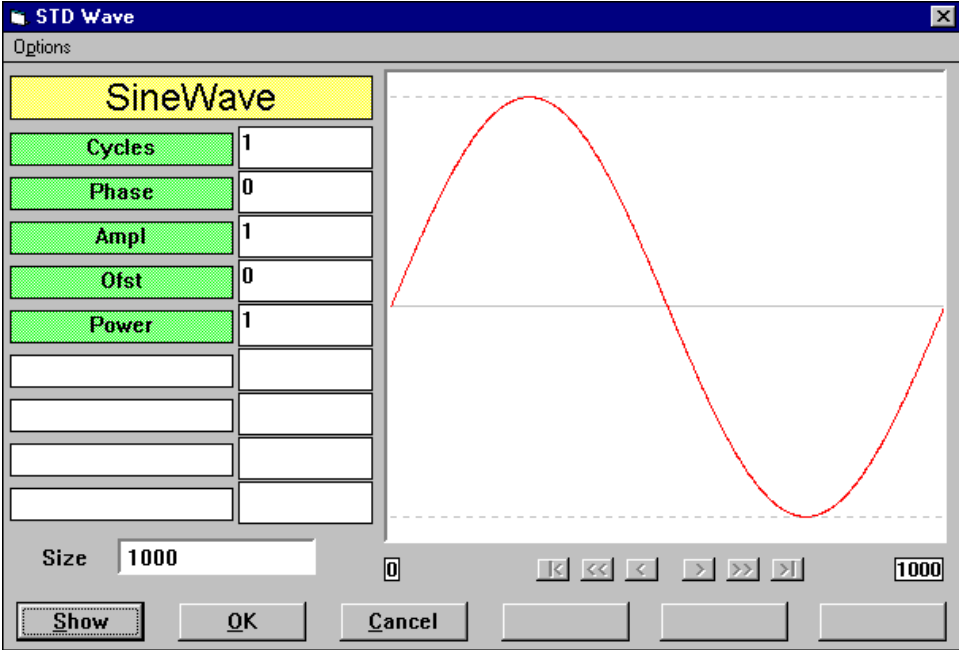
SineWave	Sine X / X	Analog Noise
CosineWave	Han(SineX/X)	Comb
Square	AM	FIR_LPF
Triangle	FM	Steps
DC	PWM	Cont Sweep
Ramp	SCM	Step Sweep
Squine	Binary FSK	Burst Sweep
Gaussian Pulse	Binary PSK	Cardiac
Pulse 1	Lines	Low Pass Filter
Pulse 2	NTSC	
VHR Pulse	PAL	
Exponential	Digital Noise	

Creating Waveforms

Standard Waveforms

Standard waveshapes can be inserted in the waveform window by choosing **Func | Stdwave...** and selecting commands from the Standard Waveform List. You may set the function parameters and preview the waveshape by clicking **SHOW**. Click **OK** to insert the waveshape into the waveform window.

