

16 Channel STG User Manual

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Indications

The Stethographics' 16 channel Stethograph (hereafter referred to as 'STG16') is intended for recording, audio reproduction, graphic display, printing and storage of sounds. It is also intended for automated identification of lung sounds. At the time of publication the STG16 is available for research and educational purposes only.

Caution

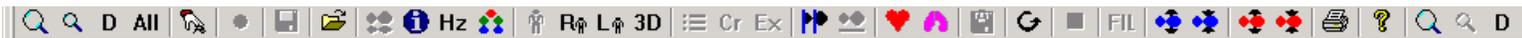
- This manual provides instructions for use and troubleshooting of the STG16. Stethographics, Inc. cannot be responsible for the performance of the STG16 if the user does not operate the system in accordance with provided instructions. This manual should be read, thoroughly understood, and accessible to all personnel who will be operating and using the STG16.
- Sounds are to be recorded using an approved electronic stethoscopes.
- Use of system for recording is not recommended in conditions where a stethoscope would not be used.
- The STG16 is intended for automated identification of lung sounds. It provides objective evidence that can aid in clinical decision making. Some care, of course, is necessary in proper recording under the supervision of a physician to be sure that artifacts are not introduced.
- Use the STG16 in a quiet room.
- Heart and lung sounds are low frequency sounds. Playback sound quality can be improved by using headphones or amplified speakers with a good frequency response down to 20 Hz.
- Heart sound analysis is for educational use only.
- It is strongly recommended that the users of the STG16 software use computing and networking security features to protect patient data created and stored using this software. Please consult your institution's data management or computer technical service personnel to implement appropriate security measures. The user assumes all risks, responsibilities and liabilities when user identification and password protection features are bypassed, disabled or ignored.
- Because national, state/provincial and local laws regulate the data privacy of patients, these laws may restrict or prohibit the transmission of files that contain the individually identifiable health information of patients. The user may also modify or edit this filename, if desired. We strongly recommend that the software user contact their institutional privacy officer or authority to understand the applicable laws and regulations before transmitting sound files with patient information.
- It is the responsibility of the clinician to assure that all recordings correspond to the appropriate patient data.

Specification

| | |
|---------------------------|--|
| Recording frequency range | 20Hz to 2000Hz |
| Sampling frequency | 8,000 Hz |
| Data recording | Standard .wav (PCM) files at resolution of 16 Bit, Mono. |
| Recording time | 20 seconds |
| Number of sensors | 16 |

Instructions for Use

1. Toolbar icons



Left to Right:

-  Expand signal vertically.
-  Collapse signal vertically.
-  Default vertical zoom.
-  Display all recorded sound at default vertical and horizontal zoom.
-  Open the driver to record sound.
-  Start Recording.
-  Save the data in to the default directory.
-  Open file.
-  Switch to Waveform Display (amplitude of sound as function of time).
-  Open Recording Information Dialog box.
-  Switch to Spectrogram Display (Show spectrogram of up to 8 channels simultaneously).
-  Switch to Christmas Tree Display (Show Waveforms or Spectrum superimposed on body plot).
-  Switch to Summary Display (Show analyzed and summarized data with patient information).
-  Switch to RMS Summary Display (Show RMS summary and histogram).
-  Switch to Localization Display (Show sound localization).
-  Switch to 3D Display (Allows viewing sound localization on a 3D model).
-  Show statistics of all identified crackles and squawks by channels.
-  Show printable crackle statistics.
-  Show crackles statistics for copying to Excel.
-  Start inspiration and expiration definition
-  Finish inspiration and expiration definition.
-  Analyze heart sounds.
-  Analyze lung sounds.
-  Save analysis on heard drive in tab delimited format.
-  Toggle 'play sound in a loop'.
-  Stop playback and recording.
-  Filter sound.
-  Amplify All Channels 3 Times - Some Data Can be Lost!
-  Reduce All Channels 3 Times - Some Data Can be Lost!
-  Amplify Tracheal Signal - Some Data Can Be Lost!
-  Reduce Tracheal Signal - Some Data Can be Lost!
-  Print screen.
-  Help.
-  Expand signal horizontally.
-  Collapse signal horizontally.
-  Default horizontal zoom.

2. Basic Operating Instructions

2.1 Recording Steps

1. Double click on the  icon to start the **STG16** software.
2. Click  and click **OK** on the pop-up window to open the driver.
3. Click  and fill in the patient's information.
4. Click  to start recording sounds. On the pop-up window review patient information, choose the protocol, and click **OK**.
5. Optional: To define breaths at bedside, use up and down arrows on keyboard (up arrow = start of inspiration and down arrow = start of expiration) while recording.
6. Press letter "S" on keyboard when optimal tracing has been obtained. (This action will automatically stop recording & save it). The 20 seconds of data that you see on the screen will be saved on the 'F' drive in the **Data** folder with the time tag.
7. Click  to proceed with as many protocols as necessary.

Tips:

1. For better quality recording turn both headphone volume knobs to zero on the preamplifier.
2. To record lung sounds from the front, apply back pad to the front as shown on the figure below – you will have to attach microphone 8 to the back pad first.



