



**Operator's Manual
SimulScope® Bedside Auscultation System**

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SAFETY PRECAUTIONS

Please read this information before using the SimulScope Bedside Auscultation System. It applies to the basic System as well as any optional equipment that may be used with the System. In this manual, WARNINGS describes precautions necessary to prevent injury or loss of life. CAUTIONS describes those precautions, procedures, techniques, etc. which are considered essential to emphasize.

WARNING

SHOCK HAZARD: A shock hazard may exist if this System is not properly grounded. The System is designed to operate with an integral rechargeable DC battery or a 3-wire AC power system containing a separate ground wire. The ground wire must not be removed or defeated.

WARNING

SHOCK HAZARD: Do not remove protective covers on any components of the SimulScope System; hazardous voltages may be present. All internal adjustments, replacements and initializations must be made by an authorized, qualified technician.

WARNING

CLEANING AND CARE: As a general safety precaution, the System should be turned off and the power (including batteries) disconnected before performing any cleaning procedures.

CAUTION

CONNECTORS: Do not immerse any of the connectors used in the System in any fluid.

TRADEMARKS

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™ SAM, PneumoSim are trademarks of Cardionics, Webster, Texas, USA

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1.0 Product Description

The SimulScope System is used for teaching heart, breath and bowel sounds and sending/receiving the same sounds over various Telemedicine systems. For a description of its use in Telemedicine, see Section 4.0, page 14.

The SimulScope is a small, portable, battery-operated, (or line operated) wireless infrared transmitter that picks up heart and lung sounds and transmits them via infrared energy to wireless Heartman® Infrared Headphones worn by each listener.



Figure 1 Bedside teaching with SimulScope

The Heartman Infrared Headphone (Figure 2) senses the infrared signal and converts it into an audible sound. Each headphone has its own volume control and automatically shuts off when removed. To conserve battery power, the Heartman control box contains a "tilt switch" that turns off the headphone whenever the control box is in a horizontal position (e.g. removed from the listener's ears and placed on a table top or other horizontal surface).

The SimulScope System consists of the SimulScope infrared transmitter (Figure 3), built-in rechargeable battery, Heartman® infrared headphones each with a 9V. battery (Figure 2), stethoscope/transducer assembly, a wall charger/power supply (called a wall transformer).

The sounds are picked up by the stethoscope and connected to the SimulScope by a cable. A bank of infrared diodes (Figure 3) on the face of the SimulScope transmits the sounds as infrared energy to each HeartMan Infrared Headphone.



Figure 2 Heartman Infrared Headphone



Figure 3 Front panel SimulScope Infrared Diodes

A system of adjustable filters (Figure 4 & 5) built into the SimulScope allows the user/instructor to accentuate or attenuate very narrow frequency ranges (i.e. faint A.I. murmur or fine crackles) for emphasis.

