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A. <u>Limited Warranty</u>

Laerdal Medical warrants to the purchaser that its product(s) is(are) free from defects in material and workmanship for a period of one (1) year from the date of purchase by the original user. During the designated one (1) year period, Laerdal Medical will, upon receipt of a product found to be defective due to materials or workmanship from the purchaser and notification in writing of the defect, at its option repair or replace any parts found to be defective or the entire product if repair is not possible.

Products found to be defective and notification of defects may also be sent to the authorized Laerdal Medical dealer from whom the product was purchased. All postage, shipping or handling charges shall be the sole responsibility of the purchaser.

Laerdal Medical is responsible for the effects of safety, reliability and performance of its product(s) only if:

- Service, repair, readjustment or modification is carried out by Laerdal Medical or persons authorized by Laerdal Medical.
- Electrical installation of the room where the product is used complies with pertinent national requirements.
- Product is used in the proper manner in strict compliance with its directions for use.

Laerdal Medical shall not be liable under this warranty for incidental or consequential damages, or in the event any unauthorized repairs or modifications have been made or attempted, or when the product, or any part thereof, has been damaged by accident, misuse or abuse. This warranty does not cover batteries, softpacks, modules, fuses, normal wear and tear, staining, discoloration or other cosmetic irregularities that do not impede or degrade product performance.

Some states in the USA do not allow the exclusion or limitation of incidental or consequential damages, so those limitations or exclusions may not apply to you. There are no other express or implied warranties, whether of merchant ability, fitness or purpose or otherwise, on the product, its parts and accessories.

B. Cautions and Warnings

Laerdal SimMan should be operated by trained persons.
Do not connect the product to a patient.

Use of a defibrillator for training purposes represents an operational hazard equivalent to use of a defibrillator on a real patient since it involves the release of high levels of electrical energy into the training manikin.
Consequently:
All safety precautions for use of defibrillators must be followed, as if the manikin were a patient. Consult your defibrillator's User Manual.

- Defibrillation should be performed on the defibrillation connectors only. If defibrillation is performed over one or more of the ECG connectors, high voltages may be present on the remaining connectors during the shock.
- To prevent overheating, do not provide more than three (3) defibrillator discharges (max 360J) in a sequence. Do not exceed an average of two (2) defibrillator discharges per minute during the training session.
- The manikin must not be in contact with electrically conducting surfaces or objects during defibrillation. A flame supporting atmosphere, for example with a high content of oxygen, should be avoided during defibrillation.
- <u>The manikin chest must be kept dry. Special attention should be taken when using IV Arm, Urinary system or Bleeding Control Modules.</u>
- To prevent chest skin electrode pitting, do not apply conductive gel or conductive defibrillation pads intended for patient use.
- Do not use cables or connectors having visible damage.
- Do not spill fluids over any component inside the manikin torso, since this could damage the unit and might also present a possible hazard for the operator.
- If a training session involves the administration of fluids and / or drugs into the IV arm, empty the arm immediately following the training session.
- Do not allow the manikin's skin to come in direct contact with ink or photocopied paper, as this can permanently stain the skin. Avoid using colored plastic gloves when handling the manikin, as they may also cause discoloration.
- Do not introduce any fluids (except airway lubricant in small amounts to lubricate the airway) into the esophagus or trachea of the manikin.

This device generates, uses and possibly radiates radio-frequency energy. If it is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. In that case the user is encouraged to attempt correction of the interference by:

- Reorienting or relocating the receiving antenna.
- Increasing the distance between the device and receiver.
- Connecting the device to an outlet on a circuit different from that to which the receiver is connected.
- Consulting the dealer, or an experienced radio/TV technician, for help.

C. Components

The Laerdal SimMan includes the following main components:

Laerdal SimMan Manikin
SimMan Software CD-ROM for Windows 98, Me, 2000, XP and NT
Operating Guide Volume I CD-ROM: Set-up / Maintenance / Trouble-shooting
Remote Control Units (2)
Pulse Oximetry Probe
Simulated Patient Monitor
Link Box
Set of Defibrillation Studs:
- Hands Free Defibrillation / Pacing Adaptors (Heartstart and Physio Control)
- Plates for Manual Defibrillation

Replaceable Neck Skin Collars (6)
Roll of Crico-Thyroid Membrane Hy-Tape (2)
Chest Tube Insertion Modules (6)
Airway Lubricant
Upper Dentures (one (1) non-breakable installed, and (3) breakable)
Replaceable Male and Female Genitalia with Urinary Connection Valves
Tool Kit, consisting of:
- Pliers
- Screw-driver
- Nut Driver
- Bolts for attaching legs to body (including locking wing nuts)

Maintenance/Repair Kit, consisting of:
- Extra Pneumothorax Bladders
- Modeling Wax
- Talcum Powder

IV Kit, consisting of:
- Tubing (2)
- Simulated Blood Concentrate
- IV Bag (2)

Blood Pressure Measuring Kit
Track Suit (jacket and trousers)
Connection Cables and Tubing, consisting of:
- AC Line Cord, Simulated Patient Monitor
- AC Line Cord, Link Box
- AC Line Cord, Air Compressor (optional)
- Cable, Link Box to Manikin
- Cable, Link Box to Simulated Patient Monitor
- Cable, Link Box to PC
- Cable for Sounds, PC to Link Box
- Hose, Manikin Air and CO_2 Supply

Pressurized Air and CO_2 source (to be purchased separately):
- Compressor Unit (included in some configurations)
- or Regulator Unit

D. System Features

D.1 SimMan Manikin
SimMan is a full body, adult male manikin that allows the simulation of Basic and Advanced Life Support Skills and Assessment to develop both individual and team skills. Hinged joints allow the manikin to be placed in various positions.

D.1.1 Head
The head allows for performance of head tilt and jaw thrust manuevers; however, the airway is open in all positions.

D.1.2 Airway and Lungs
a) SimMan's airway is instructor-controlled to allow simulation of various airway complications, including the failure of therapeutic airway devices. This encourages students to extend their airway management skills beyond those used on a daily basis.
b) SimMan accepts a wide range of airway management devices and techniques. Some examples are:
   ▪ Oral / nasal pharyngeal airways
   ▪ Endotracheal tubes - nasal and oral
   ▪ Laryngeal Mask Airways
   ▪ Combitube
   ▪ Needle cricothyroidotomy
   ▪ Surgical cricothyroidotomy
   ▪ Retrograde intubation
   ▪ Fiberoptic procedures
   ▪ Light Wand intubation
   ▪ Bronchoscopy
c) Ventilation can be performed using any of the following:
   ▪ Bag-Valve-Mask devices
   ▪ Jet ventilation
   ▪ Ventilator
d) The manikin contains two lungs. Intubation that is too deep will result in unilateral lung filling. This usually occurs on the right side, due to the accurate anatomical modeling of the tracheobronchial junction and bronchial tree.
e) The system does not accept PEEP modes of ventilation.
f) Mouth-to-mouth / nose / mask ventilation should not be performed on SimMan. Please note that thorough cleaning of the upper airways, as well as changing the lungs will be necessary if mouth-to-mouth / nose / mask has been performed on the manikin.
g) The airway contains a number of instructor-controlled complications:
   ▪ Laryngospasm
   ▪ Posterior Pharyngeal swelling
   ▪ Tongue edema
   ▪ Trismus
   ▪ Verbal response
   ▪ Decreased cervical range of motion
   ▪ Decreased right and / or left lung compliance

h) The manikin simulates spontaneous respiration with the following features:
- Chest rise and fall
- Exhalation of air
- Exhalation of CO_2 (instructor-controlled)
- The variable respiratory rate is synchronized to the Simulated Patient Monitor display and lung sounds
- The tidal volumes dynamically alter in line with the selected respiratory rate

D.1.3 Neck
a) Bilateral carotid pulses.
b) Airway access through simulated cricothyroid membrane.
c) Decreased Cervical Range of Motion DCROM (instructor-controlled).

D.1.4 Torso
a) Anatomically modeled from a human specimen, the torso demonstrates normal anatomical surface landmarks.
b) SimMan has correct anatomical landmarks for external chest compressions. Chest compressions will produce carotid pulses, as well as compression artifacts on the Simulated Patient Monitor.
c) Manikin is equipped with separate defibrillation and ECG monitoring connectors. The system provides 3- and 4-Lead ECG readings.
   Caution: These connectors are designed for ECG monitoring only. If defibrillation is attempted over any of the ECG connectors, high voltages may be present on one or more of the uncovered connectors during the shock. (See the "Cautions and Warnings" section.) Defibrillation attempts via the electrode monitoring connectors will also damage the internal electronics requiring that they be replaced.
d) Manikin is equipped with two defibrillation connectors. ECG signal can also be monitored across these connectors. Instructor can, via appropriate keyboard or remote control, command / select the "Ignore Defib" function. This determines if the defibrillation shock results in conversion to a selected waiting rhythm. Manual paddle adapters are supplied for use with manual defibrillators.
   Caution: Defibrillation must be performed only over the two defibrillation connectors. (See the "Cautions and Warnings" section.)
e) Connectors for external pacing are connected to the manikin's defibrillation connectors. Patient pads should not be used, as they do not guarantee sufficient contact. The system has a variable pacing threshold and the ability to 'ignore' pacing. Pacing capture results in a pulse synchronized with the heart rate and the display of a paced rhythm on the Simulated Patient Monitor.
f) The torso contains a number of hidden speakers that allow the realistic auscultation of sounds:
- Lung
- Heart
- Bowel
g) Tension pneumothoraces can be simulated through the inflation of resealable bladders. Needle decompression can be performed at:
- Bilateral mid-clavicular line, 2nd intercostal space
- Right mid-axillary line, 5th intercostal space

h) Chest tube insertion can be simulated, and cut can be made at left mid-axillary line at (4th and) 5th intercostal space.
i) Abdominal distension occurs with normal ventilation while using Bag-Valve-Mask or if the esophagus is intubated.

D.1.5 Arms

a) Right Arm is a Multi-venous IV Arm allowing:
   - Cannulation
   - Phlebotomy
   - Drug administration
   - Infusion

   The veins are self-sealing allowing multiple uses; however, repetitive insertions in the same area will result in leakage sooner than if the cannulations had been spread over a wider area.
   The venous system and the skin sleeve are both replaceable.
   The venous system is fluid filled when charged with simulated blood using a closed 'infusion and drainage' system.
b) Left Arm is a BP Arm with radial and brachial pulses and Korotkoff sounds.
   The BP arm allows palpation and auscultation of a blood pressure that can be measured automatically on the Simulated Patient Monitor. Auscultation gap can also be simulated.

D.1.6 Pulses

a) SimMan has physiologically correct palpable pulses:
   - Bilateral carotid pulse
   - Bilateral femoral pulse
   - Left radial pulse
   - Left brachial pulse
b) The pulses are synchronized to the simulated ECG and, when activated, the external pacemaker upon capture.
c) Pulses, once activated, will remain on for approximately five (5) seconds before reactivation is required.
   Caution: Care should be taken when palpating pulses. Use of excessive force results in the inability to feel pulse.

D.1.7 Insert Pads

a) SimMan contains bilateral thigh, gluteal, ventro-gluteal and right deltoid insert pads.
b) The pads can be used for intramuscular and subcutaneous injection practice.
c) These can be interchanged with optional trauma or nursing wound modules.

D.2 SimMan Software

The SimMan Software serves as the instructor's tool for controlling the training scenario. It requires a Pentium computer with MMX processor, 233MHz or better, a minimum of 128 MB of RAM with 150MB available on the hard disc, Windows 98 / Me / 2000 / XP / NT, and a CD-ROM drive with minimum speed of 4x.

The software features are:
a) Training controls via computer keyboard and / or remote controls
b) Over 2,500 ECG rhythm variations
c) Variable extrasystole rate
d) Choice of various extrasystole types
e) Variable pacemaker threshold (external pacemaker training only)
f) Control of manikin functions
 - Airway complications
 - Tension pneumothorax
 - Breathing
 - BP - NIBP and Arterial
 - SpO_2 simulation
 - Temperature display
g) Auscultation sounds
 - Lung
 - Heart
 - Bowel
h) Vocal sounds
 - Numerous vocal sounds are available (moan, vomit, cough, etc.)
 - Additional sounds can be recorded by the user
 - Microphone option (instructor may speak directly through the manikin's on head speaker by using the microphone)
i) Left / right or bilateral lung obstruction
j) Pulse strength
k) Activity Log
l) Scenario Builder / ECG sequence builder for your own training scenarios
m) Trend Editor
n) Event Handler

D.3 Link Box

a) The computer connects to the manikin via the Link Box.
b) 12 V DC, or 110 – 240 V AC operation
c) Remote-controlled interface connectivity to:
 - Manikin
 - Simulated Patient Monitor
 - BP arm on manikin
 - External speakers
 - Computer headphone to link audio (sounds)
 - SpO_2 probe

D.4   Air and CO$_2$ Source

Compressed air is provided by a compressor or other type of pressurized air source via a regulator unit, allowing many functions to take place:
- Airway complications
- Spontaneous breathing
- Tension pneumothorax inflation
- Carotid pulse

a) 110 – 240 V AC operation
b) CO$_2$ source
c) Connects to alternate compressed air source

D.5   Simulated Patient Monitor

The Simulated Patient Monitor provides concise clinical feedback of physiological parameters. All parameters are instructor-activated with the ability to set a lower and higher alarm limit for every parameter shown on the monitor. The monitor may be configurred to display the desired parameters and curves and it is possible to save and retrieve five (5) configurations. Colors and curve trace speeds can also be changed. The CO$_2$ curve has by default a slower trace speed.

a) 110 – 240 V AC operation
b) Simulated patient information (synchronized with all other clinical outputs)
- ECG
- Arterial blood pressure waveform
- CO$_2$ and capnograph waveform
- Heart rate related to SpO$_2$
- BP – with timed automatic updating and 'BP now' function
- Respiratory rate
- Temperature
- SpO$_2$ waveform and numerical display with audio output
- CVP waveform and numerical display output
- TOF
- TOF%
- CO
- FIO2
- FIN2O
- FI Anesthetic agent
- ETO2
- ET Anesthetic agent
- Core temperature
- Peripheral temperature

Please note: Because all information is simulated rather than actual, the parameters, with the exception of ECG, cannot be "measured or displayed" on clinical equipment.

E. <u>Software Installation</u>

<u>Installing the Laerdal SimMan software on your PC:</u>

Laerdal SimMan software requires Windows Installer 1.1 for installation. This will automatically be added to your system if needed and may require a restart of your computer. Installation of Laerdal SimMan software will proceed after restart. Follow the on-screen instructions.

- Insert the Laerdal SimMan CD in your CD-ROM drive.
- If your CD-ROM is set up for Auto run, the installation program will start automatically.
    - If your CD-ROM is not set up for Auto run, start the installation program by clicking "Run" on the Start menu, and typing d:\setup.exe (where "d" is the drive letter of your CD drive).
    - Then click "OK" or press "ENTER".
- On the Installation Start-up screen, click "Install SimMan".
- Follow the on-screen instructions for installation.

After the Laerdal SimMan software has been installed, Microsoft Java Virtual Machine will automatically be installed on your PC.
This installation will require you to restart your computer before the installation is complete.

For the Laerdal SimMan Help to function correctly, Microsoft Internet Explorer 4.01 SP1 or newer must be installed on your computer. If you are running a Windows 98/ Me/ 2000 / XP operating system, this is already installed. You can install the English version of Microsoft Internet Explorer 5.5 from the Laerdal SimMan CD by clicking "Install Internet Explorer". Local versions of Internet Explorer can be obtained from the Microsoft web site, <u>www.microsoft.com</u> .

The Internet communication protocol TCP/IP must be installed on the computer for the Laerdal SimMan program to run. Windows 98/ Me/ 2000 / XP come with TCP/IP installed, so normally you will not need to install it; however, if using Windows NT you may be required to install it.

See information below for installing TCP/IP.

To start Laerdal SimMan software, double-click the SimMan desktop icon.

<u>Note for Windows 98 / Me users:</u>
If several users will be logging into your computer, each user may be required to run the Laerdal SimMan software installation separately.
This will depend on your Windows user profiles settings.
See information below for details (Multi-User Installation Notes).

<u>Note for Windows NT / 2000 / XP users</u>:
You must be logged into Windows with administrator rights to install the Laerdal SimMan software. The installation program will let you choose between installation for all users or for the current user only.

<u>TCP/IP</u>

If the PC is setup for Internet usage, TCP/IP is already installed.
Windows 98 / Me / 2000 / XP are by default, Internet ready and come with TCP/IP pre-installed.

If TCP/IP is not installed, you should follow these steps:

1. If you are connected to a network, consult your network administrator.

2. If you are not connected to a network:
- Be sure to have your Windows installation CD or floppy disks available
- Install Laerdal SimMan software and Internet Explorer by following the loading instructions.
- Go to the Start menu, select Programs and the Internet Explorer folder and then select Connection Wizard. You will be presented with a number of choices
- Select "I want to set up a new connection on this computer to my existing Internet account using my phone line or local area network (LAN)".
- Click "Next".
- Select "Connect using my phone line".
- Click "Next".
- The necessary files will be installed (you may be prompted for Windows installation disks).
- When prompted for modem, click "Cancel" and exit the Connection Wizard.
- Restart Windows.

You should now be ready. Double-click the SimMan desktop icon to start the Laerdal SimMan program. If the Connection Wizard starts again, select "My computer is already set up for the Internet. Do not show this wizard again".
- Click "Next".

3. Alternatively, and **only recommended for expert users**, you can use Control
   Panel to install TCP/IP. (You must have Windows CD or disks available):
    In the Network setup:
     - Add "Microsoft Dial-up adapter"
     - Add "Microsoft TCP/IP protocol"

In this case, select "My computer is already set up for the Internet. Do not show this
wizard again" when prompted by the Connection Wizard.

Multi-User Installation Notes

If you run a Windows 98 / Me operating system, you may be required to install the
Laerdal SimMan software for each user who will be running Laerdal SimMan
program. This depends on the User Profiles settings in the Passwords Properties
Dialog found in the Control Panel.

If User Profiles is NOT turned on (default), SimMan is installed for all users.
Every user that logs into Windows will see the same programs.

If User Profiles is turned on, Laerdal SimMan software is installed only for the current
user.
The users may see different programs installed on the system.

It is recommended that you log into Windows rather than clicking cancel in the
Windows log-in window, before installing the Laerdal SimMan software. If you do not
log in before installing, you might get the following error message when you try to run
the Laerdal SimMan program at a later time (when you log in to Windows with a user
name):

'The Managed Software Installer failed to install the program associated with this file.
Please contact your system administrator.'

or:

'This application must be installed to run. Please run setup from the location where
you originally installed the application.'

To fix the error, start Laerdal SimMan installation from the Laerdal SimMan CD-ROM
and reinstall the Laerdal SimMan software. This will activate the program for the
current user.

F. Assembly and Setup of Laerdal SimMan System
(See the Operating Guide CD-ROM for further details.)

F.1 Attaching the Legs:
1) Locate bag containing attachment hardware.
2) Remove insert pad from upper leg.
3) Lift genitalia and reservoir section out of the pelvis of the manikin. DO NOT remove upper abdominal section.
4) Place a washer, a spring and another washer onto threaded 15cm (6") bolt.
5) Insert threaded bolt through upper leg, through hole and into internal cavity of lower pelvic area.
6) From inside pelvic area, slip a washer on the bolt.
7) Screw a locking wing nut (provided) onto bolt and tighten until desired articulation is achieved.
8) Replace genitalia, urinary reservoir and insert pad. replacing the genitalia and urinary reservoir, make that the pelvic pin has been replaced.
9) To remove leg(s), reverse the procedure.
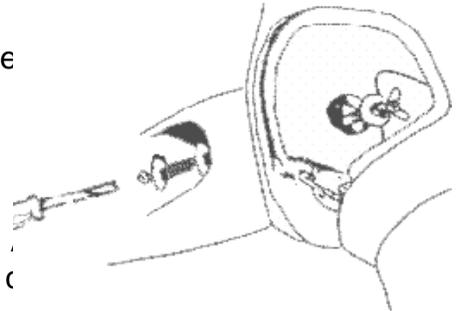
F.2 Crico-Thyroid Membrane Hy-Tape
1) Expose neck to visualize opening that has been molded in place of crico-thyroid membrane.
2) Remove used Hy-Tape from opening.
3) Cut a 4cm (1 ½ ") strip of Crico-Thyroid Membrane Hy-Tape and apply it over the opening to create simulated membrane.
4) A tight seal will enhance actual feel and sound of crico-thyroid membrane penetration.

F.3 Neck Skin Collar
1) Lay a neck skin collar, with dull side out, into molded track around neck area of trainer.
2) Attach collar ends together.
3) The collar is designed to provide multiple sites for needle and surgical techniques. When a fresh site is needed, rotate the collar in either direction.

F.4 Link Box
The Link Box connects the manikin to the computer.
To connect (also see connection guide on page 17):
1) Attach manikin cable to right lower side of manikin's torso and to the connector marked "Manikin" on the back of the Link Box.
2) Connect serial cable to connector marked "PC" on the back of the Link Box and to serial port on back of your computer. If your computer has USB connectors only and does not have a serial port, you need a "USB to serial adaptor" (to be sourced locally).
3) Connect other serial cable to connector marked "Monitor" on the back of the Link Box and to COM2 port on back of the Simulated Patient Monitor.
4) Connect clear tubing from blood pressure cuff to the inlet marked "BP cuff" on the back of the Link Box.

5) Connect the SpO_2 cable to the SpO_2 connector on the back of the Link Box.
6) Connect one end of the audio cable to the connector marked "Audio input" on the back of the Link Box and the other end with the mini-jack plug into the headphone outlet of your computer.
7) Plug the Link Box AC power cable into a power supply (110-240 V AC). If you are using the Portability Kit, attach to the 12 V DC input according to the Portability Kit instructions.
8) Connect external speakers, if used, to connector marked "Ext. speaker" on the back of Link Box.

F.5 SpO_2 Finger Probe

The SpO_2 finger probe provides enhanced realism for the care provider by simulating the use of an actual pulse oximeter probe. When the probe cable is connected to the Link Box, SpO_2 will not be displayed until the probe is placed on one of the manikin's fingers. If the probe is not attached to the Link Box, SpO_2 will only be displayed automatically when selected by the user through the instructor panel on the PC.

F.6   Simulated Patient Monitor

The Simulated Patient Monitor allows any or all of the patients' status data (ECG, Heart Rate, Arterial BP waveform, NIBP, Temperature, SpO_2, CO_2, CVP etc.) to be displayed. To connect, attach one end of the supplied cable to the COM2 port on the back of the Simulated Patient Monitor, and the other end to the Link Box. Plug the Simulated Patient Monitor into a power supply (110 V or 230-240 V AC). A monitor stand is included and separate mounting instructions are located in carton.

F.7   Air and CO_2 Source (optional)

F.7.1   Option 1: Compressor Unit

If you have purchased Laerdal SimMan with a Compressor Unit, attach one end of the double lumen tube into the compressor and the other to the right axillary side of the manikin.

Starting the Compressor:
1) Check Compressor Unit for transport damage.
2) Check that Power Switch **(4)** is set to off position "0".
3) Plug power supply cable into plug **(5)** in Compressor panel.
4) Plug power supply cable into power source.
5) Connect all hoses to SimMan.
6) Check that drain valve **(1)** is closed (hand tighten only!).
7) Close Air valve **(2)** and CO_2 valve **(3)** (blue valves in middle of panel).
8) Push Power Switch **(4)** to on position "1", the compressor will start and run for approximately 45 seconds to build pressure in tank.
9) When the compressor stops, the Laerdal SimMan is ready for use.
   Open Air **(2)** and CO_2 **(3)** valves.
10) Jet ventilation (TTJV) feature is also included and requires a special connector (available for purchase using part number 381201).
11) The compressor will start and stop with different intervals depending on consumption of air.

Shutting the compressor down after use:
1) Push Power Switch **(4)** to off position "0", the compressor will stop if running.
2) Open Drain valve **(1)** to drain air out off system.
3) Close Drain valve **(1)** and disconnect all hoses.
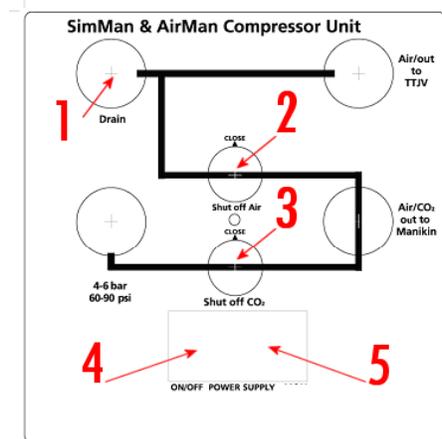
Warning:
Do not open Compressor Box when energized, it contains high voltage. The compressor should only be repaired by authorized personnel.

F.7.2 Option 2: Regulator Unit

If you have purchased Laerdal SimMan with the Regulator Unit, attach one end of the double lumen tube to the "Air/CO_2 out to Manikin" outlet on the regulator and the other end to the right axillary side of the manikin. Connect the "Air in" inlet to a wall air outlet or to a pressurized air canister (70-120 psi). If simulated exhaled CO_2 is desired, connect the "CO_2" inlet to a pressurized CO_2 canister (60-90 psi). Jet ventilation (TTJV) requires a special connector (available for purchase using part number 381201).

EXTERNAL SPEAKERS

POWER CABLE

Link Box

DC INPUT

15 PIN CABLE

9 PIN CABLE

9 PIN CABLE

SpO$_2$ CABLE

BP CUFF

Patient Monitor

POWER CABLE

MANIKIN CABLE

MONITOR CABLE

COM 2

SimMan & AirMan
Compressor Unit

TO MANIKIN AIR/CO$_2$

DATA CABLE

SOUND CABLE

CO$_2$ SOURCE

SimMan & AirMan
Regulator Unit

TO MANIKIN AIR/CO$_2$

POWER CABLE

Computer

SOUND OUT PORT/
HEADPHONE JACK

COMMUNICATION PORT

TO CO$_2$ SOURCE
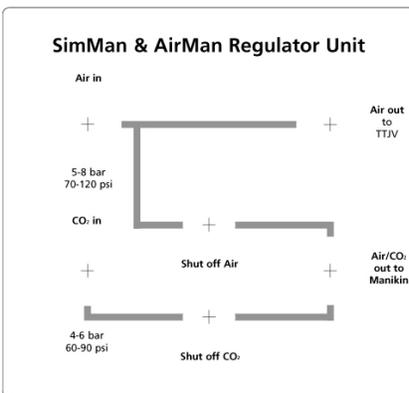
TO AIR SOURCE
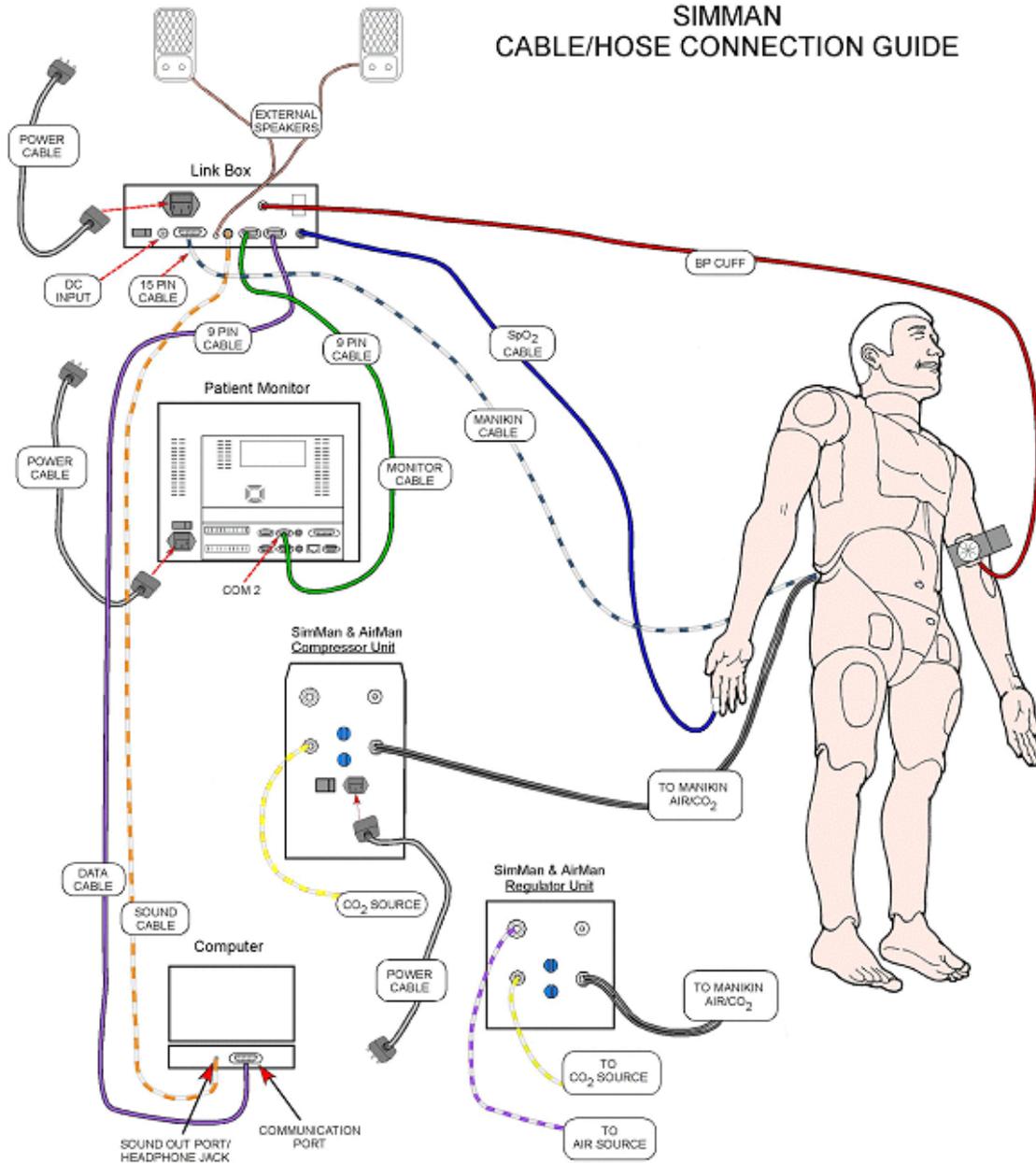
G. Instructions For Use

G.1   Airway Management
Using the computer user interface or the appropriate remote control, the following airway functions may be activated and deactivated:
- Pharyngeal Obstruction
- Tongue Edema
- Trismus
- Laryngospasm
- Decreased Cervical Range of Motion
- Decreased Right/Left Lung Compliance
- Pneumothorax
- Stomach Decompression
- Can't Intubate, Can Ventilate
- Can't Intubate, Can't Ventilate
- Exhale CO_2
- Variable breathing rate
- Apnea
- Variable pulse oximeter display
- Breath sounds

> **Important: Prior to using airway adjuncts, spray the inside of the pharynx, nostrils and all airway management devices to be inserted with a liberal amount of the provided airway lubricant.**

The Laerdal SimMan contains a unique patented difficult airway. Correct form and technique are required to perform direct laryngoscopy and endotracheal intubation. Correct use of a variety of airway adjuncts will successfully ventilate the patient simulator. When airway adjuncts are used, ventilation may be made more difficult by activating decreased lung compliance for either the right lung or left lung. Activating decreased lung compliance for both lungs causes airway adjuncts to fail to ventilate.

Special notice regarding laryngoscopy and the use of airway adjuncts:

Endotracheal Tubes
While ET tubes as large as 8.5 may be used, we recommend the use of ET tube size 7.5 to extend the life of the simulator. We also recommend the use of a malleable stylette. Care should be taken, as with any direct intubation, that the stylette does not extend beyond the end of the tube.

Laryngeal Mask Airway (LMA)
The Laerdal SimMan will allow use of the LMA Classic, LMA Unique and LMA Fastrach. Although a #5 LMA may seal correctly, the airway has been designed for use with a #4 LMA. The following procedure should be followed when an LMA is used:

- For the LMA to successfully ventilate the simulator, the instructor should observe the care provider as the #4 LMA is inserted.
- When the care provider inflates the cuff of the LMA, the instructor should simultaneously activate pharyngeal obstruction. This not only allows the LMA to obtain a proper seal, it also causes the LMA to retract slightly from the pharyngeal cavity, as seen in most actual clinical uses of the device. Activating the stomach distention function will also create a better chest rise.
- The instructor can cause the LMA to fail to ventilate, by either deactivating pharyngeal obstruction or activating decreased lung compliance for both right and left lungs.

Combitube

The Laerdal SimMan will allow the use of the Combitube, as it will successfully ventilate the "patient". We recommend the use of the Combitube trainer, as it will generally withstand multiple uses. The Combitube trainer is sized the same as a large adult Combitube. Although a small adult size Combitube may work with varying success, the Combitube trainer provides more cost-effective training and reliability of function.

The instructor can cause the Combitube to fail to ventilate, by activating decreased lung compliance for both right and left lungs.

G.2   Chest Drain / Chest Tube

The Chest Tube insertion module is located at the left mid-axillary site. This module allows chest tube insertion to be performed. A cut can be made at left mid-axillary line at the (4th and) 5th intercostal space. To replace the used Chest Tube insertion module, simply remove from its location and add a new one with the opening positioned toward the shoulder.

G.3   Circulatory Skills and IV Drug Administration

The IV arm can be used with simulated blood by attaching the supplied IV bag tubing to one of the two latex vein openings near the top of the arm. Using the supplied simulated blood concentrate, mix the desired volume of simulated blood and add to the IV bag. Release simulated blood until it runs via the tubing into the arm and out the other latex vein. Once fluid is running freely out of the second vein, seal it using a clamp. Using an 18 gauge (or smaller) needle for IV training increases the life of the IV arm skin. If you want the student to infuse medicines, attach a second IV bag for free flow.

G.4   IM / SC Injections

The insert pads are foam filled and can be injected with fluids. The foam is removable and should be squeezed out as a sponge and allowed to air dry immediately following the practice of these procedures. Powdering foam pads with talcum powder eases reinsertion into the skin.

There are five sites for subcutaneous and intramuscular injections, including right deltoid, right thigh, gluteal, left thigh, and ventro-gluteal. Using a 22 gauge (or smaller) needle increases the longevity of the "skins".

G.5 Blood Pressure Arm

Blood pressure settings are controlled using the computer or remote control. These settings are also linked to the ECG functionality, so if you are changing the rhythm from a perfusing rhythm to a non-perfusing rhythm, this will also be reflected on the blood pressure settings, which will be changed according to the new type of rhythm. A non-perfusing rhythm will also change breathing rate (BR) to zero. When changing to a perfusing rhythm, the blood pressure will remain at 0/0 until changed, breathing rate can not be changed until blood pressure has been established.

G.6 Laerdal SimMan Software

Using the computer user interface or the appropriate remote control the Laerdal SimMan Software allows the operator to select and control the following patient functions:

- Breathing (Respiratory) Rate
- Heart Sounds
- Lung Sounds
- Bowel Sounds
- Vocal Sounds
- Patented Expert Difficult Airway functions
- Over 2,500 ECG rhythm variations
- Systolic and Diastolic blood pressure values
- Pulses
- SpO_2 & CO_2
- Temperature
- All data displayed on the Simulated Patient Monitor

The remote controls are used as described below:
1) Remote I: Primary cardiac functions and other miscellaneous items
2) Remote II: Primary airway functions and other miscellaneous items

For complete operating instructions, please refer to the PC User Interface section of this manual.
For details regarding import and export of files and recording of sounds, please refer to your Windows manual and Windows help files.

G.7 Needle Decompression

We recommend a 22 gauge needle for decompression of the chest. Using a smaller gauge needle increases the longevity of the chest skin and bladders.

H. Repair and Replacement Instructions

H.1 Tension Pneumothorax Decompression – Bilateral Mid-Clavicular Sites

To repair (a vulcanizing / contact cement is needed):
1) Remove skin at shoulder sides, mid-clavicular, and remove bladder from site cavity.
2) Cover the surface of the pneumo bladder with vulcanizing / contact cement (not included). Avoid getting contact cement on chest plate.
3) Allow to air dry completely.
4) Replace bladder and chest skin over torso and secure skin at the shoulders and both sides.
5) Fill puncture marks on exterior of chest skin with modeling wax, supplied in repair kit, by applying firmly with fingertip while stretching skin.

To replace:
1) Remove skin at torso sides.
2) Lift the chest plate exposing its underside.
3) Disconnect bladder hose from in line hose connector.
4) Remove bladder from site cavity by pulling it from top side of chest plate.
5) Insert new pneumo bladder into site cavity and reconnect to the inline hose connector by threading it through from top side of chest plate.
6) Replace chest plate.
7) Replace chest skin over torso and secure skin at the shoulders and both sides.
8) Fill puncture marks on exterior of the chest skin with modeling wax, supplied in repair kit, by applying firmly with fingertip while stretching skin.

H.2 Tension Pneumothorax Decompression - Right Mid-Axillary Site

To repair (a vulcanizing / contact cement is needed):
1) Remove skin at torso side.
2) Remove flesh colored box from mid-axillary side of manikin.
3) Remove pneumo bladder from the box.
4) Cover surface of pneumo bladder with vulcanizing / contact cement (not included).
5) Allow to air dry completely.
6) Fold bladder and replace in box, return box to torso.
7) Replace chest skin over torso and secure skin at the shoulders and both sides.
8) Fill puncture marks on exterior of chest skin with modeling wax, supplied in repair kit, by applying firmly with fingertip while stretching skin.
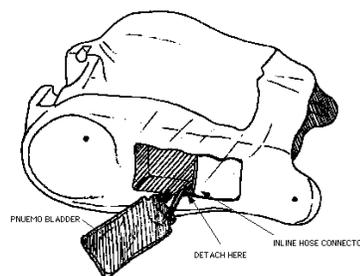
To replace:
1) Remove skin at torso side.
2) Remove flesh colored box from mid-axillary side of manikin.
3) Remove pneumo bladder from box.
4) Disconnect bladder hose from in line hose connector.
5) Remove bladder from site cavity.

6) Insert new pneumo bladder into site cavity and reconnect to in line hose connector.
7) Fold bladder and replace in box, return box to torso.
8) Replace chest skin over torso and secure skin at the shoulders and both sides.
9) Fill puncture marks on exterior of chest skin with modeling wax, supplied in repair kit, by applying firmly with fingertip while stretching skin.

