



**Speech Visualizer Instruction Manual**

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# 1 INTRODUCTION

## 1.1 **Purpose**

Speech Visualizer provides real-time visual feedback of voice and speech articulation. This manual covers installation and operating information for the Speech Visualizer application.

Refer to Section 2 for installation instructions.

## 1.2 **Document Overview**

The Speech Visualizer program uses a process that creates patterns from the speech waveform. This real-time display can be used to provide visual feedback of the pronunciation of vowels, diphthongs, and consonants in hearing impaired patients, as well as patients with normal hearing.

Fredrick Berg's scholarly work titled "Speech Development Guide For Children with Hearing Loss"<sup>1</sup> provides tangible goals for a patient to follow. Patients capable of normal speech functioning but lack auditory capabilities can greatly benefit from practice with the Speech Visualizer program.

The remainder of this document consists of the following sections:

- a. Section 2 provides instructions for software installation, hardware setup, and configuration of audio devices.
- b. Section 3 describes basic program operations such as capturing data.
- c. Section 4 walks you through all program operations in detail.
- d. Appendix A presents tips and strategies for possible problems that may be encountered.

## 1.3 **Manual Conventions**

The following conventions have been used to describe the user interface in this manual:

- a. Button names are bold, e.g., "Click the **Cancel** button to close the dialog box."
- b. Field names are in title case (the first letter of each word is capitalized) and are bold, e.g., "Enter corrected text in the **Raw Messages Text** field."
- c. Titles are in title case (the first letter of each word is capitalized), e.g., "The Vocabulary Search dialog box is displayed."
- d. Keyboard keys are in square brackets, e.g., "Press the [Enter] key."

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<sup>1</sup> Berg, F. (2008). *Speech Development Guide For Children with Hearing Loss*. San Diego, CA: Plural Publishing.

## 2 INSTALLATION

This section provides information about installation of Speech Visualizer. It includes the system requirements for the Speech Visualizer hardware and describes how to install the hardware, the driver, and the software.

### 2.1 **System Requirements**

Speech Visualizer requires a computer powerful enough to support audio data and graphic requirements of the applications software. It operates on a host computer meeting the following minimum specifications:

- a. Pentium IV, 2 GHz, or equivalent
- b. Windows XP, Windows Vista, or Windows 7 operating system
- c. Graphics card and monitor that supports minimal screen resolution of 1280x1024 (optimal screen resolution is 1600x1200)
- d. 5 GB (or greater) disk space available on the hard drive
- e. 1.0 GB of RAM (minimum) for program operation in Windows XP or Windows Vista
- f. 2.0 GB of RAM (minimum) for program operation in Windows 7
- g. CD or DVD drive
- h. Mouse and keyboard

Note: If your system does not meet these minimum specifications, do not install Speech Visualizer. First obtain a system with sufficient resources to support this program.

### 2.2 **Peripheral Hardware Components**

The following hardware items are needed to ensure good quality signal input to the Speech Visualizer program. Note that all components need to be purchased separately.

- a. Audio Preamplifier box with power cord (M-Audio Audio Buddy recommended)
- b. Cardioid microphone with XLR microphone cable (Shure SM-48 or SM-58 recommended)
- c. Audio cable, 1/4" mono phone plug (M) to 1/8" (3.5mm) phone plug (M)

### 2.3 Major Steps for Installation of Speech Visualizer

The Speech Visualizer is installed in the host computer using the procedure described below. There are three major operational steps.


- a. Install the Speech Visualizer Software: This is the process of installing the Speech Visualizer application software.
- b. Connect the audio preamplifier and microphone.
- c. Configure the Default Audio Input Device.

### 2.4 Install the Speech Visualizer Software

Perform these steps to install the Speech Visualizer software:

- a. If you received an installation disk, insert it into your CD drive. The Setup program should launch automatically. If Autorun is disabled on the computer, run **setup.exe** from the disk.
- b. If you have downloaded the executable file from the website, double-click on **setup.exe** to begin software installation.

Note: If you have problems running this installer, right-click on **setup.exe** and select **Run as administrator**.

- c. A Welcome screen appears. Click **Next**.
- d. Select the destination folder where the Speech Visualizer software will be installed. Click **Next** to keep the default destination folder, or click the **Change** button to browse to a different folder location.
- e. A Ready to Install the Program screen appears. Click **Install** to continue.
- f. The Speech Visualizer Program begins installation. This may take a few minutes to complete depending on the speed of the machine.
- g. Once installation is complete, an InstallShield Wizard Complete screen appears reporting the installation was successful. Click **Finish**.
- h. Verify that a Speech Visualizer icon appears on your desktop, providing a shortcut to the Speech Visualizer program.
- i. Use the desktop icon  to launch the Speech Visualizer program.