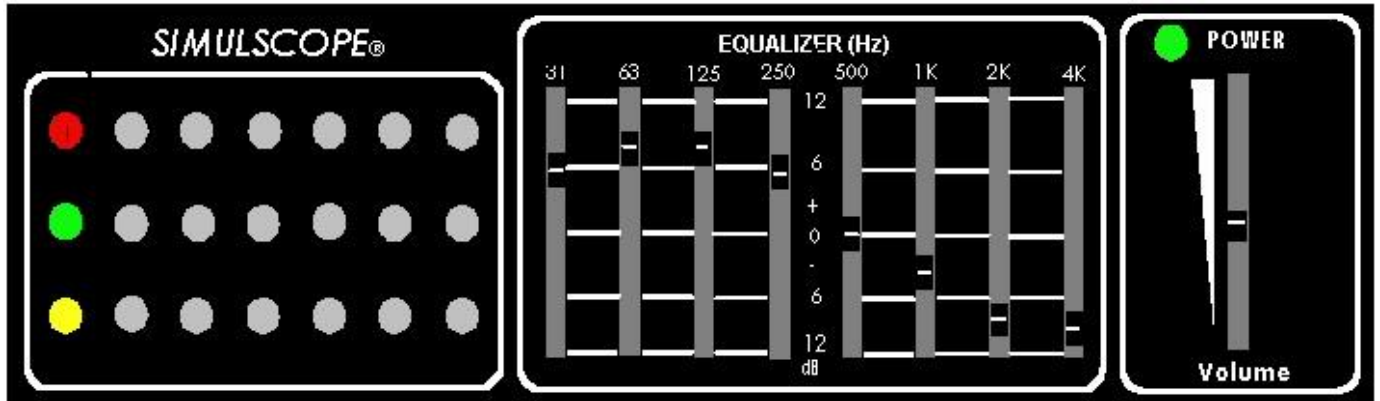


Figure 4 - Front panel of SimulScope

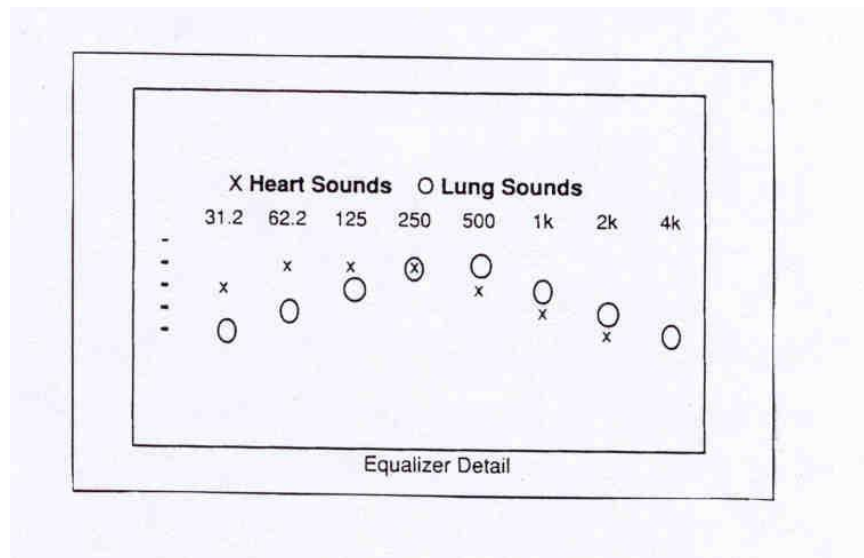


Figure 5 Graphic Equalizer Detail

The above settings are considered normal for heart sounds. The X settings are for normal heart sounds and the O settings for breath sounds. Move the filters upward to accentuate and downward to attenuate.

The SimulScope is powered either from the AC line by use of the wall transformer or by the internal rechargeable battery.

The SimulScope battery is rechargeable and will operate approximately 2.5 hours continuously when fully charged. The green power light on the SimulScope will turn orange to indicate a low battery condition. The SimulScope will operate for about 30 minutes after the low battery is indicated. A fully discharged battery will recharge overnight (13-16 hours) when connected to the wall transformer. See 2.1 below.

The Heartman Infrared Headphones are also battery-operated (standard or alkaline 9V.) and will operate continuously for 150 or more hours at which time the battery should be replaced. A low battery indicator flashes when it is time to change the headphone battery.

2.0 Set up

2.1 Charging the battery or Using the Wall Transformer

The SimulScope is charged by using the supplied wall transformer. To use, insert the wall transformer into a 120V AC (or 220-240V, if outside US) wall socket and then insert the cable into the *DC IN* port on the rear panel of the SimulScope. The SimulScope also can be operated in this manner with a depleted battery or without a battery. The battery charger operates on either 110V or 220V.



Figure 6 Power Supply (110V and 220V)

The SimulScope batteries are shipped without a charge. Before using, charge the batteries as described above in section 2.1. Charging time for the SimulScope battery is approximately 13-16 hours.

A quick charge of one hour will be enough to last through a single bedside teaching session. The wall transformer can be used to power the SimulScope as well as charge the batteries.

2.2 Connecting the Stethoscope Assembly.

The SimulScope is equipped with a Specialist Diaphragm stethoscope. A Specialist Pediatric Bell, cat. No. 360-7755, is available as an option. Attach the stethoscope into the receptacle on the *INPUT* section of the rear panel of the SimulScope marked "Stethoscope".