H.3   Chest Drain - Left Mid-Axillary Site

To replace chest tube insertion module:
1) Remove skin at torso side and left shoulder.
2) Remove chest tube insertion module from mid-axillary side of manikin.
3) Insert new chest drain module.
4) Replace chest skin over torso and secure skin at the shoulders and both sides.

H.4   Breathing Bladder

To replace bladder:
1) Remove skin at torso sides.
2) Lift out the chest plate.
3) Fold the lungs upward.
4) Remove foam part.
5) Disconnect bladder tubing from nipple on manifold-block.
6) Connect new bladder to same nipple.
7) Replace foam, lungs and chest plate.
8) Replace chest skin over torso and secure skin at the shoulders and both sides.

H.5 IV Arm

When excessive leaking occurs at the puncture sites, a new vein and skin should be installed to reduce loss of fluid. Ideally, the skin and veins should be replaced near a sink.

To remove the arm:

1) Remove deltoid pad from arm. Disconnect the attachment hardware arm using a screwdriver.
2) If replacing both skin and veins, cut skin off and discard. The thumb will detach with the skin (new skins come standard with thumb installed).
3) If the skin is not damaged and you wish to reuse it, lubricate inside of skin with liquid detergent. Beginning at the top of the arm, roll the skin down and off arm and hand.
4) Remove old veins and discard.
5) Use acetone or equivalent to remove spots of old glue from vein grooves. Dry and swab grooves with alcohol. Place new veins along grooves, extending both veins beyond arm at least 10cm (4") allowing room for connections. Spot glue veins as needed. We recommend using "Vynabond" or "VLP" from PDI (Plasti Dip International), "PL 400" from Tremco or an equivalent.
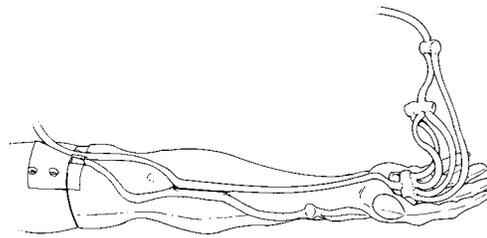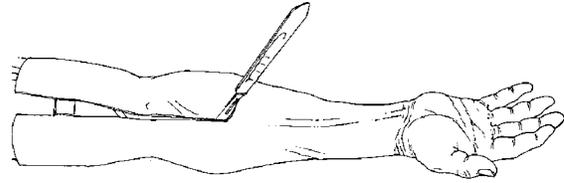
To replace skin:

1) Roll top of skin down to the hand. Spread liquid detergent generously over lower part of the arm. Holding skin and arm with palms upward, slide hand into skin, working the skin over the fingers as with a glove. Then, roll the skin up the arm.
2) Reattach arm when finished.
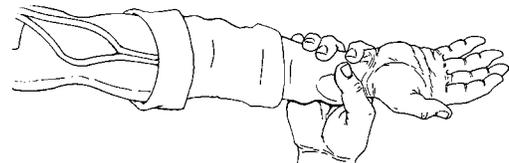
I.   Care and Maintenance

A. Do not introduce fluids into the torso area or left (BP) arm of the manikin, as electronic components may become damaged.
B. Clean with mild soap and water. DO NOT SUBMERGE MANIKIN.
C. Modules and all other parts should be drained and air-dried thoroughly prior to storage. Disinfectants should be used when appropriate.
D. All subcutaneous and intramuscular injection pads should be squeezed to eliminate excess water. To prevent mildew and mold, the foam filling should be soaked in a mild solution of bleach and water or a 1 % Laerdal High Level Manikin Disinfectant solution. Squeeze the solution out and allow the filling to air dry prior to reinsertion and storage.
E. Articulating parts will benefit from a light application of talcum powder prior to training sessions.
F. Powdering inside of chest skin with talcum powder decreases "plastic sound".
G. Use on clean surface only. AVOID FELT TIPPED MARKERS, INK PENS, ACETONE, IODINE OR OTHER STAINING MEDICATIONS, AND PLACING THE MANIKIN ON NEWSPRINT OR INKED LINES OF ANY KIND.
H. A general inspection should be conducted regularly. Do not use the product if cables or tubings have signs of damage.
I. Store properly between teaching sessions. If stored in hard cases, disconnect cables and tubings and remove legs. The different parts should be correctly positioned before closing the cases.
J. Students should wash their hands prior to using the simulator and wear gloves when using the simulator. Treat SimMan as you would a real patient.
K. Air filter in compressor should be replaced every two years. Directions for replacement are part of the Technical/Service manual.
L. A Technical/Service manual is available for purchase using part number 381950.

J.   Standards / Approvals

The product is CE-marked and in compliance with essential requirements of council directive 89/336/EEC; EMC – directive.

K. Parts / Accessories List

K.1 Accessories

1005146	Tubing Assy 40ft Compressor-Manikin, Air/CO2	
1005163	Audio Cable 25 ft, PC-Link Box	
1005164	Cable Assy 25 ft, Manikin-Link Box (15-pin D-sub)	
381200	Compressor 230 V	
381201	Jet-Vent Adapter Kit	
381210	Compressor 110 V	
381220	Regulator Unit for Fixed Air Supply	
381450	Nursing Wound Module Set	See also Optional features
381500	Trauma Module Set	See also Optional features
381550	Bleeding Control Module Set	See also Optional features
381600	Transportation Cases	
381850	Portability Kit	
381950	Technical/Service Manual	

K.2 Consumables

1005128	Multi-vein System, IV Arm	
1005129	Maintenance/Repair Kit	
1005131	Tape Crico-Thyroid (1 roll)	
1000722	Blood Concentrate, 4oz	
1000262	Silicone Liquid, 4 oz	
252090	Airway Lubricant (glycerol version)	
312029	Skin & Vein, IV Arm	
380405	Bladder Assy Mid-Clavicular (Pneumothorax Chest)	
380406	Bladder Set Mid-Axillary (Pneumothorax Side)	
381105	Neck Skin (pkg.6)	
381106	Teeth Upper Rigid (polyester)	
381107	Teeth Upper Soft (vinyl)	
383110	Chest Tube Insertion Modules (pkg.6)	

K.3 Spare Parts

260305	Power-cord (US)	
260306	Power-cord (EUR)	
260307	Power-cord (UK)	
271500	Cable 9-pin D-sub (PC/Monitor to Link Box)	
380110	Remote Control, Cardiac	
380111	Remote Control, Airway	
380200	Arm Assy, Blood Pressure	
380210	Cuff Assy, Blood Pressure	
380310	Cable Assy, Manikin-Link Box (15-pin D-sub)	
380410	Post Set, ECG/Defib	
380435	Breathing Bladder	
380455	Chest Skin with Chest Drain	
380600	Leg Assy Plain, left	
1005162	Thigh Pads, set of 2	
380650	Leg Assy Plain, right	
380700	IV Arm, right	
380810	Pad Set, Shoulder and Hip	
380901	Jacket	
380902	Trousers	
381010	Tubing Assy, Compressor-Manikin, Air/CO2	
381100	Head Assy without Bronchial Branches	
381101	Head Skin w/Airway	
381102	Fasteners for Neck Skin (pkg.10)	
381150	Audio Cable	
381300	Pulse Oximeter Probe	
381900	Directions for Use	
389200	Operating Guide Volume I (CD-ROM)	
500510	Air filter/Silencer for Compressor 381200/381210	

L. Optional Features

Nursing Wound Module Set (381450) including: • Abdominal Packing Module • Abdominal Incision Module • Abdominal Module with Sutures & Drain • Abdominal Module with Staples & Drain • Chest Incision Module with Staples • Sutured Thigh Module • Thigh Packing Module • Thigh Debridement Module • Varicose Leg Module • Diabetic Foot Module • Gluteal Ulcer Module • Ventral Gluteal Ulcer Module • Infected Stoma • Lacerated Palm Module • Upper Arm Module • Leg Stump	
Trauma Module Set (381500) including: • Trauma Head Cover • Right Crushed Foot • 1st, 2nd, 3rd degree burn sleeve • Deltoid Pad – small caliber entry wound • Deltoid Pad – large caliber entry wound • Deltoid Pad – small caliber exit wound • Deltoid Pad – large caliber exit wound • Impaled object pad • Open fracture pad • Compound fracture leg • Contused ankle assembly • Fractured clavicle lay-on • Exposed viscera module	
Bleeding Control Module Set (381550) including: • Bleeding Control Thigh • Bleeding Amputation Thigh • Bleeding Amputation Arm	

1   Software – How-to Guide

The How-to Guide is a quick reference for finding answers to questions that may not easily be found in the table of contents.

1.1   Software Usage Questions

1.1.1   General Questions

What are users and how do I manage them?	See 2.1
How can I ensure that all components are up and running?	See Appendix II.c
Head speaker sound is poor, how can I optimize it?	See Appendix III.
I want to import a scenario, where do I place the files?	See Appendix I.c

1.1.2   SimMan Patient Monitor Questions

How do I get waveforms on the monitor?	See 2.7.3
It is hard to use the touch screen on the patient monitor, how can I make it better?	See 2.14.5
How do I configure the patient monitor?	See 6.2

1.2   Startup Error Messages

SimMan Link Not Found.	See Appendix II.c
SimMan Fatal Error: SimMan could not establish contact with the SimMan host program.	See Appendix II.c

1.3   First StartUp After a SimMan Software Upgrade

The first time SimMan is started following an upgrade, a dialog box will appear giving you the option to automatically copy the new Scenario, Trend, and Handler files to all users.	See Appendix I.c

1.4   General Operation

The SimMan SW makes use of general Windows operating techniques.

1.4.1   ToolTips

When the mouse is moved over an item on the SimMan screen, an identifying ToolTip will usually appear.
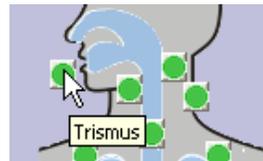
1.4.2   Copy and Paste

The SimMan SW supports copy and paste functions for large text fields, such as entering a description when saving a scenario or entering a comment when saving a student log.

There are several ways to achieve copy and paste. The simplest may be to use CTRL+C to copy the selected text to the Windows clipboard and then use CTRL+V to paste from the clipboard again to where the cursor is.

1.4.3   Using keyboard to enter numbers

When entering a number using the keyboard, you must press the ENTER key to complete your change.

1.5 Abbreviations

1.5.1 Monitor Parameters

ECG	Electro Cardio Gram
HR SpO2	Heart rate calculated based on SpO2
CO	Cardiac Output
ABP	Arterial Blood Pressure
NIBP	Non-Invasive Blood Pressure
SpO2	Pulse Oximetry
C. Temp	Core Temperature
Temp	Core Temperature
P. Temp	Peripheral Temperature
TOF	Train of 4 responses. How many responses out of 4.
TOF %	Ratio between the strength of the fourth response and the first.
FI O2	Inspired Oxygen Fraction
FI N2O	Inspired Nitrous Oxide Fraction
FI Anes.	Inspired Anesthetic Gas Fraction
ET O2	End-Tidal O2
CO2	End-Tidal CO2
ET N2O	End-Tidal N2O
ET Anes.	End-Tidal Anesthetic Gas

2 SimMan Main Program

2.1 Log In

When starting the SimMan program, the user must first log in. This allows several users to share one computer and each have their individual setup and set of scenarios and trends. A single user can also choose to log in as different usernames to have different setups for different situations, e.g., anesthesiology, emergency physicians, nursing, paramedicine, difficult airway, respiratory, etc.

2.1.1 Initial Log In

The first time SimMan is started, a new user must be created. (This is not necessary if SimMan is being upgraded.) This is the new SimMan User dialog. Passwords may be blank.
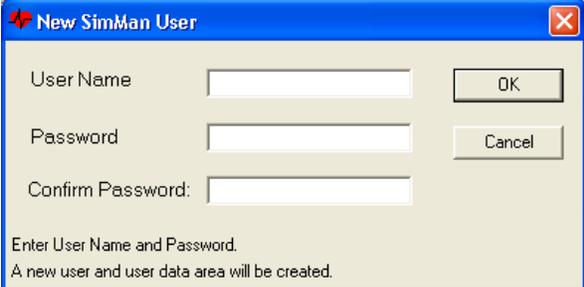
2.1.2 SimMan Log In

Once you have created a user name, this is the ordinary SimMan log in screen that will be displayed when you log on to the system.

2.1.3 Administrator Tasks

Enter administrator mode to give users who forget their passwords new ones or to delete no longer needed users.

This can be accomplished by clicking the "Admin." button in the log in dialog and logging in as administrator. The default administrator password is "password."

Then select the desired user and click "Password" to assign a new one or "Delete User" to remove the selected user.

If you choose to delete a user a warning note will appear to inform you that all the scenario and trends that the user you are deleting may have written will also be deleted.

The administrator can be given a new password, but it must not be forgotten.

Note: You cannot delete the administrator user.

2.2 Chest Drain Manikin Enable / Disable

When starting SimMan for the first time after installing the software on a new PC, you must tell the software which manikin version is connected to the PC.
Older SimMan manikins do not have chest drain functionality and require more air to fill the bladders used for pneumothorax decompression simulation.
You must specify whether or not your Manikin has chest drain functionality. This setting is stored in the computer.
You can later change this setting through the "Options" menu. See 2.14.4.
The following dialog box will then appear. Select the appropriate option.
Selecting "With Chest Drain" causes less air to be filled into the pneumothorax bladders. This is the safest option if you are uncertain of the Manikin type.
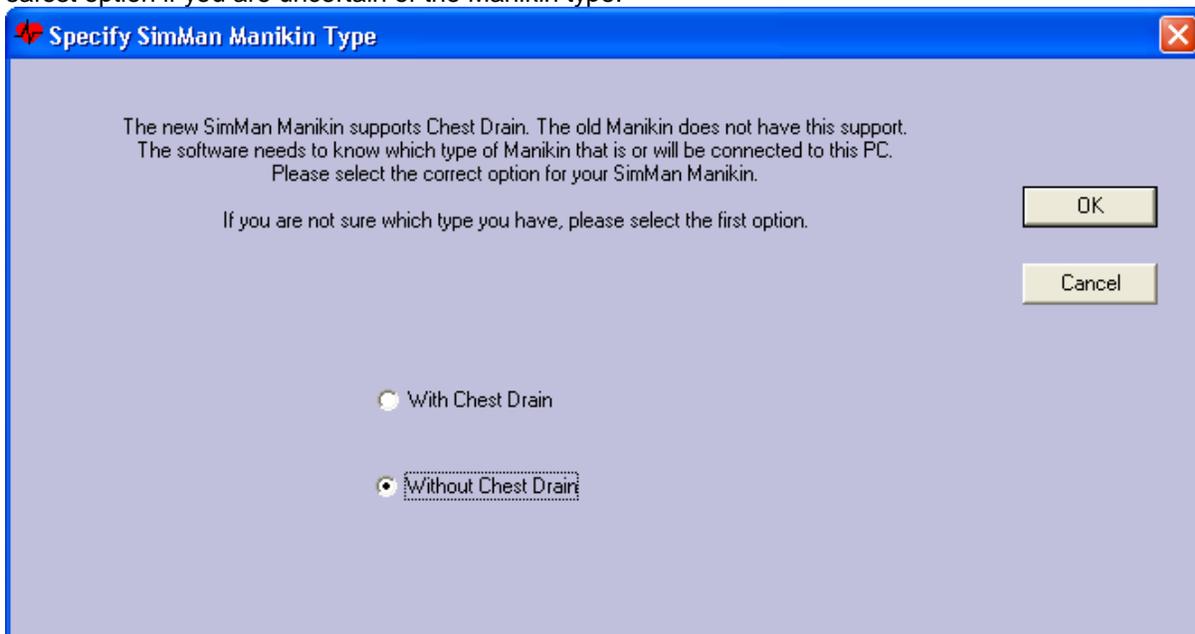
2.3 SimMan Personal Computer User Interface
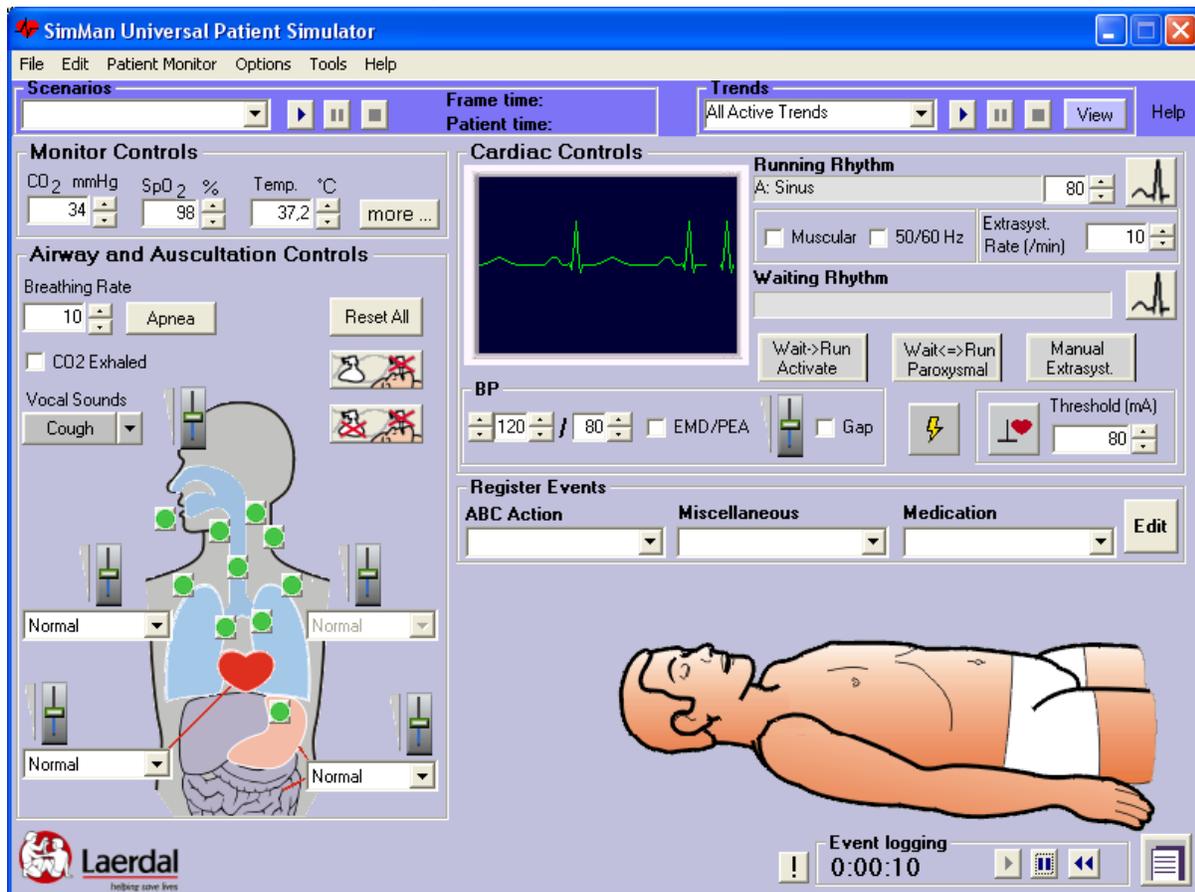
2.4 Personal Computer User Interface Overview

The SimMan User Interface allows you to control the SimMan Universal Patient Simulator.
The user interface also presents status of the simulator and an event log, which can be saved or printed.

The SimMan user interface is divided into sections:

"Cardiac Controls" controls and indicates status for ECG, Blood Pressure with BP auscultation sound, Defibrillation and External Pacing.

See 2.5 for more information on using "Cardiac Controls."
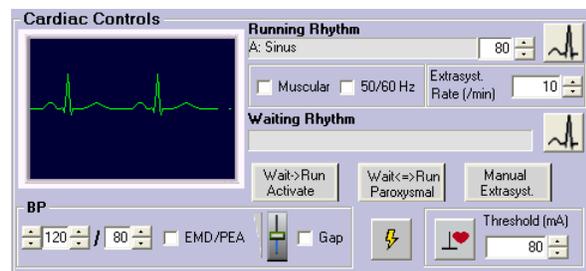
"Airway and Auscultation Controls" controls and indicates status for spontaneous breathing, the airway features, auscultation and vocal sounds.

See 2.6 for more information on using "Airway and Auscultation Controls."
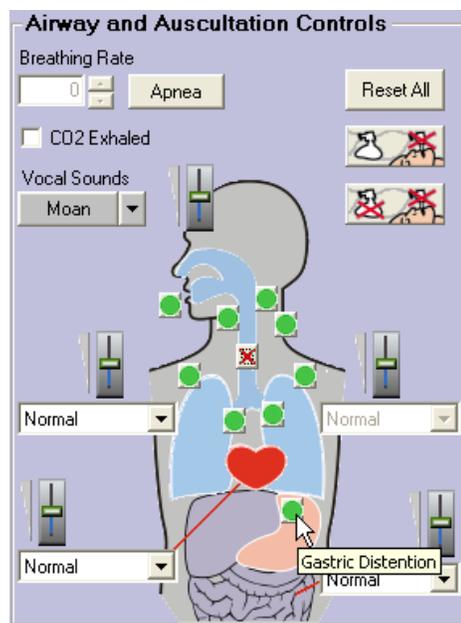
"Monitor Controls" controls and indicates status for patient monitor parameters.
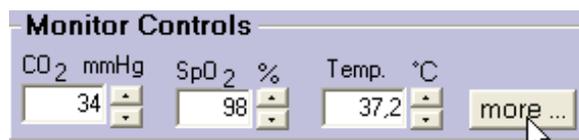
Clicking the "more…" button opens the "Monitor Control" dialog for adjusting all parameters on the Patient Monitor.

By ticking the "Link" tick box, you can make the Systolic and Diastolic sliders move together.

See 2.7 for more information on controlling the Patient Monitor.
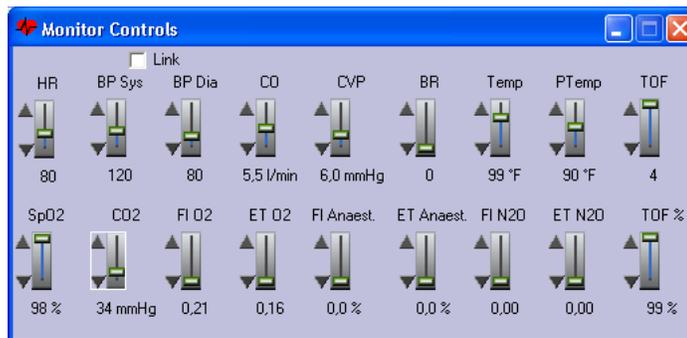
"Register Events" allows you to register "ABC Action," "Miscellaneous," and "Medication" events that are not automatically registered on the simulator.

See 2.9.1.5 for more information on registering Events and customizing Event Lists.

The Manikin picture indicates manikin status and performed events including BP Auscultation, Pulse Check, Ventilations Performed, Defibrillation Performed, Pacing, Intubation, IV-line, Suction, and Precordial Thump.

See 2.8 for more information on Manikin Functions.

The Manikin picture can be exchanged for an event log view by clicking on the button found in the lower right corner of the screen.
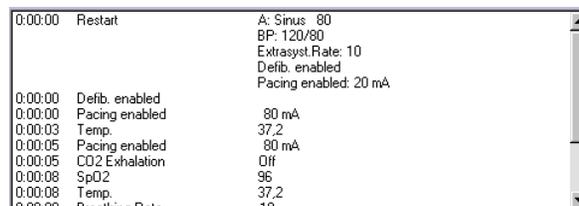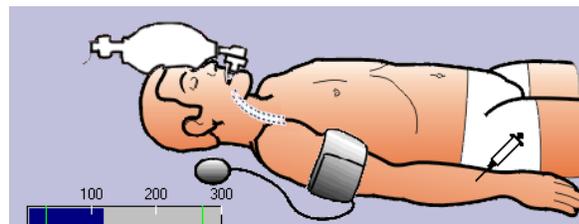
"Event Logging" controls, found in the lower right corner, can be used to pause, resume and restart the event log. The "!" button automatically adds user-entered comments directly to the log.

See 2.9 for more information on the Event Log.

"Scenarios" allows you to select a scenario and has scenario run, pause and stop controls.

See 2.12 for more information on running a Scenario and see chapter 4 for more information on creating your own Scenarios.

"Trends" allows you to select a trend and has trend run, pause and stop controls.

See 2.11 for more information on running Trends and see chapter 2.14.2 for more information on creating your own Trends.

The Program menu-bar in the top left corner of the screen controls system options.

See 2.14 for more information on the SimMan Program Menu.

Most SimMan functions can also be controlled by two infrared remote controls.

One remote control specifically controls airway functions while the other controls cardiac functions.
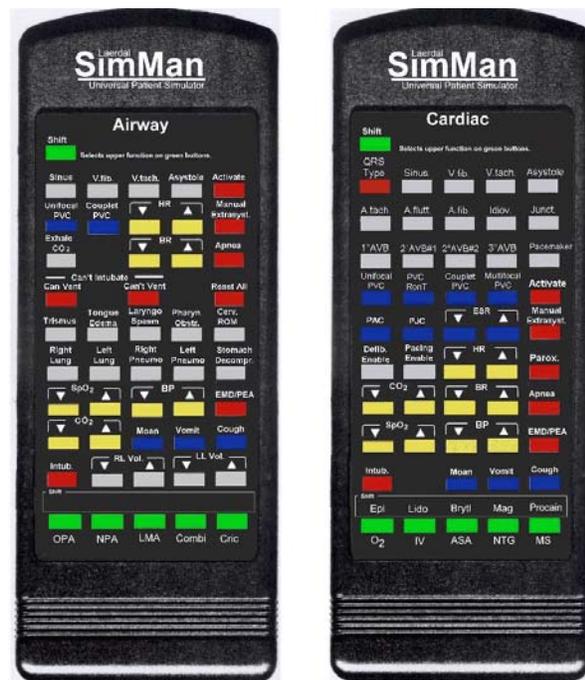
The remote controls may be used simultaneously.

Several functions are common to both remotes allowing use of only one.

The green keys on the lower row can be user defined with up to ten events per remote. See 2.10.2.1 for more information on programming the user-definable (green) keys on the remote controls' lower row.

To disable the remote controls, deselect "Remote Enabled" in the "Options" menu. This will be useful if there is more than one SimMan in a room and other instructors are also using the remote control.

2.5 ECG Rhythm Selection

2.5.1 Running Rhythm

The Running Rhythm field shows the ECG currently running on the Patient Monitor and Manikin.

At start-up, the simulator will always have a Sinus rhythm with a HR of 80.

2.5.1.1 Editing the Running Rhythm

See Appendix 5 for a complete list of available ECGs.
The heartrate of the Running Rhythm can be increased or decreased by clicking on the HR Up/Down buttons.
Heartrate steps and available heartrates are dependent on the basic running rhythm.

Using the Cardiac or Airway remote control, press the HR Up/Down keys *when no Waiting Rhythm is selected*.
When a "Waiting Rhythm" is selected, the HR for the "Running Rhythm" cannot be adjusted using the remote controls.
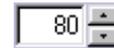
To edit a new Running Rhythm, click on the "Set Running Rhythm" button to activate the ECG selection menu.

You can now set the parameters of the ECG rhythm.

See 2.5.3 for instructions on setting "Running and Waiting Rhythms."
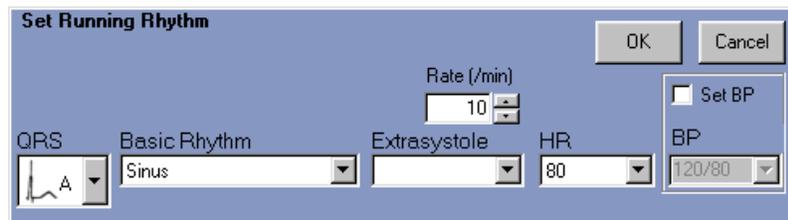
When using the remote control, only the Heartrate of the "Running Rhythm" can be adjusted directly.

2.5.1.2 Artifacts

ECG artifacts directly affect the "Running Rhythm."
Muscular or electrical artifacts can be selected by ticking the appropriate box. Ticking the box again deselects the artifact.
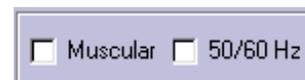
2.5.1.3 Extrasyst. Rate (/min)

This control shows and controls the extrasystole rate of the "Running Rhythm." The frequency of extrasystoles (if selected) can be varied from 2/min to Bigeminy (every second beat is an extrasystole) and they will occur randomly, at approximately the rate selected. Click on the Up/Down buttons to vary the rate.

With the Cardiac remote control, press ESR Up/Down keys to vary the Extrasystole Rate.

2.5.1.4 Manual Extrasyst.

Clicking the "Manual Extrasyst." button immediately generates an extrasystole of the selected type. If the "Running Rhythm" does not specify extrasystoles, one Unifocal PVC will be generated.

With the Cardiac or Airway remote control, press the "Manual Extrasyst." key.

2.5.2 Waiting Rhythm

The "Waiting Rhythm" section allows you to have a new rhythm waiting for activation by user or by a shock.
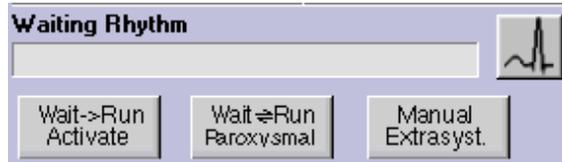
To move the "Waiting Rhythm" to the "Running Rhythm," click the "Wait->Run Activate" button.
The "Waiting Rhythm" now becomes the "Running Rhythm" and the "Waiting Rhythm" field will be empty.
A shock on the manikin will have the same result as "Activate," if shock is enabled.

With the Cardiac or Airway remote control, press the "Activate" key.

[4] To exchange the "Waiting Rhythm" and the "Running Rhythm" click the "Wait=Run Paroxysmal" button.
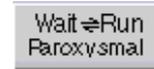
Clicking the "Wait=Run Paroxysmal" button when there is no "Waiting Rhythm" copies the "Running Rhythm" into the "Waiting Rhythm" field.

With the Cardiac remote control, press the "Parox." key.

2.5.3 Setting the Running and Waiting Rhythms

See Appendix 5 for a complete list of available ECGs.
To set a new "Running or Waiting Rhythm," click on the corresponding "Set Rhythm" button, to activate the ECG selection menu.

You can now set the parameters of the ECG rhythm
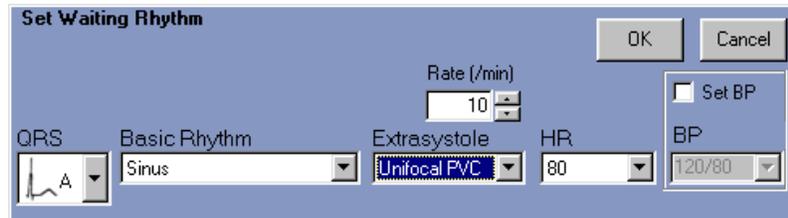
With the Cardiac or Airway remote control, press "QRS Type" or any "Basic Rhythm" key to activate "Set Waiting Rhythm."

2.5.3.1 QRS Type

There are seven different QRS waveforms named "A" to "G" which can be selected.
 Available QRS types vary with each Basic rhythm.
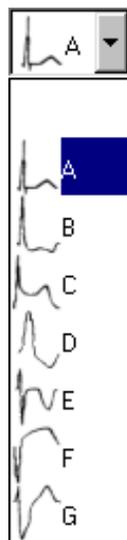
Supraventricular QRS types for: Sinus, A-Tach, A-flutt, A-fib, Junctional, 1°AVB, 2°AVB types 1 and 2, 3°AVB (rate = 60), Atrial Pacemaker, PACs and PJCs
  A. Normal upright QRS-T.
  B. Upright QRS with ST depression and T inversion.
  C. Upright QRS with ST elevation.
  D. Bundle Branch Block. Broad R-wave with T inversion.
  E. Biphasic QRS with T inversion.
  F. QS with ST elevation.
  G. Bundle Branch Block. Broad R-wave with upright T.

Ventricular QRS types for: Idioventricular, V-Tach and PVCs.

  A. Broad rS wave.
  B. Broad R wave.
  C. Broad QS wave.
  D. Broad QS wave. Same as **C**.
  E. Broad R wave.
  F. Broad Rr Wave.
  G. Broad Rr Wave. Same as **F**.
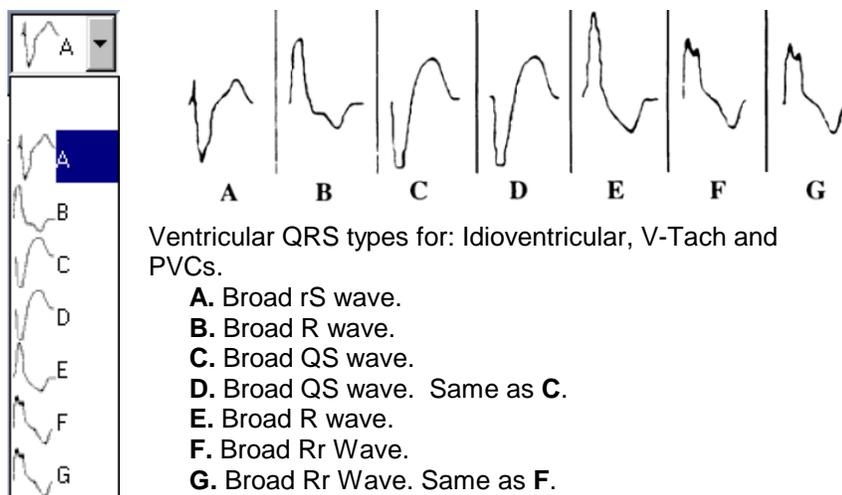
I With the Cardiac remote control, press the "QRS Type" key repeatedly until the desired QRS type is displayed.

2.5.3.2 Basic Rhythm

Select a new basic rhythm by pulling down the "Basic Rhythm" list box and selecting the desired type.
The Basic rhythm will appear with default HR and no extrasystoles.
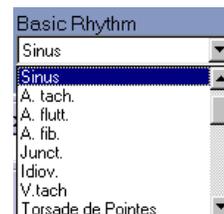
I With the Cardiac or Airway remote control, press any Basic Rhythm key.
If V.Fib or Pacemaker rhythms are selected, the HR Up/Down keys can be used to select the desired type of V.Fib or Pacemaker rhythms.

CARDIAC REMOTE:

Sinus	V.fib.	V.tach.	Asystole
A.tach.	A.flutt.	A.fib.	Idiov.	Junct.
1°AVB	2°AVB#1	2°AVB#2	3°AVB	Pacemaker

AIRWAY REMOTE:

Sinus	V.fib.	V.tach.	Asystole

2.5.3.3 Extrasystole

Select the desired extrasystole by pulling down the "Extrasyst." list box and selecting the desired type.
Available extrasystoles vary with the basic rhythm. For example, all extrasystole types are available with a Sinus rhythm and none are available with an Asystole rhythm.
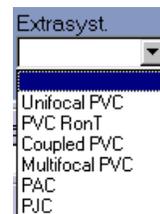
Cardiac Remote:

I With the Cardiac or Airway remote control, press any Extrasystole key.
Pressing the same key again will clear the "Extrasyst." selection.
If no "Waiting Rhythm" is selected, the extrasystole will go directly into the "Running Rhythm."

Unifocal PVC	PVC RonT	Couplet PVC	Multifocal PVC
PAC	PJC		

Airway Remote:

Unifocal PVC	Couplet PVC
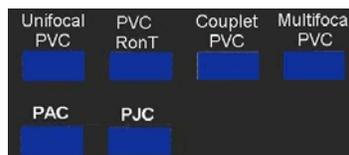
2.5.3.4 Extrasystole Rate

Select the desired extrasystole rate by clicking the "Rate (/min)" Up/Down buttons.

I With the Cardiac remote control, press the "ESR" Up/Down keys.

2.5.3.5 Heartrate (HR)

Select the desired heartrate by pulling down the "HR" list box and selecting the desired rate.

Available heartrates vary with the basic rhythm.

With the Cardiac or Airway remote control, press the "HR" Up/down keys.
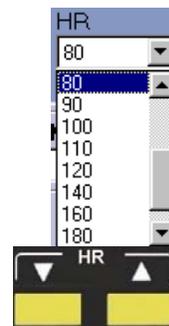
2.5.3.6 Blood Pressure (BP)

Blood pressure can be set as part of the ECG rhythm.
The advantage is that when the BP is set as part of the ECG rhythm, it will change at the same time a "Waiting Rhythm" is activated.

To set the blood pressure, tick the "Set BP" box and select thee desired blood pressure by pulling down the "BP" list box.

If "Set BP" is not ticked, the BP will remain unaffected by the ECG selection, as long as it is a perfusing rhythm.

Non-perfusing rhythms include V.fib, Asystole, Agonal, and Ventr. Standstill. Also a PEA/EMD condition will always set the BP to 0/0.

See 2.5.6 for more information on setting Blood Pressure.

The remote controls only allow for Blood Pressure to be set directly.
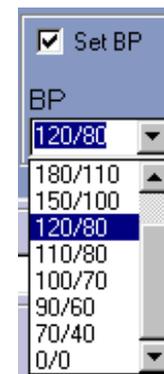
2.5.3.7 Activating the Rhythm

After the rhythm has been edited, clicking the "OK" button will move the new selection into the "Running / Waiting Rhythm."

Clicking "Cancel" will cancel the selections made and revert to the previous selections.

With the Cardiac or Airway remote control, pressing the "Activate" key will move the new selection into the "Running Rhythm."

With the Cardiac remote control, pressing the "Parox." key will move the new selection to the "Running Rhythm," and the previously "Running Rhythm" into the "Waiting Rhythm."

2.5.4 Defibrillation

This button allows you to enable or disable the response to a defibrillator shock on the manikin.

When enabled, a shock of 5J or more will activate the "Waiting Rhythm," providing one has been selected. Clicking the button disables this function.

When disabled, the simulator will not respond to a shock. Clicking the button enables this function.

With the Cardiac remote control, toggle between enable / disable using the "Defib. Enable" key.

A shock is indicated with a shock symbol on the manikin picture and is registered in the event log, regardless of whether shock is enabled or disabled.
Shock enable / disable does not effect a scenario shock event.

2.5.5 Pacing

This button allows you to enable or disable a response to external pacing and to alter the pacing threshold. At start-up, "Pacing" is enabled and pacing "Threshold" defaults to 80 mA.