## 2.5 Connect the Audio Hardware

As stated in Section 2.2, it is recommended that an M-Audio Audio Buddy preamplifier and Shure XLR microphone are used for data input to the Speech Visualizer program. This section describes how to connect this recording hardware to the host computer. Figure 2.1 provides an overview diagram for hardware connection.

- a. Place the preamplifier next to the computer in preparation for connection to the host computer, microphone and power supply.
- b. Connect the power supply to the back of the preamplifier device box. See Figure 2.2 for rear view of the Audio Buddy preamplifier.
- c. Connect the XLR male connector on the Shure hand-held microphone to the Ch 1 XLR Mic Input jack on the back of the preamplifier.
- d. Plug the 1/4" end of the audio cable into the Ch1 Output jack on the back of the preamplifier.
- e. Connect the 1/8" end of the audio cable to the line input jack on the audio card. This input is usually blue.
- f. Turn on the preamplifier using the power button located on the front panel. See Figure 2.3 for front view of Audio Buddy.

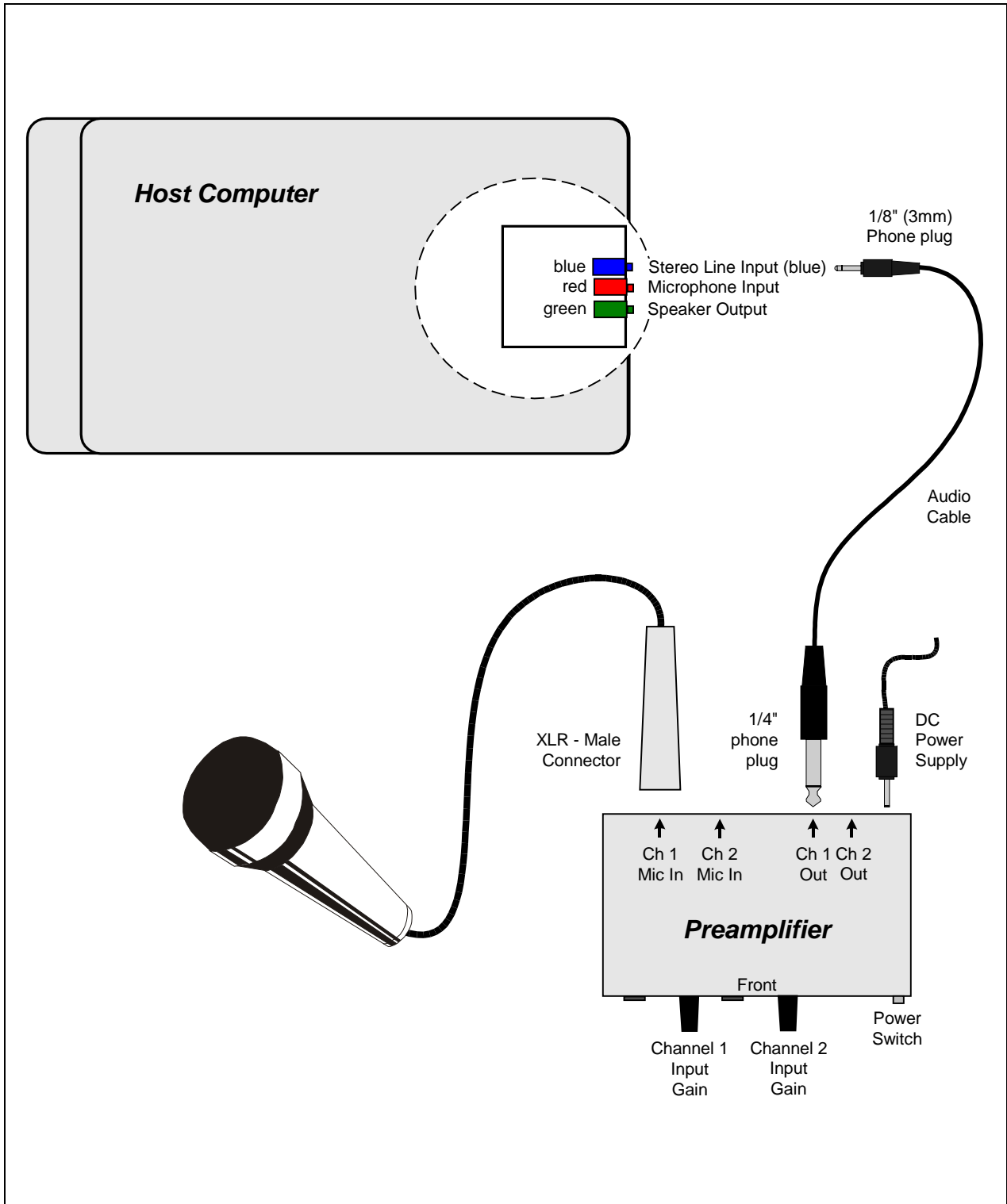


Figure 2.1: Connect the audio hardware to the host computer

### 2.5.1 Rear View of Audio Buddy Preamplifier

Refer to Figure 2.2 for the locations of the Ch1 XLR Mic Input jack, the Ch1 Output jack, and DC power supply jack. Note that Ch2 XLR Mic Input and Ch2 Output are not used for this application.