Form Standard Wave - Sinewave

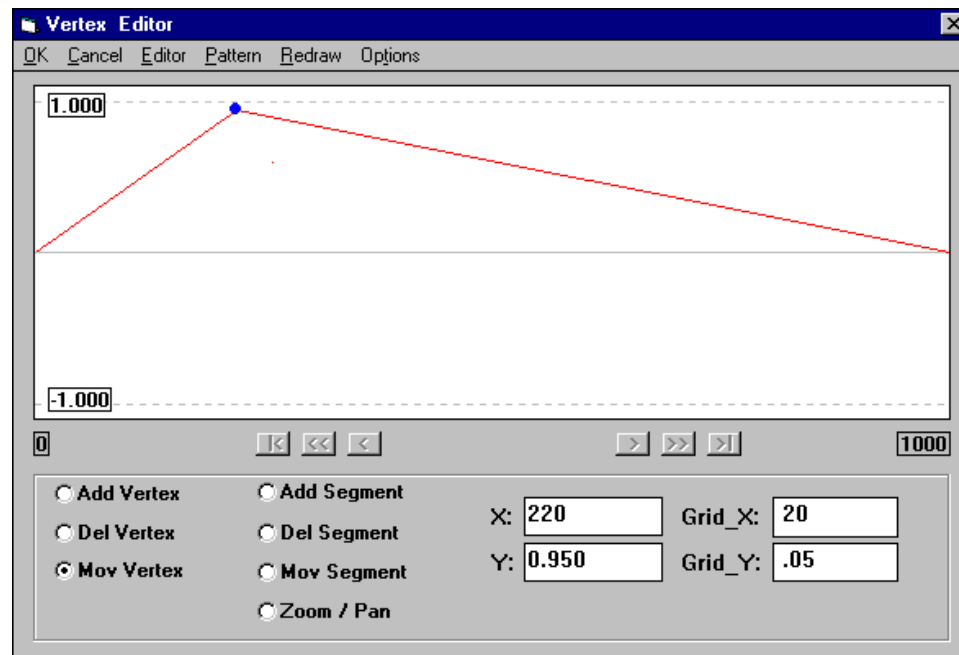


Creating Waveforms

Line Drawing

Choose **Func | Stdwave...** and click **Lines** or choose **Edit | Vertex**. Draw the desired line-based waveform by using vertex editing. Modify vertex or line segments on the preview screen. Click **OK** to insert the waveshape into the waveform window.

Form-Line Draw



Performing Waveform Math

The math menu contains 20 transfer functions and 13 operations to be performed on any type of waveform created in WaveWorks Pro. The target waveform (New Wave) must be placed below the two operands (Wave#1 and Wave#2) in the Wave List. Choose **Wave | List...** to review and correct the waveform order.

For this example New Project create the following:

Wave#1: Sinewave, Cycles=1, Phase=0, Ampl=1, Ofst=0, Power=1, Size=1000

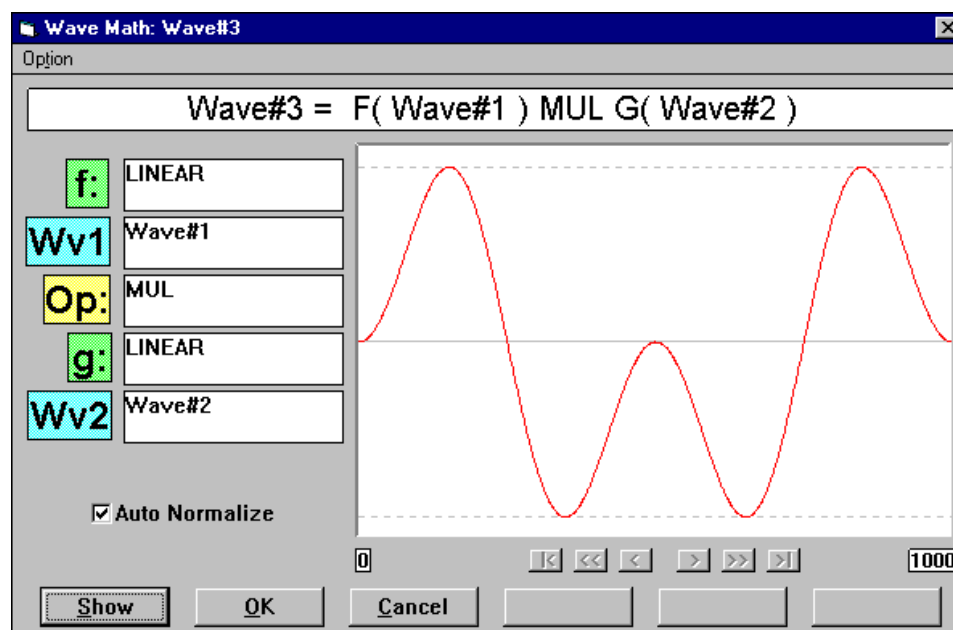
Wave#2: Sinewave, Cycles=2, Phase=0, Ampl=1, Ofst=0, Power=1, Size=1000

Wave#3: to accept the Math result, size=1000

Creating Waveforms

1. Choose **Wave | Math...** from the Menu Bar.
2. Select the first operand (Wave#1) by clicking **Wv#1**.
3. Select the first transfer function (F) by clicking **f**.
4. Select the second operand (Wave#2) by clicking **Wv#2**.
5. Select the second transfer function (G) by clicking **g**.
6. Select the operation (Op) by clicking **Op**.
7. Click **SHOW** to preview the computed waveform.
8. Click **Auto Normalize** and then **SHOW** to preview the normalized waveform.
9. Click **OK** to insert the waveshape into the waveform window or **CANCEL** to abort the operation.