When Pacing is enabled, SimMan will automatically detect the external pacer once it is producing electrical output. If the pacing spikes are being produced above the set Pacing Threshold level, pacing capture will be seen and felt if the blood pressure is adequate.
Clicking on the Pacing Threshold Up or Down buttons alters the threshold level.

Clicking on the "Pacing" button selects "Pacing Disabled" and external pacing will not result in capture, regardless of the current pacing strength.

With the Cardiac remote control, toggle between enable / disable using the "Pacing Enable" key.

External Pacing is indicated with a pacing symbol on the manikin picture and is registered in the event log, regardless of whether pacing is enabled or disabled.

2.5.6 Blood Pressure (BP)

The Blood Pressure function affects the BP shown on the patient monitor, the auscultated or palpated blood pressure on the manikin's left arm and the strength of the pulses.

Blood pressure can be set as part of the ECG rhythm (see 2.5.3.6) or adjusted directly on the BP controls.

To adjust both systolic and diastolic at the same time use the left up / down buttons. The BP will be adjusted maintaining the same pulse pressure between the systolic and diastolic pressures.

With the Cardiac or Airway remote control, press the "BP" Up / Down keys.

To adjust systolic or diastolic pressures individually, use the up / down buttons to the right of the corresponding parameter.
A difference of 10 mmHg between the systolic and diastolic pressures will be maintained.

Ticking the "EMD/PEA" box will set BP to 0/0.
Removing the tick will bring the BP back to its previous setting.

With the Cardiac or Airway remote control, press the "EMD/PEA" key.

The Korotkoff sound volume in the manikin's left arm can be adjusted by dragging the volume control lever.

To simulate an auscultatory gap in the Korotkoff sound, tick the "Gap" box.

2.5.6.1   Blood Pressure / Pulse Relationship

The pulse strength relates to the BP setting according to the following table.

Systolic BP (mmHg)	Carotid Pulse	Femoral Pulse	Radial/Brachial Pulse
>= 88	Normal	Normal	Normal
< 88	Normal	Normal	Weak
< 80	Normal	Normal	Absent
< 78	Normal	Weak	Absent
< 70	Weak	Absent	Absent
< 60	Absent	Absent	Absent

Blood Pressure will also influence NIBP and SPO2 measurement and the SPO2 curve on the Patient Monitor.

When the systolic BP drops below 50 mmHg, the Patient Monitor will fail to measure NIBP and SPO2 measurement and the SPO2 curve will flatten.

2.6 Airway and Auscultation Controls

"Airway and Auscultation Controls" controls and indicates status for spontaneous breathing, difficult airway functions, auscultation sounds, and vocal sounds.
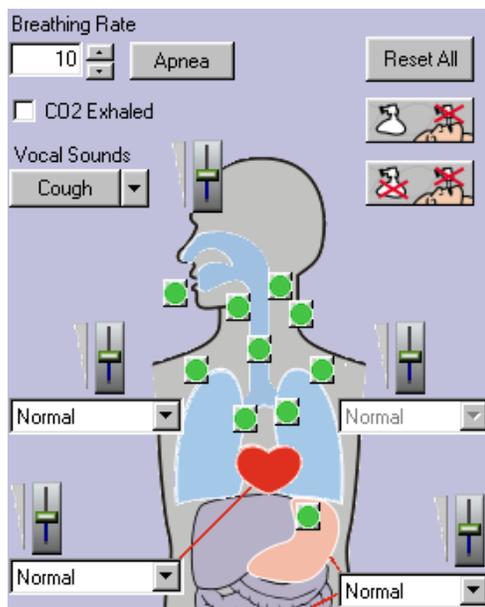
2.6.1 Airway Controls

This function allows you to set the state of all SimMan's airway functions:

- Trismus
- Tongue Edema
- Pharyngeal Obstruction
- Decreased Cervical Range of Motion
- Laryngospasm

- Right Pneumothorax
- Left Pneumothorax
- Reduced Right Lung Compliance
- Reduced Left Lung Compliance
- Stomach Decompression
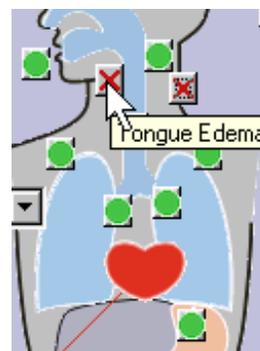
Each function is identified with a ToolTip when the mouse is moved over the button.
Each airway function has two states:

 Not Active. For instance, Trismus off

 Active. For instance, Trismus on.

The indicates clear or less trouble for the student, while the indicates trouble.

The always indicates that a bladder inside the Manikin has been filled with air.

Note: Activating Right Pneumothorax will also activate Reduced Right Lung Compliance and activating Left Pneumothorax will also activate Reduced Left Lung Compliance.

 With the Airway remote control, press a button to activate the desired function(s). Press the button again for deactivation.

2.6.1.1 Preset Buttons

Reset All will set all functions to Not Active.

 With the Airway remote control, press

Reset All .

 Can't Intubate, Can Ventilate will set:
Tongue Edema, Pharyngeal Obstruction, Cerv. ROM and Stomach Decompr.

 Can't Intubate, Can't Ventilate will additionally set Right and Left Lung compliance.

ı With the Airway remote control, press .

ı With the Airway remote control, press .

2.6.2 Spontaneous Breathing

Spontaneous "Breathing Rate" can be adjusted from 0 to 40 breaths per minute.

To adjust the breathing rate, use the "Breathing Rate" Up / Down buttons.

ı With the Cardiac or Airway remote control, press the "BR" Up / Down keys.
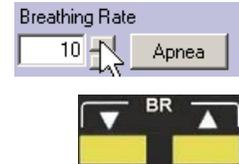
To stop spontaneous breathing, click on "Apnea".
Breathing will also automatically stop when BP is 0/0, both right and left lung compliance is active, and when laryngospasm is activated.

ı With the Cardiac or Airway remote control, press the "Apnea" key.

2.6.3 Exhale CO$_2$

The Manikin will exhale CO$_2$ during spontaneous breathing or ventilation if "CO$_2$ Exhaled" is ticked.

ı With the Airway remote control, toggle the "Exhale CO$_2$" key.

Through the Options menu, it is possible to automatically disable exhaled CO2 two minutes after it is enabled.

The "Exhale CO$_2$" control is independent of the CO$_2$ setting in the "Monitor Controls." "Exhale CO$_2$" turns the CO$_2$ being exhaled through the manikin's airway on or off. The amount of CO$_2$ exhaled is always the same.

2.6.4 Vocal Sounds

Vocal sounds are generated by the computer's sound system. For the vocal sounds to come from the manikin's head, the sound out of the computer, typically the speaker or head phone output, must be connected to the "Audio Input" on the SimMan Link.

To activate vocal sounds on the manikin, select the desired sound from the "Vocal Sounds" pull down menu.

Vocal sound volume can be controlled using the lever adjacent to the "Vocal Sounds" selection menu.
Note: Because the sound is generated by the computer's sound system,

you may also have to adjust its volume. It is activated from the symbol typically found in the lower right corner of the Windows screen. Most Laptop computers also have a volume adjustment knob close to the sound output connector.

With the Cardiac or Airway remote control, press the desired sound key.

You can also assign sounds to the user-definable keys on the remote control. See 2.10.2.1 for more information on assigning sounds to the remote control.

You can add your own vocal sounds to the vocal sound list by copying ".wav" files into the SimMan installation "Sounds" folder.

When the SimMan program starts, it will search for ".wav" files in this folder, and list their names in alphabetical order on the "Vocal Sounds" pull-down menu.

See Appendix I for more information on the SimMan data file structure.
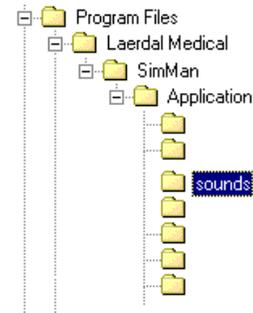
2.6.5 Adding New User Defined Vocal Sounds

You can add new vocal sounds in two steps:
1) Record the new vocal sounds using your computers sound recorder.
2) Save the recorded sounds in the SimMan "Sounds" folder.

1) **To record new sounds:**

Connect a microphone to the microphone input on your PC or use the built-in microphone, if your PC is equipped with one.
Under the "Tools" menu, select the "Microphone Controls" option. It is recommended that you adjust the microphone input level, "Mic in," by dragging the lever to the maximum level that does not cause sound distortion.
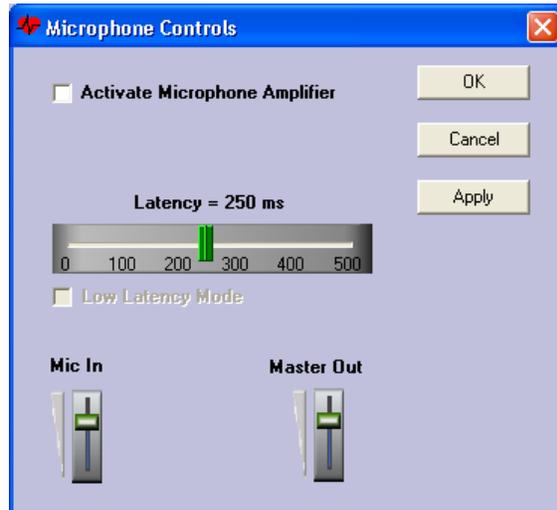
From the Windows Start menu, open the application under the folder:
Programs/Applications/Multimedia/Sound Recorder (in Win98)
Programs/Accessories/Entertainment/Sounds Recorder (in Win2000/XP)

The Sound Recorder will appear.
Record the sound using the microphone and the "Record" and "Stop" keys on the Sound Recorder window.

2) To save the recorded sound:

On the Sound Recorder window, select "Save As" and save the recorded sound file under the following folder on your PC hard drive:
 "C:\Program Files\Laerdal Medical\SimMan\Application\Sounds

Note: This is the default SimMan location. If you chose to install in a different location during the SimMan install, the correct location on your PC will be relative to the location you chose.

The next time the SimMan program starts, it will search for ".wav" files in this folder and list them in alphabetical order in the "Vocal Sounds" pull-down menu.

2.6.6 Speaking Via a Microphone through the Manikin

Some PCs have the ability to directly output microphone input through the speakers and headset output. This may be cumbersome to set up and the volume gain may be lower than when you record and play sounds.

The "Microphone Controls" dialog enables an easier way to use a microphone to speak directly through the Manikin's head speaker, than by using the standard Windows Mixer. It also provides more amplification of the microphone sound.

Under the "Tools" menu, select the "Microphone Controls" option. Enable microphone input by ticking the "Activate Mic Monitoring" tick box.

"Mic In" and "Master Out" levels can be adjusted. "Master Out" controls the output level of all PC sounds.

The downside of this function is that it introduces a small delay in sound output. This delay can be adjusted, but if it is set too short, the sound will be distorted. Ticking the "Use DirectSound" tick box will, on some PCs, allow for shorter delays. Try to adjust to the shortest delay your PC can handle.
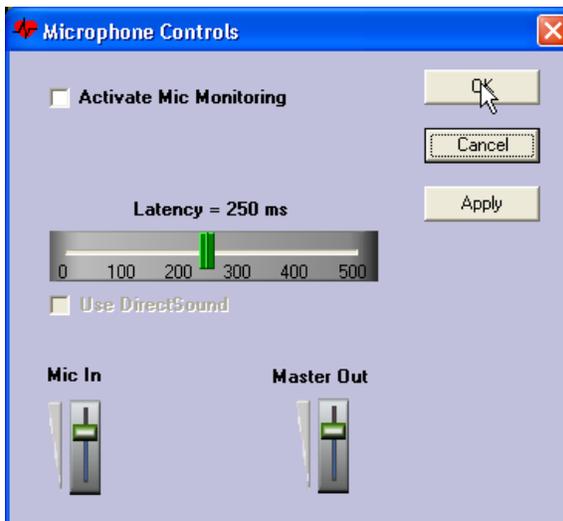
2.6.7 Auscultation Sounds

At start up, all auscultation sound will be "Normal."

To choose a different sound, select the desired sound in the corresponding list box.

The list boxes are identified with ToolTips when the mouse is moved over them.

Lungs:

| Normal |
| Normal |
| Crackles |
| Gurgling Rhonchi |
| Pneumonia |
| Stridor |
| Wheezes |

Heart:

| Normal |
| Normal |
| Systolic Murmur |
| Diastolic Murmur |
| Friction Rub |
| Mitral Valve Prolapse |

Bowel:

| Normal |
| Normal |
| Hypoactive |
| Hyperactive |
| Borborygmus |

| Normal |
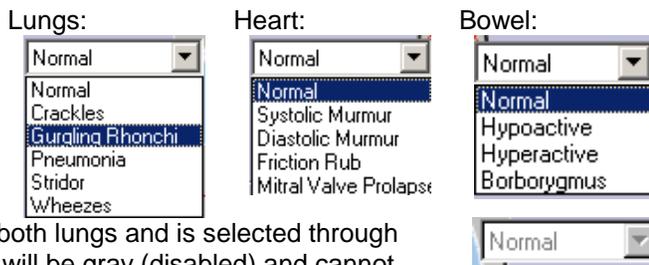
Lung sounds will, by default, be the same for both lungs and is selected through the Right Lung list box. The Left Lung list box will be gray (disabled) and cannot be used.
However, the volume of each lung is controlled separately.
There are two options for lung auscultation sounds.
1. Having the same sound in both lungs.
2. Having a different sound in each lung.

In the first case, the left lung sound selection menu is disabled.

Using the "Option" menu, you can select or deselect "Dual Breath Sounds."
Note that the sound levels are always separate for each lung.

Auscultation sounds cannot be selected from the remote controls.

2.6.7.1   Auscultation Sound Volumes

At start up, all Auscultation Sound Volumes will be set to medium.

To adjust a sound's volume, drag the corresponding slide control to the desired level.

The slide controls are identified with ToolTips when the mouse is moved over them.

With the Airway remote control, right and left lung volumes can be adjusted by pressing the "RL Vol." and "LL Vol." Up / Down keys

2.6.8 Heart and Lung Animation

During spontaneous breathing or forced ventilations, air in the lungs is indicated on the user interface. It is not an accurate indication of the amount of air in the lungs, but a non-quantified indication.

The heart animates every heartbeat.

Heart and Lung Animation can be turned on / off individually in the "Options" menu by selecting or deselecting "Heart Animation" or "Lung Animation.

2.7 Monitor Controls

2.7.1 Basic Parameter Control

"Monitor Controls" controls and indicates status for CO_2, SpO_2 and Temperature. These parameters are only shown on the Patient Monitor and do not affect any functions on the Manikin.
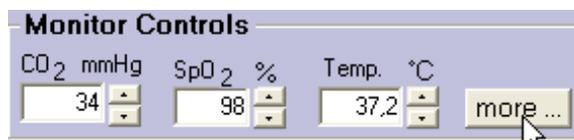
To adjust CO_2, use the "CO_2" Up / Down buttons.

With the Cardiac or Airway remote control, press the "CO_2" Up / Down keys.
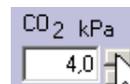
CO_2 scale can be set to mmHg or kPa in the "Options" menu by selecting or deselecting "CO2 in mmHG."

To adjust SpO_2, use the "SpO_2" Up / Down buttons.

With the Cardiac or Airway remote control, press the "SpO_2" Up / Down keys.
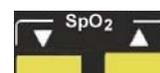
To adjust Temperature, use the "Temp." Up / Down buttons.

Temperature cannot be adjusted with the remote controls.
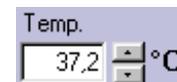
Temperature scale can be set to Celsius or Fahrenheit in the "Options" menu by selecting or deselecting "Temp in Fahrenheit".

2.7.2 Monitor Parameter Control Dialog

Clicking the "more…" button next to the temperature control opens the "Monitor Control" dialog.

The "Monitor Control" dialog controls all parameters shown on the Patient Monitor.

Note: Ticking the "Link" tick box, makes the Systolic and Diastolic sliders move together.
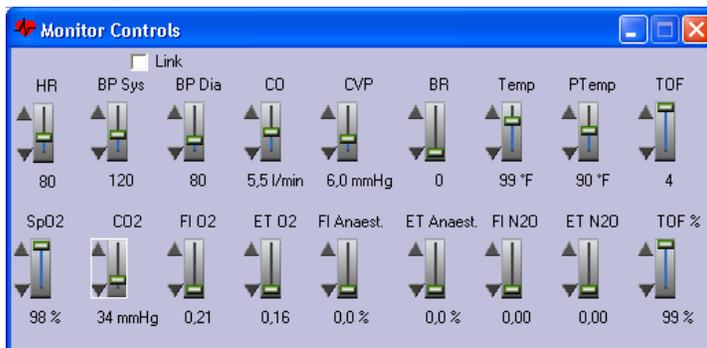
The sliders are only suitable for course adjustments. Click on arrows for fine adjustment, or use the mouse scroll wheel while hovering the mouse cursor above the control.

2.7.3 Patient Monitor Control

The parameters of the Patient Monitor can be turned on and off individually from the "Patient Monitor" menu. The idea is that the instructor can add new parameters as they become available.

Selecting "Select All" or "Remove All" turns on or off all parameters.

"TOF" indicates the number of responses. "TOF %" indicates the ratio in strength between the first and fourth response. If the "TOF" is less the 4, then this ratio is 0.

 "Cycle NIBP now" starts a NIBP measurement on the Patient Monitor. This allows the instructor to guide the students back on the right track, if desired.

See chapter 6 for more information on the SimMan Patient Monitor.

You can also turn off or set the QRS "Beeper volume" from this menu.
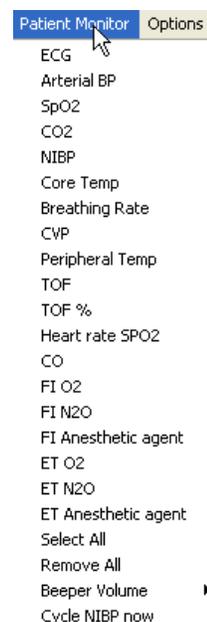
2.7.4 Parameter Variability

For enhanced realism, selecting "Monitor Parameter Variability" on the Options menu enables variability of some values shown on the Patient Monitor.

2.8 Manikin Functions

The Manikin picture indicates manikin status and shows performance of specified events.
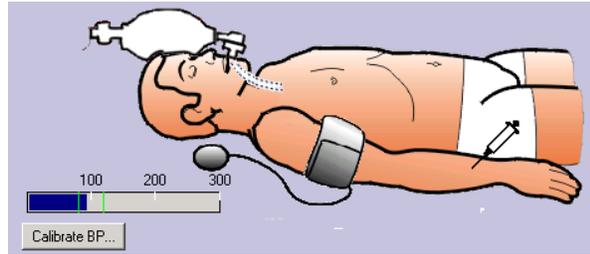
Pulse Check
This symbol is placed on the manikin at the location a check for pulse is being palpated and can be carotid, femoral, brachial or radial.

Chest Compressions Performed

Ventilations Performed

Defibrillation Performed (detects shocks above 5 joules)

Precordial Thump

Pacing (detects external pacing)

Blood Pressure Auscultation / Palpation
The symbol, the bar and the "Calibrate BP" button appear when pressure is building up in the cuff.

The blue bar indicates the cuff-pressure.
The green lines indicate the set diastolic and systolic pressures.
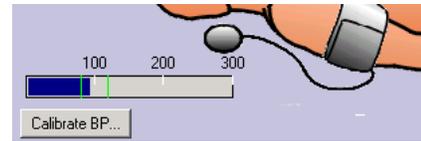
Clicking the "Calibrate BP" button, allows you to calibrate the blue bar indicator to your measurement instrument. When the new window appears, inflate the cuff until the measurement instrument shows 100mmHg and then press the "Calibrate" button. The blue bar is now calibrated to 100mmHg.
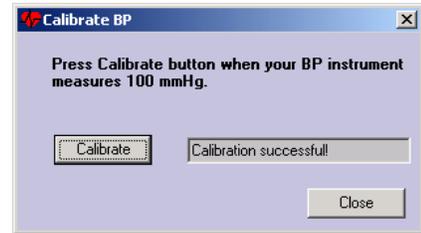
The "Calibrate BP" dialog can also be started from the "Tools" menu by selecting "Calibrate BP…" from the menu list.

In addition, some manual registrations can be indicated on the manikin picture:

Intubation

Oxygen

IV line

Suction
(automatically removed after 5-10 sec.)

2.9 Event Log

The Manikin picture can be exchanged for an

Event Log view by clicking on the button found in the lower right corner of the screen.

Every new operator setting and every action on the manikin is entered into the Event Log.

2.9.1 Event Log Controls

The Event Log time indication defaults to zero when the SimMan program is started.

Elapsed time from the start of the session is displayed. This elapsed time is also displayed in the upper left corner of the Patient Monitor.

Clicking the "Pause Event Log" button pauses the Event Log and stops the elapsed time.

Clicking the "Restart Log" button clears the Event Log and the time resets to zero. "Restart" will also remove indicated events such as Intubation and IV-Line from the manikin picture. You must answer "Yes" in a confirmation dialog before the log will restart.

Note: "Restart Log" is different from "Reset Patient" on the "Tools" menu. "Reset Patient" will restore SimMan and the Manikin picture to its original setting at start up.

2.9.1.1   Adding Comments to the Event Log

The instructor can add additional comments to the log by clicking the "!" button.
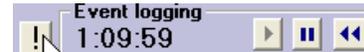
An "Enter Comment" dialog will appear. Enter the comments you want to appear in the log and click the "Submit" button.
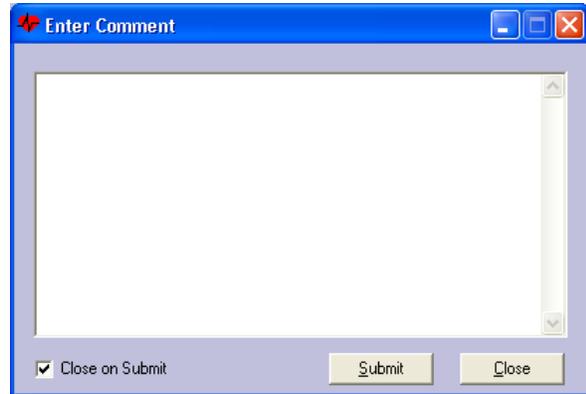
Uncheck the "Close on Submit" box if you don't want this window to automatically close when you click "Submit".

2.9.1.2   Saving the Event Log

To save the current event log to disk, select "Save Log" from the "File" menu.
The "Save As" dialog will be displayed.
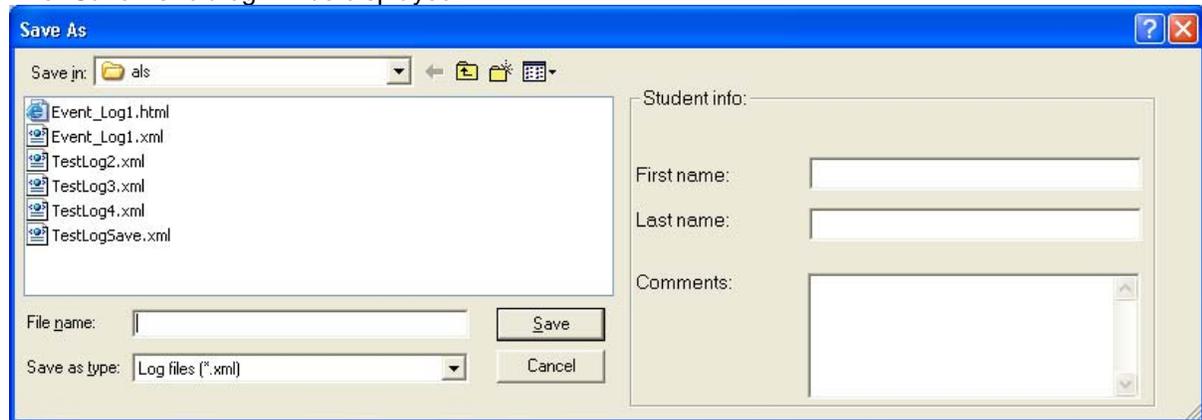
The save dialog allows you to enter student name(s) and comments prior to saving the file.

Type in filename and click "Save" to save the log.

The file is saved in XML format. See Appendix IV for more information on the XML Event Log Format and its usage.

2.9.1.3 Saving the Trend History when Saving the Event Log

It is possible to save pictures of all trend view windows along with the log file. Depending on which style template you choose when printing the log, these pictures may be shown in the log. From the Options menu, select "Save trends images when saving the log." A Trend View dialog will appear immediately after saving the log.
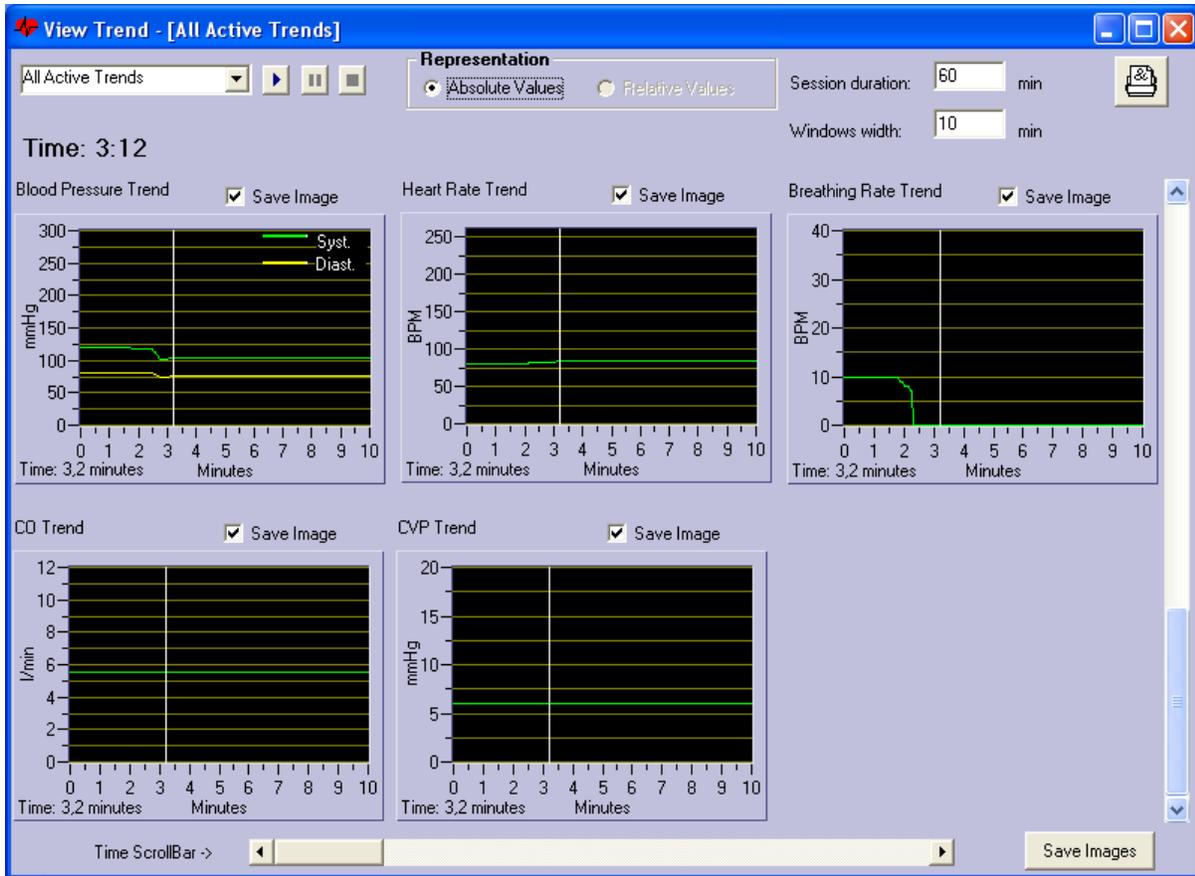
This dialog has a new button "Save Images" rather than the usual "Close" button. There is also a "Save Image" check-box for each trend that let you select which trend images to save.

Adjust the time scrollbar and window's width so that the desired period of the trend history is displayed. Then click the "Save Images" button.

In the …\SimMan\Application\Report\AIs folder, a folder will be created with the same name as the saved report but with "_images" at the end. This folder will contain one picture for each of the trends displayed at the time you clicked the "Save Images" button.

When printing the saved report, these pictures will be copied to the same temporary folder (not a subfolder) the generated .html file is copied to. It is then possible to create a style template that also displays these curves. See appendix IV for more information.

2.9.1.4 Printing the Saved Log

Select the "Print Saved Log…" from the file menu to print a previously saved log.
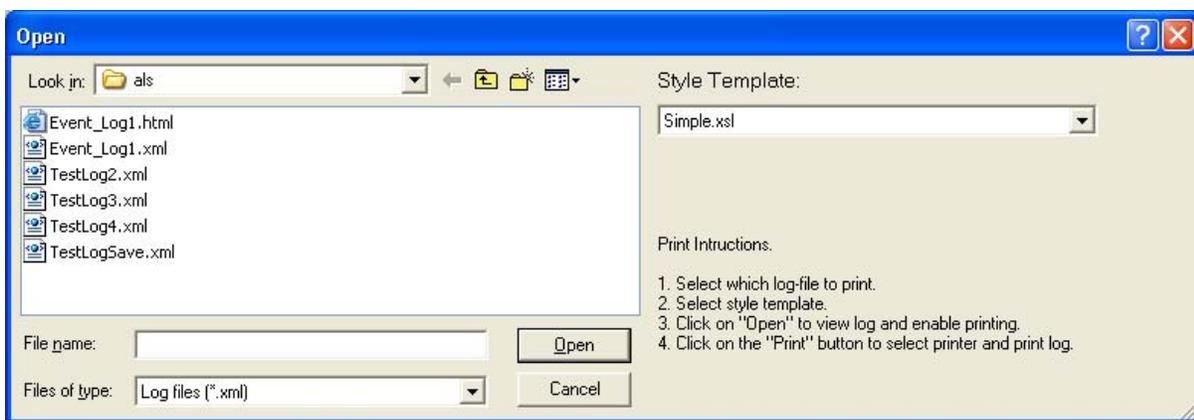
Select the log you want to print, choose a style template
and click on "Open."

A preview will be displayed in your default Internet browser.
Select to print from the browser.

See Appendix IV for more information regarding XML.

2.9.1.5   Print Current Log

Select "Print Current Log…" to print the event log that is shown in the event log window.

Notice that this printout does not contain the additional info fields you enter when you
save the log.

Select the Style Template and press OK.

A preview will be displayed in your default Internet browser.
Print the log from there.
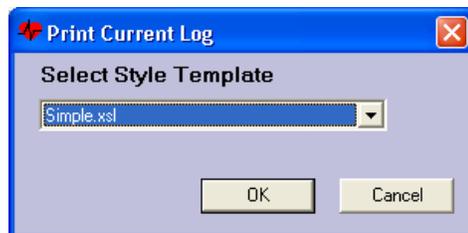
2.10 Manual Logging of Events

2.10.1 Entering Events / Handling Event Lists

Events that are not
automatically registered by the
manikin can be entered using
the three event lists.

The Cardiac and Airway remote control bottom
rows give 10 different events for each remote
control.

The upper events work with the shift button
pressed, the lower without the shift button pressed.
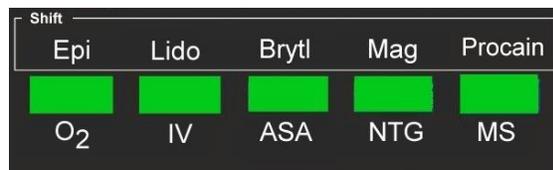
Pull down the list of events in the desired category by clicking the ⏷ button. Select the desired event.

The event is entered in the log when it is selected.

The events can be organized in folders. Click on the "+" sign to expand the folder and view the events saved in that folder.
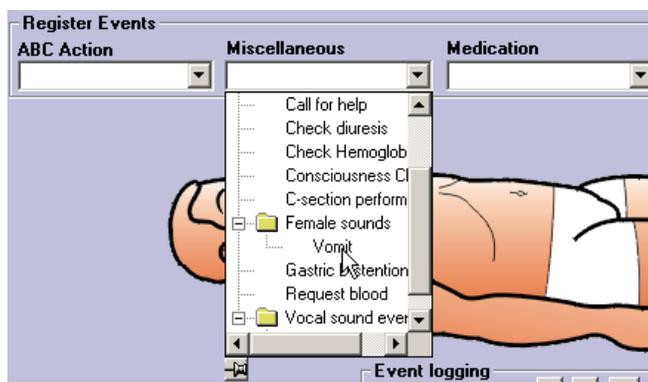
Normally the list closes when an event is selected, but it can be "pinned." Clicking on the "pin" symbol at the bottom of the list will cause it to stay open. Click the symbol again to "unpin" the list.
The list can also be "undocked" from the main SimMan window into its own window by right-clicking the list and selecting "Undock." This window can then be moved freely over the screen.

The list is now in its own window with a title bar. Click on the title bar to drag the list anywhere on the screen.

You can also resize it by clicking the mouse in the window's lower right corner and dragging it to the desired size before releasing the mouse button.
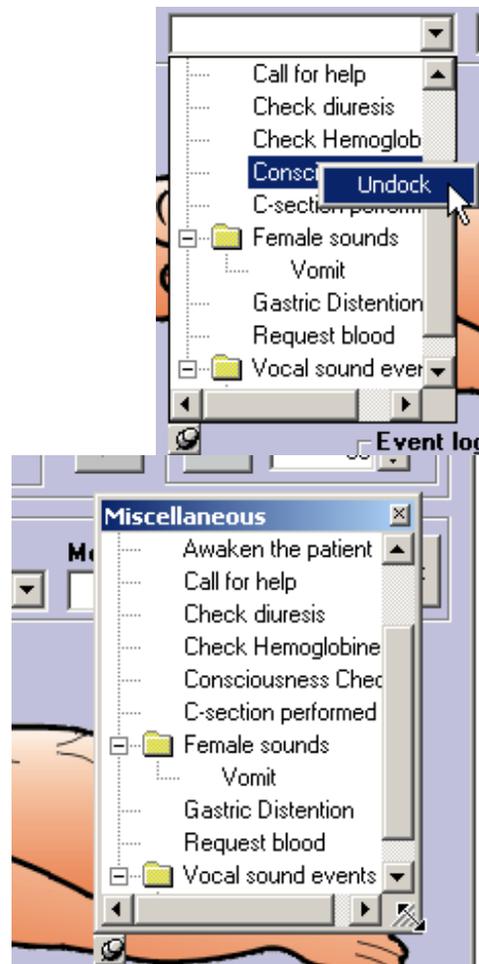
In Windows 2000/XP, you can also make the list window transparent by right-clicking it and selecting "Transparent."

To dock the list back into the SimMan window again, right-click it and select "Dock."

Medication

- Albumin
- Aminophylline
- Amiodarone
- Anaesthetised airways
- Appropriate cardiac drugs
- ASA
- Atropine
- Benzodiazepines
- Blood
- Bretylium
- Dextran
- Dobutamine
- Dopamin
- Epinephrine
- Fentanyl
- Flumazenil
- Fu...
- Ge...   Dock
- Glu...   Transparent
- Glucose 50%
- Glycopyroniumbromide
- Inhalation Therapy
- Ketamine
- Lactated Ringer
- Lidocain
- Magnesium Sulfate
- Mannitol
- Morphine
- Morphine Sulfate
- Naloxone
- Neostigmine
- Nitroglycerine
- Nitroprusside
- Pancuronium
- Plasma
- Procainamide

Help

Edit

2.10.2 Edit Registered Events List

Using the "Edit" button, new events can be added, deleted, or assigned from the event logging lists.

This function also allows you to assign events to remote control keys.
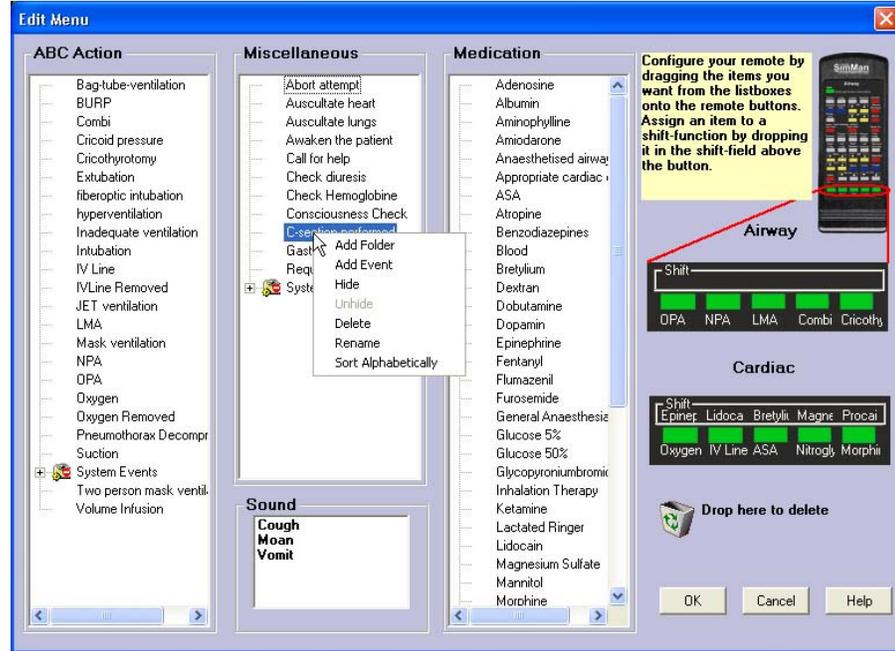
Right clicking on the title of the event list you want to edit gives you the Edit menu.
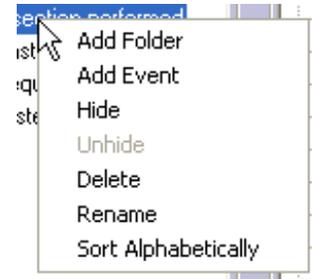
Add Folder	**ADDS A NEW FOLDER IN THE SELECTED LIST.**
Add Event	Adds a new event to the selected list.
Hide	Hides the event under the cursor. Hidden events are shown in the example on the right. Hidden events are not shown in the lists on the main SimMan window.
Unhide	Unhides the event under the cursor, if it is hidden.
Delete	Deletes the event under the cursor.
Rename	Renames the event under the cursor. You can also rename an event by clicking to select it and then clicking on it again to type the new name.
Sort Alphabetically	Sorts the selected event list alphabetically.
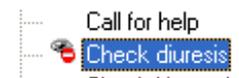
It is possible to copy events to and from folders. Open the folder and use the mouse to drag and drop events into it. To move an event rather than copying it, hold down the shift button while dragging the event to the desired location.
The folder named "System Events" contains all events that originally came with the system. This folder is hidden and undeletable and it is not possible to edit its content. If you have deleted an original event from an event list and want it back, you can copy it from this folder.