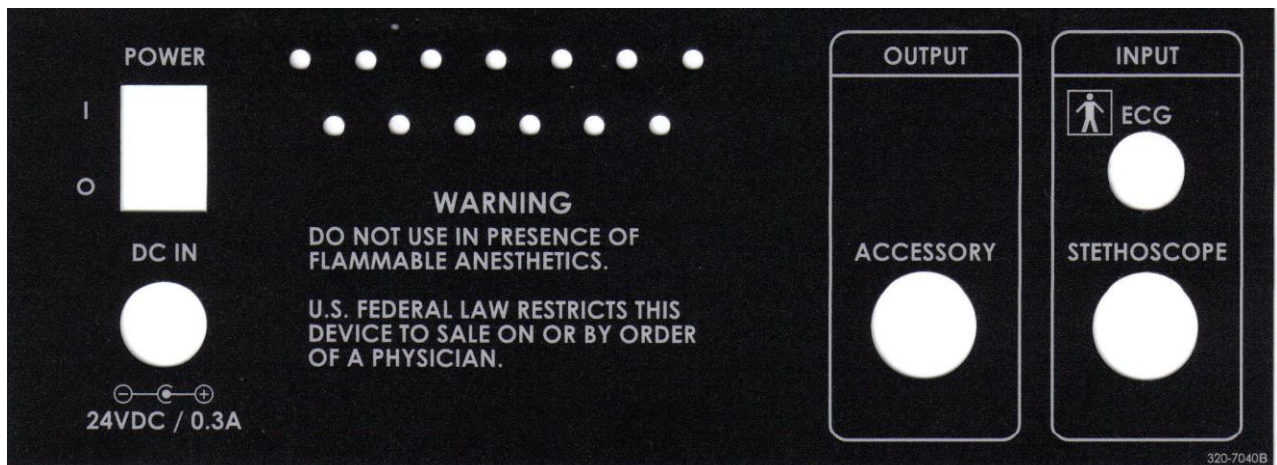


Figure 7 – Rear Panel of SimulScope

2.3 Connecting the ECG cable (see Figure 8)

If you do not have the SimulScope with ECG (SimulScope "R"), skip this section and go to Section 2.4. Some SimulScope models (SimulScope "R", p/n: 718-7006) are equipped with an ECG board that causes one of the LEDs on the front panel to flash each time a QRS wave is detected.

To connect the ECG cable:

1. Use standard disposable electrodes.
2. Prepare the patient by placing the three electrodes in the standard configuration for a 3-lead ECG (right arm, left arm, left leg).
3. Connect the ECG leads to the snap on each of the three electrodes. The end of the electrode lead is labeled with proper placement on the patient. Connect each of the ECG leads to the connector end of the supplied patient cable labeled R, B and W respectively.
4. Connect the connector of this cable to the **INPUT** section of the rear panel of the SimulScope labeled **ECG**.



Figure 8 Connecting the ECG cable

2.4 Set up for recording

We recommend reviewing Appendix D-Recording Techniques prior to recording.

2.4.1 Recording sounds with a laptop computer.

Connect the *Accessory* output of the SimulScope to the *Sounds input* on the laptop. Cardionics will supply you with a cable for connecting.

- 2.4.2 Using the HeartMan PC Wireless Receiver, Cat. no. 718-7041.** The HeartMan Wireless PC Receiver is a variation of the HeartMan Infrared Headphone. Its purpose is to wirelessly connect the SimulScope to a PC. This allows the user to not only send heart and lung sounds from the patient or SAM, the Student Auscultation Manikin, but also to a PC. No wires or cables are needed. See Figure 10

Set up. 1. Connect the HeartMan Wireless PC Receiver to the Mic-In on the side of the laptop. 2. Open the StethView Digital Recording Software which has been installed on your PC. 3. Turn the HeartMan Wireless PC Receiver ON by use of the thumbwheel switch on the side. 4. Stand this unit upright. Note: It has a tilt switch and will turn off if in the horizontal position. 5. Adjust the amplitude of the phonocardiogram using the thumbwheel switch.

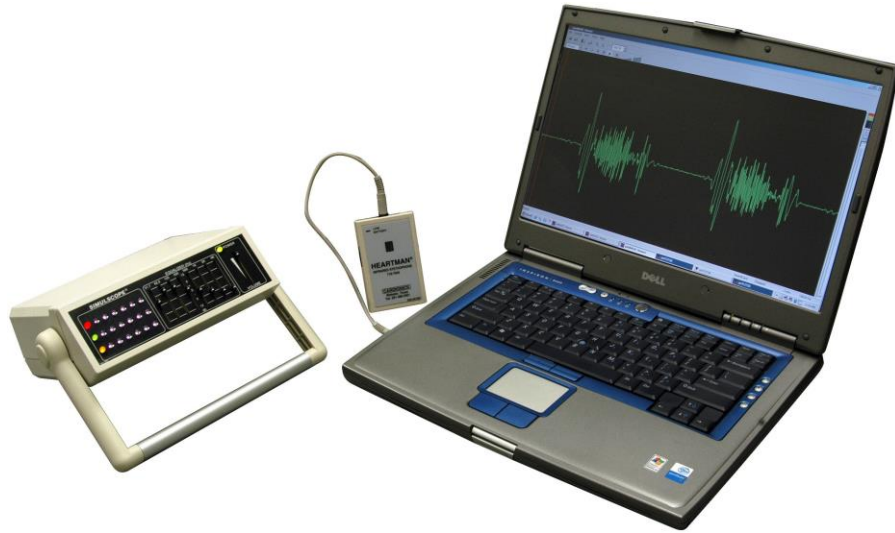


Figure 10
SimulScope with HeartMan Wireless PC Receiver

2.5 Playback of recorded sounds.

2.5.1 Playback from a laptop computer.

Connect the **Sounds Output** on the laptop to the **Stethoscope IN** on the SimulScope. All listeners must be wearing a Heartman Infrared Headphone. Begin playing sounds from the laptop. Turn the SimulScope ON, then the Heartman headphones. Adjust the volume as needed using the VOL control on the headphones and the graphic equalizers on the SimulScope.