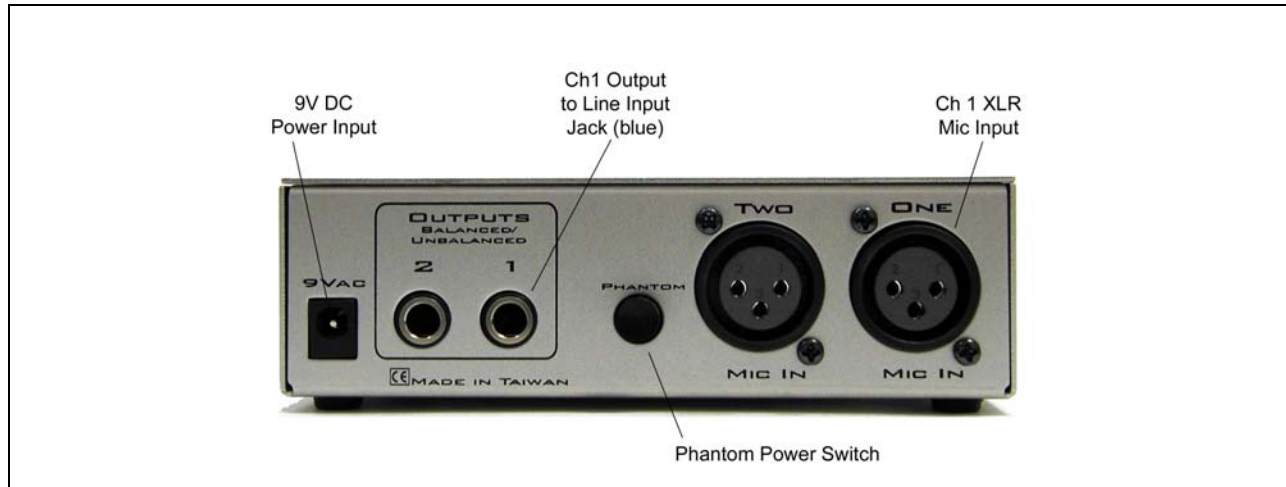


Figure 2.2: Rear View of Audio Buddy Preamplifier

### 2.5.2 Front View of Audio Buddy Preamplifier

Refer to Figure 2.3 for the locations of the Ch 1 Input Gain Control dial and the power button. Note that Ch 2 Input Gain is not used for this application.

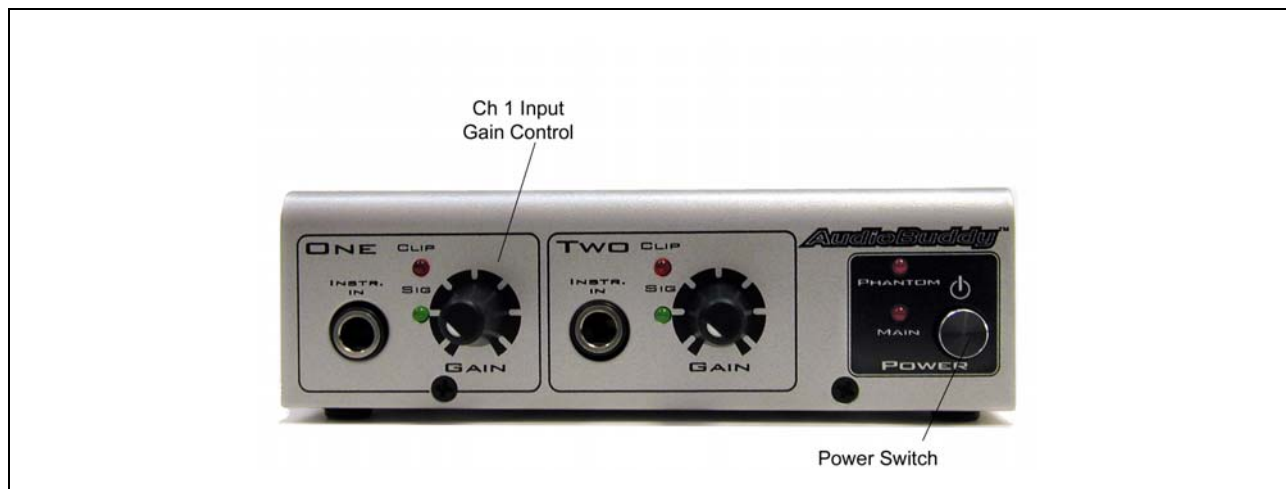


Figure 2.3: Front View of Audio Buddy Preamplifier

## 2.6 Default Audio Device Configuration

This section describes how to configure the onboard audio device as the default device for recording.