Make sure to click the "OK" button to save your changes.

2.10.2.1 Assigning Events or Sounds to the Remote Control

You can assign events or sounds to the lower row of keys (green) on each remote. Two events can be assigned to each key, one with the shift key pressed simultaneously and one without the shift key pressed.

The two key rows are shown on the "Edit" menu screen.

An event or sound is assigned to a remote control key by dragging the event / sound from the list to the desired key identifier.
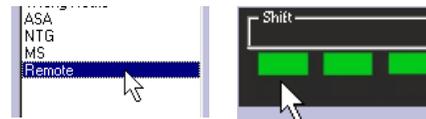
Releasing the event / sound on or below the key assigns it to the key directly.

Releasing the event / sound above the key assigns it to the shift function of the key.

To remove an assignment from a remote control key, click and drag the assignment from the remote control to the recycle bin. This event will still appear on the event list.

Make sure to click the "OK" button on the screen to save your changes.

2.10.2.2 Using Events while Running Scenarios or Event Handlers

When starting a Scenario or an Event Handler two things can happen to the event menus:

1. If the Scenario or Event Handler has customized event menus stored with it, the event menus in the GUI will change to these menus when the Scenario or Handler starts. See 4.6 for more info.
2. If the Scenario or Handler does not have customized event menus, a new folder in the event menu is created called "Current Scenario Events." This folder contains all events used in the Scenario or Handler.

In both of these cases, all events used in the Scenario or Event Handler will be visible when they are started, even if the events are not defined in event menus prior to starting.
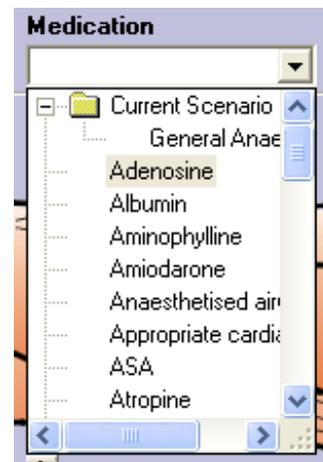
If you start a Scenario and the Scenario starts an Event Handler, the events of the Event Handler will be added to the menus.

See 2.12 for more information about running Scenarios and 2.13 for information about running Event Handlers.

2.11 Trends

Trends allow CO_2, SpO_2, Temperature, Blood Pressure, Heartrate, Breathing Rate, Cardiac Output, and Central Venous Pressure to develop over a time period according to a preprogrammed trend.

Several Trends can be preprogrammed.

Trends are relative. Trend parameters will always begin from the system's current settings and all changes made by the Trend are relative to those settings.

See chapter 3 for more information on working with Trends.

2.11.1 Main Window Trend Controls

"Trends" controls can be used to start, stop and pause trends. The Trends list box shows available trends. Trends can be organized in folders.

"All Active Trends" must be selected to perform an action on all running trends.

The "Active Trends" folder contains a list of currently running trends.

The rest of the items are either Trends or folders containing Trends.

To start a trend, select the desired trend and click the "Start Trend" button.

When a trend is running, the text "Trend Running" will display with its current time position.

The running Trend also appears in the "Active Trends" folder.

When selected, it will show its current time position.

Selecting "All Active Trends" changes the Trend time position to current log time.

To stop the trend, select it in the "Active Trends" folder and click the "Stop Trend" button.

To pause the trend, select it in the "Active Trends" folder and click the "Pause Trend" button.
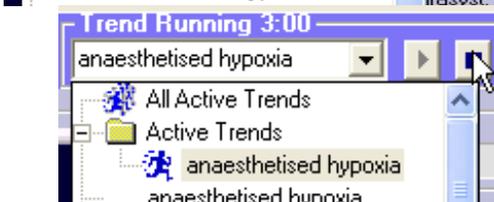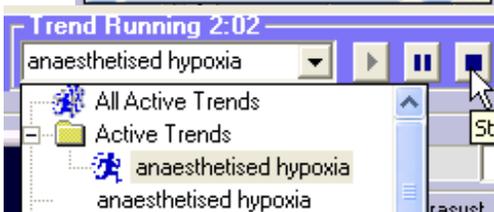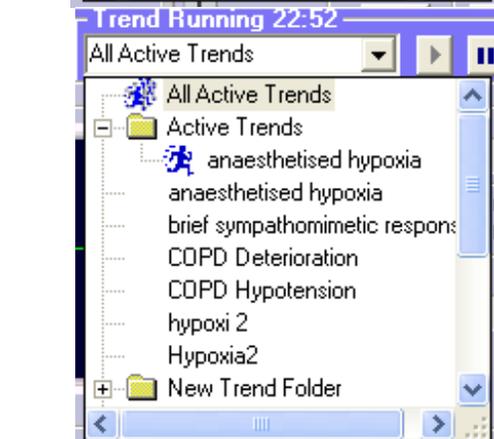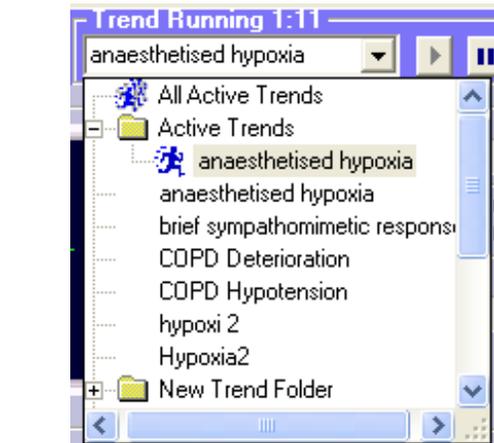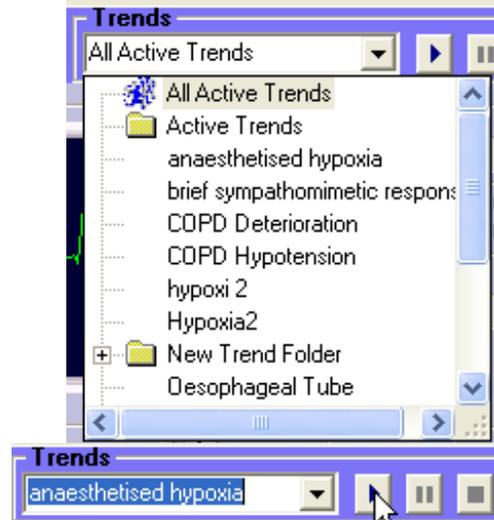
To resume the trend, select it in the "Active Trends" folder click the "Start Trend" button.

To run another trend simultaneously, select it from the list and click the "Start Trend" button. The title will now change to "Multiple Trends Running."

Note: When the title says "Multiple Trends Running," the stop, pause and resume controls affect all running trends.

To control an individual trend, you must first select it from the "Active Trends" folder.

2.11.2 Trend View

For a graphical view of the Trends, click the "View" button.

In addition to many other controls, the "View Trend" window also contains start, stop and pause controls.

When "All Active Trends" is selected, the time reflects the log time and all values are absolute. The moving cursor describes the now time.

Values to the left of the cursor are the history. All changes are recorded.

To the right of the cursor are the projected values, i.e. the contribution of all active trends added together.

Making manual changes to the values will cause the projected trend to shift up or down.
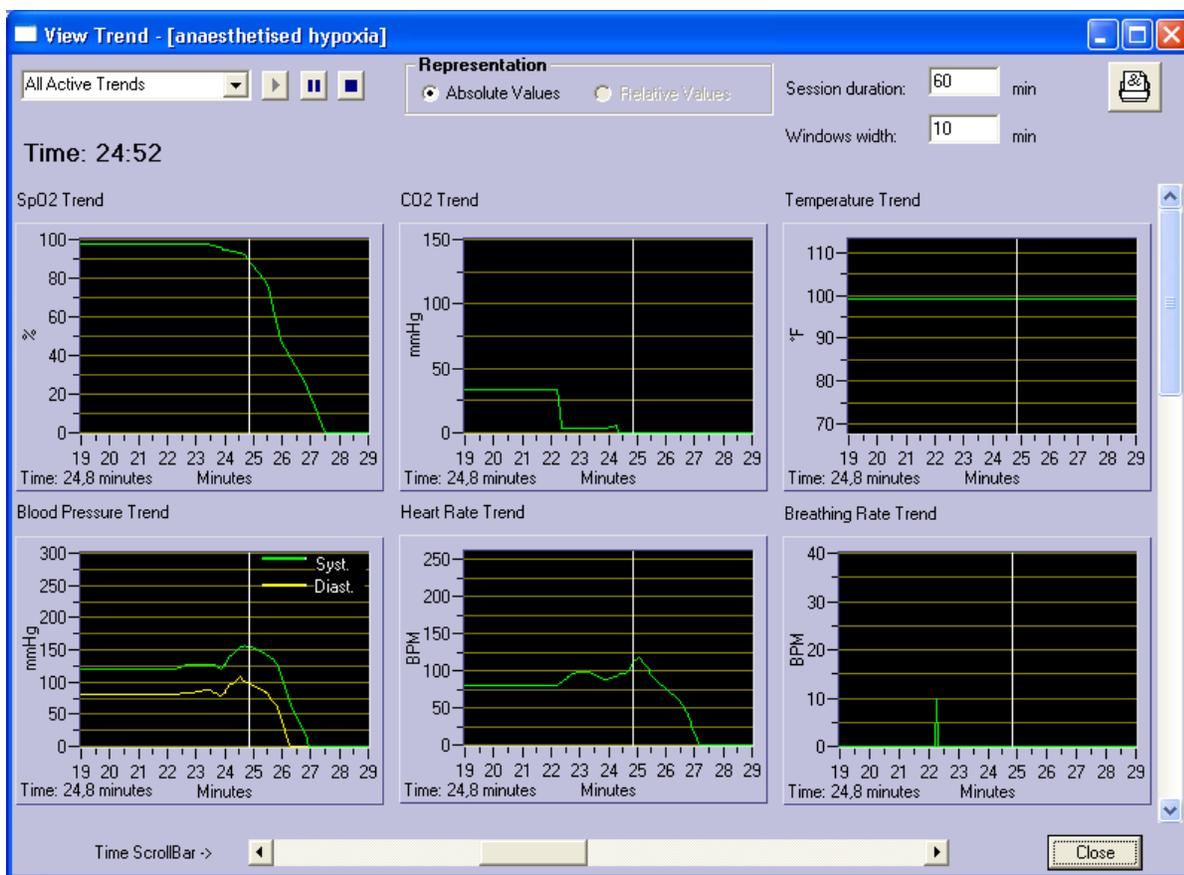
This is a list of the "Active Trends" running in the above view.

Note: It is possible to have multiple instances of the same Trend running simultaneously.
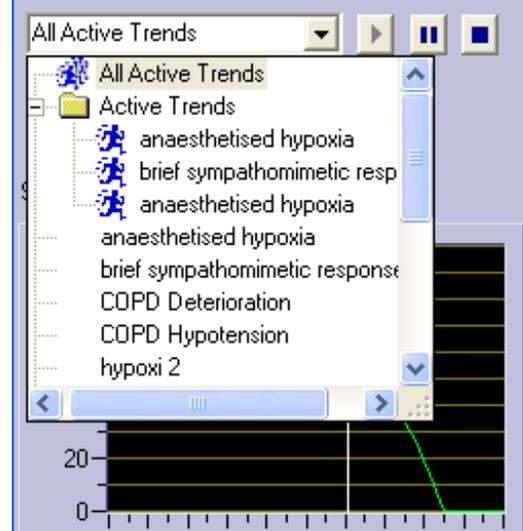
When an individual "Active Trend" is selected, the displayed time will switched to reflect how long the Trend has been running.

The values are now shown in relative mode. For example, the trend starts at 0 and the view shows how much the trend has affected the values and how much it will affect them.
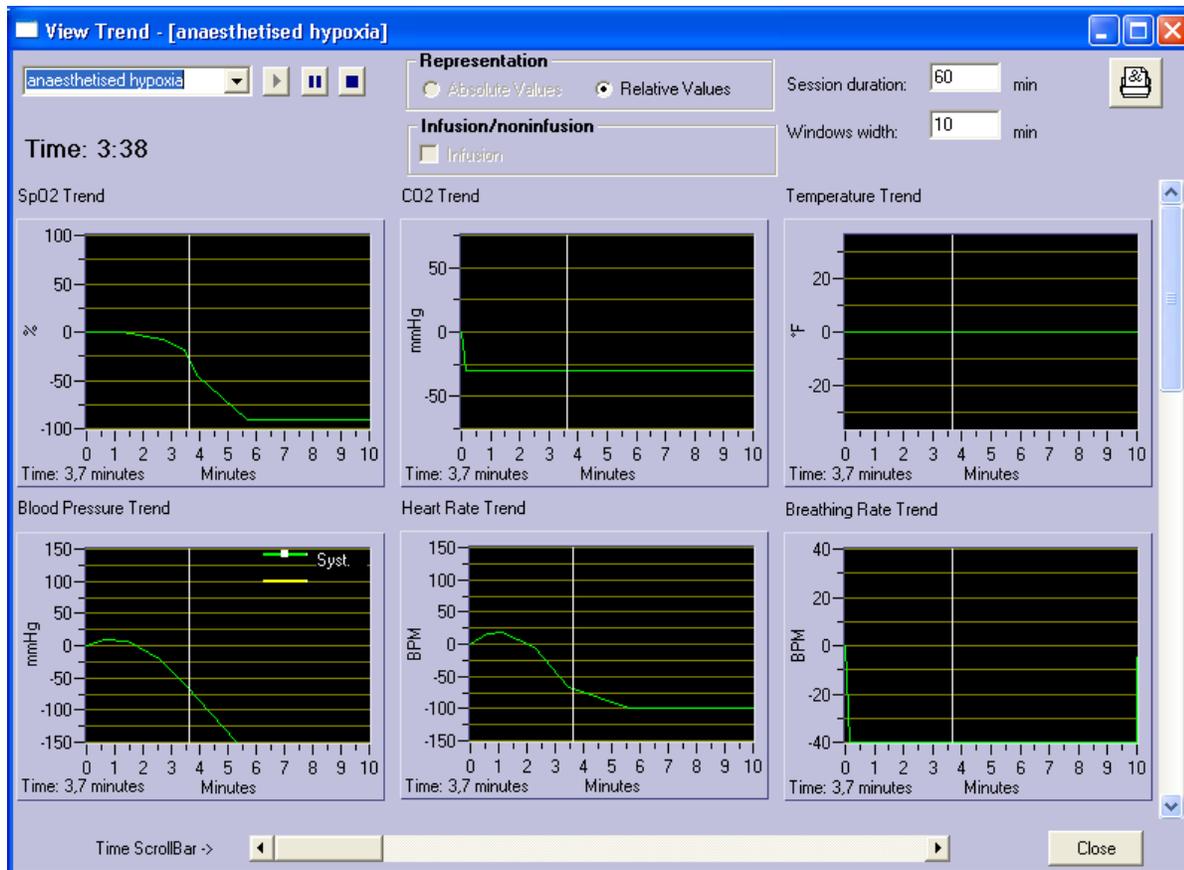
"Representation" allows you to select the desired value mode. "Absolute Values" mode reflects the actual values. "Relative Values" mode reflects the relative changes from the start of the trend. See above.

"Infusion/noninfusion" allows you to specify whether or not the trend is an infusion trend. Ordinary trends automatically stop when they reach their end. An infusion trend does not stop, it continues until stopped manually or by a scenario, and then returns to its relative starting point.

See 3.4.3 for more information on Infusion Trends.

The "Time Scrollbar" at the bottom allows you to scroll within the display window.

"Session duration" allows you to set the maximum value of the "Scroll Bar." "Session Duration" is automatically increased as needed.
"Windows width" allows you to set display window width.
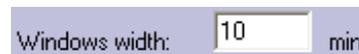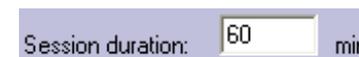
Dragging the scrollbar to the right brings the last two trend curves into view.
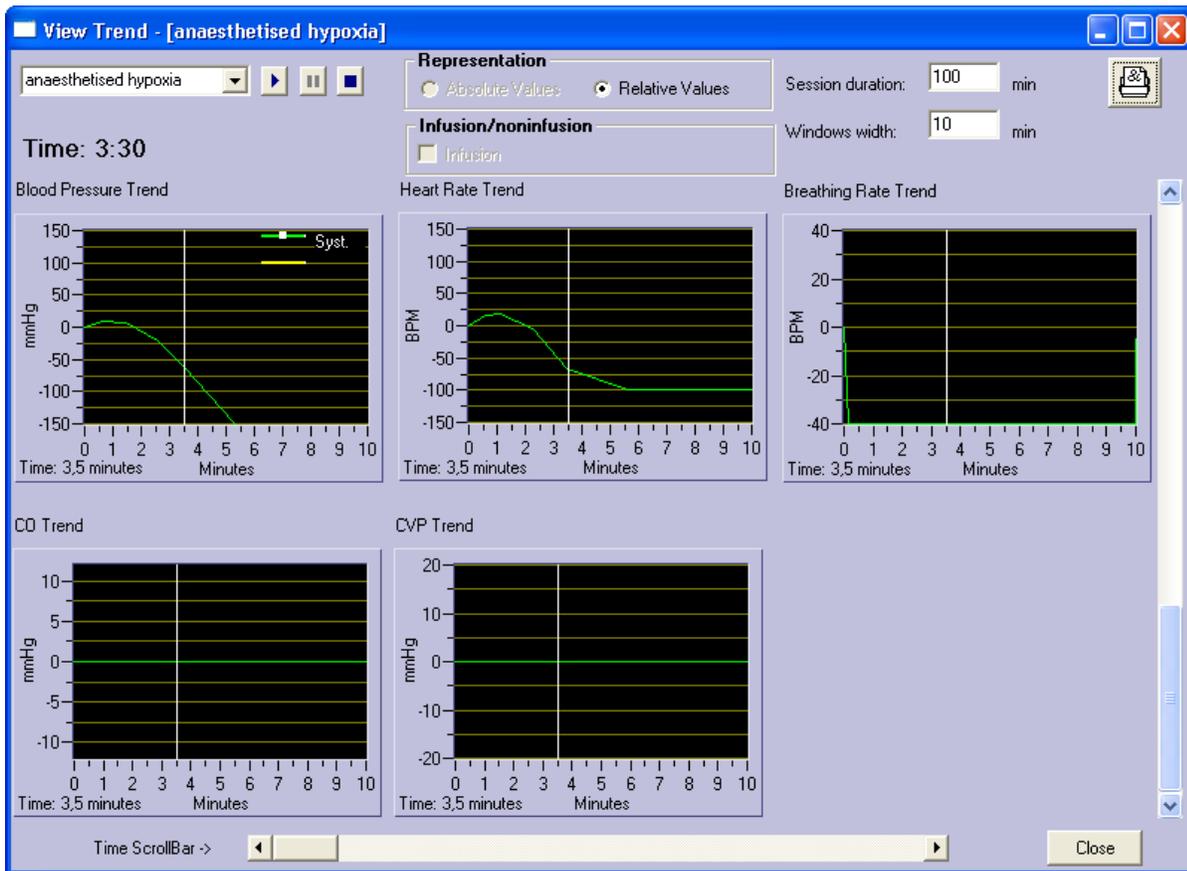
Clicking the "Printer" symbol prints the trend curves view.

Right clicking any of the trend windows allows you to save the window as a picture for future review.

Select the desired picture format and a standard save dialog will appear. The pictures are by default stored in the same folder as the log files. That is the ..\SimMan\Application\Report\AIs folder.
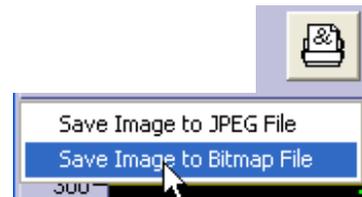
2.11.3 Trend Max/Min Value Control

Prevent the parameter values from changing beyond the desired range, by selecting "Trend Max/Min Values…" in the "Options" menu to open the "Set Max/Min Trend Values" dialog.

	Max	Min
SpO2	100	0
CO2 (mmHg)	150	0
Temp. (°F)	113	32
BP sys.	300	0
BP dia.	300	0
HR	300	0
BR	40	0
CO	12,0	0,0
CVP	20,0	0,0

Buttons: OK, Cancel, Apply

2.12 Running Scenarios

THE SCENARIO IS A MEANS OF PREPROGRAMMING CERTAIN AUTOMATIC RESPONSES FROM THE MANIKIN. SCENARIOS ARE PROGRAMMED TO SET THE MANIKIN IN A CERTAIN CONDITION WITH AUTOMATIC CHANGES TO CONDITION BASED ON STUDENT ACTION, OR THE LACK THERE OF.

A SCENARIO CAN BE STARTED BY SELECTING "START SCENARIO…" FROM THE "FILE" MENU.

The "Start Scenario…" dialog allows you to select a scenario and read its comments.
If someone send you a new scenario or you download it from the web, it may contain new trends, handlers or sounds. When you run or edit the scenario, all trends, handlers and sounds used by the scenario will be copied to the logged-in users profile. But only if a trend, handler or sound with the same name doesn't already exist. If it already exists, the existing one will be used instead.

See chapter 4 for more information on building scenarios using the "Scenario Editor."

Open

Look in: 📁 scenarios ▾ ← 🔼 📁 ✳️ 🔳▾

📁 New Folder
📄 1_need_to_debug.sce
📄 1111ACLS_bradycardias.sce
📄 Can`t_ventilate,_Can`t_intubate.sce
📄 COPD_Exacerbation.sce
📄 C-section

📄 Oesophageal_Intubation.sce
📄 Rapid_Sequence_Induction.sce
📄 Sedated_awake_intubation.sce
📄 Spontaneaous_Pneumothorax.sce
📄 Test1.sce

Type: SCE File
Date Modified: 13.11.2000 01:00
Size: 27,5 KB

File name: Can`t_ventilate,_Can`t_intubate.sce   **Open**

Files of type: Scenario files (*.sce) ▾   Cancel

Comments:

Case history:
Male 26 years old. Acute Appendicitis, ate 3 hours ago, is nauseous, and has vomited. Was in severe pain, but has been given 75 mg of Pethidin i.m. 45 minutes ago. No previous hospital record, but admits "frequent" use of anabolic steroids. (And so he looks). He is on the operating table, connected to the ECG, SpO2, and BP monitor.

Learning objectives
The trainee is to take proper action when experiencing a patient that goes in to a can`t intubate, can`t ventilate mode. The trainee has to do a cricothyrotomy procedeure, and ventilate the patient in order to save him.

A SCENARIO CAN ALSO BE STARTED DIRECTLY FROM THE SCENARIO CONTROLS BY SELECTING THE DESIRED SCENARIO AND CLICKING THE "RUN SCENARIO" BUTTON.

When a scenario is running, the text "Scenario Running" will display.

"Frame number" with "Frame time" and "Patient time" are displayed to the right of the scenario controls.

When a scenario is running, Event Log controls are disabled but may be controlled by the Scenario controls.

Note: Stopping / pausing / resuming a scenario controls affect all running trends. However, trends can be controlled without affecting scenario execution.

All controls are available when a scenario is running, and can be used to override the values set by the current scenario frame.

Note: If the scenario changes frame, it may again override your manual selections. The scenario may also start trends that could cause the values to change.

To pause a running scenario, click the "Pause Scenario" button.

While the scenario is paused, it will not accept manually input events. Running trends and event logging are also paused and the text "Scenario Paused" will be blinking.

To terminate a scenario, click "Stop Scenario" button.

Scenarios
That_Scenario ▾ ▶ ⏸ ⏹

Scenario Running
The_Scenario ▾ ▶ ⏸ ⏹
▶ ⏸ ⏹   Frame 0 time: 16 s
         Patient time: 0 s

Event logging
0:00:40   ▶ ⏸ ◀◀

Scenario Running
The_Scenario ▾ ▶ ⏸ ⏹

Scenario Paused
The_Scenario ▾ ▶ ⏸ ⏹

Scenario Running
The_Scenario ▾ ▶ ⏸ ⏹
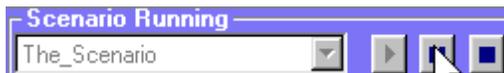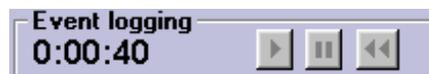
2.13 Running an Event Handler

THERE ARE THREE TYPES OF EVENT HANDLERS, ONE FOR EACH TYPE OF EVENT CATEGORIES: ABC, MISCELLANEOUS, AND MEDICATIONS.

An Event handler is programmed to perform a specified action each time a specified event occurs. The programmer selects the events to handle and the desired action.

A running Event Handler is common to a running Scenario. Both respond to events and both can perform actions. However, the Scenario can respond to some Events in additional to those the Handlers can respond to. Also, the Scenario can change its response to an event, a Handler always responds in the same way.

The Handlers are easier to understand and to build on your own.

See chapter 5 for more information on building Event Handlers using the "Handler Editor."

EVENT HANDLERS ARE STARTED BY SELECTING "START ABC HANDLER…", "START MISC. HANDLER…", OR "START MEDIC. HANDLER…" FROM THE "FILE" MENU.

The "Open" dialog allows you to select a Handler and read its comments.
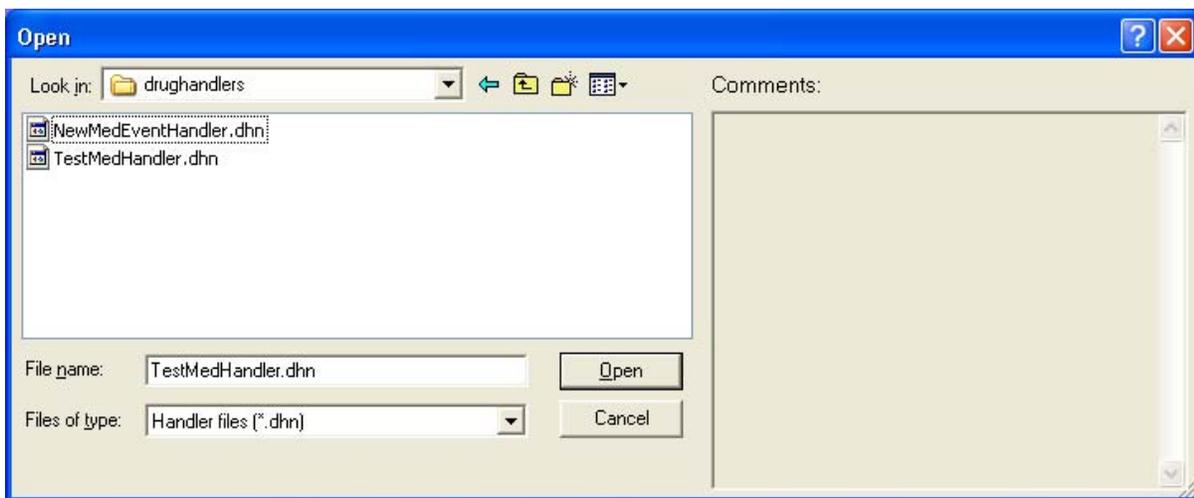
A hand icon appears next to its category name in the "Register Events" control to indicate a Running Handler.

Moving the cursor over the hand displays a ToolTip describing the Running Handler.

CLICKING ON THE HAND ICON CAUSES THE "STOP MEDICATION HANDLER" PROMPT TO DISPLAY.
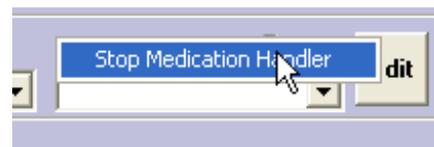
Clicking the prompt stops the Handler.

ONLY ONE HANDLER FROM EACH CATEGORY CAN BE RUNNING SIMULTANEOUSLY.

A HAND ICON IS DISPLAYED NEXT TO EACH EVENT CATEGORY HAVING A RUNNING HANDLER .

2.14 Program Menu

The "Program" menu is, in some cases, an alternative way of performing some actions. In other cases, it is the only way.

2.14.1 File Menu

The "File" menu controls system wide commands.

Start Scenario	Start Scenario is an alternative way of starting a scenario. See 2.12.
Start ABC Handler	Starts an ABC Event Handler. See 2.13.
Start Misc. Handler	Starts a Miscellaneous Event Handler. See 2.13.
Start Medic. Handler	Starts a Medication Event Handler. See 2.13.
Save Log	Saves the Event Log. See 2.9.1.2.
Print Log	Prints the Event Log. See 2.9.1.4.
Log in as another user…	Allows a different SimMan user to log in. See 2.1.2.
Exit	Closes the program. Clicking the "X" in the upper right corner of the SimMan window also closes the program.
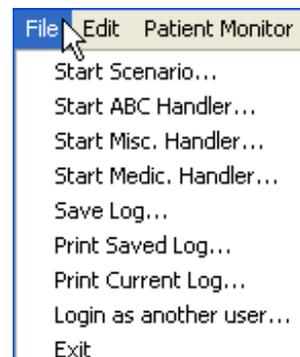
2.14.2 Edit Menu

The "Edit" menu controls edit commands.

Edit Scenario

Edit ABC Handler

Edit Misc. Handler

Edit Medic. Handler

Edit Trends

2.14.3 Patient Monitor Menu

The "Patient Monitor" menu controls, as the name implies, the Patient Monitor. See 2.7.3.

2.14.4 Options Menu

The "Options' menu controls various settings. Check the references for more information on each control setting.

Dual Breath Sounds	See 2.6.7.
Heart Animation	See 2.6.8.
Lung Animation	See 2.6.8.
Temp in Fahrenheit	See 2.7.1.
CO2 in mmHg	See 2.7.1.
Remote Enabled	See 2.4.
Exhaled CO2 2 min. Auto Off	See 2.6.3
Monitor Parameter Variability	See 2.7.4
Save trend images when saving log	See 2.9.1.3.
Chest Drain…	See 2.2.
Trend Max/Min values	See 2.11.3.
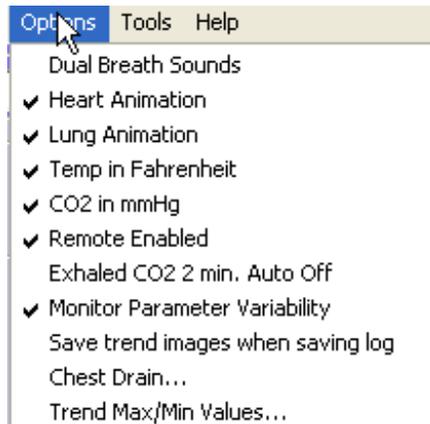
2.14.5 Tools Menu

The "Tools" menu controls various commands.

Mic Monitor…	Opens the microphone monitor dialog for improving direct microphone volume. This control can also set the Windows volume control. See 2.6.6.
Calibrate BP…	Allow you to calibrate the SimMan SW to your cuff pressure meter. See 2.8.
Calibrate Patient Monitor	Opens the calibrate dialog on the Patient Monitor. Follow the on screen instructions to complete the calibration.
Reset Patient	Restores the SimMan and Manikin picture to its original setting at start up.

2.14.6 Help Menu

The "Help" menu provides access to SimMan Help and displays software version information in the about dialog.

Show Help	Opens SimMan Help window.
About SimMan	Shows SimMan SW version info. See Appendix II for more information on other programs that make up the SimMan software.
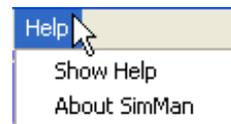
3 Edit Trends

TO EDIT A NEW OR EXISTING TREND, SELECT "EDIT TRENDS" FROM THE "EDIT" MENU. SEE 2.14.2.

"Edit Trends" allows you to create, edit, print and save Trends.
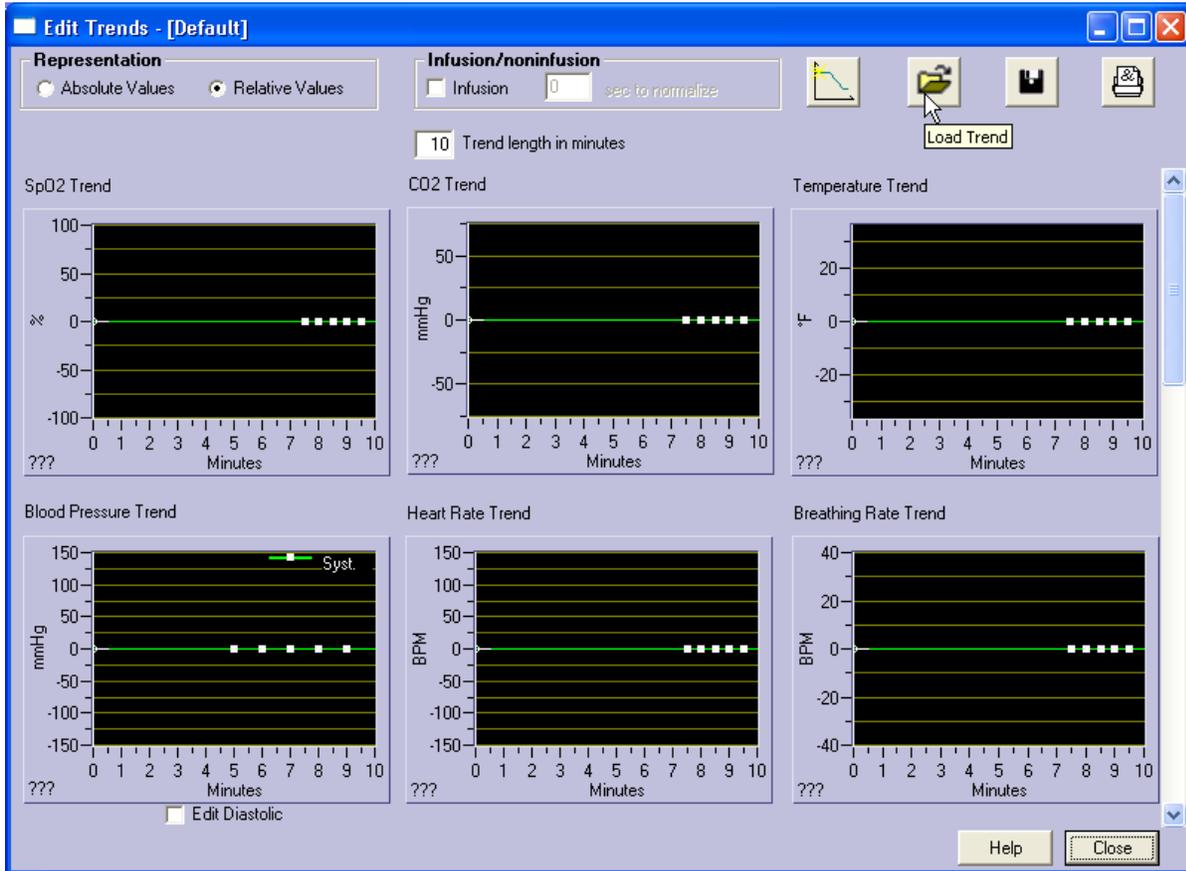
Use the scrollbar on the right to bring the remaining two trend curves into view.
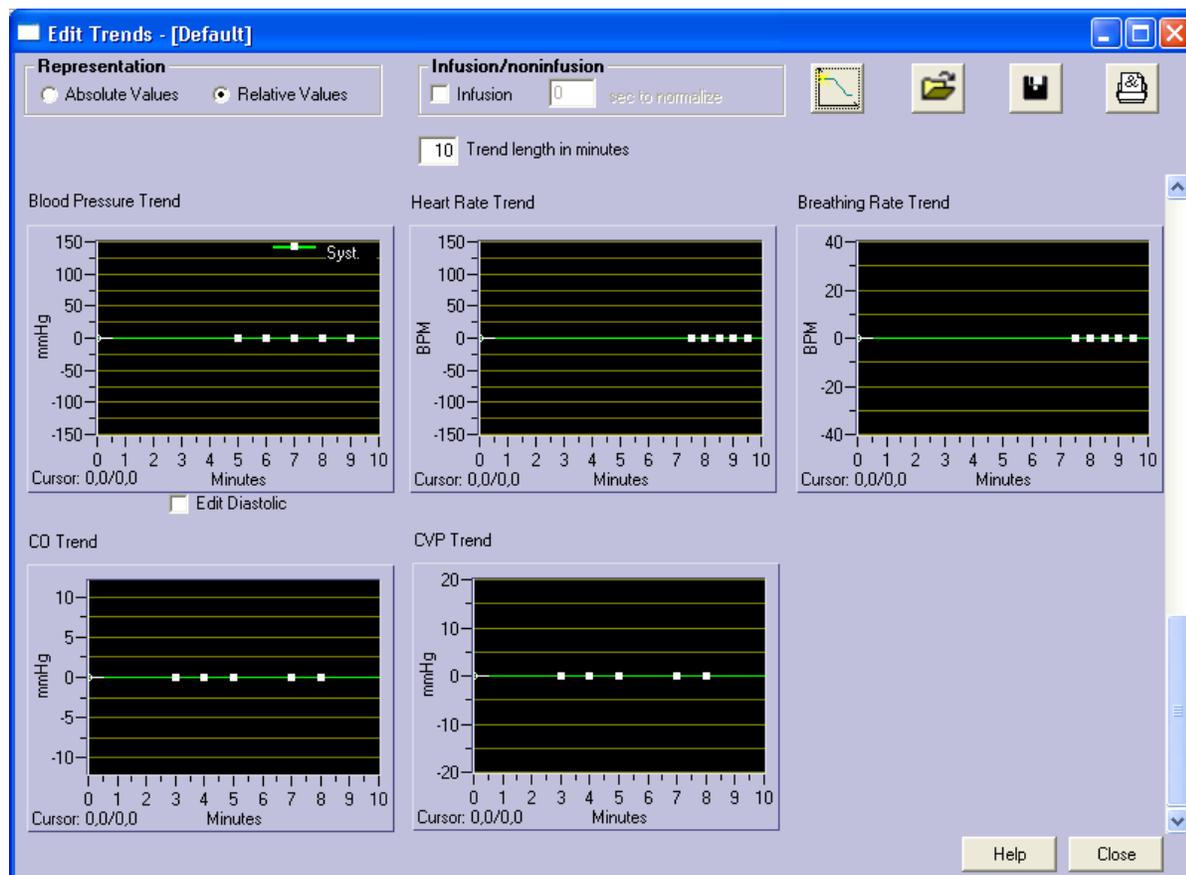
3.1   Load Trend

To load an existing trend, click the "Load

Trend" button ![button] for the "Open" dialog, select the desired Trend and click "Open."
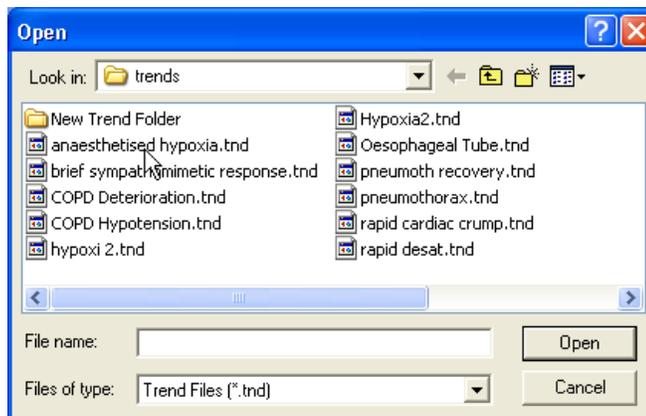
3.2   Save Trend

To save a trend, click the "Save Trend"

button ![floppy disk icon] for the "Save As" dialog, type in a new file name or select an existing Trend name and click "Save."

