Operator's Manual

StethView Digital Recording System

Win XP Version

Catalog Number 717-8000

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1.0 Product Description

The StethView Digital Recording System is a software program designed for recording and viewing heart and/or breath sounds. The System captures heart or breath sounds with any one of these Cardionics Auscultation Instruments -- the SimulScope III Bedside Auscultation System, the SimulScope Bedside Auscultation System with ECG, the Ausculette II Bedside Auscultation System or the E-Scope Electronic Stethoscope. StethView will operate with most current model laptop or desktop PC computers.

The StethView provides a phonocardiogram (PCG) display of the heart sounds or a phonopneumogram (PPG) of breath sounds. A feature within of the StethView program will provide a simultaneous ECG along with the PCG to allow the user to identify systole in patients with rapid heart rates. An external device, the Audio Interface Module, and the SimulScope with ECG is used to capture the patient's ECG.

A Patient Information Section allows the sounds to be stored for immediate playback or to be compared with other sounds from the same patient. Sounds can also be saved as .wav files.

The .wav sound files can be sent by email, if desired.

The StethView utilizes the soundboard of the computer to receive the sounds. When playing back, it is recommended that computer speakers not be used. Computer speakers are notoriously poor at reproducing low frequency heart sounds. We recommend listening with headphones.

If using either SimulScope or the Ausculette, playback can be done through either of these systems. If using the E-Scope, however, we recommend the use of the Cardionics low frequency headphones, cat. no. 718-0406 for playback.

These headphones can be used with most computer soundboards.

2.0 Installing StethView on your computer

2.1 Important Note

It is important to realize that StethView is a graphics program. It is designed to run on 16-bit color with a screen resolution of 800x600 pixels. If StethView does not install properly, please try the following: on the desktop place the mouse on an empty spot on the desktop and right click. Then click on **P*roperties***. Click on the ***Settings*** tab. The correct setting is*: High color (16 bit*). If your computer does not have this screen resolution, you will have to upgrade your graphics card prior to installation of StethView. The upgrade is simple and inexpensive. Your computer department should be able to do this for you, but feel free to call Cardionics for assistance at 1-800-364-5901 or 281-488-5901 or fax us at 281-488-3195.

To install, simply place the StethView Software into the CD-ROM drive of your computer and follow the “On-screen” instructions.

2.2 Connecting Cardionics Auscultation Instruments

If using the E-Scope Electronic Stethoscope, connect the ***Sounds Out*** (see Fig.1) of the E-Scope using the cable supplied by Cardionics.

Connect the E-Scope to a PC computer using Cardionics cable, 711-9000. Connect the distal end of this cable to the Mic-in or line-in on the computer for recording. For playback, remove this connector from the “Mic In” and insert into the “Headphone” output of the PC. This cable is matched to the E-Scope. You can playback directly into the E-Scope, if desired. However, be sure the E-Scope has

turned off prior to listening or you will hear sounds from the chest piece as well as from the StethView. See Figure 2 for a diagram and see section 6.0 for ordering information.

Figure 1: E-Scope Sounds Output

2.3 Connecting the SimulScope III Bedside Auscultation System or Ausculette II Bedside Auscultation System

Connect the SimulScope ***ACCESSORY OUTPUT*** (See Fig 2) to the ”line-in” on the soundboard of the computer. If your computer soundboard does not have a “line-in”, use the “mic-in”.

If recording ECG with heart sounds, connect the ECG cable to the ECG input on the SimulScope ECG. To record ECG, you must have a Audio Interface Module (see section 6.0 for ordering information).

Cardionics Auscultation Instruments	Heart/Breath Sounds	ECG Recording
E-Scope	Yes	No
SimulScope III	Yes	No
SimulScope - R	Yes	Yes
Ausculette II	Yes	No

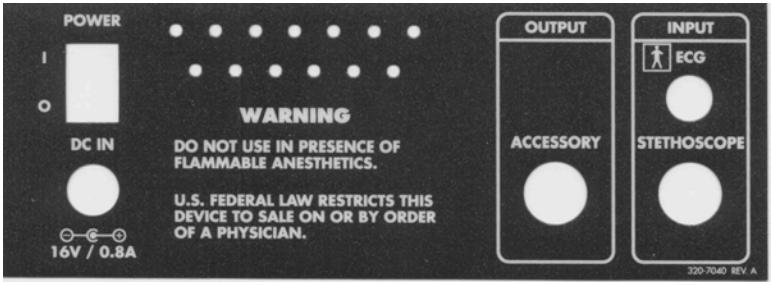


Figure 2: SimulScope Rear Panel

If using the Ausculette II, connect a ¼ inch phone jack on the rear panel of the Ausculette to the computer's *Mic in* or *line-in*.

2.4 Set up For Sounds and ECG display

If you wish to display sounds and ECG simultaneously on StethView, the Audio Interface Module is required.

If you do not use ECG, skip this section and go to Section 4.0.