Note that the procedure used to configure the default audio device will vary depending on your operating system. Section 2.6.1 describes how to configure the audio device in Windows Vista or Windows 7; Section 2.6.2 describes how to configure the device in Windows XP.

### 2.6.1 Audio Device Configuration in Windows Vista or Windows 7

In Windows Vista or Windows 7, follow these steps to verify that the on-board audio device is being used as a line input device and is selected as the default:

- a. Verify that the preamplifier is correctly connected to the Line In jack for the onboard audio device on the host computer.
- b. From the **Start** Menu, navigate to Control Panel, Sound.
- c. In the Sound dialog, access the Recording tab.
- d. Verify that the Line In option for the on-board audio device is selected as the default device in the Recording tab. The default device is identified by a green checkmark beside the device icon. Check the computer documentation if you are not sure which audio device was provided with the computer.
- e. If the on-board line input device is not the default device for recording, select it as follows:
  - i. In the Recording tab, find the on-board audio device.
  - ii. Select the Line In option for the onboard device, and then click the **Set Default** button.
  - iii. Click **OK** to close the Sound dialog.
- f. Close the Control Panel.

Note that if the Speech Visualizer program is already open, it will have to be closed and re-launched before these new settings will take effect.

### 2.6.2 Audio Device Configuration in Windows XP

In Windows XP, follow these steps to verify that the on-board audio device is being used as a line input device and is selected as default:

- a. Verify that the preamplifier is correctly connected to the Line In jack for the onboard audio device on the host computer.
- b. From the **Start** Menu, navigate to Control Panel, Sounds and Audio Devices.

- c. In the Sounds and Audio Device Properties dialog box, access the Audio tab.
- d. Verify that the on-board audio device is selected in the **Default device** drop down box for Sound Recording. If the on-board sound device is not currently selected as the default device for recording, click the drop-down arrow and select it from the displayed list.
- e. Click the **Volume...** button in the Sound Recording section to display a Recording Control dialog box.
- f. In the Recording Control box, verify that **Line In** is selected. (Note that, depending on your audio device, you may have to either choose the **Select** checkbox for Line input, or choose the **Mute** checkbox for Mic input. See Figure 2.4 for more information.)
- g. Close the Recording Control dialog box to return to the Sound and Audio Devices Properties box.
- h. If a change was made, click **Apply** in the Sound and Audio Devices Properties box to implement your new settings.
- i. Click **OK** to close the Sound and Audio Devices Properties box.
- j. Close the Control Panel.

Note that if the Speech Visualizer program is already open, it will have to be closed and re-launched before these new settings will take effect.