Form Math



Creating Waveforms

Form Op

The 'Math Operator' dialog box has a title bar with a close button. The main area contains a large text field with the word 'MULTIPLICATION'. Below this are two columns of buttons: the first column contains 'ADD', 'SUB', 'MUL' (highlighted in green), 'DIV', 'CAS', 'INTO', 'ADIN', 'CNV', 'FIR', and 'AM'; the second column contains 'PM', 'FM', and 'QAM'. To the right of these buttons are two input fields, both containing the number '0'. At the bottom are 'OK' and 'Cancel' buttons.

Form F (or G)

The 'Math Transfer Function' dialog box has a title bar with a close button. The main area contains a large text field with the formula 'F: aX+b'. Below this are two columns of buttons: the first column contains 'NULL', 'LINEAR' (highlighted in green), 'SECT', 'SQR', 'ABS', 'CUBIC', 'SQRT', 'LOG', 'EXP', and 'POLY'; the second column contains 'INTG', 'DIFF', 'DCcut', 'Norm', 'Rotate', 'Mirror', 'Iphase', 'Qphase', 'I/Q_swap', and 'BandPass'. To the right of these buttons are two input fields labeled 'a' and 'b', with 'a' containing '1' and 'b' containing '0'. Below these are several empty input fields. At the bottom are 'OK' and 'Cancel' buttons.

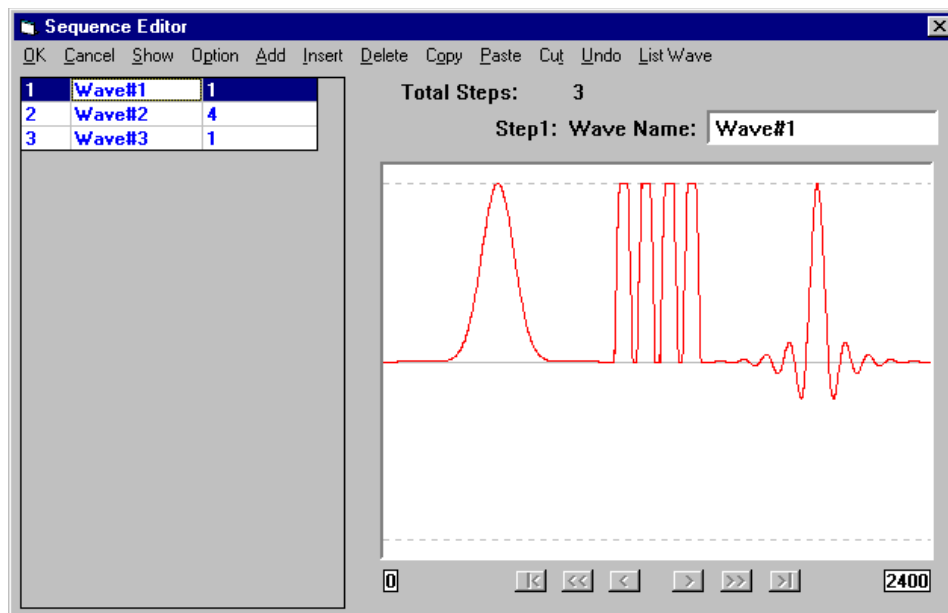
Creating Waveforms

Waveform Sequence

You may create a long and complex waveform by looping and linking previously created waveforms. For this example New Project create the following:

Wave#1: Gaussian Pulse, Time Const = 1, Ampl=1, Ofst=0, Size=1000
Wave#2: Pulse 2, Cycles=1, T Delay(%)=10, T Rise(%)=20, T High(%)=40,
T Fall(%)=20, High=1, Low=0, Trans Shape=0, Size=100
Wave#3: Han(Sin X/X), Width=100, Ampl=1, Ofst=0, Size=1000
Wave#4: to accept the Sequence result, Size=1000 (size will adjust automatically)

1. Select the target waveform window by clicking the Title Bar of the waveform.
2. Choose **Func | Sequence...** from the Menu Bar. (Wave#4)
3. Choose **Wave List** from the Menu Bar to select the first waveform in the sequence (Wave#1). Click the right column of the Wave List and enter the loop count in the text box (1).
4. Choose **ADD** from the Menu Bar to add number of steps in the sequence.
5. Click the center column of step 2 and select the second waveform in the sequence (Wave#2). Click the right column of the Wave List and enter the loop count in the text box (4).
6. Repeat the above steps 4 and 5 until the sequence list is completed (Wave#3, 1).
7. Click **SHOW** to preview the new sequence waveform. (To view the entire sequence waveform, click **Option | Xspan | Max** and note the total waveform.)
8. Click **OK** to complete the operation or **CANCEL** to abort the process.