Note: Selecting an existing Trend name from the "Trends" folder when saving, will overwrite the selected Trend.
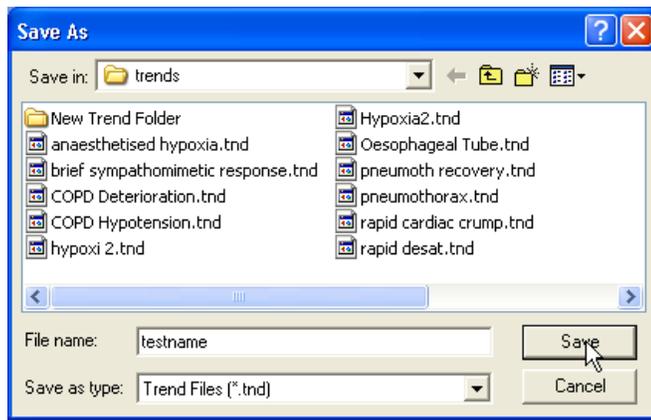
3.3   New Trend

The "New Trend" ![new trend icon] button loads a default (flat line) trend for editing.

3.4   Editing Trends

3.4.1   Basic Editing

Each trend curve has five points that can be moved up / down and left / right to create a curve.

The starting point is zero and cannot be moved.

Trends are relative by default and will always use current system values when the trend is started.
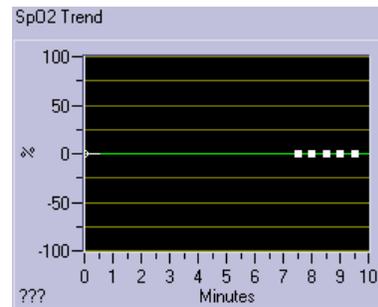
To edit a trend curve, click and drag a point to the desired position.

When the cursor moves over a point, it will change to a cross hair

![cross hair icon].
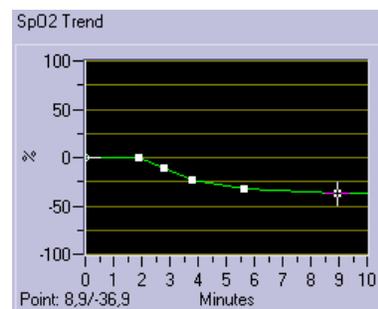
As you drag a point, its position is shown in the lower left corner of the "Edit Trends" window as "Time in minutes"/"Relative value"

Point: 8,9/-36,9

By default, only the systolic pressure can be edited in the blood pressure trend.

The trend will maintain the start value difference between systolic and diastolic pressures.

Systolic and diastolic pressures can be edited individually by ticking the "Edit Diastolic" tick box.
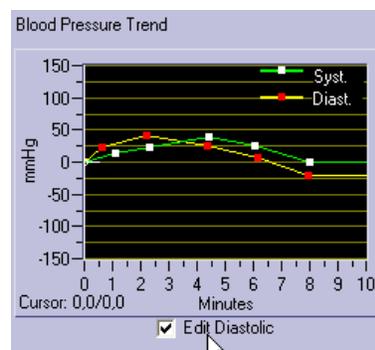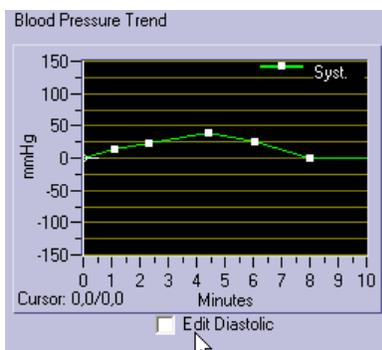
3.4.2 Absolute / Relative Mode

There are two modes of "Representation," including "Absolute Values" and "Relative Values."

Here, "Relative" means that the trend begins at the system's current value when you start the trend. This is relatively 0 and the trend either increases or decreases this value.

"Absolute" displays a view of what the trend would look like with the current. Trends are stored relatively rather than absolutely.

Trends may be viewed in absolute values, taking the current starting values as the zero-value and showing them on an absolute scale.
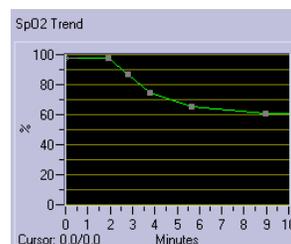
In both "Relative" and "Absolute" views, the cursor can be dragged across a trend curve. Cursors on all the other curves will follow the dragged cursor.

The number in the lower left corner of each trend curve displays the time at the cursor position.
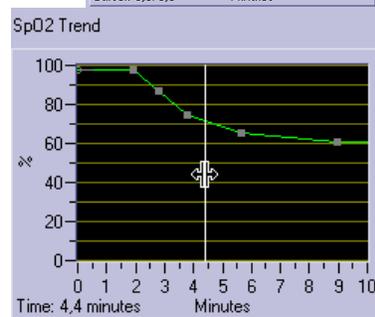
3.4.3 Infusion Trends

There is a special type of trend for infusions.

An ordinary trend stops by itself when it reaches the last point. Infusion trends do not stop by themselves. Once they reach the last point, they will not make any more changes until they are stopped manually or by a Scenario or Event Handler, see 2.11.

When an infusion trend stops it will normalize its current value back to the original value in the specified number of seconds.

The infusion trend on the right will cause the heartrate to increase by 25 BPM within 10 minutes. When the trend is later stopped, the heart rate will drop by 25 BPM within 2 minutes. This occurs independently of other changes made to the heartrate.
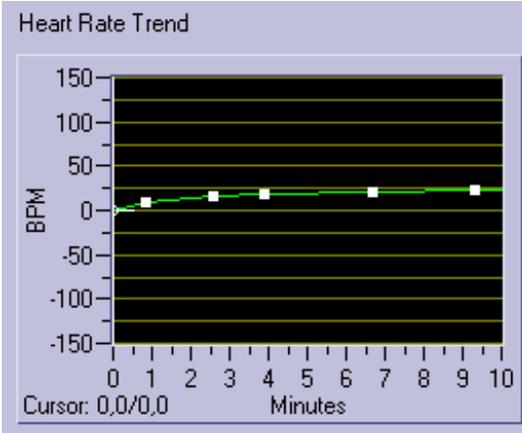
3.4.4 Trend Length

You can set the width of the "Trend Window." The last point, except for in an "Infusion Trend," determines the actual Trend length.

3.4.5 Trend Max/Min Limits

Since the starting point is not known when making a trend, the trend can cause values to exceed a desired level. To prevent this from happening, set the "Trend Max/Min Values" from the "Options" menu. See 2.11.3.

3.5 Print Trends

To print a trend, click the "print trend" button .

4   Scenario Builder

This is a graphical editing tool that allows you to create, edit and save scenarios to be run under the "Run Scenario" function. See 2.12 for more information on running scenarios.

Note: Be aware that the "Scenario Builder" and "Run Scenario" function can be running simultaneously. This is useful when creating and testing of scenarios.
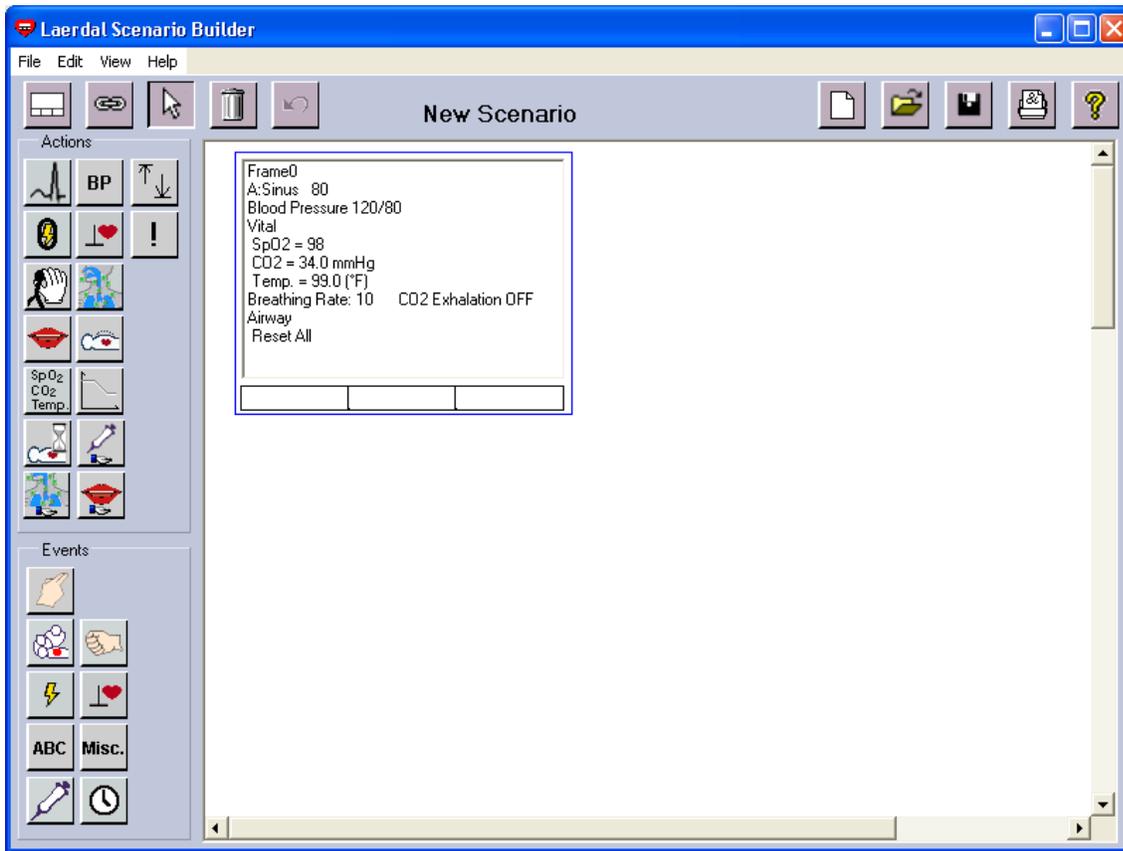
4.1   Startup

The Scenario Builder is started by selecting "Edit Scenario" from SimMan's main program "Edit" menu.

4.2   Program Menu

The "Program" menu is located on the upper left corner of the "Scenario Builder" window.
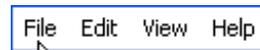
4.2.1   File Menu

The "File" menu controls Windows system commands.

New Window	Opens a new scenario builder window. Good for copying frames from one scenario to another.
New Scenario	Clears the view and displays a new scenario containing only Frame0 with its initial values.
Load Scenario	Loads an existing scenario.
Save Scenario	Saves a scenario.
Print Scenario	Prints a scenario.

Exit	Exits the Scenario Builder.
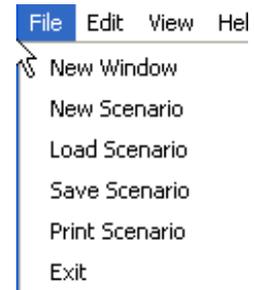
4.2.2 Edit Menu

The "Edit" menu contains copy and paste controls.

Copy	Copies the selected item(s) to the clipboard.
Paste	Pastes the copied items from the clipboard.
Select All	Selects all items.
Edit Event Menus	Customizes the Event Menu for this scenario. It is also possible to assign specific events to the remote control keys. See 4.6 for more info on customizing event menus.
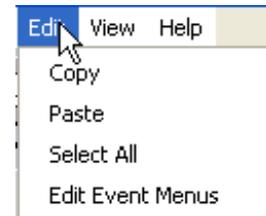
4.2.3 View Menu

The "View" menu contains one item that opens a dialog listing the "Used Events and Trends.

Below is an example from a simple scenario.
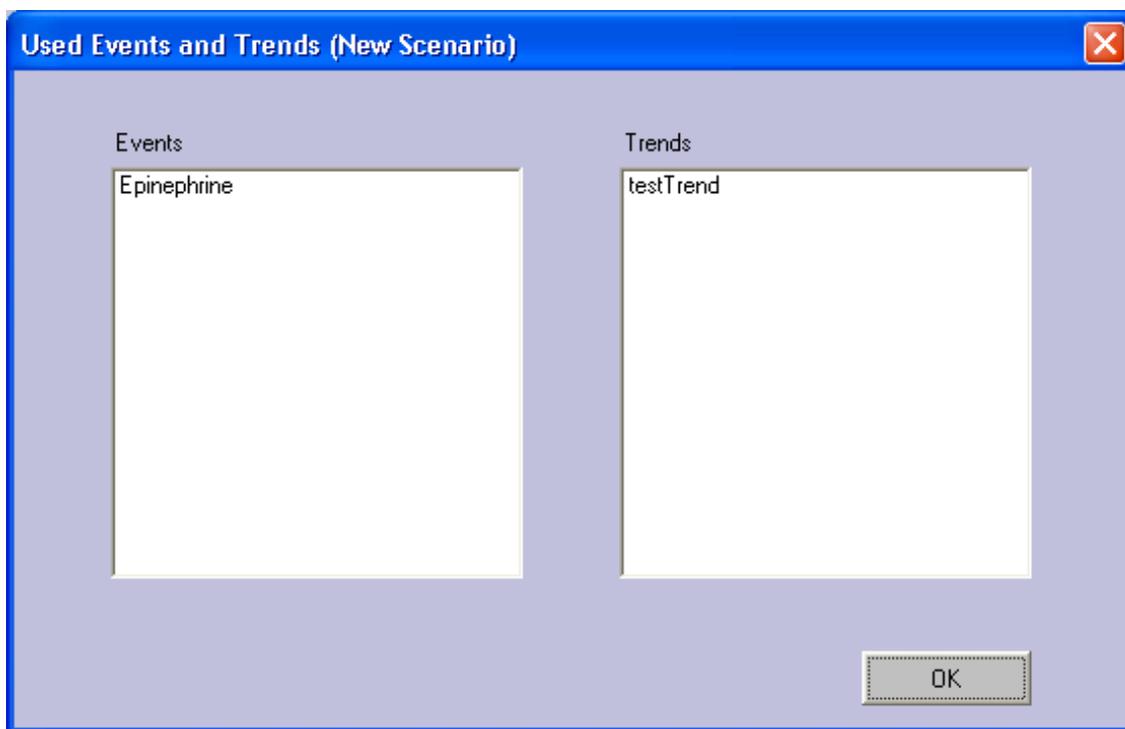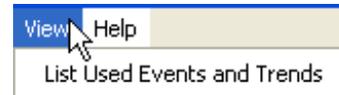
4.2.4 Help Menu

The "Help" menu provides access to SimMan Scenario Builder Help and displays software version information in the "About" dialog.

Show Help	Opens the Help window for SimMan Scenario Builder.
About SimMan	Shows software version info in the "About" dialog.

4.3   Load Scenario

The button allows you to load and edit an existing Scenario. The "Open" dialog allows you to select a Scenario and read its comments. Once the desired Scenario is selected, click "OK."

This function can be activated from the "File" menu as well.

If someone send you a new scenario or you download it from the web, it may contain new trends, handlers or sounds. When you run or edit the scenario, all trends, handlers and sounds used by the scenario will be copied to the logged-in users profile. But only if a trend, handler or sound with the same name doesn't already exist. If it already exists, the existing one will be used instead.
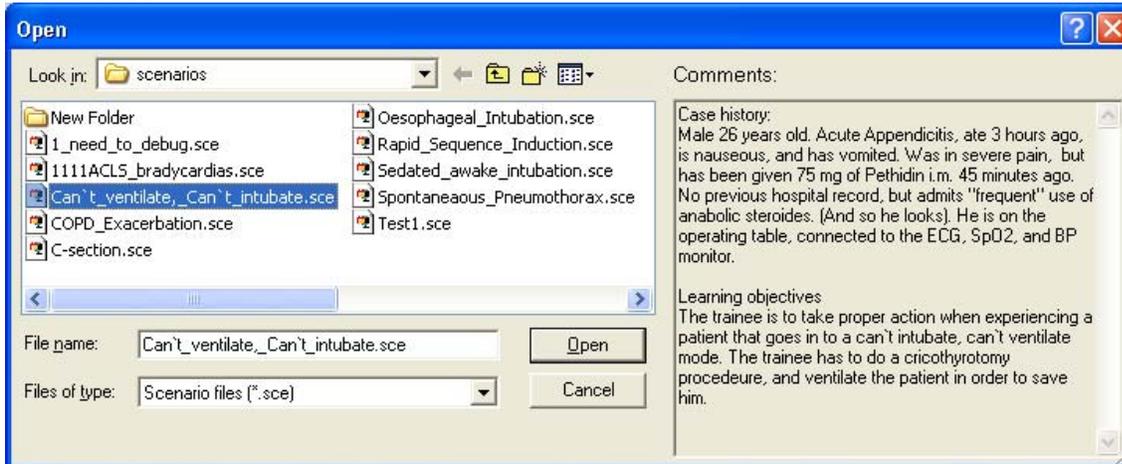
4.4   Save Scenario

The button allows you to save a Scenario to your "Scenarios" folder.

The function can also be activated from the "File" menu.

The comment field allows you to enter descriptive text about the scenario to be read in the "Open" dialog when a Scenario is opened for editing or execution.

Note the "Save Menus" check box. This box is checked by default. When checked, the scenario's "Event Menus" will be saved along with the scenario. You can edit how the menus will look by clicking the "Edit Menus…" button. See 4.6 for more information about event menu customization.

All trends, handlers and sounds that are used in the scenario are saved in the scenario file. If you want to send the scenario to someone else, the scenario file is the only file you need to send.

4.5 Print Scenario

To print a Scenario, select "Print Scenario" from the "File" menu.

Select preferred print mode in the "Select Print Mode" dialog and click "OK."

"Reduced size" prints the scenario on one A4 / Letter page.

"Full size" prints the scenario on two A4 / Letter pages.

You can include the comments with the printout by ticking / unticking the "Print Comments" tick box. The comments will be printed on a separate page.
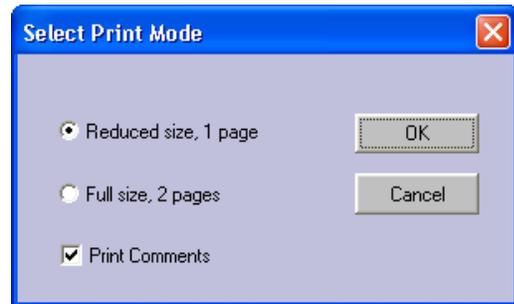
If you are printing the scenario "Full size" on two pages, you can use the page break preview line in the drawing area to see where the page break will naturally occur.

If the break splits a frame, you can drag the line to force appropriate page breaks.
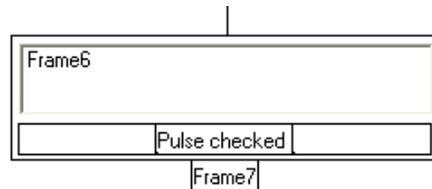
4.6 Customize Event Menus

When creating a scenario, you can customize how the event menus will look for a user running the scenario to ensure that the menus are organized and easy to operate.

Selecting "Edit Event Menus" from the "Edit" menu displays this dialog. This function also allows you to assign events to remote control keys.

The functionality is almost identical to the edit menus in the GUI. See 0. The difference is that by default, the events used by the scenario are visible and the non-used are hidden. You must unhide non-used events if you want them to be seen when running the scenario.
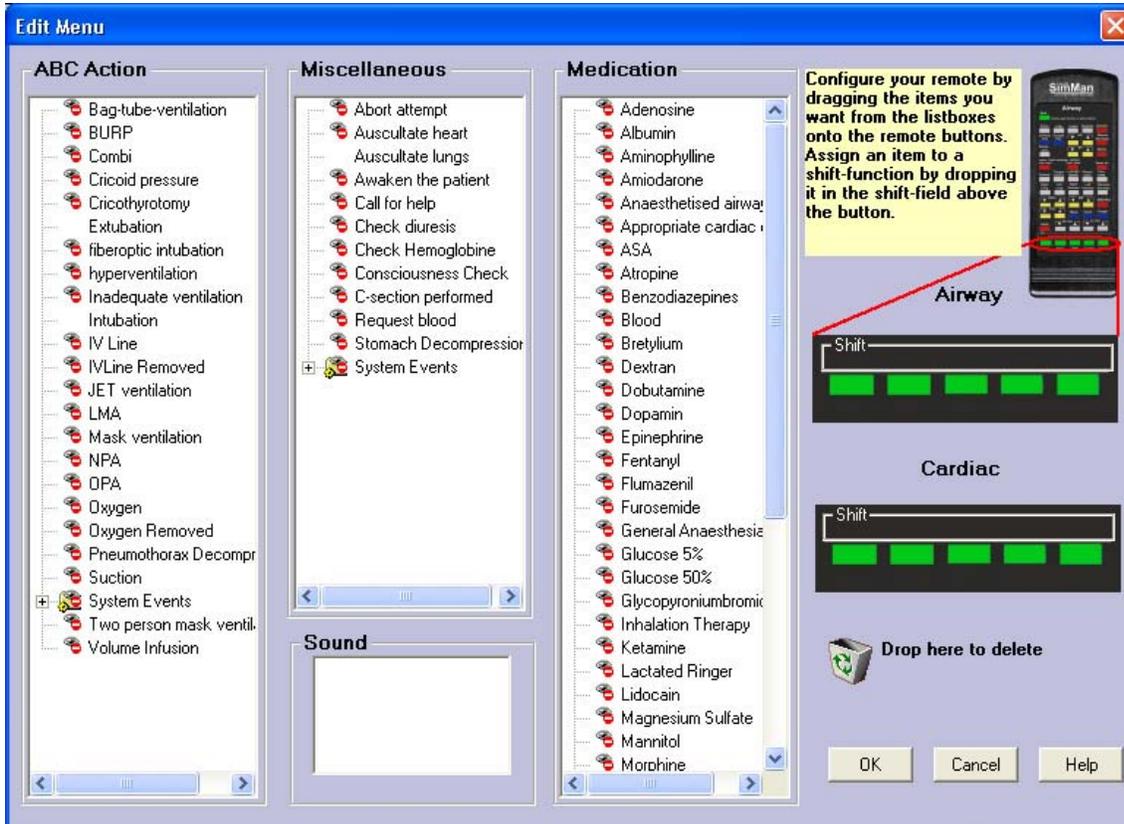
When saving the scenario the customized event menus is by default included in the scenario file and these menus will be shown when running the scenario (instead of the logged-in users menus). If you un-check the "Save Menus" tick-box the menus will NOT be saved with the scenario and the logged-in users menus will be shown when running the scenario.
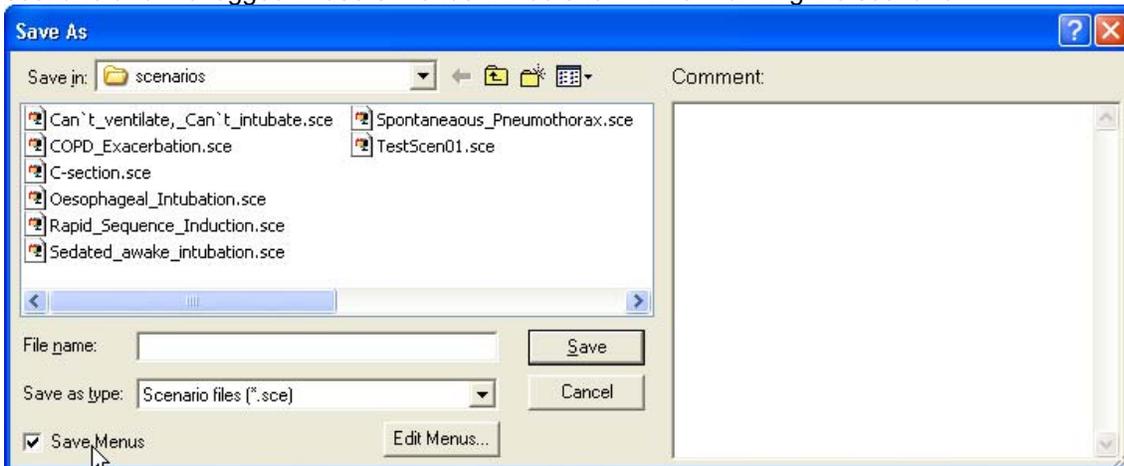
The edit menus dialog can also be opened by clicking the "Edit Menus…" button in the save dialog.

If a running scenario starts a handler, the events used in that handler will be appended to the corresponding event menu.

4.7 Actions / Events Terminology

It is important to understand the difference between Events and Actions, especially in the "Scenario Builder."

Events
Things that happen outside the control of a scenario and usually caused by student(s) are called "Events." The ABC / Miscellaneous / Medication Events in the main SimMan window are also Scenario Events. There are also time "Events" caused by either of the two timers reaching a predetermined limit.

Actions
In a scenario, Actions are performed by the scenario. For example, changing a parameter value, creating an airway complication and making vocal sounds are Actions performed by scenarios.

See 4.16 for more information on Events.
See 4.15 for more information on Actions.

4.8 Frames

A "Frame" represents a state in the scenario.

The frame's large upper field, the "Actions field," contains the name of the frame "Frame0" and state descriptions.

Frame0 is always the starting frame, and will always contain a default setup when "New

Scenario" is selected.

"Frame0" cannot be deleted, but can be changed.

```
Frame0
A:Sinus   80
Blood Pressure 120/80
Vital
 SpO2 = 98
 CO2 = 34.0 mmHg
 Temp. = 99.0 (°F)
Breathing Rate: 10     CO2 Exhalation OFF
Airway
 Reset All
```
| Pulse checked | Intubation | Epinephrine |

The scenario is constructed from a set of frames. Each frame represents a state of the patient. The Scenario can only operate in a single frame at any given time. The scenario moves to other frames as events specified in the "Events fields" occur.

The "Event fields" are found along the bottom of each frame. They specify events that will cause the scenario to advance.

| Pulse checked | Intubation | Epinephrine |

To control which frame the scenario moves to, connection lines are drawn from each event box to the desired frame. When the specified event occurs, the scenario moves to the corresponding frame.

```
Frame0
A:Sinus   80
Blood Pressure 120/80
Vital
 SpO2 = 98
 CO2 = 34.0 mmHg
 Temp. = 99.0 (°F)
Breathing Rate: 10    CO2 Exhalation OFF
Airway
 Reset All

| Pulse checked | Intubation |    | Epinephrine |
```

```
Frame1
Comment: (Correct Step)
 Pulse checked or Intubation
```

```
Frame2
Start Trend: IncreaseHR  (Start: 0:0,Dur.: 10:0)
```
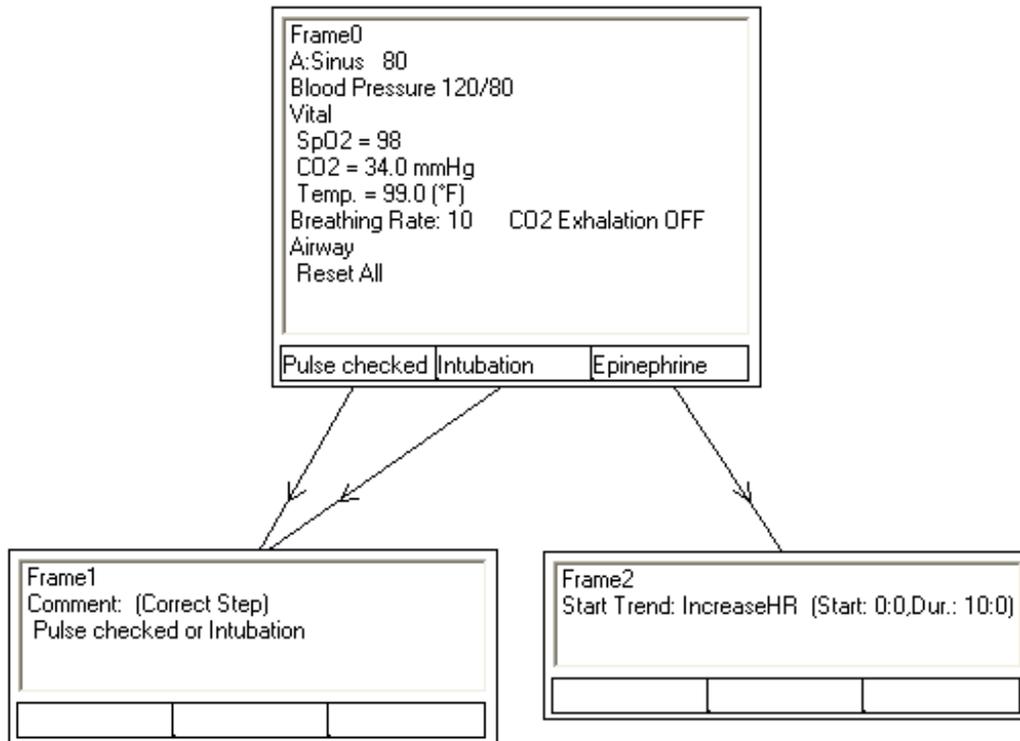
The scenario always starts in "Frame0." The "Action field" sets the initial parameters when starting a scenario. When the scenario moves to another frame, the new frame's "Action field" changes the parameters as specified. All other parameters are not changed.

The actions in the "Action field" are performed one time when the Scenario enters a new frame. While in a frame, the instructor can change any of its values.

When the Scenario is running, the frame name and time and Patient time are displayed next to the control buttons.

> Frame 0 time: 16 s
> Patient time: 0 s

4.9   Creating a Frame

To create a frame, click the "Create Frame" button and then on the screen in the location desired.
The frame automatically receives a name that displays in the "Action field."

After the button is clicked, the cursor changes, as shown to the right, and then changes back again after the new frame is placed in the scenario.
Note: Frame names do not indicate any order of execution. They are reference names for programming purposes only.

4.10 Moving Frames

To move a frame, click the "Select Frame" button.

Click on the border of the frame you want to move and drag it to the desired location before releasing the mouse button.
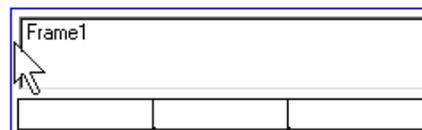
```
Frame1
```

You can select several frames by holding down the "CTRL" key while clicking the border of additional frames or using the cursor to click and drag a frame around the desired frames.

Frame1
Comment: (Correct Step)
 Pulse checked or Intubation

Frame2
Start Trend: IncreaseHR (Start: 0:0,Dur.: 10:0)
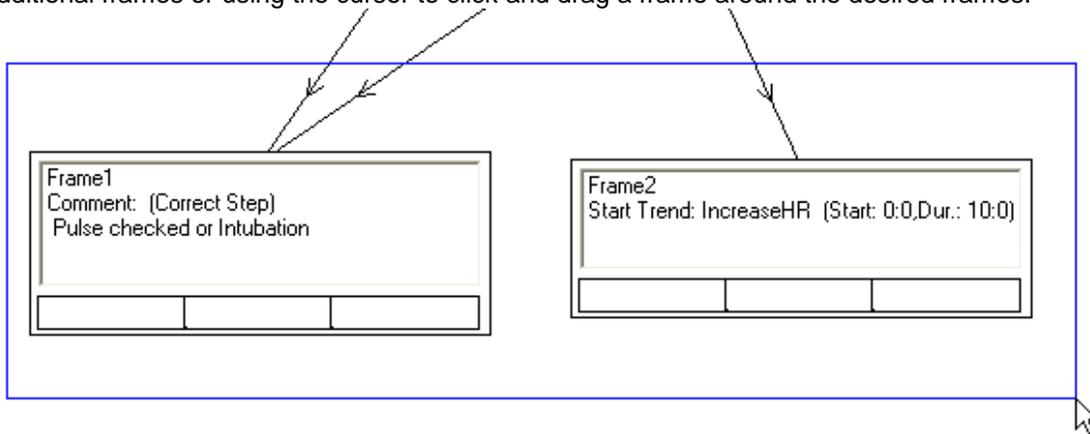
Once the selected frames are marked with a blue border, you can click on one and drag them around.

Frame1
Comment: (Correct Step)
 Pulse checked or Intubation

Frame2
Start Trend: IncreaseHR (Start: 0:0,Dur.: 10:0)
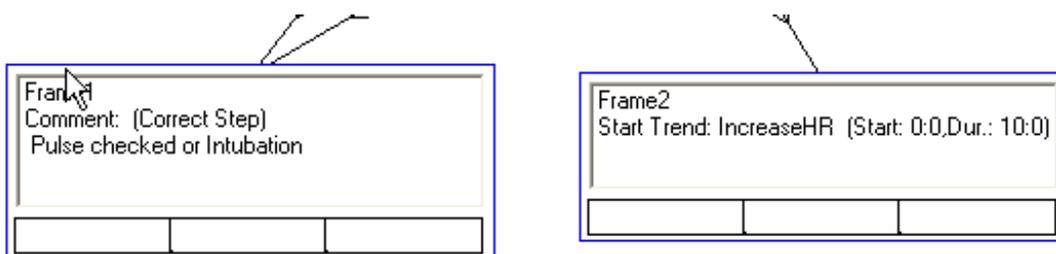
4.11 Copying Frames

A frame must be selected before you can copy it.

First click on the "Select" button.
To select one frame, click its border. To select several frames, hold down the "CTRL" key while clicking the border of additional frames.

Frame1

Or, click and drag a frame around the frames you want to copy.
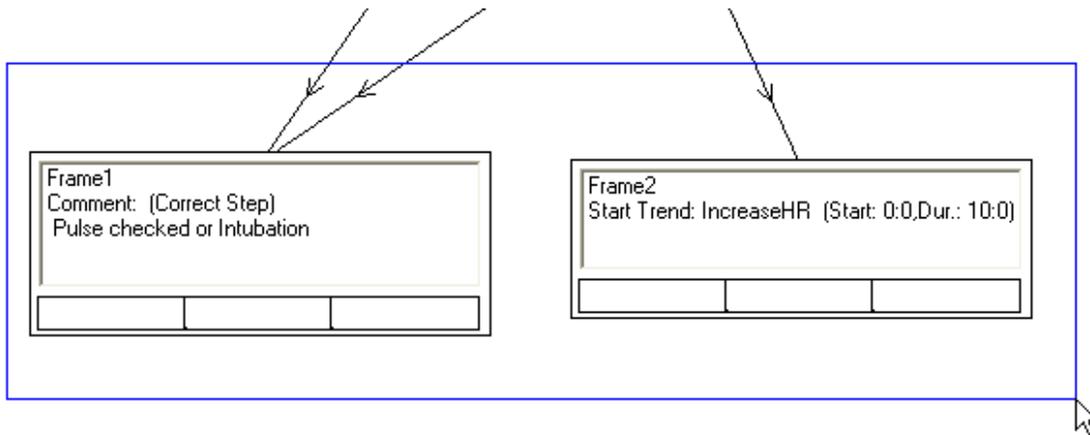
Frame1
Comment: (Correct Step)
 Pulse checked or Intubation

Frame2
Start Trend: IncreaseHR (Start: 0:0,Dur.: 10:0)

The selected frames are marked with a blue border.
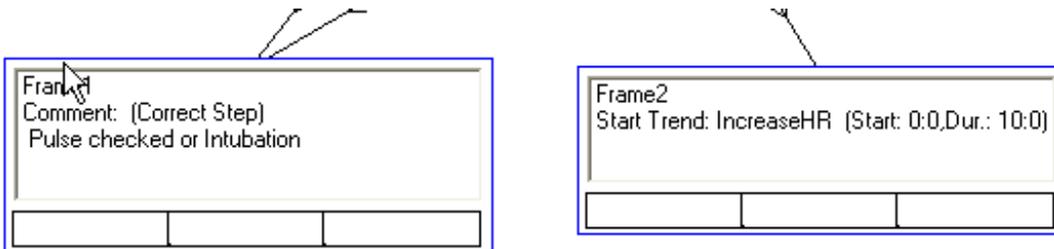
To copy the selected frames, select "Copy" from the "Edit" menu and then select "Paste." See 4.2.2. *(You can also use standard Windows hotkeys CTRL+C for copy, and CTRL+V for paste.)*
The copied cells are pasted at the top left of the drawing area and are selected and ready to be moved to the desired location.
You can also open a new "Scenario Builder" window and use the copy and paste functions to copy frames from one Scenario to another.

4.12 Resizing Frames

Click and drag the frame's right edge to resize the frame, including "Event fields," horizontally.
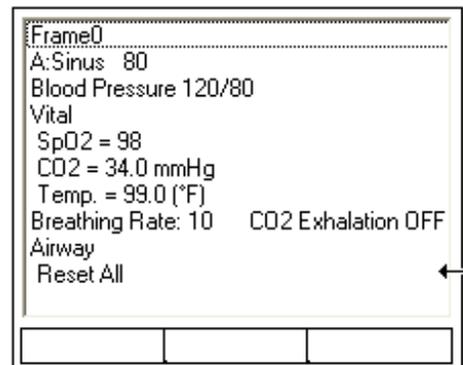
Click and drag the frame's bottom edge to resize the frame, but not the "Event fields," vertically.
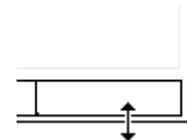
Click and drag the frame's lower right corner to vertically and horizontally resize the frames simultaneously.
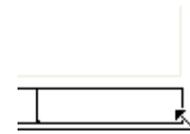
4.13 Connecting Frames

Frame connections are drawn from an "Event field" in one frame to the "Action field" of another frame. When an event occurs, they specify the frame to which the Scenario moves.