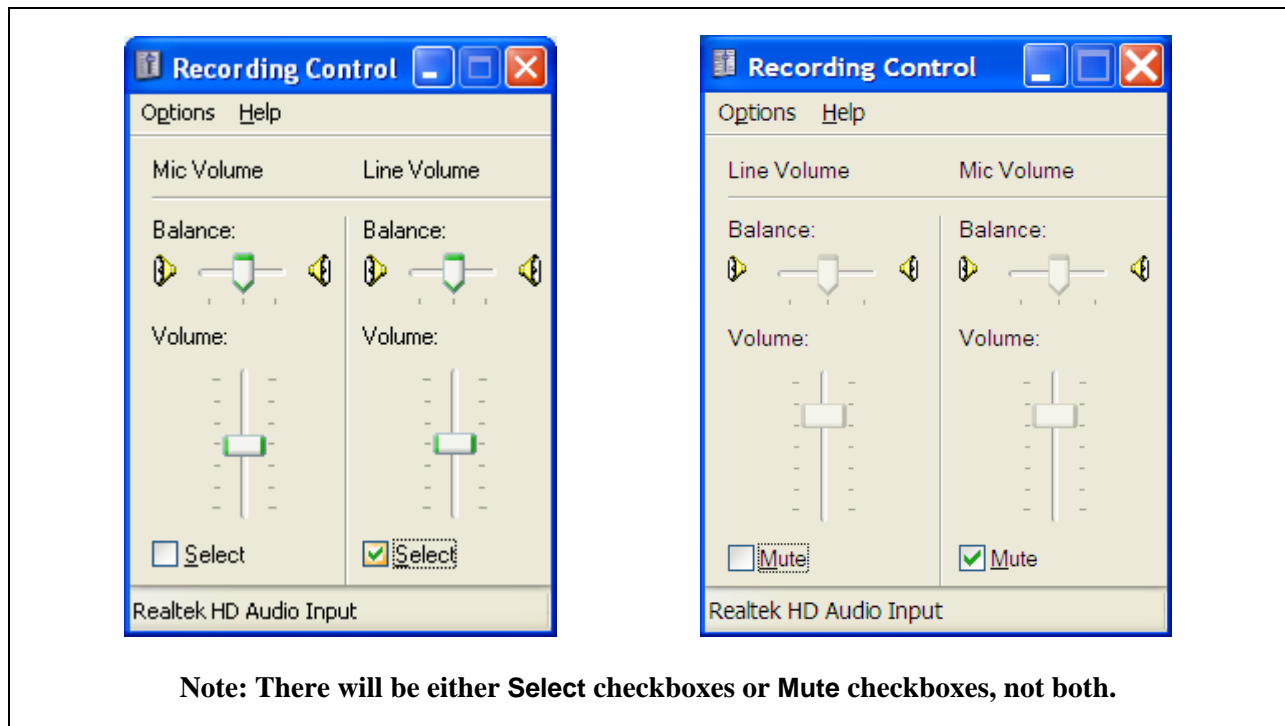


Figure 2.4: Recording Control Options (Windows XP)

## 2.7 Test the Software Installation

After installing the software, run the program to verify the ability to record audio data. Refer to Section 3.6, Recording and Displaying Speech Visualizer Data, for a description on how to perform these program functions.

If data capture is not working, it may be necessary to check Appendix A – Troubleshooting for further instruction.

### 3 GETTING STARTED

This chapter provides a brief overview of how to operate the Speech Visualizer. It walks you through a number of steps to familiarize you with some of the program's capabilities.

By following the instructions provided, you will learn the fundamentals of using the program.

#### 3.1 **Microsoft Windows Operating Systems**


The Speech Visualizer program runs on the Microsoft XP, Windows Vista, and Windows 7 operating systems. STR's software was written in compliance with the standard Windows user-interface recommendations to facilitate ease of use.

This manual assumes that the user has basic familiarity with Windows (e.g., use of a mouse, drop-down menus, dialog boxes, etc.). Users unfamiliar with Windows should obtain a manual or secondary source for reference to ensure that operational descriptions used in this manual are understood.

#### 3.2 **Entering the Program**

If you wish to enter the Speech Visualizer program automatically when you turn on the computer, you can do this by adding the Speech Visualizer shortcut to the "Startup" folder in the Programs menu. This can be done by simply dragging the shortcut on your desktop through the menus, to the Startup folder, or by copying the shortcut icon to the Startup folder through Windows Explorer.

To start the program, proceed as follows:

- a. Use the Speech Visualizer icon on your desktop  to launch the application.
- b. Alternatively, click the Windows **Start** button, then click **All Programs** and open the STR-SpeechTech folder to access the Speech Visualizer shortcut icon.

#### 3.3 **Work Area at Start-up**

When you launch the program, your screen will look similar to the display shown in Figure 3.1.

The title bar at the top of the application window shows the name of the program and the program icon. Standard Windows buttons are shown in the right side of the title bar to minimize, maximize, and close the program.

Below the title bar is a menu, where setup options and on-line help are accessed. Next is the Speech Visualizer display area, where the graphics are displayed during signal capture. The bottom of the application window contains the **Capture**, **Clear** and **Quit** buttons.