Sample Waveforms

This chapter describes sample waveforms you can create in Pragmatic WaveWorks Pro.

Sample Files

The following sample project files were placed in the \WWP\SAMPLES directory during installation. Most of these waveforms in the project files were created in WaveWorks Pro.

Use File | Open... to open one of these files. Once a file is opened, the waveforms can be edited, analyzed, and saved.

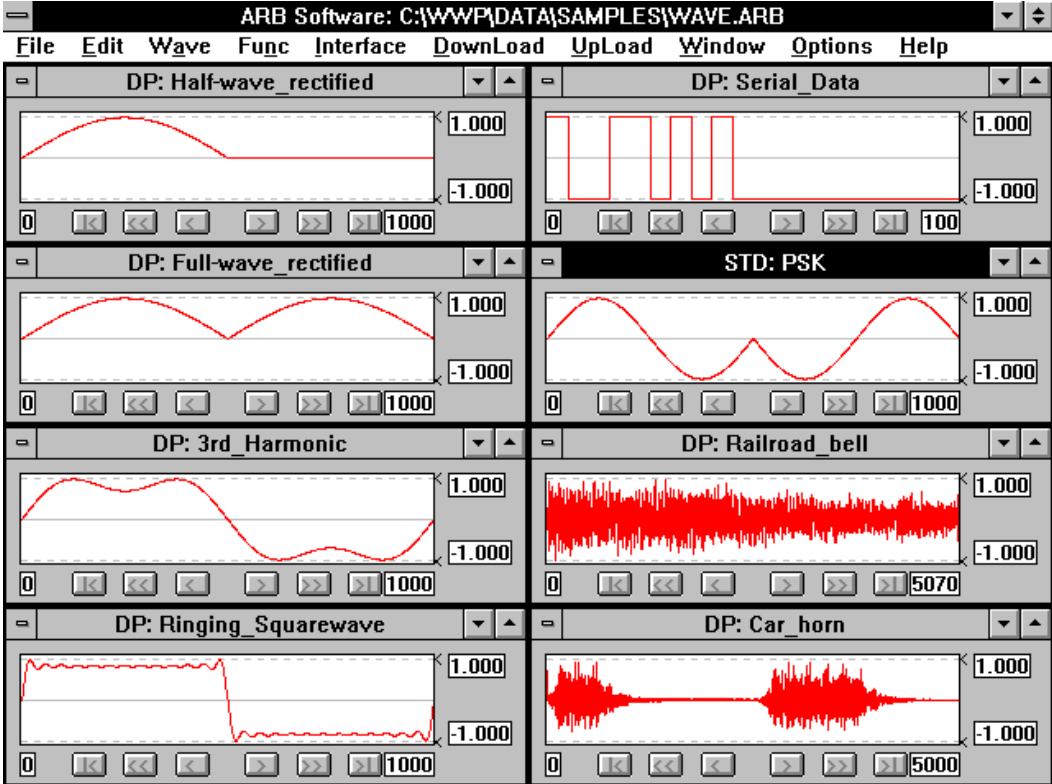
Project File Name	Description
WAVE.ARB	8 sample waveforms
MATH.ARB	MATH example - 10% noise added to sinewave
SEQ.ARB	Sequence example - 3 step sequence of 3 waveforms

Waveform Examples (WAVE.ARB)

Waveform Name	Size	Sample Clock	Description
Half-wave_rectified	1000	60 kHz	60 Hz half-wave rectified waveform
Full-wave_rectified	1000	60 kHz	60 Hz full-wave rectified waveform
3rd_harmonic	1000	...	Sinewave with 3rd harmonic distortion
Ringling_squarewave	1000	...	Squarewave with odd harmonics to 25th
Serial_data	100	...	11-bit frame of serial data
PSK	1000	...	Phase Shift Key modulated signal
Railroad_bell	5070	~18 kHz	Sound of railroad bell captured by DSO
Car_horn	5000	~ 10 kHz	Sound of car horn captured by DSO