2.6 Recording and playback of Sounds and ECG

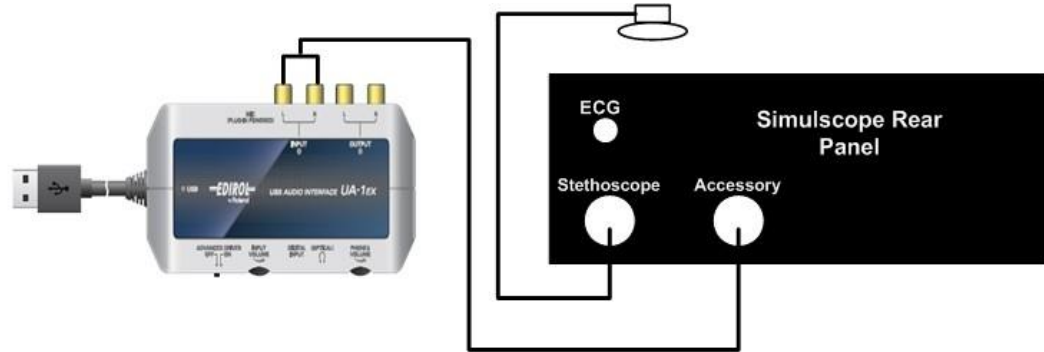
Set Up for Recording. To record and playback both heart sounds and ECG, you will need an Audio Interface Module, UA-1ex, (see figure 11). As shown in the below diagram, connect the stethoscope to the Stethoscope output on the rear panel of the SimulScope. Then connect the Accessory Output on the rear panel of the SimulScope to the inputs on the Audio Interface Module. Adjust the amplitude to the traces by using the Input Volume knob on the bottom of the Audio Interface Module.

Attach 3 lead electrodes patches to the patient in the normal manner. Then attach the ECG cable to the electrodes with the distal end connected to the rear panel of the SimulScope.

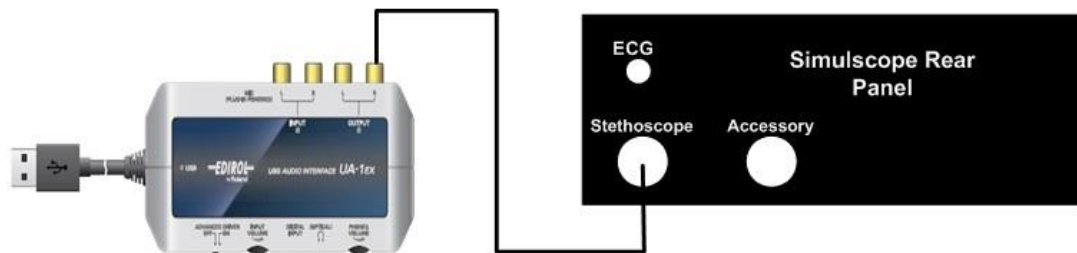
With the StethView Digital Recording System installed on a PC or laptop, set the system for two channels. Refer to Section 2.4 of the StethView Operator's Manual. On the Main Menu of the StethView, locate the Options tab. There is a Pull-Down Menu. Select "Number of Channels". Select two (2) channels.

Set up for Play back.

Refer to the Playback section of Figure 11. Connect the Audio Interface Module to the Stethoscope input on the rear panel of the SimulScope. Using the StethView Digital Recording System software, play the sounds and ECG. You will hear the sounds while wearing a HeartMan Infrared Headphone (supplied with the SimulScope) and view the ECG on the PC or laptop from the StethView screen.



StethView USB to SimulScope Recording



StethView USB to SimulScope for Playback

Figure 11

2.7 Using the SimulScope as a Classroom Infrared Emitter with the CardioSim Digital Heart Sound Teaching System.

To use the SimulScope as a classroom infrared emitter with the CardioSim Digital Heart Sound Teaching System, connect the **Stethoscope IN** of the SimulScope to the **Infrared Array** on the rear

panel of the CardioSim VII control module by use of a cable. Then use the CardioSim in the normal manner. Turn the CardioSim **speaker volume OFF** and listen using Heartman Infrared Headphones. Use Cardionics cable, Cat. No. 711-7780 (not supplied).



Figure 12 Connecting SimulScope to CardioSim

3.0 Using the SimulScope for Teaching.

3.1 Using the Heartman Infrared headphone

Locate the Heartman infrared headphones, Cat. No. 718-7040 (Figure 12).



The headphone has an individual volume control that should be in the *OFF* position when not in use. The battery has a long life and does not require charging. **The headphone will turn itself off automatically when placed in a horizontal position.** The battery shelf life is approximately three years.