You can have only one connection from each "Event field," but multiple connections to a frame. The connection line arrows show the direction of the connection.

```
Frame0
A:Sinus   80
Blood Pressure 120/80
Vital
  SpO2 = 98
  CO2 = 34.0 mmHg
  Temp. = 99.0 (°F)
Breathing Rate: 10     CO2 Exhalation OFF
Airway
  Reset All
```
| Pulse checked | Intubation | Epinephrine |

```
Frame1
Comment:  (Correct Step)
  Pulse checked or Intubation
```

```
Frame2
Start Trend: IncreaseHR  (Start: 0:0,Dur.: 10:0)
```
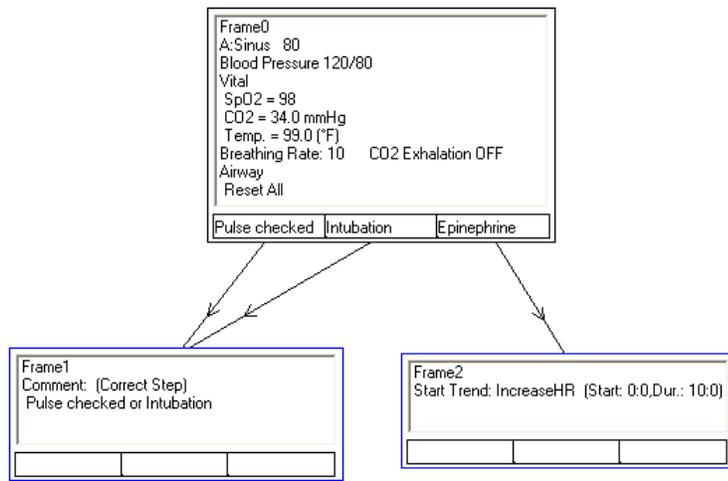
Non-empty "Event fields" not connected to a frame will shade red. Empty "Event fields" having connections will also shade red.

If a frame has no input connector, the "Action field" will shade red.

```
Frame0
A:Sinus   80
Blood Pressure 120/80
Vital
  SpO2 = 98
  CO2 = 34.0 mmHg
  Temp. = 99.0 (°F)
Breathing Rate: 10     CO2 Exhalation OFF
Airway
  Reset All
```
| Pulse checked | Intubation | Epinephrine |

```
Frame1
Comment:  (Correct Step)
  Pulse checked or Intubation
```

```
Frame2
Start Trend: IncreaseHR  (Start: 0:0,Dur.: 10:0)
```
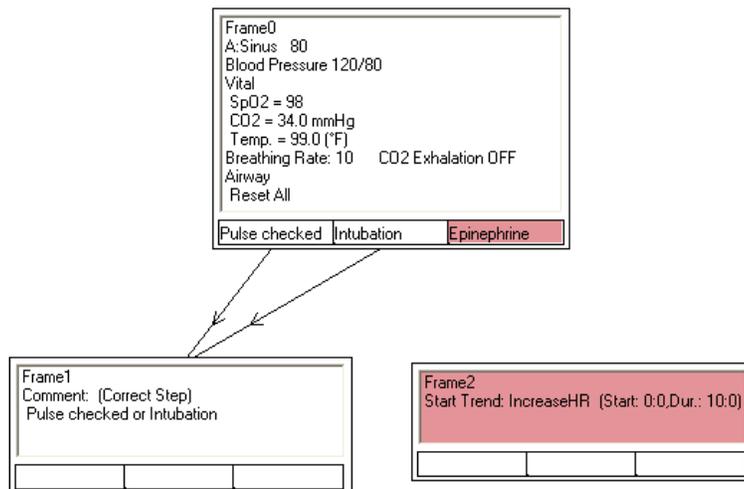
To connect frames, click the "Connect Frames" button.

Frames can now be connected in three different ways.

1. Connection with a line.

Click the "Event field" you want to connect and drag the mouse to the "Action field" for connection before releasing the mouse button.

2. Connecting through a node.

Connecting through a node is useful when connecting backwards in a Scenario because connection lines going back and forth can make the scenario hard to read.

```
Frame0
A:Sinus  80
Blood Pressure: 130/75
Cough

Pulse checked | Precord. thump | 2 shocks
```
—*This is a connection line*

```
Frame1


Pulse checked |  |
```

```
Frame4


Precord. thump |  |
```
Frame0 —*This is a node*
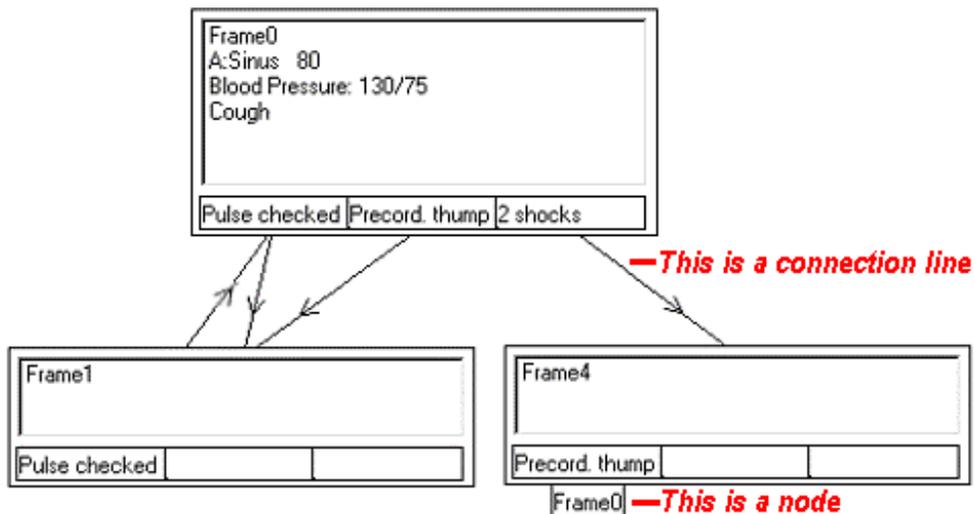
To connect through a node:
- Click in the "Event field" you want to connect.
- Drag the mouse outside the frame and release the mouse button to open the "Connect to Frame" dialog.
- From the dialog, select the desired connection frame and click "OK."

Connect to Frame:
```
Frame0          ▼    OK
Frame0
Frame1               Cancel
Frame2
Frame3
Frame4
```
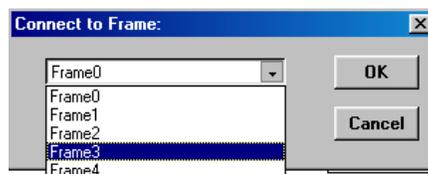
3. Connecting back to the current frame.

Connecting back to the current frame saves repetition of frames.
This one-frame scenario will make the manikin moan at start up and again every time a shock is given.

```
Frame0
Moan
Shock Count = 0


1 shocks |  |
```
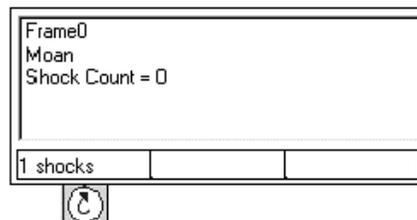
Connection though a node and using the special loop back symbol are two ways for connecting a frame back to itself.
To connect using the loop back symbol:
- Click in the "Event field" you want to connect.
- Drag the mouse to the "Action Field" of the same frame and release the mouse button.

The cursor will change shape when in "connection mode."

To change the cursor back to normal, click the "Select" button.

4.14 Deleting Frames, Connections and Frame Items

To delete a frame, click the "Select frame" button.
Note: "Select frame" is usually the default mode when no other function is selected.

Select the frame by clicking its border (the selected frame is marked with a blue border) and

then clicking the "Delete Item" button 🗑. The frame and its connections will be deleted.

```
Frame1


 |  |
```
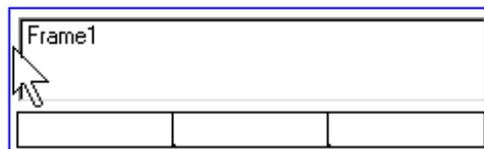
You can also delete a group of frames by selecting them using the cursor to drag a frame around them.

"Frame0" cannot be deleted from any scenario.

To remove a connection, select it by clicking it (the connection line will become blue when selected)

and then clicking the "Delete Item" button .

```
┌────────────────────────────────────┐
│ Frame0                             │
│ A:Sinus  80                        │
│ Blood Pressure: 120/80             │
│                                    │
│                                    │
│ ┌──────────┬───────────┬─────────┐ │
│ │          │ 1 shocks  │         │ │
│ └──────────┴───────────┴─────────┘ │
└────────────────────────────────────┘

┌────────────────────────────────────┐
│ Frame1                             │
│                                    │
│                                    │
│ ┌──────────┬───────────┬─────────┐ │
│ │          │           │         │ │
│ └──────────┴───────────┴─────────┘ │
└────────────────────────────────────┘
```
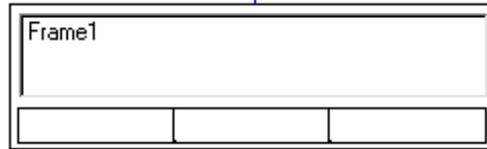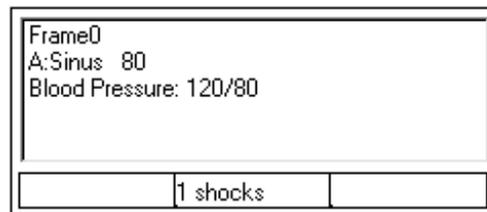
To remove an "Action" or "Event," select the item by clicking on it (the item will be highlighted in blue) and then clicking the "Delete Item" button

 .

```
┌────────────────────────────────────┐
│ Frame0                             │
│ A:Sinus  80                        │
│ Blood Pressure: 120/80             │
│                                    │
│ ┌──────────┬───────────┬─────────┐ │
│ │          │ 1 shocks  │         │ │
│ └──────────┴───────────┴─────────┘ │
└────────────────────────────────────┘
```
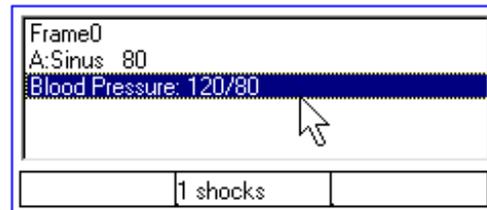
4.14.1 Undoing Last Deletion

The last performed deletions can be undone using the button.

If undo is not possible, the button will be disabled.

4.15 Actions

These are the Actions the Scenario performs when a new frame is entered. They are located in the "Action fields" of a frame and are performed once each time the running scenario enters a frame.

To add or edit Actions in a frame:

Click on the desired Action button

Click the "Action field" in the frame you want to edit

Edit the dialog and click "OK."

The programmed action will now appear in the frame's "Action field."

Available Actions:

4.15.1 ECG
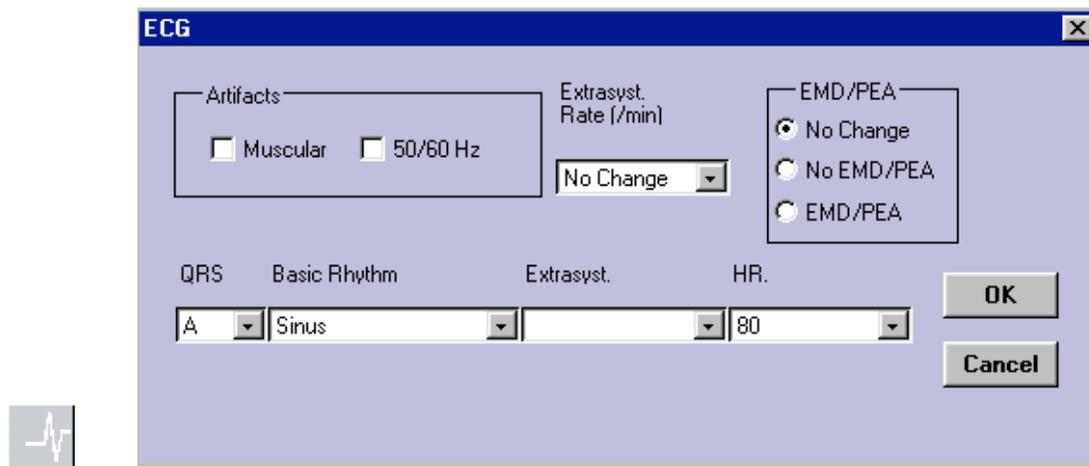
The "ECG Action" button allows you to set the ECG and ECG related parameters. If "Extrasyst." is blank (default), "Extrasyst. Rate (/min)" will not change from its previous state.

Note: EMD / PEA can be set from this Action. Selecting EMD/PEA will set the blood pressure to zero independent of the ECG rhythm and the blood pressure setting. Selecting "No EMD/PEA" will bring the blood pressure to the previous setting, if the ECG is a perfusing rhythm.

4.15.2 Blood Pressure
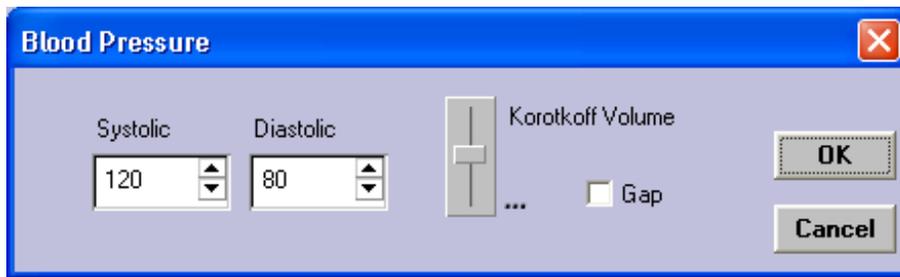
Blood Pressure

Systolic: 120 Diastolic: 80 Korotkoff Volume ☐ Gap

OK Cancel

BP

The "BP Action" button allows you to set blood pressure ("Systolic" and "Diastolic" pressures can be set independently) and Korotkoff sound volume.

If the volume set lever is not moved, the sound volume will be unaffected and indicated by "…" to the lower right of the lever.

Kor …

If the volume is changed, the volume level will display as "0" to "10."
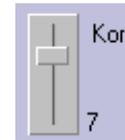
Koro 7

Tick the "Gap" tick box to make an auscultation gap in the Korotkoff sound.

☑ Gap

4.15.3 Set Trend Max/Min
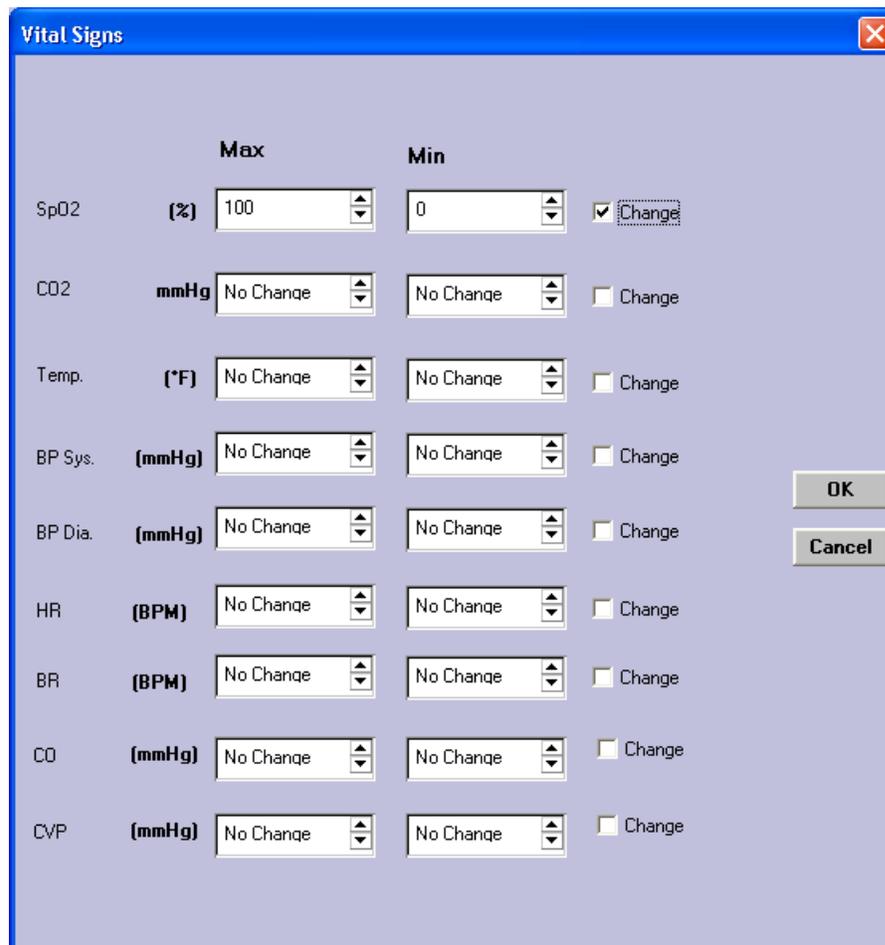
Vital Signs

		Max	Min	
SpO2	(%)	100	0	☑ Change
CO2	mmHg	No Change	No Change	☐ Change
Temp.	(°F)	No Change	No Change	☐ Change
BP Sys.	(mmHg)	No Change	No Change	☐ Change
BP Dia.	(mmHg)	No Change	No Change	☐ Change
HR	(BPM)	No Change	No Change	☐ Change
BR	(BPM)	No Change	No Change	☐ Change
CO	(mmHg)	No Change	No Change	☐ Change
CVP	(mmHg)	No Change	No Change	☐ Change

OK Cancel

The "SimMan Trends Action" button allows you to set parameter limits for vital signs.
Default limits are specified in the SimMan main program "Options" menu by selecting "Trend Max/Min Values…". These limits are overridden when set in a Scenario. It is good practice to set the limits in scenarios to ensure they are set correctly.

Only the limits with the "Change" tick box ticked will be set, the others remain unchanged.

4.15.4 Clear Shock Count

In the "Defibrillation Performed" event, you can set the event for execution after a certain number of shocks. The number of shocks is accumulative throughout the scenario. For instance, "3 Shocks" means three shocks given from "Frame0" or from the frame where the shock counter was reset. The function "Clear Shock Count" can be used to set the shock counter to zero in any frame.

The "Clear Shock Count" action goes directly into the frame without setting any dialog.
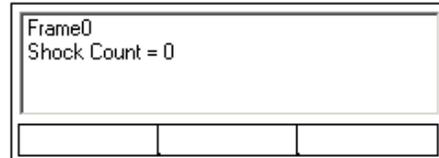
Example:
The following scenario will convert the patient after three shocks. The patient will then re-fibrillate after 30 seconds and can be converted again after three shocks… and so on.
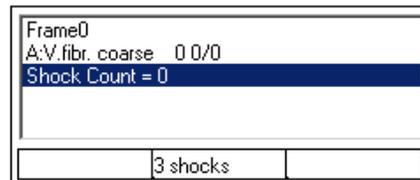
If there had been no "Shock count=0" in "Frame0," the scenario would have worked the first time, but when the patient re-fibrillated (return to "Frame0"), the scenario shock-counter already has three shocks so it would have gone directly to "Frame1" again.
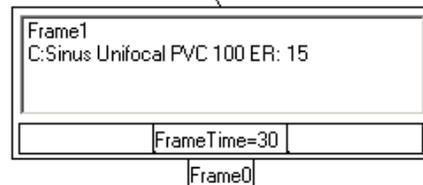
4.15.5 Pacing Enable - Ignore
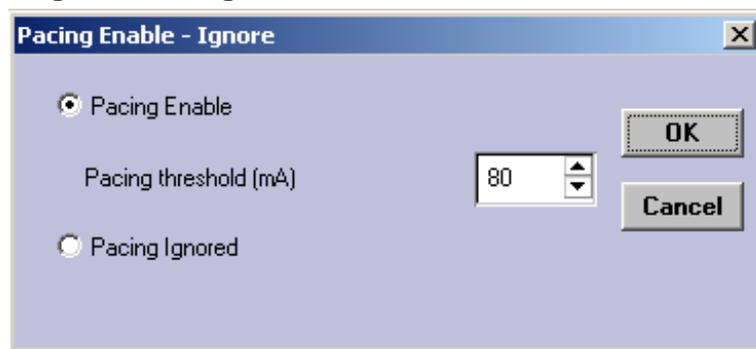
Pacing Enable. Enables Pacing capture and allows you to set a Pacing threshold.

Pacing Ignored. Disables Pacing Capture. The "Pacing Capture Started" and "Pacing with Capture" events cannot occur if "Pacing Ignored" is set.

4.15.6 Comments

The "Comments Action" button allows the addition of user-entered comments in the Event Log to aid in evaluation of student performance.

4.15.7 Auscultation Sounds

The "Auscultation Sounds" button allows you to select Right Lung, Left Lung, Heart and Bowel sounds in addition to setting sound volume.
Note: Right and Left Lung sounds are set independently.

If "No Change" is selected, the corresponding sound is unaffected.

If the volume set levers are not moved, the volume will be unaffected and indicated by "…" to lower right of the lever.
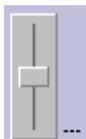
If the volume is changed, the level will be displayed as "0" to "10."
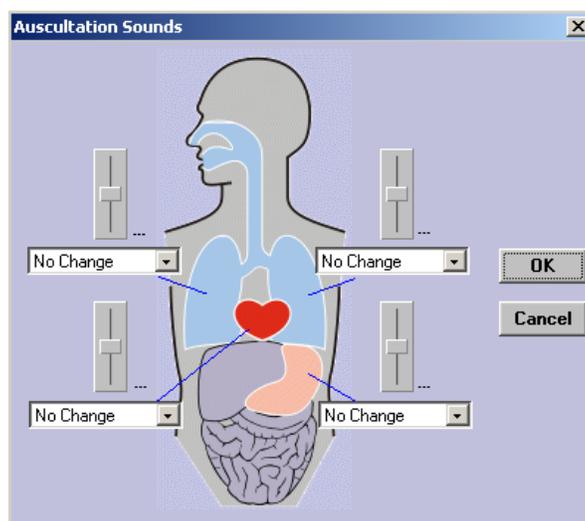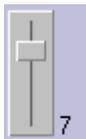
4.15.8 Airway

The "Airway Action" button allows you to set the state of all SimMan airway functions.

Each function is identified with a ToolTip when the mouse is moved over the button.

Each airway function has three states:

□ No change. The function will remain as set in previous frames.

■ Not Active. The function will be cleared. For instance, Trismus off.

☒ Active. This function will be activated. For instance, Trismus on.
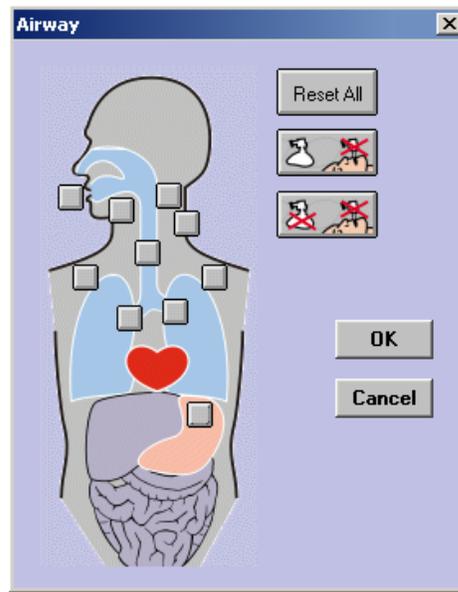
4.15.8.1 Preset Buttons

Reset All sets all functions to Not Active.
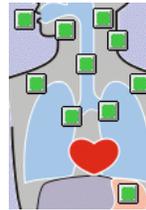
Can't Intubate, Can Ventilate sets:
Tongue Edema, Pharyngeal Obstruction, Decreased Cerv. ROM and Stomach Decompr.

Can't Intubate, Can't Ventilate additionally sets Right and Left Lung Compliance.

4.15.9 Vocal Sounds

The "Vocal Sounds Action" button allows you to select one of the manikin vocal sounds.

The sound can be repeated several times at the selected interval.

Repetitions of sounds will continue, even if the scenario changes frame. Repeated sounds can be stopped in another frame by selecting "Stop Sound."
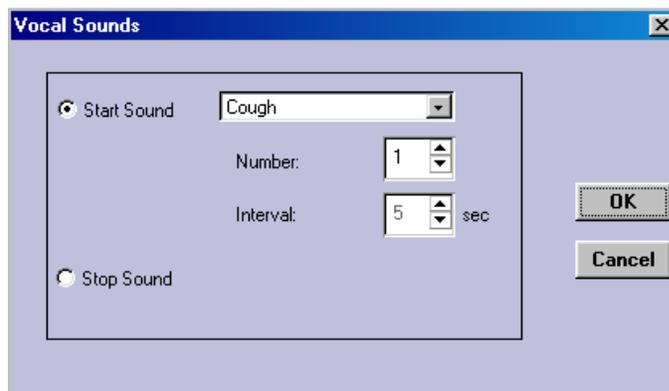
Starting another sound in another frame overrides a previously programmed sound. However, the sound will not start until the one playing has completed.

4.15.10 Breathing Rate

The "Breathing Rate Action" button can be set from 0 - 40 breaths per minute in increments of two.

Output of CO_2 in the exhaled air is also controlled from this function.

Breathing

Breathing Rate / min.

10

CO2 Exhalation
- ● No Change
- ○ Enable
- ○ Disable

OK

Cancel

4.15.11 Vital Signs (Patient Monitor)

The "Vital Signs Action" button allows you to set Patient Monitor parameters.

Only the parameters with the "Change" tick box ticked will be changed, the others remain unchanged.

CO_2 and Temperature scales are controlled by the SimMan settings.

Vital Signs

SpO2 (%)	No Change	☐ Change
CO2 mmHg	No Change	☐ Change
Temp. (°F)	No Change	☐ Change
Perif. Temp. (°F)	No Change	☐ Change
CO (l/min)	No Change	☐ Change
CVP (mmHg)	No Change	☐ Change
Fi O2	No Change	☐ Change
ET O2	No Change	☐ Change

Fi N2O	No Change	☐ Change
ET N2O	No Change	☐ Change
Fi Anaest. (%)	No Change	☐ Change
ET Anaest. (%)	No Change	☐ Change
TOF	No Change	☐ Change
TOF % (%)	No Change	☐ Change

OK

Cancel
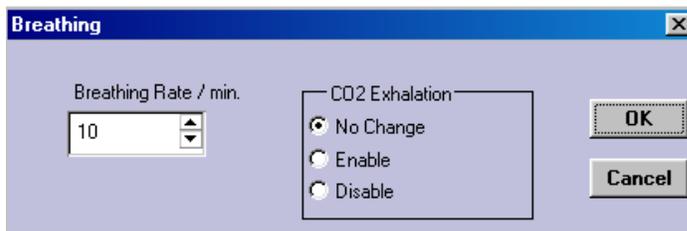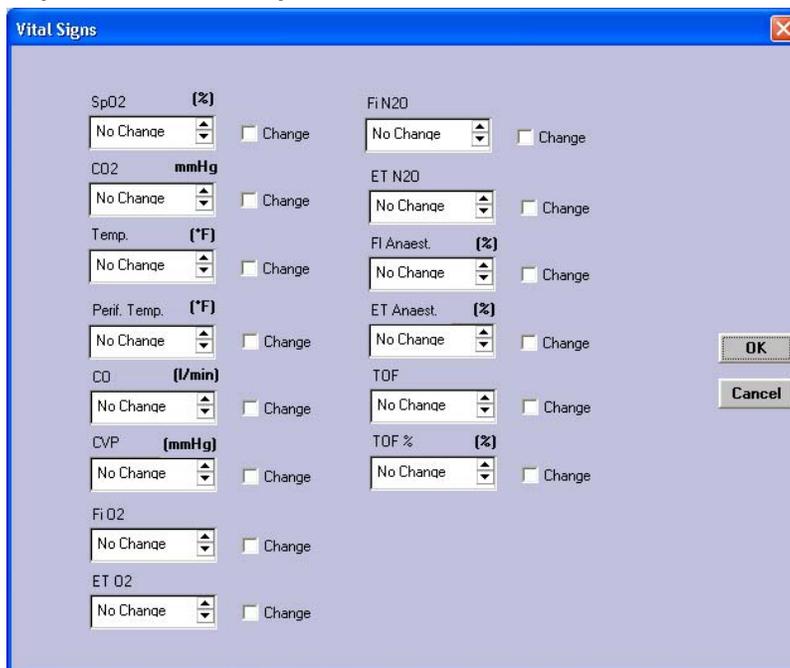
4.15.12   Trends

The "Trends Action" button allows you to start and stop a Trend from a Scenario.
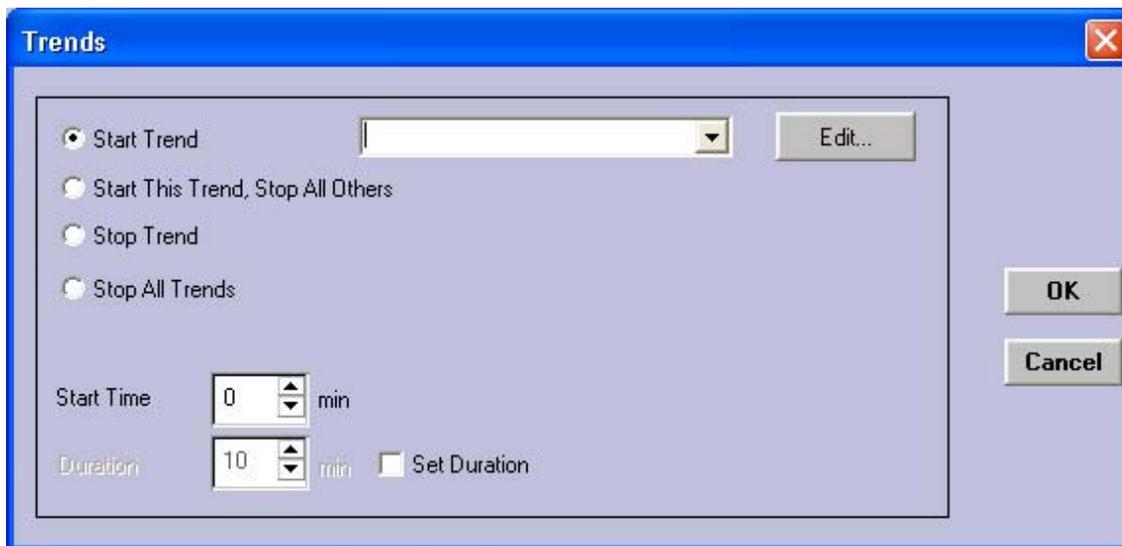
There are two options for starting a trend.

1. "Start Trend" starts the selected trend to run simultaneously with all other trends that may be running when the scenario enters this frame.
2. "Start This Trend, Stop All Others" starts the selected trend to run while stopping all others when the scenario enters this frame.

There are two options for stopping a trend as well.
1. Selecting "Stop Trend" stops a specific Trend.
2. Selecting "Stop all Trends" stops all active Trends.

Clicking the "Edit…" button opens the "Trend Editor."

"Trend Editor" allows you to specify the Start Time and Duration of a Trend.

Start Time defines how far into the programmed trend the trend will be started. For example, this Trend will skip to the start position and start from there.

Duration defines how long the trend will run.

The default is that the trend starts from the beginning and continues until its last defined point, except for infusion trends that continue until they are stopped.
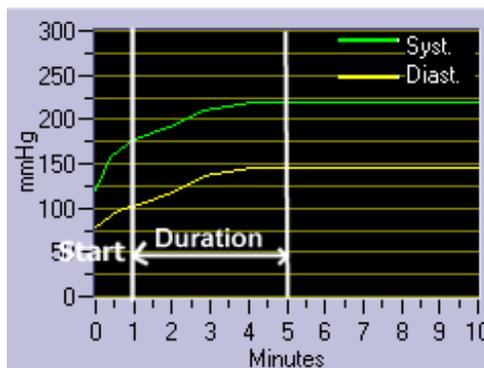
Trends cannot be started and stopped in the same frame.

```
Frame0
Stop Trend: Trend1

                    FrameTime=0 m 0 s
```

```
Frame1
Start Trend: Trend2  (Start: 0:0,Dur.: 10:0)

```
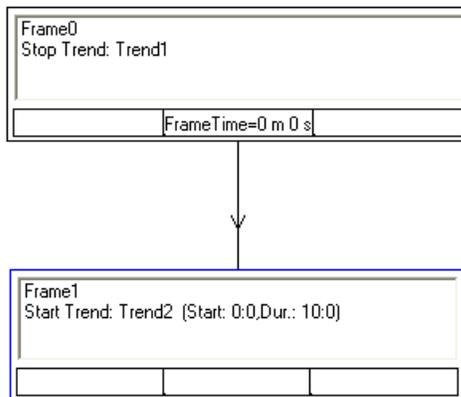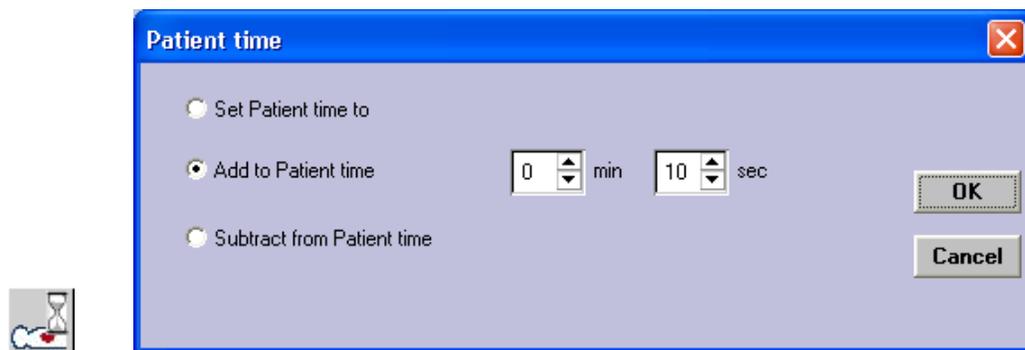
4.15.13   Patient Time

The "Patient time Action" button allows you to manipulate the "Patient time." "Patient time" is a time parameter counted down in every frame of a scenario. It will count down and stop at zero. You can use the value of the "Patient time" as an Event to move to another frame. See 4.16 for more information on using Events.

This scenario action can be used to set a "Patient time" value, add a value to "Patient time," or to subtract a value from "Patient time." The default value is 0, so it must be set to a value greater than zero to be of any use.

When running a Scenario, "Patient time" is displayed below the Frame number / time next to the control buttons.

Example: In this example, the "Patient time" is set to 90 seconds in Frame0. If no CPR is given, the patient will go from V.fibr. to Asystole in 90 seconds. If CPR is started, the patient is given 15 more seconds, and for every 10 seconds of CPR given, the patient is given back 15 seconds in "Patient time."

```
Frame0
A:V.fibr.  0 0/0
Patient time =1 min 0  sec
------------------------------------------
CPR started          |        Pat.Time<0 m 0 s
```

```
Frame2
Patient time +0 min 10  sec
------------------------------------------
CPR15 s      |          Pat.Time<0 m 0
```

```
Frame1
Start Trend: Trend2 (Start: 0:0,Dur.: 10:0)
```
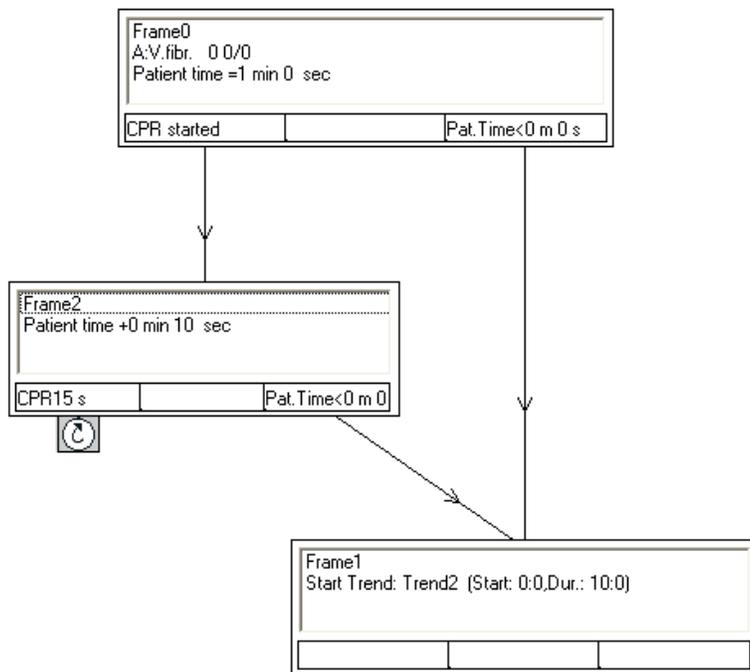
4.15.14   Add Medication Handler
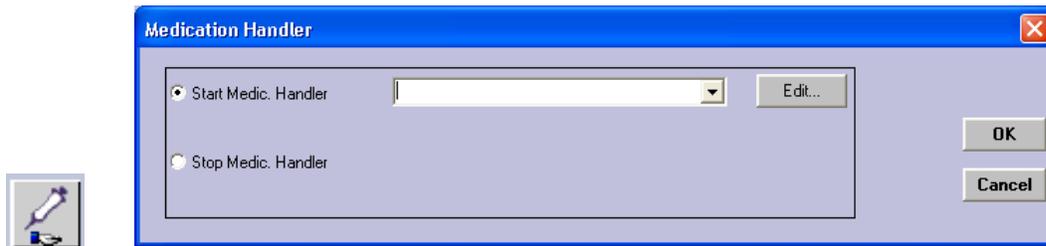
The "Medication Handler Action" button allows you to start or stop a "Medication Handler." Only one "Medication Handler" can be active at one time. If you start a new "Medication Handler" while another one is active, the running "Handler" will automatically be stopped before the new one is started.

See chapter 5 for more information on "Event Handlers."

Clicking the "Edit…" button starts the "Medication Handler" editor.