Sample Waveforms

Waveform Windows

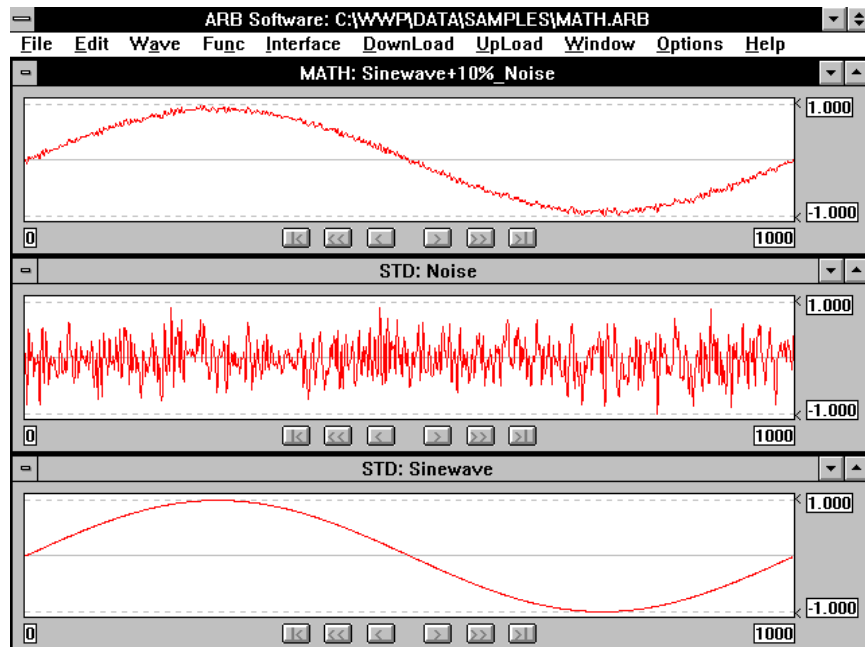


Wave List

	NAME	SIZE	TYPE	FileName	SAVED	DEVICE	Downloaded
1	Half-wave_rectified	1000	DP	WAVE.D01	Yes	Not	No
2	Full-wave_rectified	1000	DP	WAVE.D02	Yes		No
3	3rd_Harmonic	1000	DP	WAVE.D03	Yes		No
4	Ringing_Squarewave	1000	DP	WAVE.D04	Yes		No
5	Serial_Data	100	DP	WAVE.D05	Yes		No
6	PSK	1000	STD	WAVE.W06	Yes		No
7	Railroad_bell	5070	DP	WAVE.D07	Yes		No
8	Car_horn	5000	DP	WAVE.D08	Yes		No

Sample Waveforms

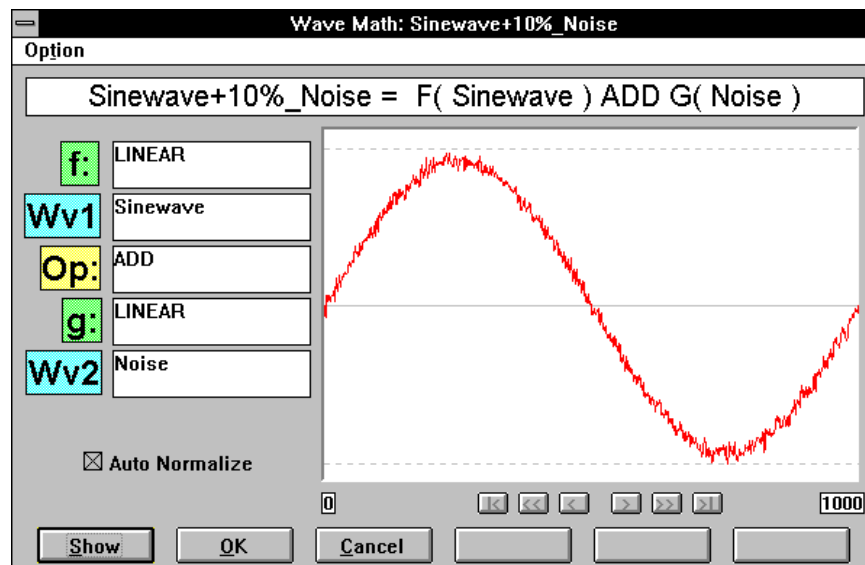
MATH Waveform Example (MATH.ARB)