Figure 3: Audio Interface Module

2.4.1 Installing the Audio Interface Module for ECG recording.

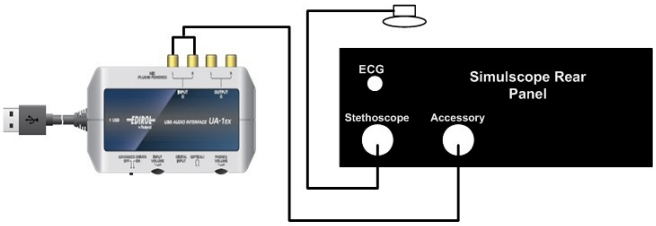
The Audio Interface Module is used ONLY with the SimulScope for display, recording and playback of ECG.

1. Plug Audio Interface Module into computer USB port.

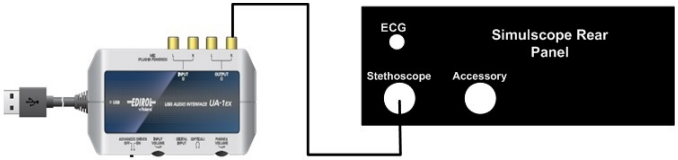
2. Insert the supplied cable from Audio Interface Module to SimulScope Accessory Output located on the rear panel of the SimulScope as shown in Figure 3.

3. For playback disconnect **Stethoscope** from **SimulScope**.

4. Connect supplied cable from SimulScope Stethoscope to Audio Interface Module.



StethView USB to Simulscope Recording



StethView USB to Simulscope for Playback

Figure 4: Playback though SimulScope

5. Turn power on to the computer and startup Windows. Connect the Audio Interface Module to your computer USB port.

6. **A USB Composite Device** will be detected automatically, and the driver will be installed.

7. After installing the driver, restart Windows.

8. Making Driver Settings. Click the Windows **Start** Button, and select **Settings-Control Panel**. (In Windows XP, click the **Start** button and then click **Control Panel**.)

9. Access "**Sound and Multimedia Properties**" In Control Panel, double click the **Sounds and Multimedia** icon to open the "**Sound and Multimedia**

Properties” dialog box. If the **Sounds and Multimedia Properties** icon is not shown. In the **Control Panel**, click **Sounds, Speech, and Audio Devices**. Next, click **Sounds and Audio Devices** to access the “**Sounds and Audio Devices Properties**” dialog box.

10. Click the **Audio** tab.

11. As the **Preferred device** for **Sound playback** and **Preferred device** for **Sound recording**, select **USB Audio Codec** or **USB Audio Device**.

12. Click **OK** to complete settings.

This completes installation of the **USB Composite Device** driver and **Audio Device Module** driver.

3.0 Using StethView

3.1 Selecting *Options*.

Initially, you should select *Options* from the *Files* menu. The menu *as* shown below will be seen.

Recording time
Recording Rate
Number of channels
Continuous playback
File location
Trace color
Language

3.1.1 Recording time:

Select from 1-120 seconds. Recommended 10-15 seconds for heart sounds.

3.1.2 Recording rate:

The recording rate must match sound card capabilities. Most users don't know what these capabilities are so we suggest starting with 11,025Hz. Run a few tests at different recording rates. To reduce high frequency noise, we recommend recording at a rate that is at least twice the highest frequency expected. Since Heart Sound frequencies are from 20Hz to 650Hz, a recording rate of at least 1300 is suggested. Breath Sound frequencies are from 70Hz to 2000Hz; a recording rate of at least 4000 is recommended.

3.1.3 Number of channels:

(1 or 2) Choose 1 if only PCG (phonocardiogram) is to be recorded and 2 if PCG and ECG are to be recorded.

3.1.4 Continuous playback:

The recording is "looped" for continuous playback.

3.1.5 File location:

The Patient .wav files are located in “Data files”. If sub-directories are desired to keep files organized, use Windows Explorer and create subdirectories as desired.

3.1.6 Trace Color:

This screen permits the user to change colors using the StethView software.

3.1.7 Language:

English only at this time.

3.1.8 ECG Recording.

To record PCG and ECG, click on ***Number of channels*** in the ***Options*** menu. This button will allow you to change the number of channels from 1 to 2.

[If an ECG is not used, ignore this step.] The ***Options*** menu allows you to have two channels for *Sounds and ECG.* If using ECG, you must use the SimulScope –R, cat. no 718-7006. For the ECG to display, the computer must have a *Line-in* section. If only a *Mic-in* is available, the ECG cannot be displayed.

For ECG you will also need the Audio Interface Module from Cardionics. See section 6.0 for ordering information.

3.2 To Display and Record a Sound

After selecting *Options*, *Files* Menu and click on *New Recording.*

To record, click on the *Record* button. The amplitude of the trace can be adjusted using the *Level Adjust* Bar in the lower right section of the above screen.