The battery will operate for over 150 hours. Additional batteries can be obtained locally or from Cardionics. A standard 9V. alkaline battery is recommended as a replacement.

Figure 13- Heartman Infrared Headphone

3.2 For bedside teaching

The SimulScope is designed for bedside teaching, but can also be used in the classroom with the CardioSim Digital Heart Sound System, or with SAM, the Student Auscultation Manikin.

At the bedside, attach the stethoscope to the ***Stethoscope INPUT*** on the rear panel, then turn the volume control *ON*. We recommend that the volume control be moved to full volume position and the sound volume level adjusted in the headphones. When the volume control is *ON*, a green light should glow brightly and three LEDs on the front panel (red, green and yellow) will also be lit. If any of these LEDs are not lit, the SimulScope should be returned for repair. It can still be used on an interim basis, but when convenient return to Cardionics for repair.

Adjust the graphic equalizers controls as shown in Figure 13 for normal sounds. The *X* indicates normal heart sounds and the *O* indicated normal breath sounds. A label for the graphic equalizer adjustments is located on the top panel of the SimulScope. Moving the filter controls upward will accentuate a frequency and moving them downward will attenuate a sound frequency.

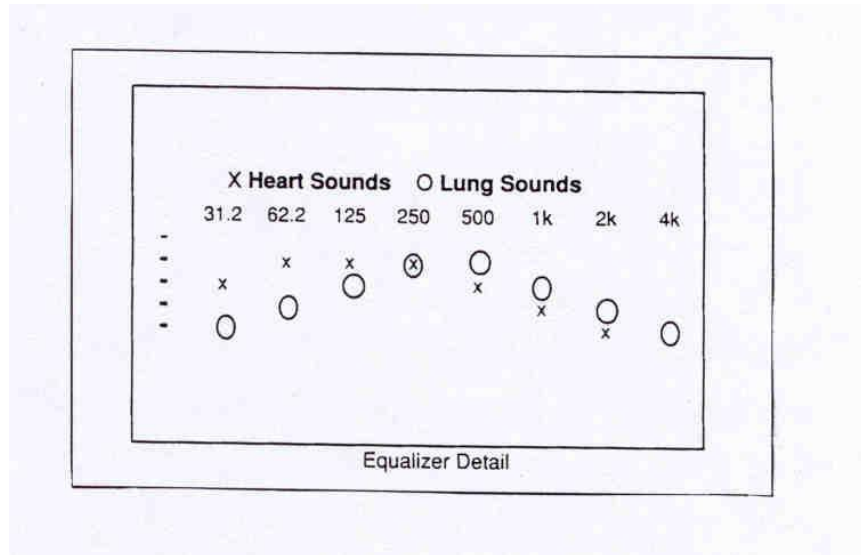


Figure 14 Graphic Equalizer detail

Slide the volume control of the SimulScope to the full position. The patient's heart and/or lung sounds should now be heard. If a click is heard on the first heart sound, reduce the volume on the SimulScope by moving the VOL downward until it disappears.

The SimulScope, with a fully charged battery, will run for approximately 2.5 to 3 hours.

Tips on successful use.

The SimulScope should be aimed at the students. The instructor can stand behind the SimulScope, if desired. If for any reason, the reception is not sufficient, try aiming the SimulScope at a mirror.

NOTE: There are some florescent lights that interfere with infrared transmission. If sound is not clear, try dimming or turning off the florescent lights.

3.3 For classroom teaching

For classroom use, we recommend using the wall transformer. This transformer will run the SimulScope and charge the battery simultaneously. If desired, the SimulScope will operate with the wall transformer only.

The transformer cable should be inserted into the **DC IN** port on the rear panel of the SimulScope. When used as a classroom infrared emitter, the SimulScope is used in the same manner as at the bedside except that the wall transformer will be used.

3.3.1 Using the SimulScope with SAM, the Student Auscultation Manikin

Set up SAM, the Student Auscultation Manikin following instructions in the SAM Operator's manual. Place the stethoscope of the SimulScope on SAM as you would a live patient.

You may listen to heart sounds at the pulmonic, tricuspid, aortic or mitral areas. You may listen to breath sounds at the anterior or posterior upper or lower part of the chest. You may listen to bowel sounds at the right and left abdomen or the carotid pulse bruit on the right side of the neck.



Figure 15 Using the SimulScope with SAM, the Student Auscultation Manikin

3.3.2 Using the SimulScope with Harvey, the Cardiology Patient Manikin (a product of the University of Miami).

Connect the sounds output of Harvey, located on the lower right side of the Harvey cabinet to the Stethoscope Input of the SimulScope located on the rear panel of the SimulScope. Use Cardionics cable, Cat. No., 711-0254 Turn ON a sound from Harvey, then turn the SimulScope ON and operate it as you would with a patient.