Wave List

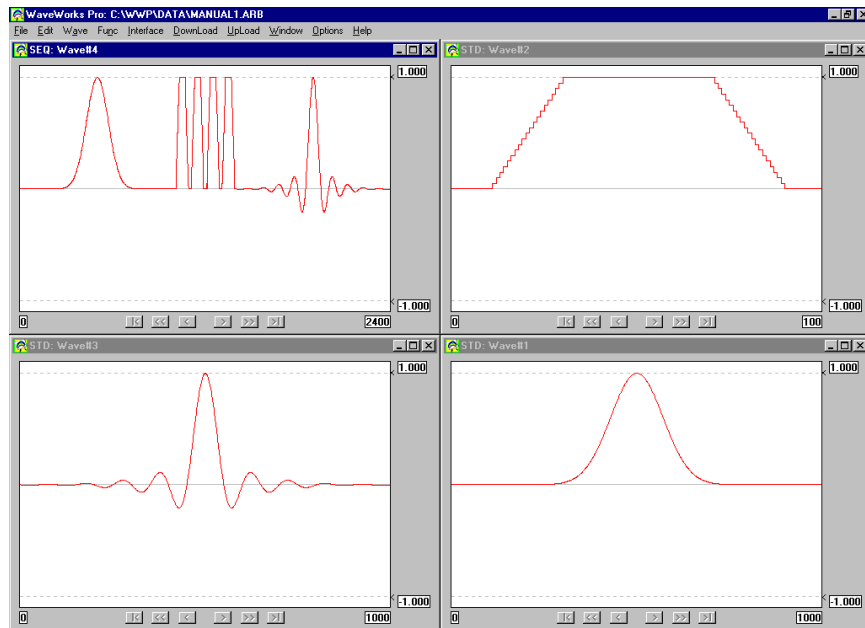
	NAME	SIZE	TYPE	FileName	SAVED	DEVICE	Downloaded
1	Sinewave	1000	STD	MATH.W01	Yes		No
2	Noise	1000	STD	MATH.W02	Yes		No
3	Sinewave+10%_Noise	1000	MATH	MATH.M03	Yes		No

Wave MATH screen



Sample Waveforms

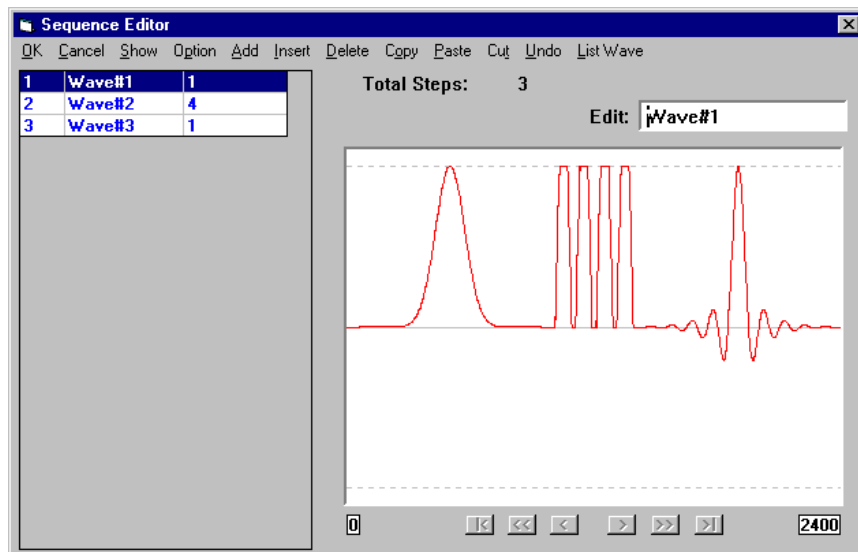
Sequence Waveform Example (SEQ.ARB)



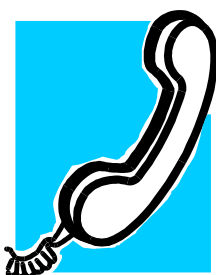
Wave List

NAME	SIZE	TYPE	File Name	SAVED	DEVICE	Downloaded
Wave#1	1000	STD	MANUAL1.W01	Yes		No
Wave#2	100	STD	MANUAL1.W02	Yes		No
Wave#3	1000	STD	MANUAL1.W03	Yes		No
Wave#4	2400	SEQ	MANUAL1.S04	Yes		No

Sequence Editor



Pragmatic Instruments, formed in 1988, provides the waveform generator market with products offering synthesizer accuracy, high-definition amplitude resolution, exceptionally low distortion and a superior user interface. The Pragmatic staff collectively represents over 100 years of function generator and arbitrary waveform generator expertise, including involvement in the development of the first commercially available arbitrary waveform generator. Recognized for innovation and exemplary customer support, Pragmatic has consistently provided new solutions in waveform generation.



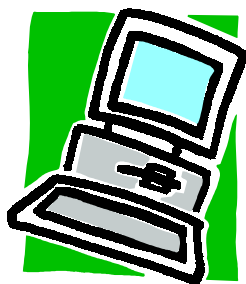
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