4.15.15   Add ABC Handler
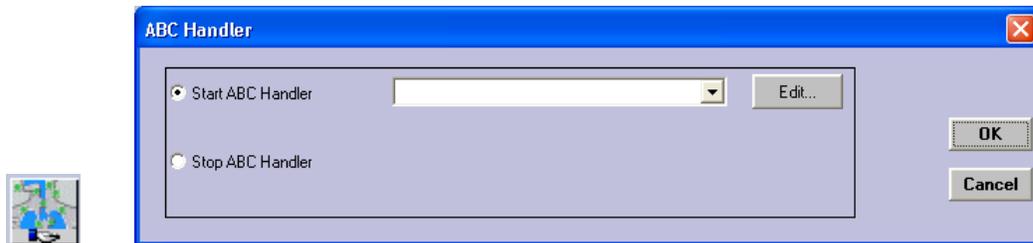
The "ABC Handler Action" button allows you to start or stop an "ABC Handler." Only one "ABC Handler" can be active at one time. If you start a new "ABC Handler" while another one is active, the running "Handler" will automatically be stopped before the new one is started.

See chapter 5 for more information on "Event Handlers."

Clicking the "Edit…" button starts the "ABC Handler" editor.

4.15.16   Add Miscellaneous Handler

The "Miscellaneous Handler Action" button allows you to start or stop a "Miscellaneous Handler." Only one "Miscellaneous Handler" can be active at one time. If you start a new "Miscellaneous Handler" while another one is active, the running "Handler" will automatically be stopped before the new one is started.

See chapter 5 for more information on "Event Handlers."

Clicking the "Edit…" button to starts the "Miscellaneous Handler" editor.

4.16 Events

A running scenario detects events caused by student(s) and internal events, such as "Time Events." You may specify events the scenario will check for by placing them in a frame's "Event fields." When the running scenario reaches that frame and the event occurs, the scenario will move to the frame connected to that "event field."

With exception of "Intubation" and "IV-Line," all events must happen in the frame where the events are specified. "Intubation" and "IV-Line" are remembered events, meaning they are active until their opposing events, "Extubation" and "IV-Line removed," occur.

Example 1: In this example, "Pulse checked" will move the scenario from Frame0 to Frame1. The pulse must be checked again in Frame1 to bring the scenario back to Frame0. Frame1 has no memory of the fact that the "Pulse checked" event also happened in Frame0.
Example 2: In this example, performing either "Intubation" or "IV-Line Insertion" in Frame0 will move the scenario to Frame2 because "Intubation" and "IV-Line" events are remembered.
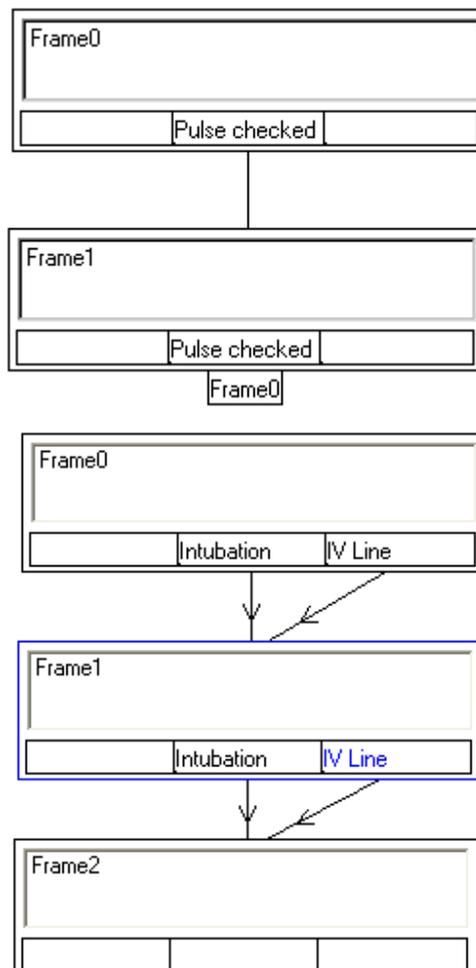
4.16.1 Adding or Editing Events in a Frame
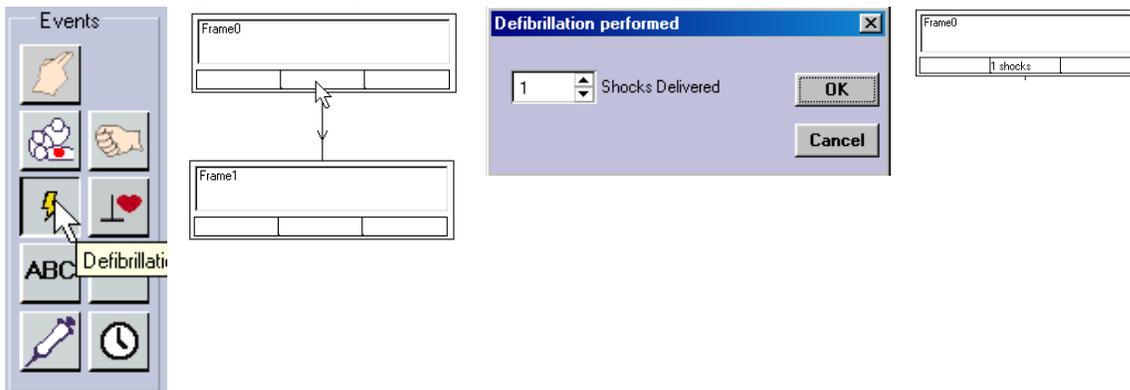
Click the desired Event button.

Click the "Event field" in the frame you want to edit

Edit the dialog and click "OK."
Note: Some events do not have a dialog.

The programmed event will now appear in the frame's "Event field."

4.16.2 Add / Delete "Event Fields"

In some cases, more than three event fields are needed. Click the right mouse button in any event field and. select "Add Event Output" from the menu.

A new empty "Event field" is added to the right of the existing fields.

To delete an "Event field," click the right mouse button in the field you want to delete and. select "Delete Event Output" from the menu.

Note: It is not possible to have less than three event fields in a frame, but there is no limit to how many may be added.

You can resize an event field by resizing the frame.
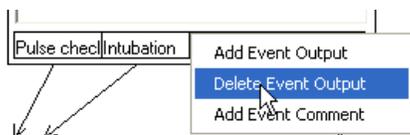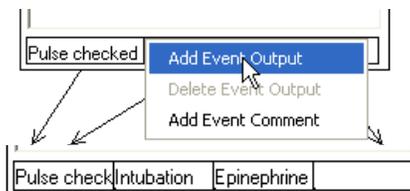
4.16.3 Add "Event Comment"

"Add Event Comment" allows you to add a comment in a log when the student performs an action or another event occurs, e.g. a time event.
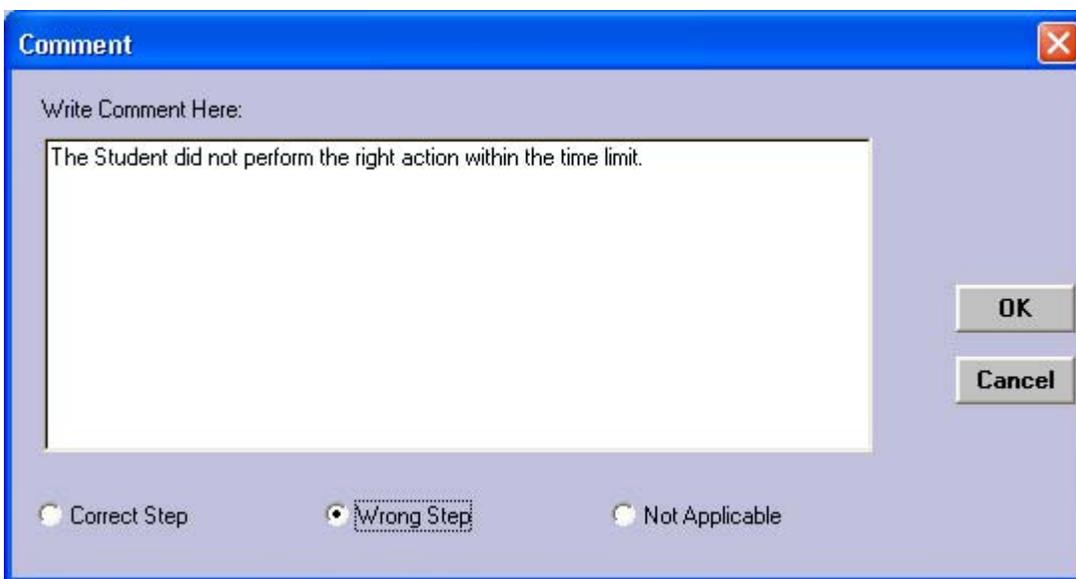
The comment can be earmarked if the action was a correct or wrong step or that the comment is not applicable to the action. When going through the log during debriefing, this can aid finding interesting log items.

An event frame containing a comment is marked with a "!" button. Click on this button to edit the comment.
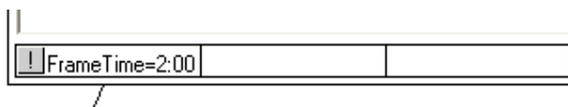
Available Events:

4.16.4 Pulse Checked

The "Pulse Checked Event" occurs when pulse is checked on the manikin. This event has no dialog and is displayed immediately in the "Event field."

It does not matter where the pulse is checked; any pulse check (Carotid, Radial, Brachial or Femoral) on the manikin will fulfill the criteria for the event.

4.16.5 CPR Performed
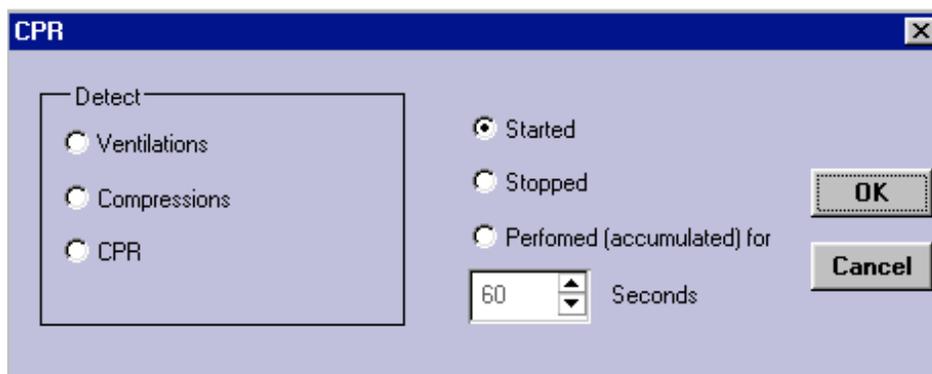
The "CPR Performed Event" function allows you to set one of the following CPR related events.

Started:
- Ventilations started
- Compressions started
- CPR started. Either compressions or ventilations are started on the manikin.

Stopped:
- Ventilations stopped. No ventilations detected for five seconds.
- Compressions started. No compressions detected for five seconds.
- CPR stopped. No ventilations or compressions detected for five seconds.

Performed:
- Ventilations / Compressions / CPR performed.
  To set the amount of time allowed between the starting and stopping of a specified activity, click the Up / Down buttons for "Performed (accumulated) for" until the desired number of seconds is reached. If the activity is started and stopped several times within the same frame, the time of the sequences are accumulated.

4.16.6 Precordial Thump

The "Precordial Thump Event" occurs when a Precordial thump is performed on the manikin. This event has no dialog and is displayed immediately in the "Event field."

Frame0
	Precord. thump	

4.16.7 Defibrillation Performed

The "Defibrillation Performed Event" allows you to set the event for execution when a certain number of shocks are given. Set "Shocks Delivered" by clicking on the Up / Down buttons and then click "OK."
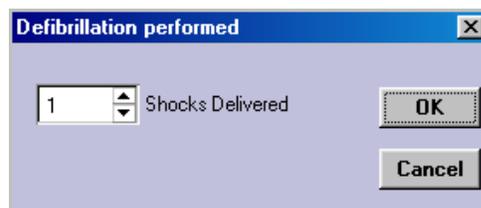
Defibrillation performed

| 1 | Shocks Delivered | OK |
| | | Cancel |

The number of shocks is accumulative over the Scenario. For example, "3 Shocks" means three shocks given from Frame0, where the Scenario started, or from the Frame where the shock counter was reset. Use the "Clear Shock Count" function to reset the shock counter in any Frame.

In the following example, it will take two shocks to convert the patient if performed within the first 45 seconds. If not, it will take three shocks within an additional 30 seconds, otherwise the Manikin will convert to asystole. Notice that one shock could be given within the first 45 seconds (Frame0) and the remaining 2 shocks could be given in the next 30 seconds (Frame2).

```
┌─────────────────────────────────┐
│ Frame0                          │
│ A:V.fibr. coarse   0 0/0        │
│                                 │
│                                 │
│ ┌──────┬──────────┬───────────┐ │
│ │      │ 2 shocks │FrameTime=45│ │
│ └──────┴──────────┴───────────┘ │
└─────────────────────────────────┘

        ┌─────────────────────────────────┐
        │ Frame2                          │
        │ A:V.fibr. fine   0 0/0          │
        │                                 │
        │ ┌──────┬──────────┬───────────┐ │
        │ │ 3 shocks │FrameTime=30│      │ │
        │ └──────┴──────────┴───────────┘ │
        └─────────────────────────────────┘

┌─────────────────────────────────┐   ┌─────────────────────────────────┐
│ Frame1                          │   │ Frame3                          │
│ A:Sinus Unifocal PVC 100        │   │ A:Asystole   0 0/0              │
│                                 │   │                                 │
└─────────────────────────────────┘   └─────────────────────────────────┘
```
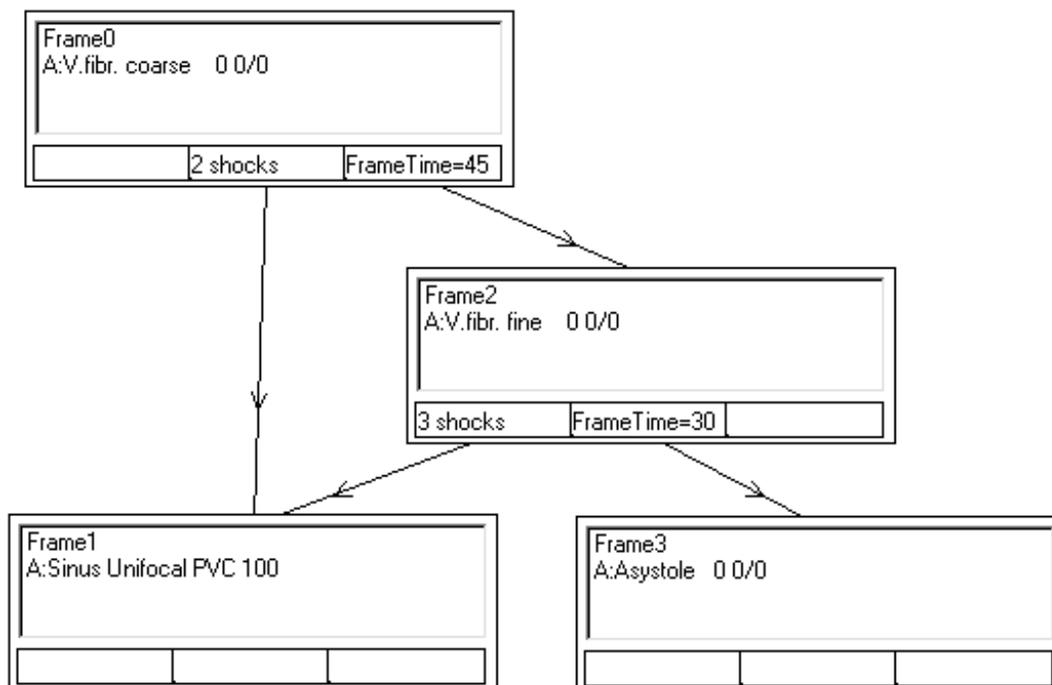
4.16.8 Pacing Performed
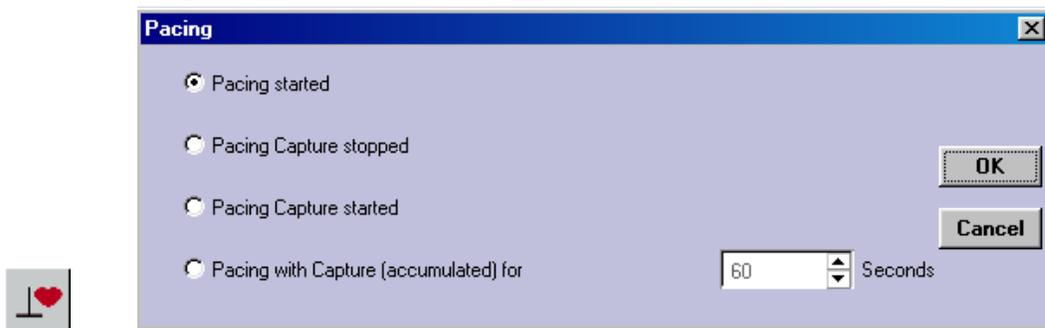
The "Pacing Performed Event" button allows you to set one of the following Pacing related events.

- Pacing started. Pacing is performed on the manikin. Capture may not necessarily occur.

- Pacing capture started. Pacing is performed on the manikin with a current level over the set threshold. This event cannot happen if pacing is disabled. See 4.15.5 for more information on the "Pacing Enable - Ignore" Action.

- Pacing capture stopped. Pacing capture has occurred and has now stopped.

- Pacing with capture (accumulated) for. Pacing has been performed for more than the period of time you have set in this frame. If pacing is started and stopped several times within the same Frame, the time of the pacing sequences is accumulated.

4.16.9 ABC Action
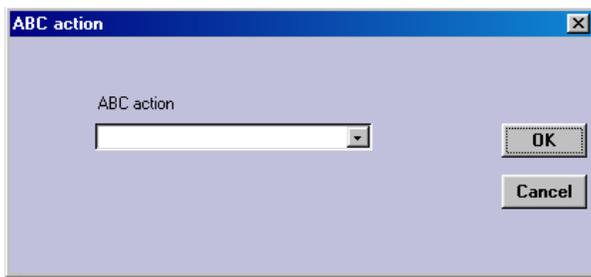
The "ABC Event" button allows you to set any of the ABC actions. Actions added by the "Edit" menu function can be programmed as events.

"Intubation" and "IV-Line" differ from the other events in that they do not have to occur in the same Frame that the event is specified. The scenario will remember that "Intubation" has occurred and the event will be true in any frame after the occurrence until "Extubation" occurs. The same will be true for "IV-Line" which will be remembered until "IV-Line Removed" occurs.

Example: In this somewhat complicated scenario, we have a limited time to give the patient Epinephrine and get to Frame6. To give Epinephrine, we must have either an IV-Line or an ET-tube. While preparing Intubation or IV-line, time can be bought by performing CPR. If no CPR is given, the time will elapse and the patient will die (Frame4).

To do all this, we will need more than three events in some frames. The test for"IV-Line" and "Intubation" is done in Frame5 and Frame2, while the actual registration of the event can be done in Frame1.
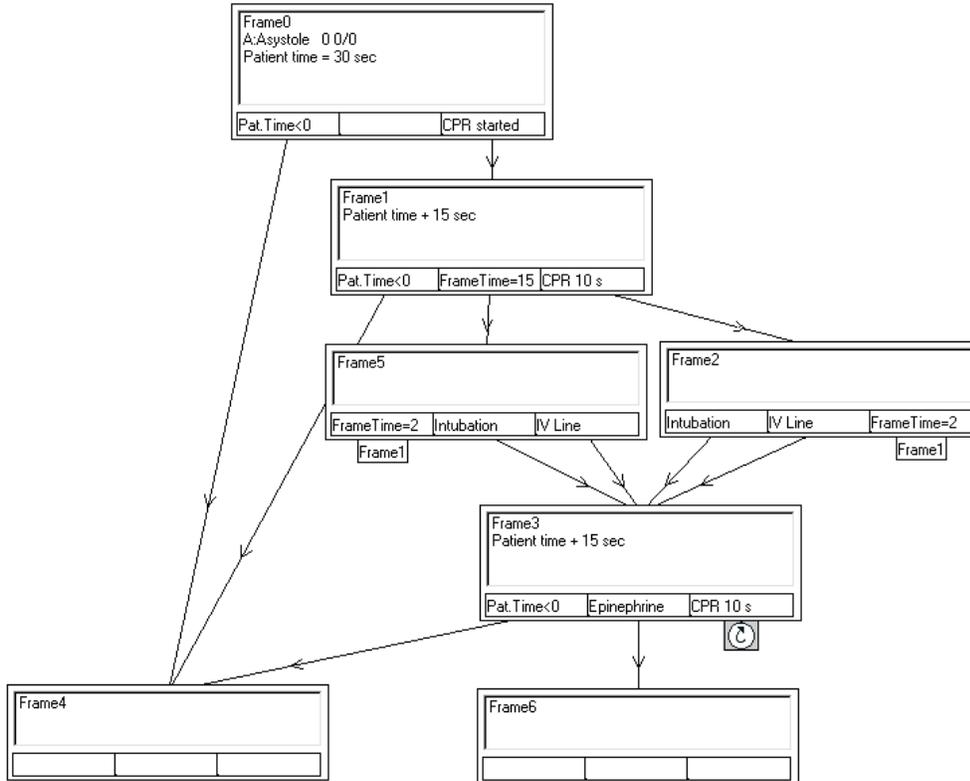
4.16.10   Miscellaneous
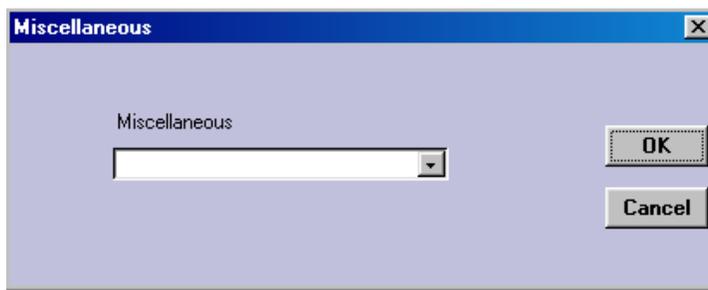
The "Miscellaneous Event" button allows you to set any of the "Miscellaneous" actions. Actions added by the "Edit" menu function can be programmed as events.

4.16.11   Medication
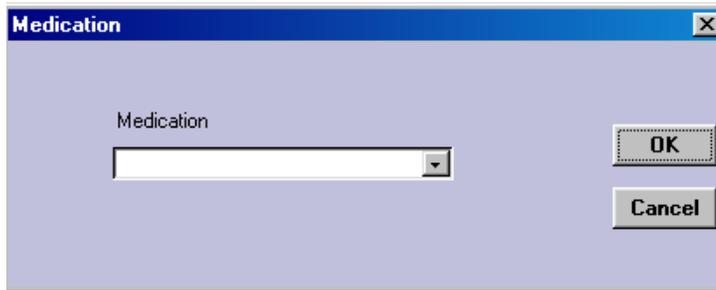
The "Medication Event" button allows any of the "Medications," including medications added by the "Edit" menu function, to be programmed as Events.

4.16.12   Time Events

The "Time Event" button allows you to set events based on either "Patient time" or frame time (time in the current frame). After selecting "Patient time <=" or "Time in this Frame =," set the desired time by clicking the Up / Down buttons to the desired seconds and click "OK."

Patient Time. The Patient time is equal to or less than the set number of seconds.

Time in this Frame. The amount of elapsed time since the scenario entered this frame is equal to the set number of seconds.

The scenarios have two timers.

1. Patient timer. This timer counts downwards. It starts at zero when the scenario starts, so it must be set to a value before use. In addition to setting a specific value, time can also be added or subtracted by the scenario. See 4.15.13 for more information on "Patient time." You are free to use this timer as you choose. The "Patient timer" can be used to count the seconds a critically ill patient has left to live. Actions performed correctly by the students can add to the timer. Time will be subtracted if actions performed by the student are dangerously wrong or if they bring the patient out of the critical state altogether. The scenario can be programmed to make the patient beyond rescue if the student does not perform the correct action and the timer will reaches zero.

2. Frame timer (Time in this frame). This timer counts upwards from zero when the running scenario changes from one frame to another. This timer is intended to automatically change to another frame when the running scenario has stayed within the same frame for the specified amount of time. The running scenario cannot change the frame timer other than by entering a new frame. A scenario is allowed to go from one frame back to itself and the frame time will then be reset to zero.

5   Event Handlers

5.1   Overview

The purpose of "Event Handlers" is to simplify automatic responses to events. Events are those listed in the SimMan window as ABC Action, Miscellaneous and Medication events. There is one Handler for each category.

Scenarios can perform the same task as Event Handlers, but Event Handlers specialize in handling events. By running the event handlers simultaneously with a running a scenario, you can take event handling out of the scenario and let the scenario concentrate on the training. The simplified scenario is easier to build and maintain.

If a scenario handles an event, such as starting a trend when a medication is given, it must go to a new frame, start the trend and then come back again.
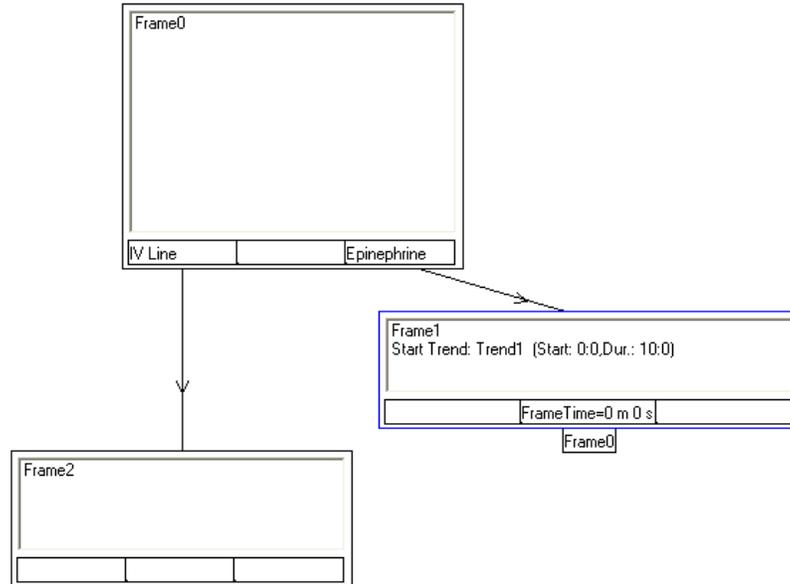
However, the event might happen in another frame causing it to perform the same check in every frame.

If you also want to check for several other events, the scenario soon becomes long and cumbersome.
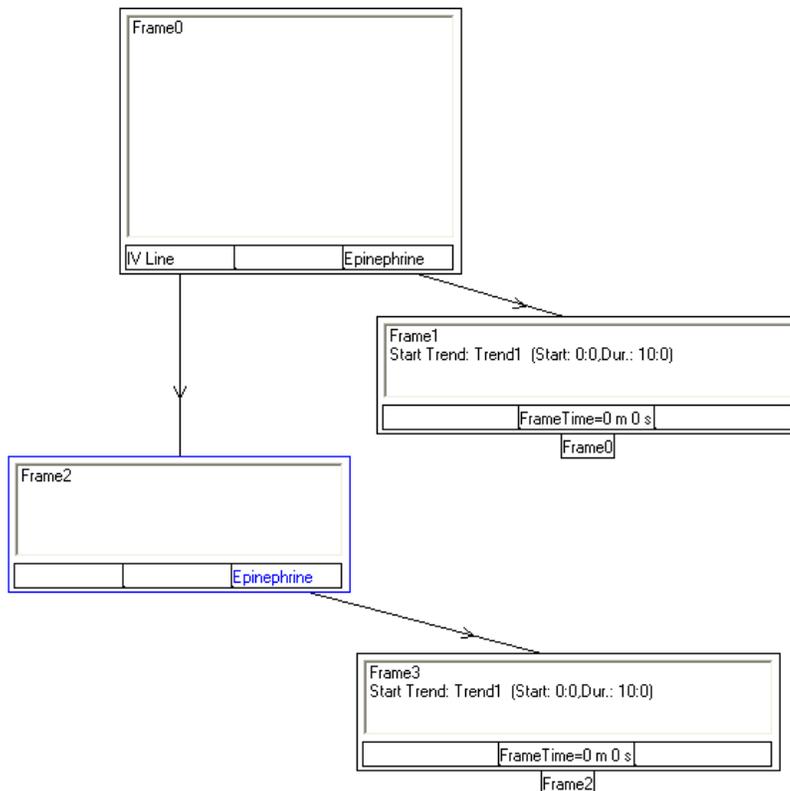
The event handlers are specialized in handling events. They jump to another frame, perform an action and jump back again. Since they run simultaneously with the scenario, it works as if the scenario were performing a check in every frame.

This is how the scenario looks when using a medication handler.

The scenario starts the medication handler. Once started, the medication handler will start "Trend1" each time "Epinephrine" is given, no matter which frame the scenario is in.

The "Medication Handler" can be expanded to handle many drugs.

In addition, you can start handlers that handle ABC and Miscellaneous Events.

Medication handler: MedicHandler1
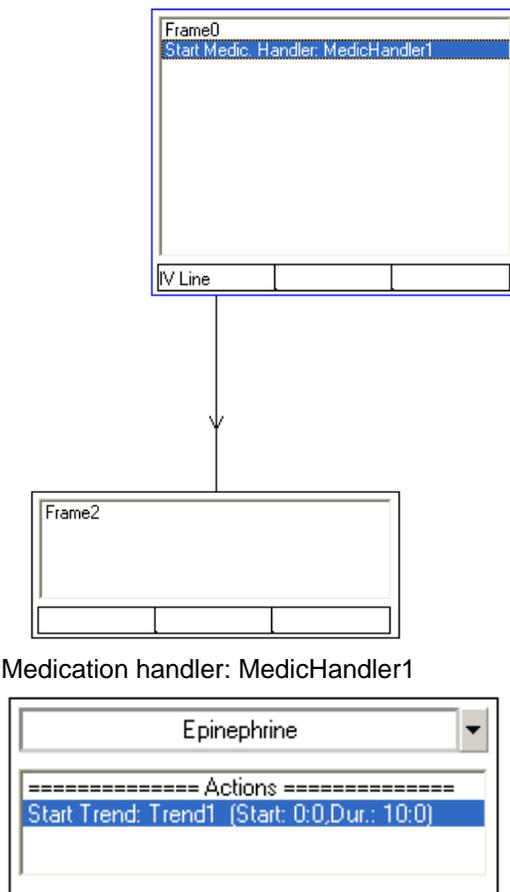
5.2   Startup

The Event Handler Editor is started from the "Edit" menu of SimMan's main program. Select the type of handler you will edit/create.

Then either start the handler to run from within a scenario (see 2.13), or you can start it to run stand alone by selecting "Start Handler" from the "File" menu of SimMan's main program.

5.3 Handler layout

Layout of a Medication handler.
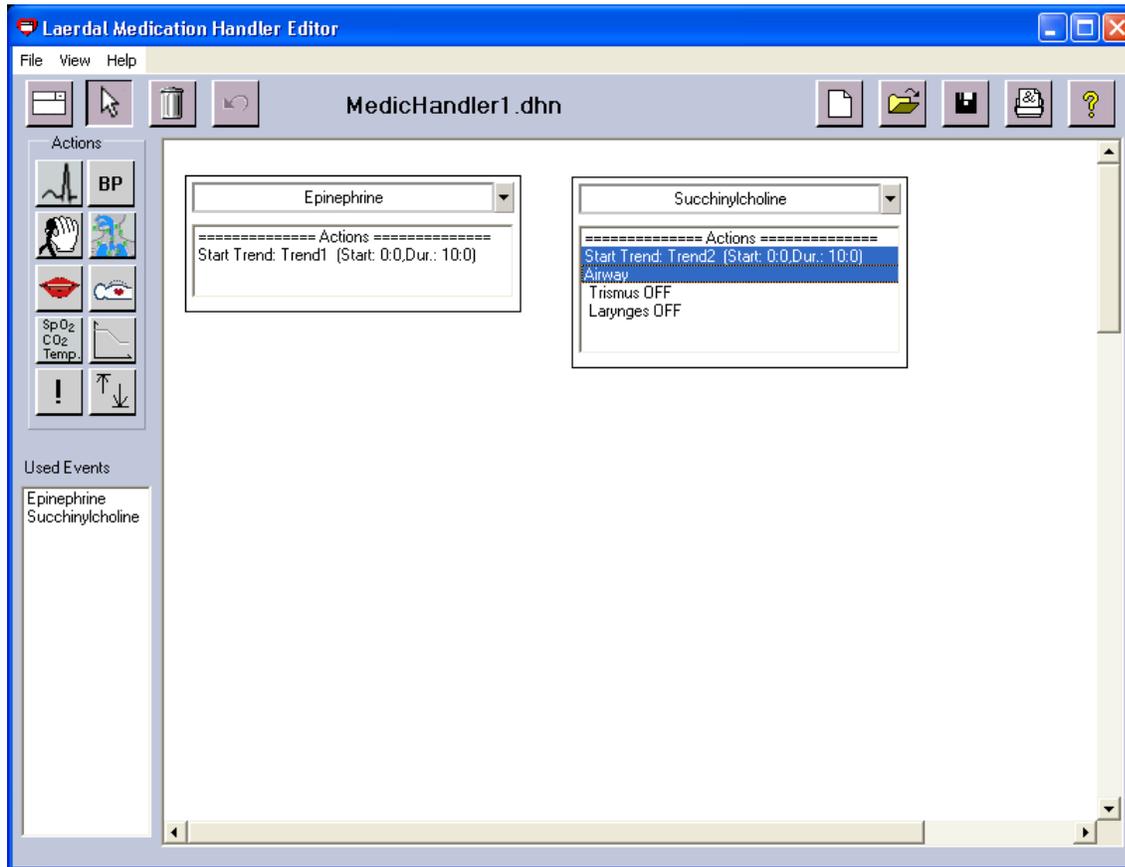
The handlers look very much like scenarios, but there are some obvious differences. There are differences between the various handler types as well. The most obvious differences are that the frames look different and that the handlers do not have connection lines between the frames.

Each frame handles an event, a medication event in the Medication Handler. You select the event at the top of the frame.

The actions are about the same as for scenarios, except that you can't start handlers.

There are no event fields at the bottom of the frames.
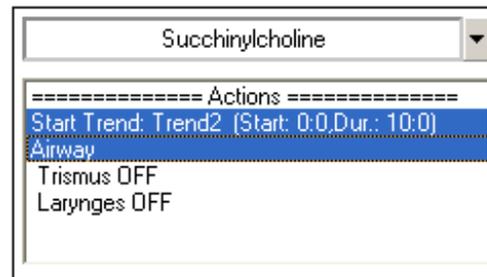
Handlers work differently than scenarios. They wait until an event occurs and then check for any frames having that selected event. If so, it jumps to that frame and performs its actions before going into wait again.

If you think in terms of scenarios, the scenario below is equivalent to the above handler.

A scenario equivalent to a drug handler.

It is always waiting in frame0 for a selected event to happen. Then it moves to the corresponding frame, performs the actions and immediately moves back to frame0 again.

A list of all used events can be found on the lower left side of the handler.

Unpredicted results may occur if you select the same event in several frames.
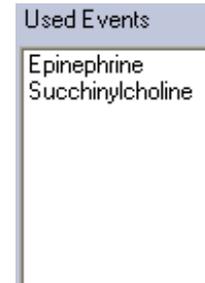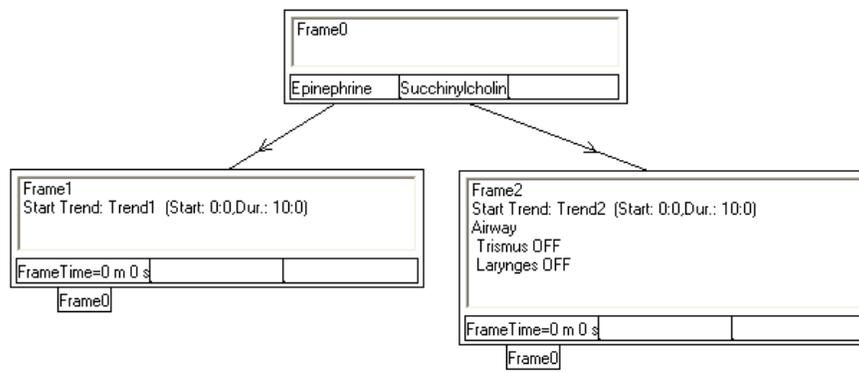
5.4 Program Menu

The "Program" menu is located at the top left corner of the Handler window.

5.4.1 File Menu

The "File" menu controls Windows system commands.

New Window	Opens a new handler window. Good for copying frames from one handler to another.
New Handler	Clears the current view.
Load Handler	Loads an existing handler.
Save Handler	Saves a handler.
Print Handler	Prints a handler.
Exit	Exits the Handler Editor.
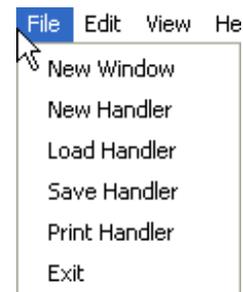
5.4.2 Edit Menu

The "Edit" menu contains copy and paste functions.