2.2 How To Test Microphones

1. Attach the chest pieces to the back pad. It should be observed that the chest pieces are delicate instruments and will last longer if they are attached to the back pad at all times. Do not put pressure on the diaphragm, put pressure on the edges instead
2. Connect microphone cables to the conditioning box.
3. Start sound recording.
4. Test the microphone connections by gently touching diaphragms 1 through 8 and 9 through 16 while monitoring their responses on the computer screen.

2.3 How To Apply Back Pad on a Patient

1. Ask the patient to wear a gown.
2. Adjust the stretcher if needed to a more comfortable angle (~ 30 degrees). It should be noted that the stretcher in flat position produces least amount of noise. If you prefer to use a reclining chare, use the plastic one. Make sure that it does not produce any sound when patient sits on it. Pay special attention to vital capacity maneuver.
3. Place infection control barrier wrap over patient's back (skin to wrap to microphone provides best transmission)

4. Place microphone back pad on patients back with top (two microphones) approximately 3 fingers width below C7 and bottom (6 microphones) near estimated lung bases. Be sure that all microphones have good contact with patient's chest wall.
5. Help the patient lie down on the back pad.
6. Readjust the back pad if necessary (remembering that the back pad is covering the area of the lungs, not the diaphragm).
7. Use extra pillows on the sides to secure side microphone attachments if necessary.
8. Position chest piece 8 on the skin above the heart to monitor heart sounds.
9. Position chest piece 16 on the side of the wind pipe to monitor tracheal sound.
10. Instruct patient not to move at all and not to talk. Be sure that you have preempted any possible room noise to avoid extraneous noise in the recording.

2.4 How To Analyze the Data

1. Click  to start inspiration definition.
 - Drag mouse with the left button depressed from the beginning of inspiration to the end of inspiration
 - Release left button – green horizontal square appears on the screen.
 - Drag mouse with the left button depressed from the beginning of expiration to the end of expiration
 - Release left button – blue horizontal square appears on the screen.
 - Repeat for all breathes you want to include into analysis.
2. Click  to finish inspiration and expiration definition.
3. Click OK to save the inspiration/expiration definition.
4. Click  to analyze data.
5. Click  to print summary sheet.

2.5 Waveform Display basic functions

1. To open a data file click , locate the file and double click on any of the w#.wav files.
2. To zoom data vertically click  in the left of the toolbar. Click  for default zoom.
3. To zoom data horizontally click  in the right of the toolbar. Click  for default zoom
4. Scroll through data with the **scroll** bar, Page Up/ Page Down buttons or rotate the mouse wheel.
5. To play data back click button with the channel number on the left of the screen. Click  to stop play back.
6. The play back is looped when the  is checked. To check the loop button click it once. To uncheck it click it again.
7. You can change the duration of sound being looped by clicking on the time axes zoom buttons at the right of the toolbar. Move the lopped interval with the scroll bar, Page Up/ Page Down buttons or rotate the wheel on the mouse.
8. To filter sound click **Filter**.
9. Double click inside the window to view the window properties.

2.6 Christmas tree display basic functions

1. On the waveform display indicate the interval of interest by positioning the cursor in the middle of this interval.
2. Click  to switch to X-Tree display.
3. On the pop-up display choose between waveform and spectrogram and click OK.
4. To zoom data vertically click  in the left of the toolbar. Click  for default zoom.
5. To zoom data horizontally (both expanded waveform and the spectrum) click  in the right of the toolbar. Click  for default zoom
6. You can scroll through the data by left clicking anywhere on the screen. Click to the left of the center to scroll left, click to the right of the center to scroll to the right.
7. Double click to view properties

2.7 Summary, RMS Summary, and Localization screens basic functions

1. To play data back click button with the channel number on the left of the screen. Click  to stop play back.
2. Toggle **View > Show Total** to hide / view numerical information.
3. Double click to view properties

2.8 Spectrogram screen basic functions

1. Choose number of channels and channels to view on the **Spectrogram properties** screen under **View** menu.
2. To play data back click button with the channel number on the left of the screen. Click  to stop play back.
3. To zoom data vertically, i.e. over frequency axes click  in the left of the toolbar. Click  for default zoom.
4. To change spectrogram sensitivity click  in the right of the toolbar. Click  for default sensitivity
5. Double click to view properties

2.9 Saving Data

The data is saved on the drive **F** in the **Data** folder. The folder with the patient name and date tag contains subfolders corresponding to each protocol. These subfolders have time tag. Each subfolder contains 16 wave files corresponding to 16 channels and one text file with patient information.

2.10 Standard Recording Protocol

We suggest that patient are instructed to perform the following breathing maneuvers in the order below. We also suggest that full 20 seconds of data is recorded with each maneuver.

P1 = Normal breathing;

P2 = Deeper than normal breathing;

P3 = Cough, then deeper than normal;

P4 = Whisper e-e-e;

P5 = Forced Vital Capacity Maneuver x 2;
P6 = Deeper than normal breathing;

3. Troubleshooting Guide

| Symptom | Possible Cause | Suggested Solution |
|---------------------------------------|--|---|
| STG16 computer program will not load. | Problem with program. Problem with computer. | Contact Stethographics support. |
| Artifacts on recording | Patient is moving. | Ask patient to remain silent and relax. |
| | Room noise | Record in a quiet room. |
| | Finger noise | Hold chest piece firmly |
| | Hair noise | Moisten hair |

4. Support

If you have any questions or require any technical assistance e-mail us at support@stethographics.com.