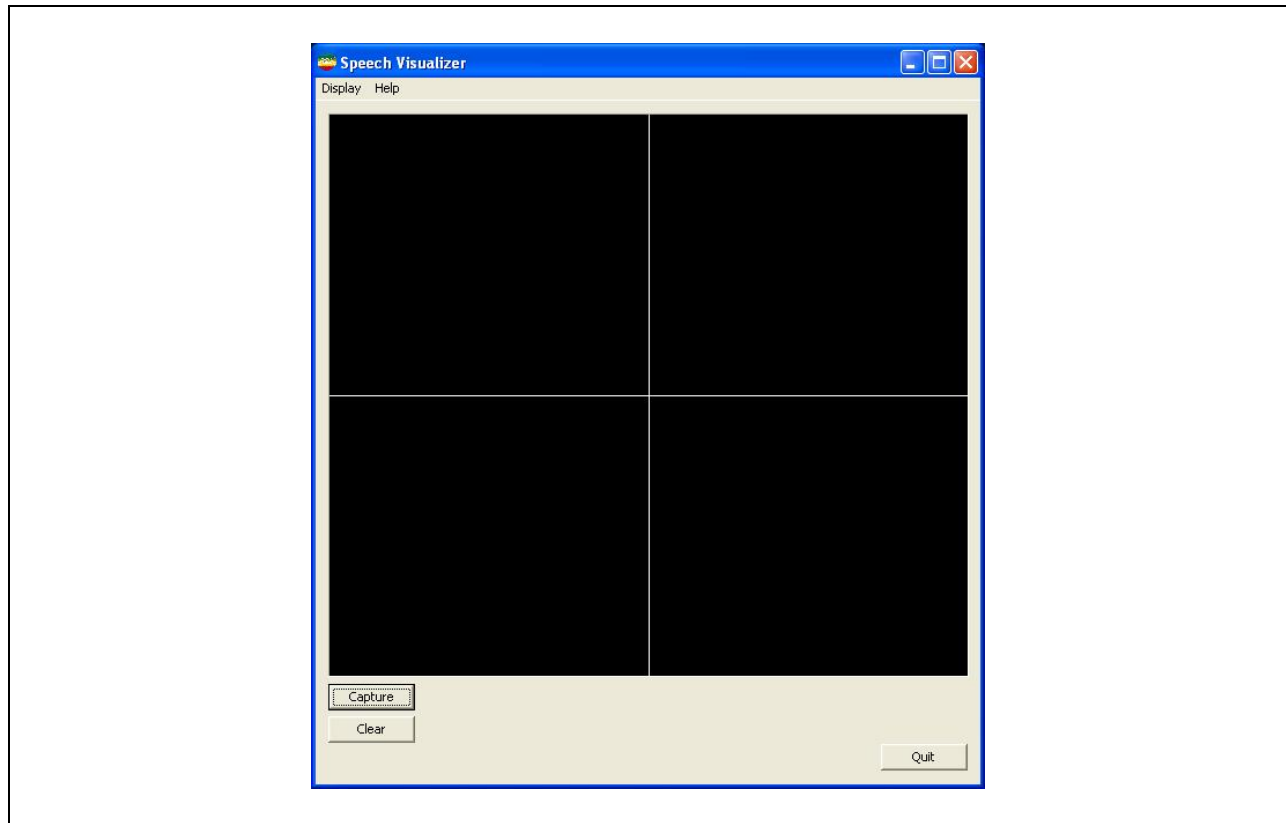


Figure 3.1: The application window on start-up

### 3.4 Using a Mouse and Pull-Down Menus

The Menu appears across the top of the work area. Pressing the **Left** mouse button on the desired menu choice highlights that item on the Main Menu and displays a submenu associated with that particular item.



The left mouse button is also used to select the **Capture**, **Stop** and **Quit** buttons.

### 3.5 Shortcut Keys in Speech Visualizer

The table below describes shortcut keys that are used by the program.

Key	Function	Description
Spacebar	Records Signal	Captures a signal from the microphone and displays results in the Speech Visualizer display pane. Also stops capture when capture is in progress.
Esc	Quits the program	Immediately closes the Speech Visualizer application window.

### 3.6 Recording and Displaying Speech Visualizer Data

Before attempting to capture and display real-time patterns, ensure the recording hardware is installed and configured correctly.

- a. Ensure that the microphone and preamplifier hardware is correctly connected to your host computer, and that the configuration settings are correct.
- b. The microphone should be approximately 2 inches away from the client.
- c. The following steps assume that the default Speech Visualizer analysis and display settings are used. Section 3.6.1, Changing the Speech Visualizer Options, describes how to view and optionally change these settings.
- d. To begin real-time capture and processing, click on the **Capture** button below the Speech Visualizer display pane. Alternatively, press [Spacebar] to start data capture. Figure 3.2 shows a display of the window containing recorded signal data.
- e. During data capture, the signal is displayed in real time in the Speech Visualizer display pane. The **Capture** button turns into a **Stop** button during data capture. If **Stop** is selected during phonation, the current signal remains in the Speech Visualizer display pane for further analysis.
- f. Once phonation is complete, you may stop data collection by pressing the [Spacebar]; you may then resume by pressing [Spacebar] again. Starting data capture again will erase previously captured data.
- g. Experiment with the instrument in this fashion to gain familiarity with the display and how data is processed.