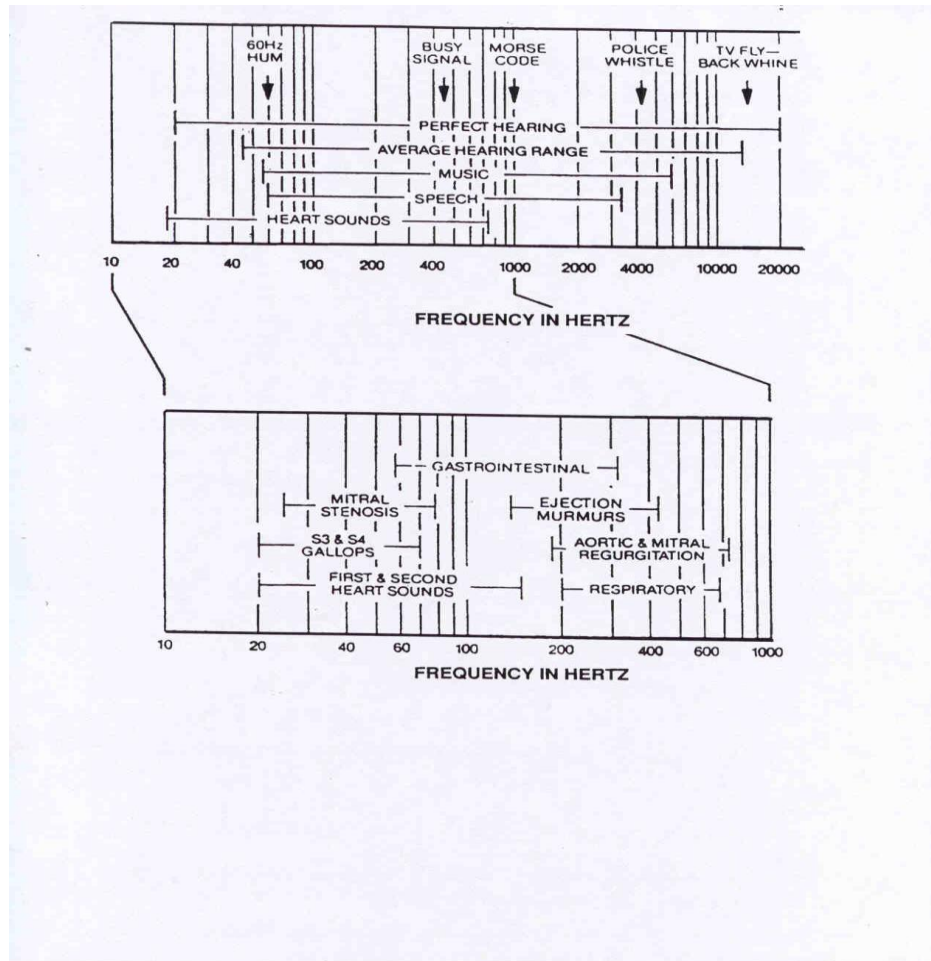


Figure 16 Frequency of sounds in Hertz

4.0 SimulScope for Telemedicine.

4.1 Product description - SimulScope in Telemedicine

Telemedicine is the branch of medicine that allows sound, data and video to be transmitted and received over high quality telephone lines for remote diagnosis.

There are always at least two stations - a sending station or location and a receiving station.

4.1 Using the SimulScope with Polycom or Tandberg Teleconferencing Systems.

For sending, connect the output of the SimulScope to the audio input of the Tandberg or Polycom Teleconferencing System. Use Cardionics cable, Cat. No. 711-0248.

For receiving, connect the audio output of the Tandberg or Polycom Teleconferencing System to the Stethoscope IN on the rear panel of the SimulScope using Cardionics cable, Cat. No. 711-0246.

Appendix A – Suggested Uses

Telemedicine

The SimulScope has been shown to be very effective in sending and receiving diagnostic quality heart and breath sounds in a Telemedicine clinic.

Teaching

Bedside Auscultation.

The SimulScope is ideal for use at the bedside and will transmit through glass or plastic partitions in an ICU/CCU or nursery. The stethoscope can be used as a microphone to communicate to students/listeners on the other side of the glass enclosure.

Classroom Use

With the CardioSim Digital Heart Sound Teaching System

The SimulScope may be attached to the IR output of the CardioSim and used as a classroom infrared emitter.

With the PneumoSim Digital Breath Sound Teaching System

The SimulScope will transmit sounds produced by the Cardionics PneumoSim digital Breath Sound Teaching System.

With SAM, the Student Auscultation Manikin.

The SimulScope may be used with SAM, the Student Auscultation Manikin to broadcast sounds to a classroom of students with each listener wearing a Heartman Infrared headphone.

Auditorium use.