After the recording is completed, press the *Play* button to see the trace and hear the sound. The sound can be heard through the computer speakers. To play back using Ausculette or SimulScope, connect the Playback cable (see section 6 if you do not have this cable) from the headphone jack of the computer to the *Stethoscope In* on the SimulScope or Ausculette. For playback using the E-Scope, connect the playback cable supplied to the *Sounds Output* of the E-Scope.

If there is no display on the screen or if “clipping” of the trace occurs, you may need to adjust the system *mic-in* or *line-in* volume. See trouble shooting section in section 5.0.

Important Note: To obtain a good quality phonocardiogram, we highly recommend that you remove your hands from the stethoscope head during recording. Hand movement introduces a significant baseline artifact. While recording, we recommend that you secure the stethoscope head by wrapping the patient with an ACE elastic bandage, then slipping the stethoscope under the elastic bandage to secure it. Have the patient relax and let the screen run for several sweeps. The phonocardiogram will be significantly improved**.**

Once a signal and the point of maximum intensity (PMI) has been obtained and the phonocardiogram is stable without significant baseline noise, you are ready to record. As described above, determine how long you wish to record. For human subjects, 8-20 seconds is normally ample. At Cardionics, we record heart sounds for 10 seconds and breath sounds for 20 seconds. To set the recording time, click on the *Options* button located in the *Files* section of the Main Menu. The maximum recording time is 120 seconds (2 minutes).

Click on the *Record* button in the middle of the screen as seen in Figure 3. When ready, click on the *Start Recording* button. The phonocardiogram will be seen on the screen as the recording occurs. You may click on *Stop Recording* at any time or let the program run for the scheduled amount of recording time.

Recording heart or breath sounds is different than listening. Practice is recommended. See Appendix A for some recording techniques.

3.3 Main Menu - StethView Digital Recording System

File Edit Simulated Sounds Utilities About Exit

3.3.1 Files

New Recording –	Begins with a new record. Can be saved later to a patient file.
Existing Patient –	Accesses previously recorded sounds from an existing patient.
Import a .wav file –	Allows importation of a .wav file from any location on the computer.
Save as a patient file –	Allows a new recording to be saved as a patient file.
Save as file –	Allows any new recording to be saved as a non-patient file, i.e. for teaching.
Close –	Closes StethView.
Options –	see Section 4.1 of this manual on page 7.

3.3.2 Edit

Play at ½ speed **–** plays sounds slowly for easier identification.

Filter sounds **–** allows a recorded file to be filtered with both high and low selectable frequencies to improve the definition on the waveform.

3.3.3 Simulated Sounds

Simulated – allows the user to select from a library of existing simulated sounds. Both sounds and PCG are heard and seen.

Real – allows the user to select from a library of prerecorded real patient sounds with PCG display.

No real sounds are current stored on StethView.

This is for a future upgrade.

3.3.4 Utilities

Email – permits the user to send a saved file via email.

Compare sounds – allows the user to compare two existing sounds on the same screen.

Print – prints sections of StethView

Sound trouble – troubleshooting section.

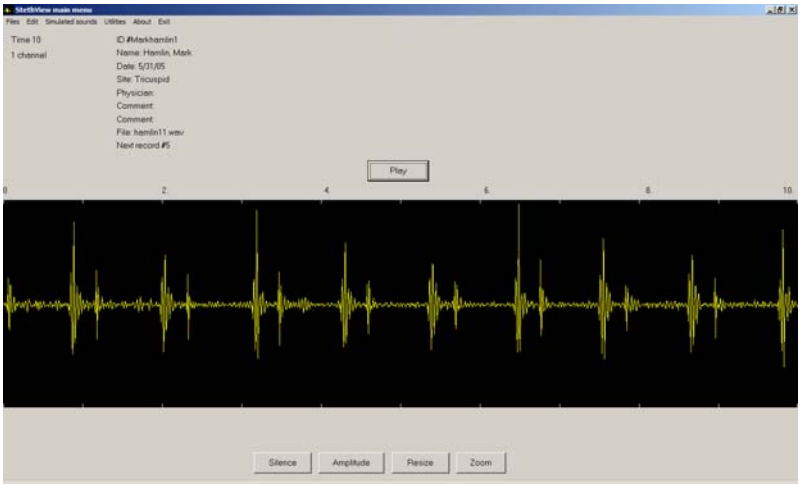


Figure 5: Display and Recording

3.4 Playback

Once the recording has been completed, you may Playback immediately by clicking on the *Play* button. The above recording was taken with the patient standing and little time spent finding the PMI. Notice how noisy the base line is. In this recording, the person holding the stethoscope did not use an elastic bandage to secure the stethoscope as suggested above.

3.4.1 Playback through the E-Scope

The same cable used for recording with the E-Scope can be used for playback. However, the cable must be moved to the headphone jack on the computer. Or, headphones can be attached to the computer for playback

3.4.2 Playback through the SimulScope

Connect the Playback cable from the Headphone jack of the computer to the “Stethoscope In” on the SimulScope. Listen with Heartman Infrared Headphones provided with the SimulScope.