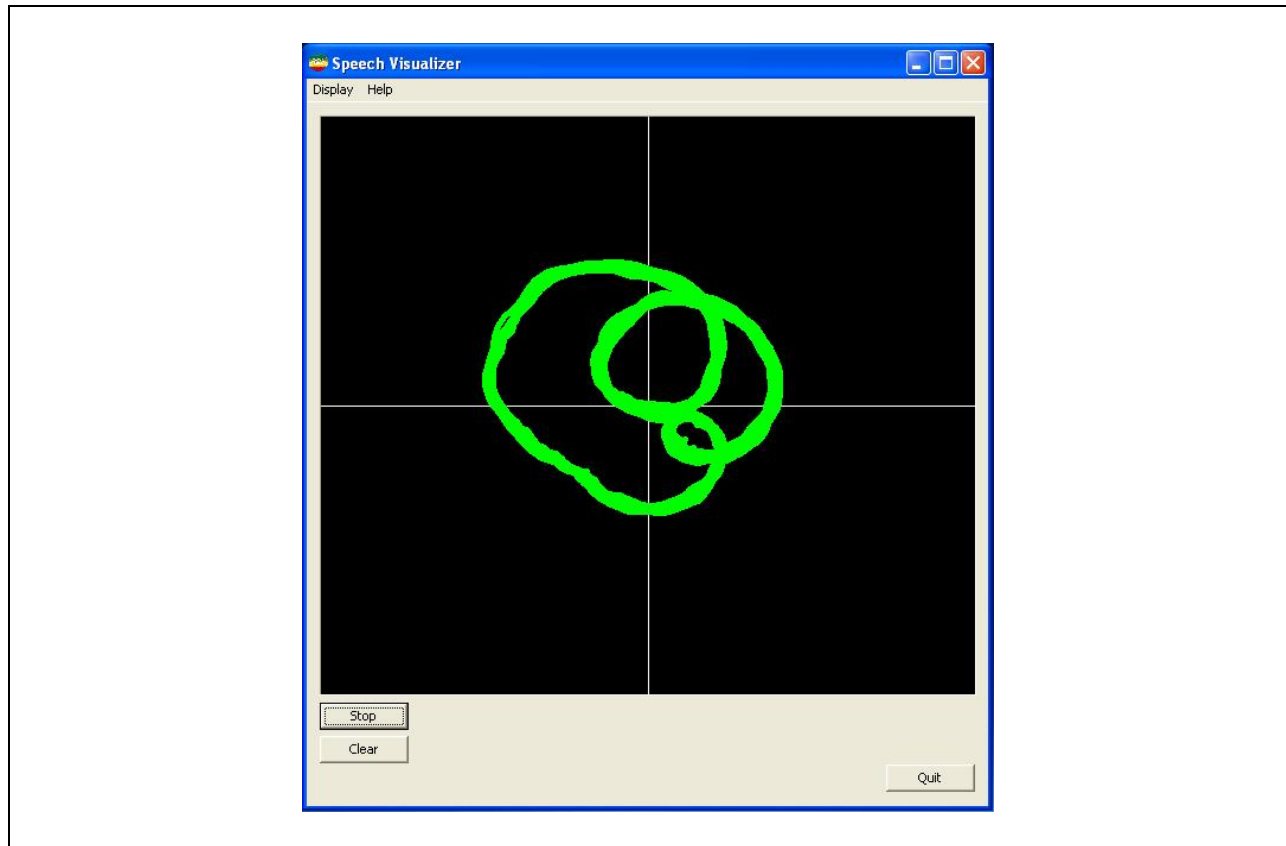


Figure 3.2: Speech Visualizer display pane during data capture

### 3.6.1 Changing the Speech Visualizer Options

When recording is started, the processing and display parameters are determined by the settings for the Speech Visualizer options. All options are set using the **Display** menu. This provides access to a capture options dialog box and a color options dialog box. Refer to Section 4 for information about each Speech Visualizer option.

### 3.7 Summary

You have reviewed a number of features and have performed your first recording using the Speech Visualizer software. The next section provides a ready reference to all operations available in the program.

## 4 PROGRAM OPERATIONS

This chapter provides detailed information on how to perform program operations. The information is organized to provide some general information, and then describes the functions available from each menu item in the Main Menu.

### 4.1 **Speech Visualizer Application Window**

The Speech Visualizer display pane, by default, is a black screen with a white grid splitting the pane into four quadrants. **Capture** and **Clear** buttons are located below the grid, and allow a user to quickly start, stop and clear data capture as necessary. The **Quit** button, also located below the grid, is used to exit the program.

#### 4.1.1 **Capture Button**

You may record and display signal data in real time in the Speech Visualizer window. Before starting data capture, ensure that all hardware is properly connected, and audio settings on the host computer are correct. See Section 2 for more information.

- a. To view and optionally change the Speech Visualizer capture options, click on the **Display** menu and select **Capture**. See Section 4.2 for detailed information about each option.
- b. To begin real-time capture and processing, click on the **Capture** button below the grid. Alternatively, press the [Spacebar]. The **Capture** button toggles to a **Stop** button.
- c. Stop data capture by clicking the **Stop** button, or press the [Spacebar] a second time. If phonating when capture is stopped, the visual display will remain on screen for further analysis.