By use of an auxiliary infrared emitter, the Auditorium Infrared Sound System, Cat. No. 718-4006, any large auditorium can be completely equipped for infrared sound transmission without wiring. Call Cardionics for details. Telephone: 281-488-5901.

Appendix B

SimulScope Parts List

Catalog Number	Description
718-7003	SimulScope System for teaching
718-7005	SimulScope transmitter only without battery
718-7006	SimulScope System with built-in ECG
718-7008	Wall transformer Unit (110V. & 220V.)
718-7015	Battery for SimulScope
718-7040	Heartman Infrared Headphone
718-7131	Cardionics stethoscope with <i>Specialist</i> stainless steel bell/diaphragm
Cables	
711-0243	SimulScope to PC Mic Input for recording or display
711-0244	PC to SimulScope Stethoscope IN for playback
711-0246	Polycom or Tandberg System to SimulScope for Receiving
711-0248	SimulScope to PolyCom or Tandberg Teleconferencing System
711-0254	Harvey to SimulScope for listening to Harvey's sounds
711-7006	ECG (3-lead) cable for SimulScope
711-7780	CardioSim to SimulScope for listening to CardioSim sounds
Software	
717-8000	StethView Digital Recording System

Appendix C - Troubleshooting

PROBLEM	PROBABLE CAUSE AND SOLUTION
Weak Reception	Probable cause is a weak battery. Check battery condition using voltmeter. Check battery in SimulScope. Recharge, if necessary. Replace a single headphone battery to test the system. Best reception is achieved when the infrared diodes on the face of the SimulScope are pointing directly at the small window in the middle of the Heartman Infrared Headphone label. Light colored walls will reflect infrared energy so that direct line of sight contact between the headphone and the SimulScope is not always necessary. Dark blue or black walls will absorb infrared energy and cause weak reception if direct contact between the headphone is not maintained. Pointing the face of the SimulScope toward a mirror will increase reception.
Abnormal White Noise	See Weak Reception above and Florescent light interference below.
Crackling in Headphone	See Weak Reception above and Florescent light interference below..
Clicking sound	Volume on SimulScope may be too high. Reduce volume and click should disappear.
No sound	<ol style="list-style-type: none">1. Headphone may be facing in wrong direction. Headphone label should be facing away from the user. Please keep fingers away from the label when not in use.2. If the room has a black or dark blue wall, it will absorb infrared energy.3. Be sure VOL controls on SimulScope and headphone are turned up sufficiently.4. Heartman Infrared Headphone battery may be depleted. Replace the 9V battery if necessary.

Appendix C -Troubleshooting (Cont.)

Sound changes
in volume

You may have exceeded the range of the SimulScope.
The range is 30 feet in a small room

Florescent light
interference

Some florescent lights can cause a noisy signal to be received by the Heartman Infrared Headphone. There are several possible solutions as follows: 1.) turn off the lights, 2.) move the SimulScope transmitter so that it is not located directly under a florescent light. Ask the listeners not to stand directly under a florescent light or replace the florescent lights. If florescent lights are the problem, please obtain the part number of the bulb and the ballast. They are stamped on the units themselves. Call this information into Cardionics. We may be able to suggest a solution.

Appendix D Recording Techniques

1. The room should be quiet. Most of the problems with recording heart sounds result from not having the room quiet and from lack of practice. Before attempting to record a patient, do several test recordings until proficiency is obtained.
2. The patient should be relaxed as much as possible.
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 of advantage 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. It is much more satisfactory to have the patient stand up and lean over with his/her elbows on an examining table. 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.

Appendix D Recording Techniques (Cont.)

- 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 (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.

Appendix E

Specifications

Cat. No. 718-7003

INPUTS:

STETHOSCOPE:

Electret microphone audio detector mounted in electronic stethoscope head with 5 feet flexible cable.

ECG (OPTION):

Provides differential amplifier with .5 to 40 Hz bandwidth, 1000 V/V gain, 100 dB CMR, 10 Mohm input impedance. Flashes green light on front panel to indicate QRS detection.

AUDIO FREQUENCY RESPONSE: 30 Hz TO 4 KHz (-3 dB) with equalizer controls centered.

AUDIO EQUALIZER:

Provides +/- 12 dB of gain adjustment via individual slide control for each band.

Band center frequencies as shown below:

31.2 Hz	500 Hz
62.5 Hz	1 KHz
125 Hz	2 KHz
250 Hz	4 KHz

INFRARED TRANSMISSION:

INFRARED WAVE LENGTH:

880 Nanometers.

TRANSMISSION RANGE:

30-50 feet, direct line of sight (within same room).

SUBCARRIER FREQUENCY:

95 KHz center frequency with +/- 45 KHz deviation.

ENCLOSURE:

SIZE:

Hand-held, 8"x 7"x3".