3.5 Editing a Sound

There are five methods of editing. *Filtering* a sound can be found in the *Edit* menu and four additional methods will be seen at the bottom of the screen AFTER the sound is played.

To Edit the trace, first press the *Play* button to view and hear the recording.

At the bottom of the screen, there are four Edit buttons, (1) *Silence*, (2) *Amplitude*, (3) *Resize* and (4) *Zoom*.

The *Silence* button will eliminate any sound from a designated section of the trace. The *Amplitude* button will reduce the amplitude of any designated section of the trace.

The *Resize* button will allow selected sections of the trace to be eliminated.

The *Zoom* button allows viewing only of selected sections of the trace.

3.5.1 Silencing a section of the trace.

To Silence a section of the trace, click on the *Silence* button. Then, move the mouse to the trace. Click and hold the mouse. Drag the mouse over the section to be silenced. An example of the resulting trace is shown below. There will be a prompt to *POST*. Clicking on *Post* will activate the *Silence* function. An example of the resultant trace is shown below.

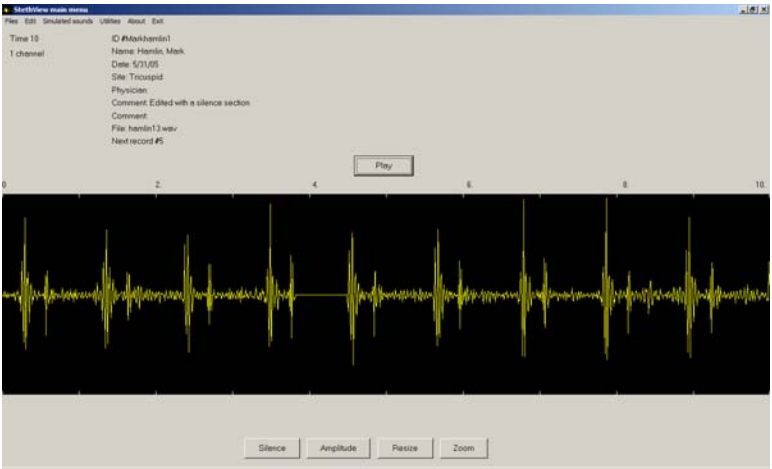


Figure 6: Silencing a Section of the Trace.

3.5.2 Amplitude Change.

To change the amplitude of the trace, click on the *Amplitude* button. Click and hold the mouse as it is dragged over the section of the trace that is intended for amplitude change. Click on *POST*. Then, enter the amount of amplitude reduction in the dialog box. An example of the resultant trace is shown below.

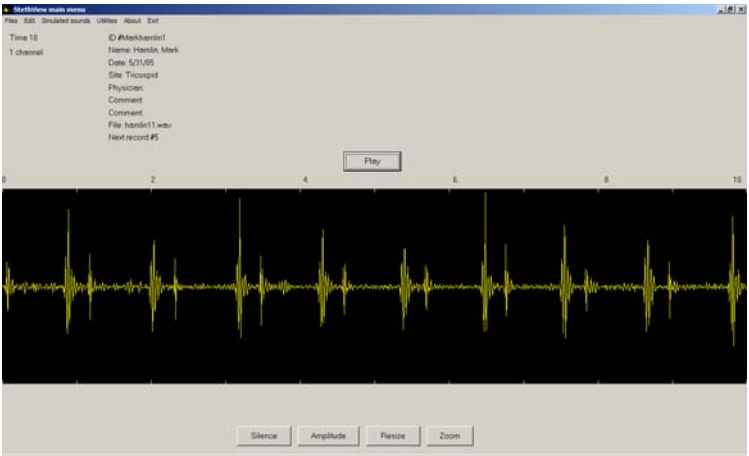


Figure 7: Changing Amplitude of the Trace.

3.5.3 Resizing a trace.

The purpose of the *resize* button is to allow the elimination of an unwanted section of the recording either at the beginning or end of the trace. This section allows the user to edit any unwanted section. For example, if the recording is good, but the patient moves during the last part of the recording causing unwanted traces on the phonocardiogram, this section can be eliminated. This will allow you to keep the desired sections eliminate all else. Click on *Resize*. Then, drag the mouse over the section of the trace to be maintained. Click on *POST*. An example of the resultant trace is shown below.

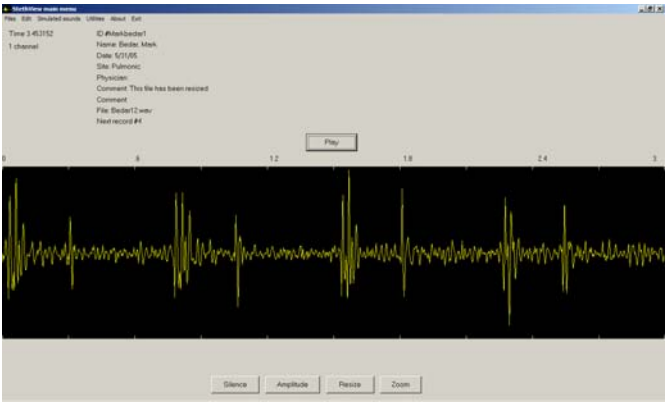


Figure 8: Resizing a Trace

Note that the new trace has time marks above the trace in the gray section starting with zero.