#### 4.1.2 **Clear Button**

After data capture is complete, you may optionally clear the Speech Visualizer display pane before capturing data again. To clear the Speech Visualizer display pane, select the **Clear** button. Note that the display is cleared automatically when a new Capture is started.

#### 4.1.3 **Quit Button**

To exit the program and return to the Windows environment, click on the **Quit** button.

## 4.2 Display Menu

The **Display** menu is used to define different capture options and modify the colors displayed in the Speech Visualizer working window.

### 4.2.1 Capture Options

All capture parameters are set from within the Capture Options dialog box. To display this setup dialog box, access the **Display** menu and click on the **Capture** menu item.

After changing the settings, click the **Apply** button to apply the new settings to the Speech Visualizer display pane and close the dialog. Click **Cancel** to close the dialog box and discard any changes made that were not applied.

#### Capture Options:

**Show Grid** – If **Show Grid** is selected, sets the program to display the four-quadrant grid in the Speech Visualizer display pane. If not selected, no grid appears in the Speech Visualizer display pane.

**Single Pass** – Sets the program to single-pass capture mode. When **Single Pass** is selected, capture continues up to a maximum duration set by **Total Duration** (40-150 mSec), and then stops automatically. If not selected, data capture continues indefinitely. This format facilitates capture of short sections of data without having to manually stop the capture operation; capture is stopped automatically by the program. Note that single pass capture will start with the trigger of voicing above a moderate dB threshold to allow for accurate data capture.

### 4.2.2 Scope Color

The colors displayed in the Speech Visualizer display pane may be modified by accessing the **Display** menu, then the **Color** menu item. A Scope Color dialog box is displayed where color options can be modified.

#### Scope Color Options:

**R, G, B Scrollbars** – Change the color of the Speech Visualizer contour by moving the scrollbars for **R** (red), **G** (green) and **B** (blue). A display of the current color produced from the scrollbar movement is shown at the bottom left corner of the dialog.

**Background** – Sets the Speech Visualizer display pane background color to either **Black** or **White**. Select the radio button for the desired background color. A display of the current background color from the radio button selection is located at the bottom left corner of the dialog.

## 4.3 Help Menu

### 4.3.1 Speech Visualizer Help

This manual is available as an eBook in PDF format from within the application. Please note that this manual is not available in a printed version, but may be optionally printed from the PDF document.

Note: The eBook is in Portable Document Format (PDF) file format, and may be viewed and printed using Adobe Reader software, which is available as a free download from the Adobe Systems Inc. Web site. Go to [www.adobe.com](http://www.adobe.com), then click the **Get Adobe Reader** button on the Web page.

To view the eBook from within the application, ensure that the Adobe Reader software is installed on your computer, then proceed as follows:

- a. Select **Help** from the Main Menu.
- b. Then select **Speech Visualizer Help**. The Adobe Reader software is launched and the eBook version of this manual is displayed.
- c. Note the Bookmarks tab is open. The window is divided into two (2) panes, with links to the topic headings in the left pane and the information from the selected page displayed in the right pane. For example, click the “+” beside Section 2 INSTALLATION in the left pane to show a list of all topics in the chapter, and then click on System Requirements (for example). The selected topic is displayed in the right pane.
- d. Alternatively, you may use the Table of Contents in the body of the eBook to jump to a topic of interest, or use the Pages (Thumbnails) tab. There are also scroll buttons along the bottom of the Help application that allow you to move from page to page.

Note: You can keep the eBook open while you use the application. Use the [Alt+Tab] keys to move between the applications.

### 4.3.2 About Program

This menu item is used to display information about the program. To display this information box, select **About** from the **Help** menu.

### APPENDIX A - TROUBLESHOOTING

This section provides some tips and strategies for some of the problems you might encounter while operating the program.

Problem or Symptom	Possible Solution
The Speech Visualizer is not capturing data when phonating into the microphone	Check that the preamplifier is powered on, and that the microphone and patch cord to the computer are properly connected. See Section 2 for more information on proper hardware connection.
	Ensure that the Channel 1 input “Gain” knob on the preamplifier is turned up. If using the Audio Buddy, the green LED light above the “Gain” knob should flash occasionally during input.
	If running on the Window Vista or Windows 7 operating system, ensure that the properties for the Line Input device are correct. Access the Line Input device in the Control Panel, then click the Properties button. A Properties box is displayed. Access the Levels tab, and verify the Line In volume is set to 50%, and the Mute button is not selected.
	If the hardware device is properly connected and configured, but data capture still does not work, make sure your audio driver is completely up to date. Some audio drivers refuse to use the Mic Input also as a Line Input, and driver upgrade may fix this problem. First, review Section 2.5, Connect the Audio Hardware, and Section 2.6, Default Audio Device Configuration, to ensure the correct hardware connection and configuration is in place before attempting to update a driver from the hardware manufacturer.