WEIGHT:

3 lbs. including battery pack.

Specifications (Cont.)

ACCESSORY OUTPUTS:

SOUNDS:

3VppK nominal, 9VppK, max. 1K ohm output impedance.
FM modulated, 4.5 KHz center frequency, 30 Vppk output for tape recorder.

ECG (option):

POWER:

BATTERY:

Nickel Cadmium battery pack w/external access for replacement.

BATTERY LIFE:

2.5-3 hours continuous operating time on fully recharged battery.

POWER/LOW BATTERY: Green indicator for power on/off. Turns orange

INDICATOR:

to indicate low battery condition with approximately 30 minutes operating time remaining.

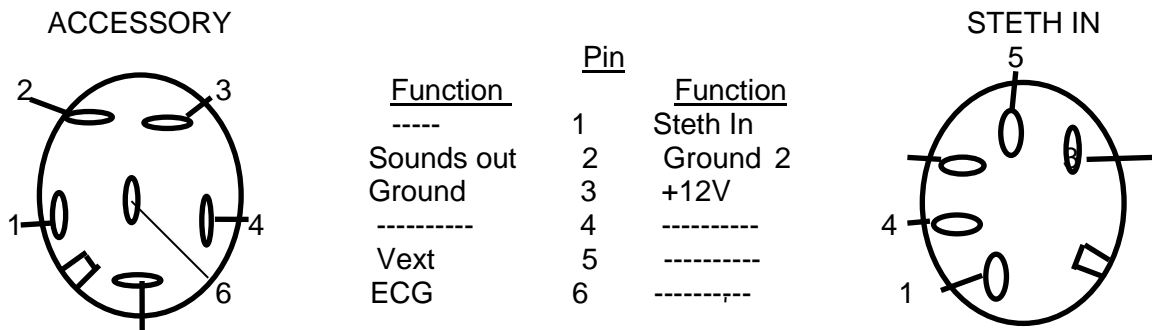
AC POWER SUPPLY/
BATTERY CHARGER:

Wall mount 120VAC power supply allows unit to operate while charging battery. Fully depleted battery requires 12-16 hours for recharge.

SAFETY:

Meets ANSI/AAMI standard, safe current limits for electromedical apparatus, non-isolated patient connection.

Rear Panel Pin Outs



Appendix F – Limited Warranty

Cardionics warrants this product to be free of manufacturing defects in material and workmanship for a period of one year from the date of original consumer purchase or from an authorized dealer.

What this warranty covers:

1. Cardionics warrants the SimulScope and HeartMan Infrared Headphones to be free of manufacturing defects in material and workmanship for a period of one (1) year from the date of original consumer purchase from Cardionics or an authorized dealer.
2. This written warranty is limited to the original consumer purchaser, transferable only by written authorization of Cardionics.
3. All warranties, expressed or implied, made by Cardionics, including warranties of merchantability and fitness are limited to the one (1) year period of this warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.
4. This warranty is limited to repair of the product or replacement thereof, at the discretion of Cardionics. Calibrations are considered normal maintenance and are not included in the one year warranty.

What this warranty does not cover:

1. This warranty does not cover defects or damage resulting from use of the product other than its normal, intended and customary use. This warranty does not cover defects or damages from abnormal use, abnormal conditions, improper storage, exposure to moisture or liquid, unauthorized modifications, repairs made by unauthorized personnel, unauthorized connections (those not described in this manual), misuse, neglect, abuse, accident, alteration, improper installation or other acts which are not the fault of Cardionics, including damage caused by shipping.
2. SimulScopes which have had the serial number removed or made illegible.
3. Damage resulting from use of non-Cardionics approved accessories.

Policies concerning service.

Shipping charges. The customer shall bear the cost of shipping the product to Cardionics. Cardionics will pay the return freight within the United States. Customers outside the US will be asked to pay for shipping in both directions. This includes both warranty and out-of-warranty service. We suggest that you insure the package

Authorization for return. Before sending equipment for repair, please call Cardionics, at 281-488-5901 or in the U.S. or Canada 1-800-364-5901 for a return authorization number. This will help us track your repair.

Reason for return. Please include a note with your name, address, telephone and email address and what you believe the problem to be.

Packing for return. Equipment requiring repair should be suitably packaged for shipping.

Where to obtain service. Ship package prepaid to Cardionics, 910 Bay Star Blvd, Webster, Texas 77598 USA. We will endeavor to complete repairs within fifteen (15) working days from date of receipt of product by Cardionics.

Out-of-warranty service. . When a product is returned for service that is out-of-warranty, Cardionics will call you to obtain your authorization prior to making the repair. We will ask for a credit card payment at the time of the call. If the repair is from an authorized Cardionics dealer or institution, Cardionics will ask for a purchase order number.

Consequential Damages

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