3.5.4 Zoom.

The *Zoom* button allows the user to examine a selected section of the trace without changing it. Click on *Zoom*. Drag the mouse over the section to be examined. The selection section of the trace will be seen. An example of the Zoom is shown below. Click on *Restore full view* to see the prior trace.

Figure 9: Zoom Feature

3.5.5 Filter a trace

Play the sound to be filtered. Select the *Edit* menu. Click on *Filter a sound*. Then, in the dialog box on the right side of the screen, enter the desired low frequency. Press Enter. Then, enter the high frequency. Press Enter. Note: Heart sounds have a frequency response range from 20Hz to 650Hz. An S1 and S2 vary from 70Hz to 120Hz and an S3 is approximately 50-60Hz. Murmurs are generally in the 200-350Hz range.

Breath sounds vary between 780Hz to 2000Hz with some pediatric sounds reaching as high as 4000Hz.

Heart sounds above 650 Hz, except those of a prosthetic valve, are not diagnostically significant[1] ([1] – From Auscultation of the Heart, Ravin, Abe, MD, FACC, Second Edition, page 15, Year Book Publishers).

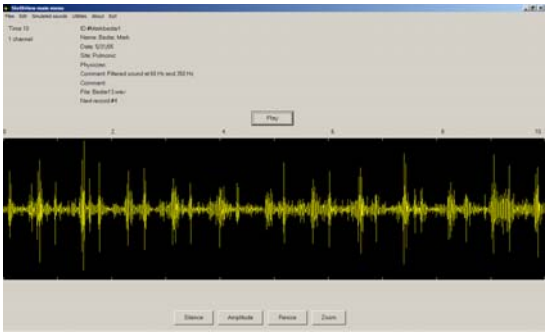


Figure 10: Filtering a Sound Tracing

3.5.6 Playing a half speed

First, play the sound at full speed. Then, from the Edit section, click on Play at half speed. The sound will be seen and heard.

3.5.7 Saving a file

To *Save* the edited file, first press the *Play* button, select the *File* section of the menu. The file can be saved as a *Patient file* or as a *.wav* file. We highly recommend that you save the raw data from your recording PRIOR to editing. In the event that you make an error in the edit process, having the raw data will allow re-editing or multiple edits.

After recording and playback, click on *Save to file*.

3.5.8 Saving as a .wav file.

Wav files are commonly used for sound recording and can be transmitted over the Internet via email with ease. To save as a .wav file, click on *Save as file*. The following screen will be seen.

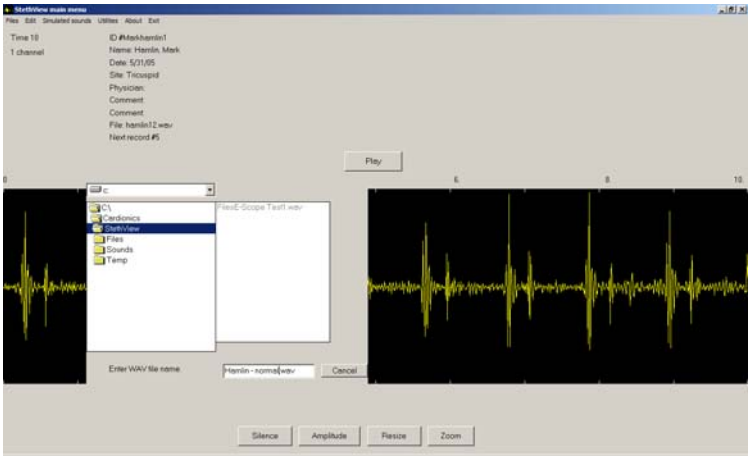


Figure 11: Saving as a .wav File

Highlight the *File* section as shown in the above trace. Then enter the name of the file to be saved in the box marked *xxxx.wav*. Replace the *xxxx* with your file name. Press Enter.

3.5.9 Saving as a Patient file

To save as a Patient file, click on *Save as Patient* file in the *File* section. The Patient file menu will be seen. The sections of this screen marked with an asterisk must be filled in. Additionally, the location of the stethoscope on the patient's chest must be filled in. When complete, click on *Click here when done*. An example of the resultant screen is shown below.

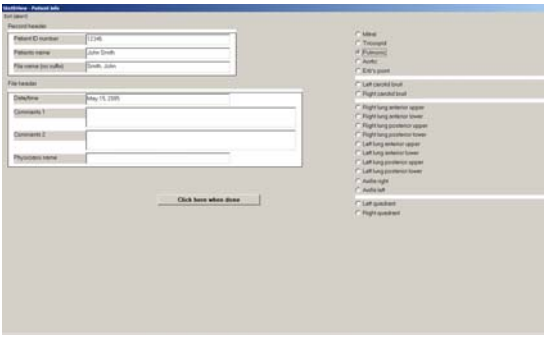


Figure 12: Saving as a Patient File

4.0 Playing a Simulated Sound

This program has a series of simulated and real sounds. The simulated sounds are presented with ECG. To play any of these sounds through the computer's speaker or headphones, from the *Main Menu*, click on *Simulated Sounds*. These sounds may also be played through the SimulScope by connecting a cable from the *sounds out* on the soundboard of the computer to the *Stethoscope IN* on the rear panel of the SimulScope. A menu of these sounds is presented. Double click on the sound of choice. An example of Aortic Stenosis is shown below.

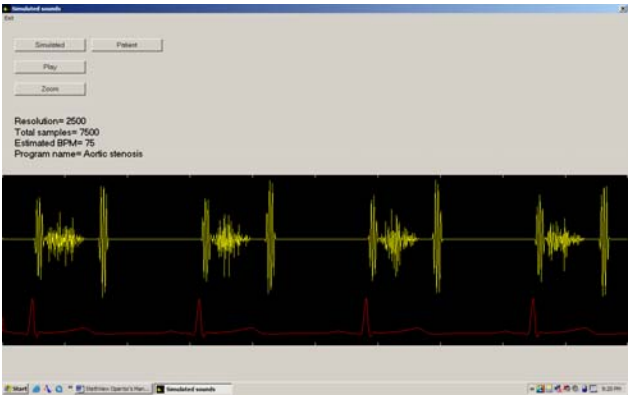


Figure 13: Playing a Simulated Sound (AS)

5.0 Utilities

The Utilities section of the Main Menu is shown below.

Email
Compare Sounds
Print
Sound troubles

5.1 Email

This section permits any sound to be sent via ordinary email.

5.2 Compare sounds

Permits any two sound traces to be viewed simultaneously. The sound associated with each trace can be heard alternately.

5.3 Print

Allows the screen contents to be printed.

5.4 Sound troubles

Gives suggestions on recording or playback.

5.5 Email

Insert the name of the recipient's email. Add a Subject. If you wish to add a message, do so in the Message body section. If you know the name of the files you wish to attach, use the *Add a file* button. The *Add a Record* section permits adding a Patient record. If you wish to send a specific Patient file, be sure that you have selected and played that Patient's file. Then, use the *Add a record* button.

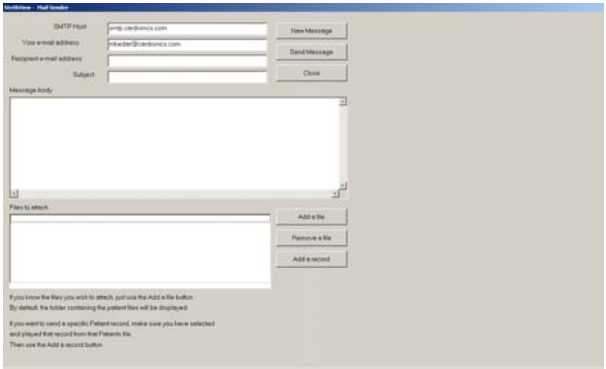


Figure 14: Email a File.

5.6 Compare Sounds

This section allows the user to compare two sounds on the same screen. The phonocardiogram (or phonopneumogram) of any two recorded sounds can be displayed and played on the same screen. The sound can be heard alternately.

To compare two sounds, click on *Utilities* from the Main Menu, then *Compare sounds*. An example of the screen is shown below.

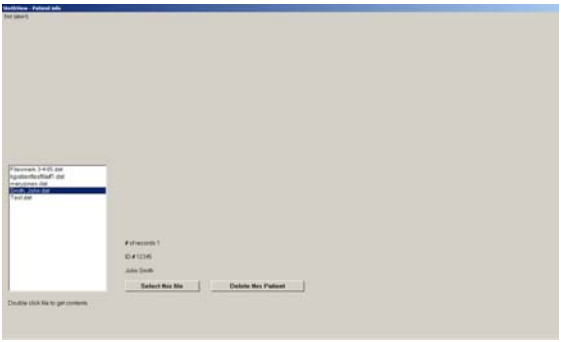


Figure 15: Compare Sounds - Step 1

From the dialog box above, double click on the sound to be compared first. Click on *Select this file*. An example of the resultant screen is shown below.

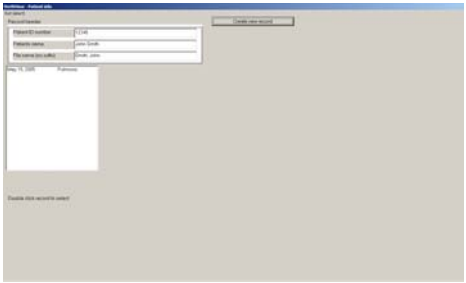


Figure 16: Compare Sounds - Step 2

At the above dialog box, there is a list of the sound recording for patient *Hamlin*. Click on *May 15, 2005 recorded at the tricuspid site*. The following screen will be seen.

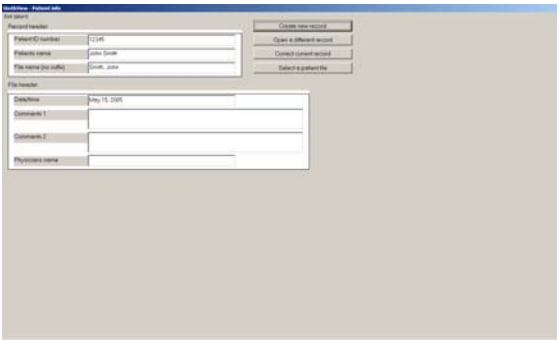


Figure 17: Compare Sounds - Step 3

Click on Select *a patient file.* The below dialog box will be seen as soon as the first sound has been selected. In this case, we will click on *Bedar, Mark* as shown below.

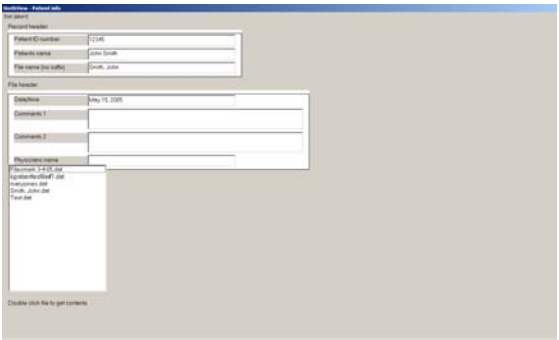


Figure 18: Compare Sounds - Step 4

Double click on *Mark Bedar*. After this file has been selected, the following screen will be seen.

Figure 19: Compare Sounds - Step 5

Click on each *Play* button. The resultant screen is shown below.

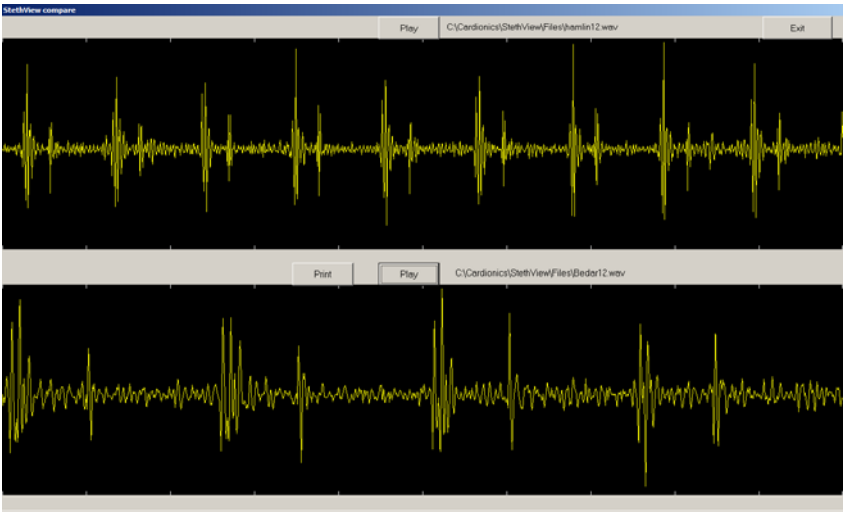


Figure 20: Comparing Two Phonocardiograms

If the E-Scope or SimulScope is connected for listening, the sounds of each will be heard when the trace is played.

5.7 Importing .wav files

If you have recorded .wav files on your computer, they can be imported into the StethView system and a phonocardiogram can be created and edited, if desired. To import a .wav file, from the *Files* Menu, click on *Import WAV* files.

The screen will appear as follows:

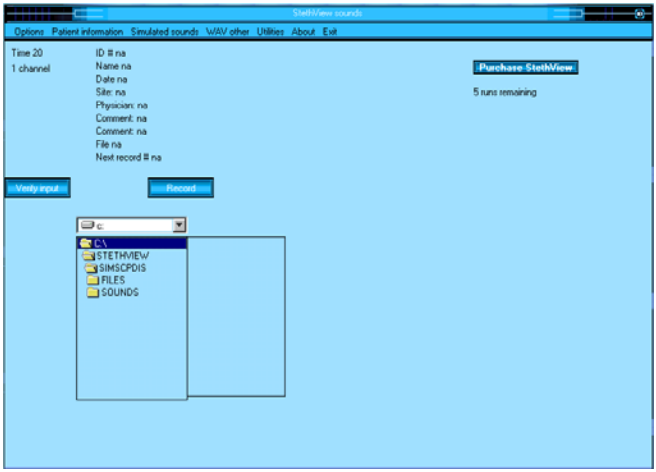


Figure 21: Importing a .wav File

In order to import .wav files, you must first know where they are stored on your computer. First, click on the white box above to locate the drive on which the .wav files are located. Next, double click on the drive in the blue box. In the above case, you would click on the C drive in the blue box. The screen will then appear with a series of files in your computer. Scroll to the directory containing your files. When you locate this directory, click on it and the file will appear. Click on the file you wish to import and it will appear in the StethView program. To view, click on *Play*.

6.0 Troubleshooting

Problem	**Remedy**
No display	Check the sound input level on the Media player of the computer**.**
Trace is clipping	First, try using the level adjust bar on the lower right side of the menu. If the trace still clips, adjust the sound input level on the media player of the computer. If you are unfamiliar with the media player, please either consult your computer manual or call Cardionics for assistance.
Noise on the baseline of the recording	There will always be a little baseline noise, i.e., the baseline will never be perfectly flat. Excess noise is generally the result of hand noise while holding the stethoscope head during recording. See Appendix A, item 2 If excess noise is still evident on the trace, the stethoscope head may not be at the point of maximum intensity. Try repositioning the stethoscope head.

7.0 Ordering information & catalog numbers

Cat. No.	Description
718-7700	E-Scope Electronic Stethoscope
718-0406	Stereo computer headphones
711-7762	E-Scope computer cable for recording & playback.
718-7003	SimulScope III Bedside Auscultation System
718-7010	Computer cable for recording
711-7015	Computer cable for playback
718-7040	Heartman Infrared Headphone
718-7006	SimulScope–R Bedside Auscultation System (with ECG board)
711-7020	Computer cable for recording and playback
711-7050	Audio Interface Module
718-0100	Ausculette II Bedside Auscultation System
711-0100	Computer cable for recording
711-0105	Cable for playback

8.0 Appendix A (Recording Techniques)

PLEASE NOTE: Recording sounds as opposed to listening takes time to become proficient.

1. The room should be quiet and the patient should be as relaxed as possible. Most of the problems associated with recording are due to lack of practice. Before recording heart or breath sounds from a patient, run several test recordings to develop your technique.

2. **IMPORTANT.** For recording a phonocardiogram using the SimulScope and the StethView software with minimal baseline noise, secure the stethoscope to the patient's chest using an elastic bandage such as an ACE® bandage or tape. The patient should be as relaxed as possible. If excessive baseline noise is still seen, change to a bell on the stethoscope.

3. For a thorough examination, the patient should be in a sitting, lying and left lateral recumbent position. For an adequate examination, the recumbent position alone can be used, but listening to the heart with the patient only in a sitting position is absolutely inadequate. Typical diastolic murmurs of good intensity that are heard when the patient is in the recumbent position may NOT be heard at all when the patient is sitting. In the recumbent position, the patient's arms must not be held over the head, since this will elevate the rib cage and decrease the intensity of the heart sound.

   Occasionally, it is advantageous to listen with the patient in the prone position; this may be true in patients with deep chests or those who may have a friction rub. This position may be awkward when the patient is in bed or on the examining table and supporting himself/herself on the elbows.

Muscle noise is at a minimum in this position and the patient and examiner are much more comfortable. An important additional advantage of this position is that the patient can be made to exercise by touching his toes several times before he assumes the position.

4. When the bell of the stethoscope is applied to the skin, the enclosed skin forms a diaphragm. With increased pressure, the skin diaphragm is made more taut and its natural period of oscillation increases. This improves the response to higher pitches and at the same time there is a general lowering of the sensitivity of the skin diaphragm. As a result, the lower-frequency components of the heart sounds are attenuated, whereas the higher frequencies are still well heard.

   This important maneuver of being able to diminish the intensity of low-pitched sounds, by pressure on the bell has several implications and applications:

   a. To hear faint, low-pitched sounds, the examiner must apply the bell lightly to the chest wall.

   b. By noting what happens to a sound or murmur when the bell is first applied lightly, and then with pressure, the examiner can judge, to a certain degree, the pitch of a sound or murmur.

   c. The high-pitched systolic murmur of mitral regurgitation is less likely to be affected by pressure than medium-pitched, innocent systolic murmurs.

   d. With pressure, the faint, high-pitched, systolic murmur of mitral regurgitation is less affected than the first heart sound, and the masking effect of the first heart sound is thus diminished. The same is

true of the high-pitched, early diastolic murmur of aortic regurgitation and accentuated second heart sound.

e. In some very noisy hearts with both systolic and diastolic murmurs (because of the amount of sound in systole), it is difficult to be sure if there is a low-pitched diastolic murmur. With pressure, the total sound is diminished and the low-pitched murmur diastole may disappear. By holding the bell alternately lightly and heavily and by concentrating on diastole, the examiner can detect the diastolic rumble.

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