Copy	Copies the selected item(s) to the clipboard.
Paste	Pastes the copied from the clipboard.
Select All	Selects all items.
Edit Event Menus	Customizes the Event Menu for this scenario. It is also possible to assign specific events to remote control keys. See 4.6 for more information on customizing event menus.
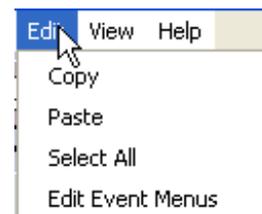
5.4.3 View Menu

The "View" menu contains one item that opens a dialog listing used Events and Trends.
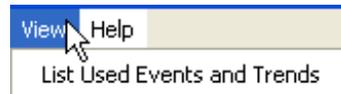
Here is an example from a simple Handler.
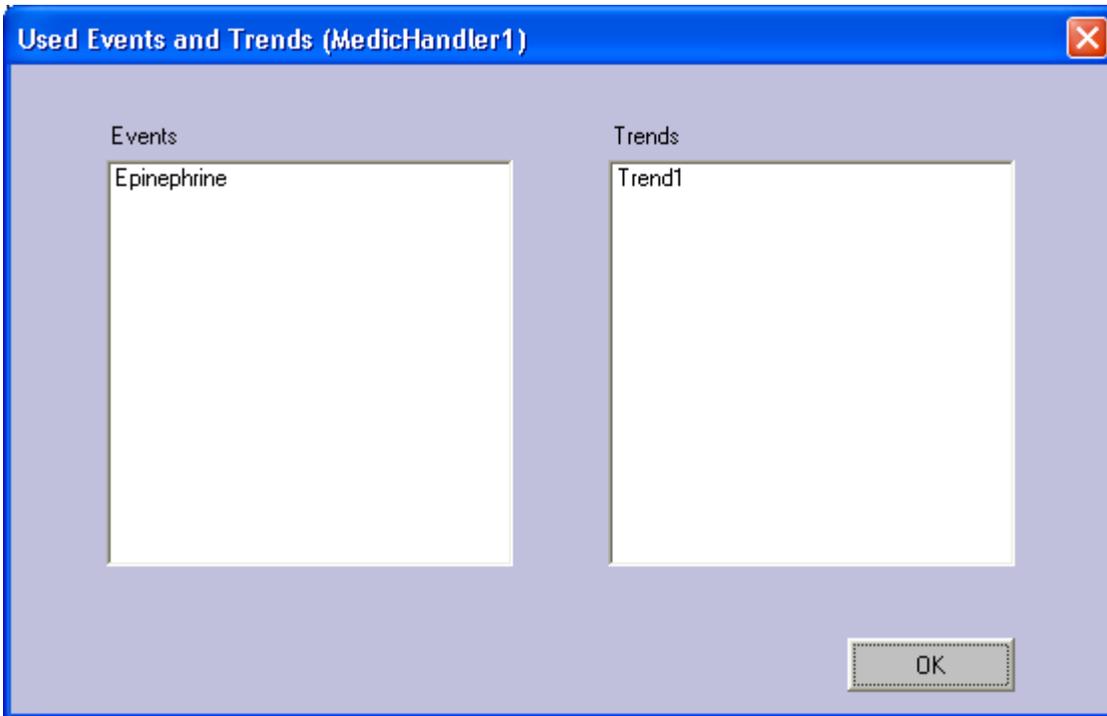
5.4.4 Help Menu

The "Help" menu allows access to the SimMan Handler Editor Help and displays software version information in the about dialog.

Show Help   Opens the SimMan Handler Editor Help window.

About   Shows software version info in the dialog.

5.5 Load Handler

The ![folder icon] button allows you to load and edit an existing handler.

The function can also be activated from the "File" menu.
Once you select a handler, its comments are displayed in the window on the right.
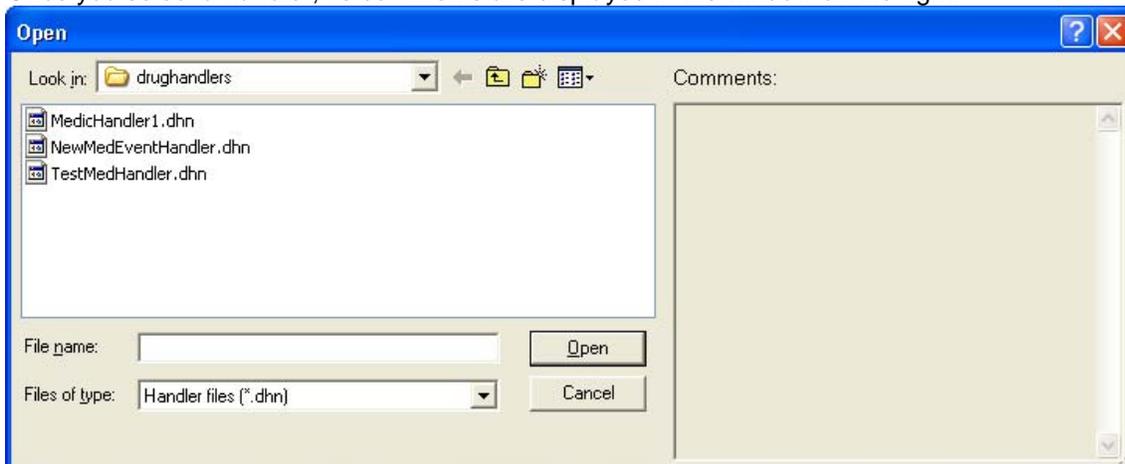
5.6   Save Handler

The ![save icon] button allows you to save a Handler to your "Handler" folder.

The function can also be activated from the "File" menu.

Descriptive text about the handler can be entered in the comment field. This text can be read in the open dialog when a handler is opened for editing or execution.

Note the "Save Menus" check box. This box is checked by default. When checked the "Event Menus" of the event handler will be saved along with the handler. You can edit how the menus will look by clicking the "Edit Menus…" button. See 5.8 for more info about event menu customization.
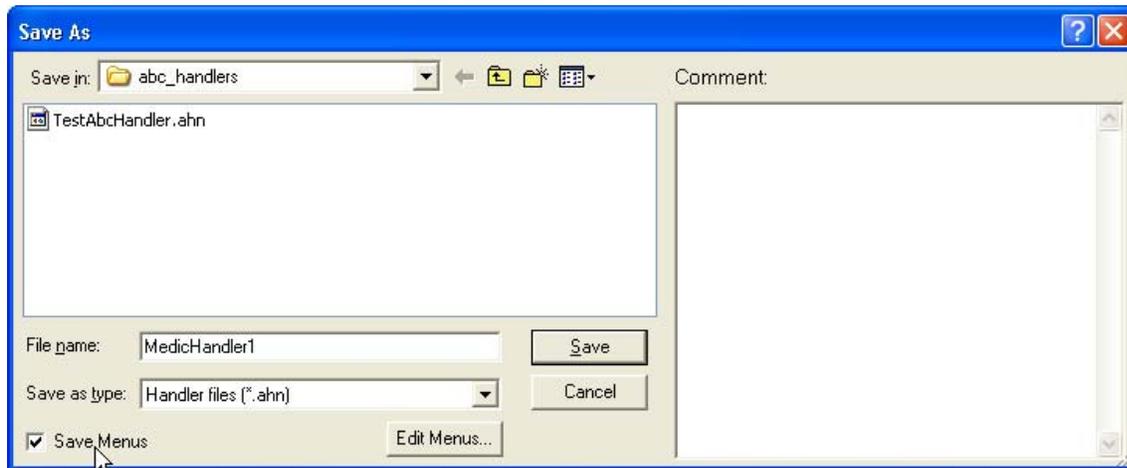
5.7   Print Handler

To print a Handler, select "Print Handler" from the "File" menu.

Select desired print mode in the "Select Print Mode" dialog and click "OK."

"Reduced size," prints the Handler on one A4 / Letter page.

"Full size" prints the Handler on two A4 / Letter pages.

You can include the comments with the printout by ticking/unticking the "Print Comments" tick box.
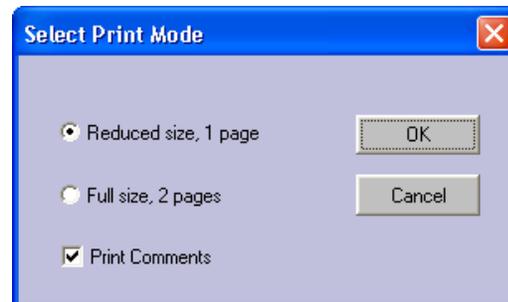
5.8   Customize Event Menus

When creating an event handler, you can customize how the event menus will look for a user running the handler to ensure that the menus are organized and easy to operate.

Selecting "Edit Event Menus" from the "Edit" menu displays this dialog. This function also allows you to assign events to remote control keys.

The functionality is almost identical to the edit menus in the GUI. See 0. The difference is that by default, the events used by the scenario are visible and the non-used are hidden. You must unhide non-used events if you want them to be seen when running the event handler.
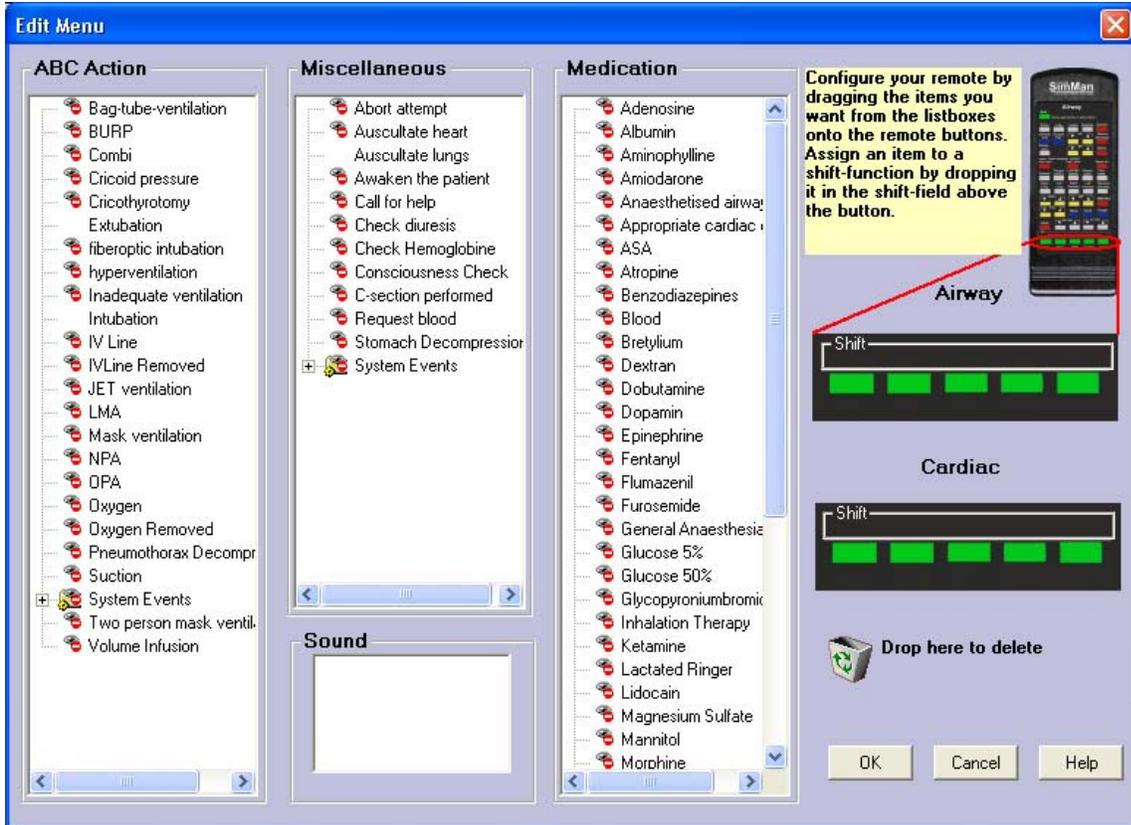
When saving the handler the customized event menus is by default included in the handler file and these menus will be shown when running the handler (instead of the logged-in users menus). If you un-check the "Save Menus" tick-box the menus will NOT be saved with the handler and the logged-in users menus will be shown when running the handler.
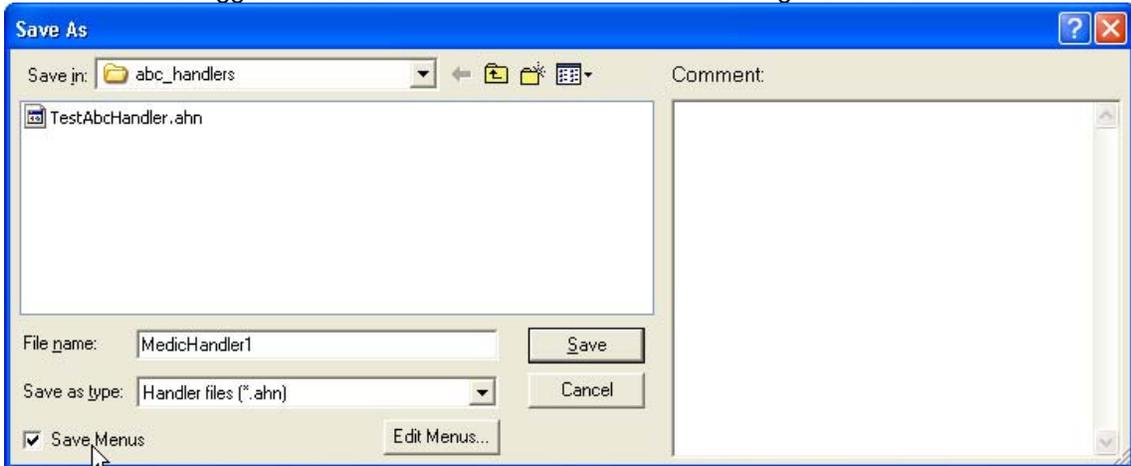
The edit menus dialog can also be opened by clicking the "Edit Menus…" button in the save dialog.

If a scenario is running when the handler is started, the menu saved with the handler will not be shown. Instead the events used in the handler will be automatically appended to the corresponding menu already loaded by the scenario. Thus all events used by either scenario or handler will be visible in the menu.

5.9 Frames

A frame in the Event Handler handles an event. Select the event to be handled from the pull-down menu at the top of the frame and add the actions in the "Actions field."

Note: Unlike scenarios, frames aren't numbered.
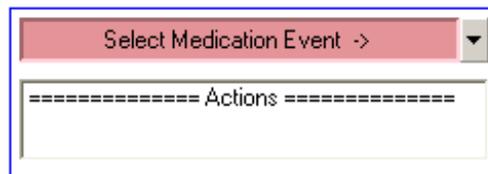
5.10 Creating a Frame

To create a frame, click the "Create Frame" button and then on the screen where you want to place the frame.

After the "Create Frame" button is clicked, the cursor changes, as shown to the right, and changes back again after the new frame is placed in the handler.

5.11 Moving Frames

To move a frame, click on the "Select Frame" button.

Click the border of the frame you want to move and drag it to the desired position releasing the mouse button.
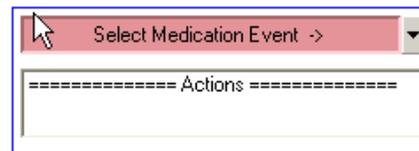
```
Select Medication Event ->    ▼
============== Actions ==============
```

You can select several frames by holding down the "CTRL" key while clicking the border of the additional frames or by clicking and dragging a frame around the frames you want to move.

```
            Epinephrine         ▼
============== Actions ==============
Start Trend: Trend1  (Start: 0:0,Dur.: 10:0)
```

```
            Succhinylcholine    ▼
============== Actions ==============
Start Trend: Trend2  (Start: 0:0,Dur.: 10:0)
Airway
 Trismus OFF
 Larynges OFF
```

When the selected frames are marked with a blue border, you can click on one of them and drag both around.

5.12 Copying Frames

A frame must be selected before you can copy it.

First, click the "Select" button.
To select one frame, click on its border. To select several frames, hold down the "CTRL" key while clicking the border of the additional frames. You can also use the cursor to click and drag a frame around the frames you want to move.

```
Select Medication Event ->    ▼
============== Actions ==============
```
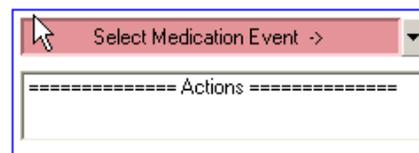
The selected frames will be marked with a blue border.

To copy the selected frames, select "Copy" from the "Edit" menu and then select "Paste." *(You can also use the standard Windows hotkeys CTRL+C for copy, and CTRL+V for paste.)*
The copied frames are pasted in the top left of the drawing area and are already selected for moving to the desired location.
You can also open a new Handler Editor window and use copy and paste to copy frames from one handler to another.

5.13 Resizing frames

Click and drag on the frame's right edge to resize
the frame horizontally.

5.14 Deleting Frames or Frame Items

To delete a frame, click the "Select" button and select the whole frame by clicking its
border (the border will be highlighted in blue). Or, select the item you wish to delete
(selected items are highlighted in blue).

Note: "Select frame" is usually the default mode when no other function is selected.

Click on the "Delete Item" button and the
selected item(s) will be deleted
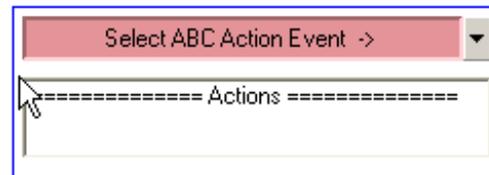
5.14.1 Undoing Last Deletion

The last performed deletions can be undone using the button.

If undo is not possible, the button will be disabled.

5.15 Select an Event

Pull down the event menu.
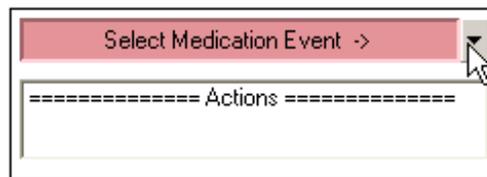
Select the event you want the frame to
handle and click "OK."
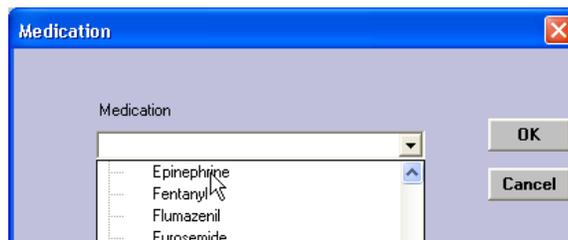
5.16 Actions

Actions are what you want the Handler to do when the handled event happens.

To add or edit actions in a frame:
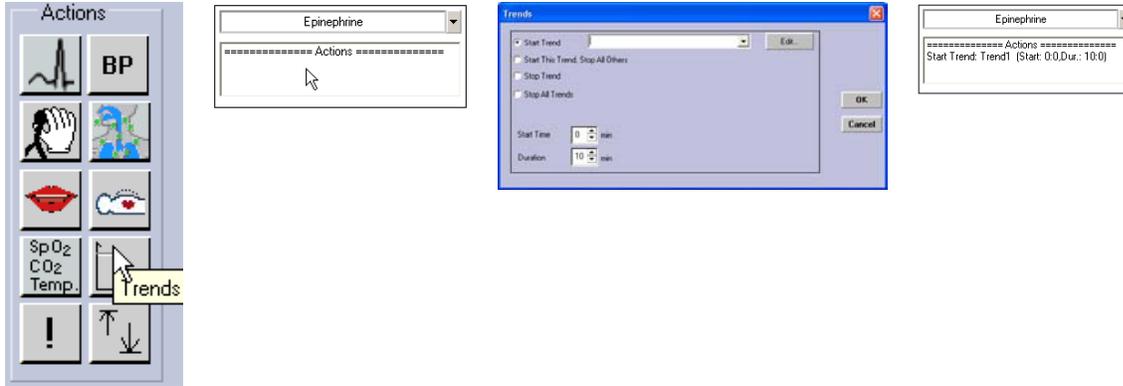
Click on the desired Action button.	Click the "Action field" of the frame you want to edit.	Edit the dialog that appears, and click "OK."	The programmed action will now appear in the frame's "Action field."

Available Actions:

5.16.1 ECG
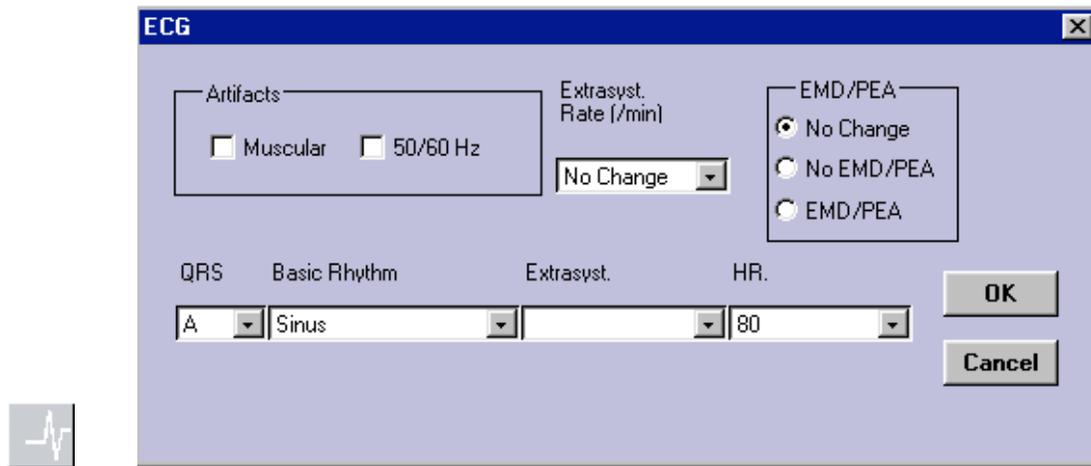
The "ECG Action" button allows you to set the ECG and related parameters.
If the "Extrasyst. Rate" is set to blank (default), "Extrasystole Rate" will not be changed from its previous state.

Note: EMD / PEA can be set from this Action. Selecting EMD / PEA will set the blood pressure to zero independently of the ECG rhythm and the blood pressure setting. Selecting "No EMD/PEA" will bring the blood pressure to the previous setting, if the ECG is a perfusing rhythm.

5.16.2 Blood Pressure

BP
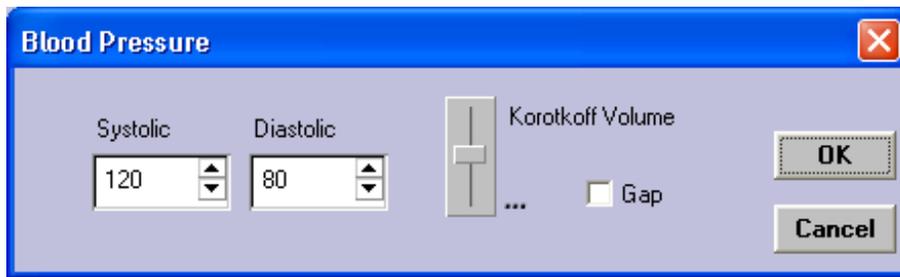
The "BP Action" button allows you to set blood pressure, Systolic and Diastolic rates independently, and Korotkoff sound volume.

If the volume set lever is not moved, sound volume is unaffected and indicated by "…" to the lower right of the lever.
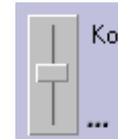
If the volume is changed, the level will be displayed as "0" to "10."
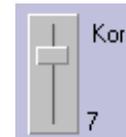
Tick the "Gap" tick box to make an auscultation gap in the Korotkoff sound.

5.16.3 Auscultation Sounds

The "Auscultation Sounds Action" button allows you to select Right Lung, Left Lung, Heart and Bowel sounds in addition to sound volume.
Note: Right and Left Lung sounds are set independently.

If "No change" is selected, the corresponding sound is unaffected.

If the volume set levers are not moved, sound volume will be unaffected and indicated by "…" to the lower right of the lever.
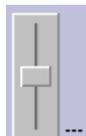
If the volume is changed, level will be displayed as "0" to "10."
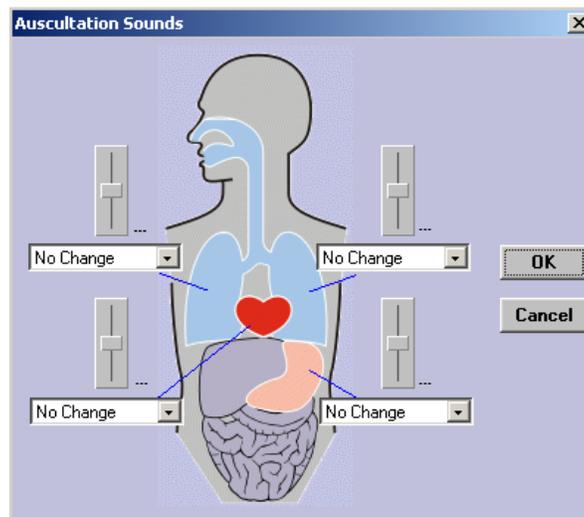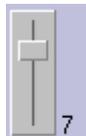
5.16.4 Airway

The "Airway Action" button allows you to set the state of all SimMan airway functions.

Each function is identified with a ToolTip when the mouse is moved over the button.

Each airway function has three states:

☐ No change. The function will remain as set in previous frames.

☒ Not Active. The function will be cleared. For instance, Trismus off.

☒ Active. This function will be set. For instance, Trismus on.
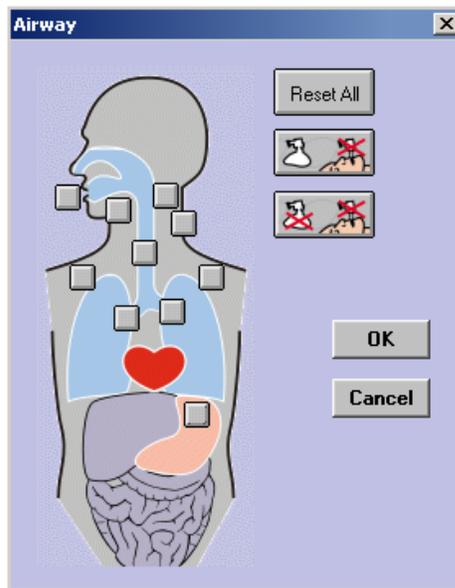
5.16.4.1 Preset Buttons

Reset All sets all functions to Not Active.

Can't Intubate, Can Ventilate will set:
Tongue Edema, Pharyngeal Obstruction, Cerv. ROM and Stomach Decompr.
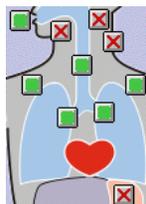
Can't Intubate, Can't Ventilate will additionally set Right and Left Lung compliance.

5.16.5 Vocal Sounds

The "Vocal Sounds Action" button allows you to select one of the manikin vocal sounds.

The sound can be repeated several times at a selected interval.

Repetitions of sounds will continue, even if the scenario changes frame. Repeated sounds can be stopped in another frame by selecting "Stop Sound."
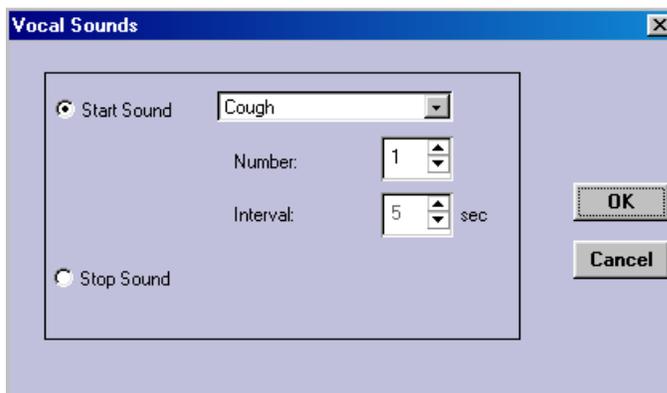
Starting another sound in another frame overrides a previously programmed sound. However, the sound will not start until the one playing has completed.

5.16.6 Breathing Rate

The "Breathing Rate Action" button can be set from 0 - 40 breaths per minute in increments of two.

Output of CO_2 in the exhaled air is also controlled from this function.
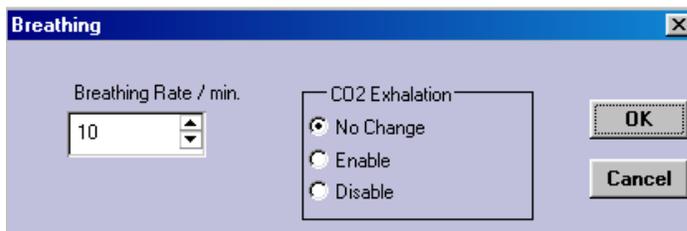
5.16.7 Vital Signs (Patient Monitor)

The "Vital Signs Action" button allows you to set Patient Monitor parameters.

Only the parameters with the "Change" tick box ticked will be changed, the others remain unchanged.

CO_2 and Temperature scales are controlled by the SimMan settings.
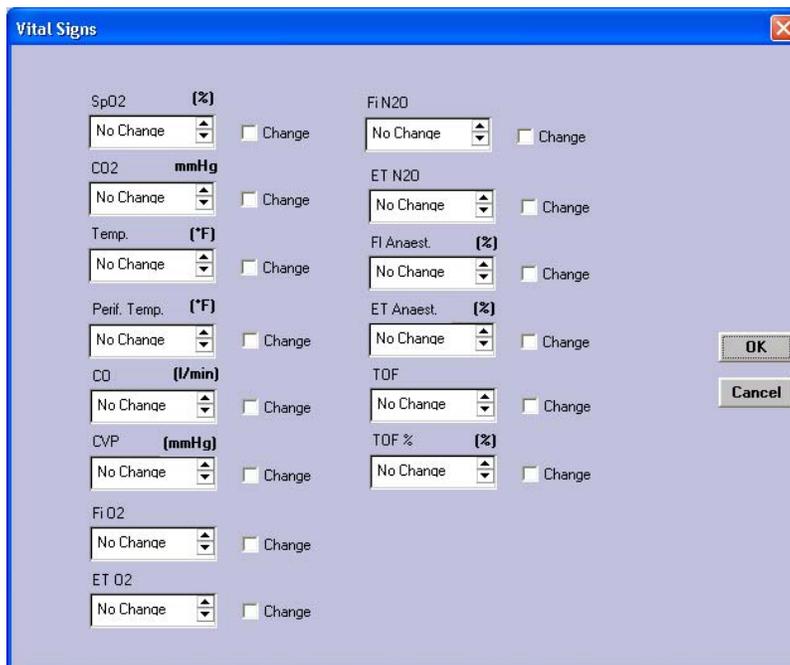
5.16.8 Trends

The "Trends Action" button allows Trends to be started and stopped from a Handler.
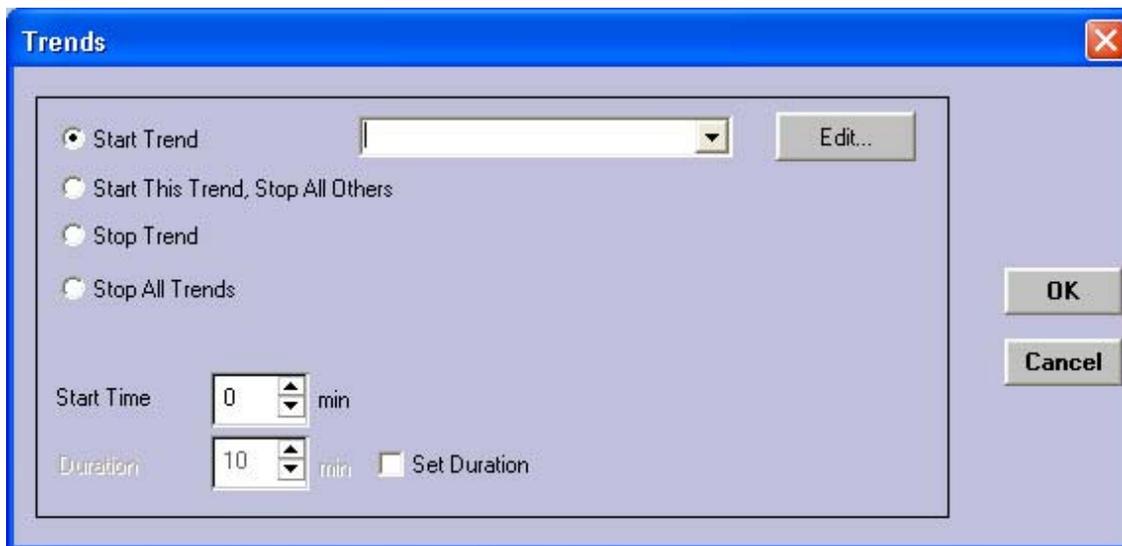
There are two options for starting a trend.

1. "Start Trend" starts the selected trend to run simultaneously with all other trends that may be running when the handler enters this frame.
2. "Start This Trend, Stop All Others" starts the selected trend to run while stopping all others when the handler enters this frame.

There are two options for stopping a trend as well.

1. Selecting "Stop Trend" stops a specific Trend.
2. Selecting "Stop all Trends" stops all active Trends.

Click the "Edit…" button to open the Trend Editor.

"Trend Editor" allows you to specify the Start Time and Duration of a Trend.

Start Time defines how far into the programmed trend the trend will be started. For example, this Trend will skip to the start position and start from there.

Duration defines how long the trend will run.

The default is that a trend starts from the beginning and continues until its last defined point, except for infusion trends that last until they are stopped.

Trends cannot be started and stopped in the same frame.
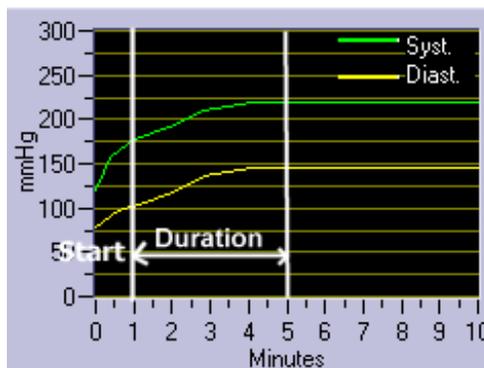
5.16.9 Comments

Comment ☒

Write Comment Here:

Pulse checked

⊙ Correct Step   ○ False Step   ○ Not Applicable

OK

Cancel

[!]

The "Comments Action" button allows the addition of user-entered comments in the Event Log to aid in evaluation of student performance.

5.16.10   Set Trend Max/Min

Vital Signs ☒

		Max	Min	
SpO2	(%)	100	0	☑ Change
CO2	mmHg	No Change	No Change	☐ Change
Temp.	(°F)	No Change	No Change	☐ Change
BP Sys.	(mmHg)	No Change	No Change	☐ Change
BP Dia.	(mmHg)	No Change	No Change	☐ Change
HR	(BPM)	No Change	No Change	☐ Change
BR	(BPM)	No Change	No Change	☐ Change
CO	(mmHg)	No Change	No Change	☐ Change
CVP	(mmHg)	No Change	No Change	☐ Change

OK

Cancel

[↑↓]

The "SimMan Trends Action" button allows you to set parameter limits for vital signs.

Default limits are specified in the SimMan main program "Options" menu by selecting "Trend Max/Min Values…". These limits are overridden when set in a Scenario. It is good practice to set the limits in scenarios to ensure they are set correctly.

Only the limits with the "Change" tick box ticked will be set, the others remain unchanged.

6   SimMan Patient Monitor

6.1   Introduction

The SimMan Patient Monitor emulates an ordinary patient monitor. It is used to display vital signs parameters and waveforms for the student. It is controlled by the instructor using the PC, but will allow alarms to be set along with some customization using its touch sensitive screen.

This chapter focuses on use of the touch screen for setting alarms and performing other customization. See 2.7 for more information on using the PC to control the Patient Monitor.
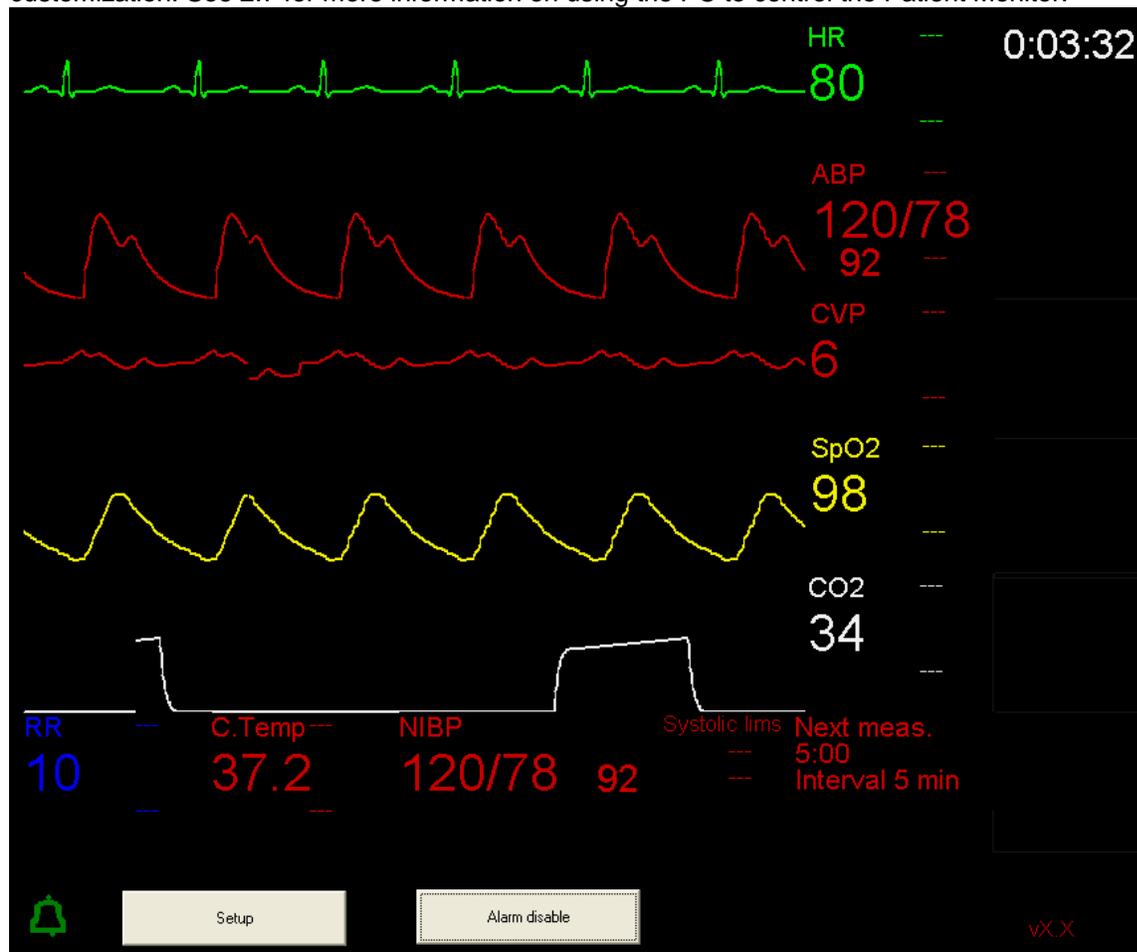
As mentioned above, the screen is touch sensitive. It is split into several fields and two buttons. When a field is touched, a menu appears. A picture representing of the layout of the fields is shown below. There are two types of fields, waveform fields and number fields. The waveform fields are the upper ones to the left. The rest are number fields. Note that one number field is much wider at the bottom. Its layout is specialized to contain the NIBP numbers; besides its layout it is an ordinary number field.

The two buttons are the "Setup" button that opens the "Setup Menu" and the "Alarm Disable" button that switches off a sounding alarm.

```
┌─────────────────────────────┬──────┬──────┐
│                             │      │      │
├─────────────────────────────┼──────┼──────┤
│                             │      │      │
├─────────────────────────────┼──────┼──────┤
│                             │      │      │
├─────────────────────────────┼──────┼──────┤
│                             │      │      │
├─────────────────────────────┼──────┼──────┤
│                             │      │      │
├──────┬──────┬───────────────┴──────┼──────┤
│      │      │                      │      │
└──────┴──────┴──────────────────────┴──────┘
   [ Setup ]          [ Alarm disable ]
```
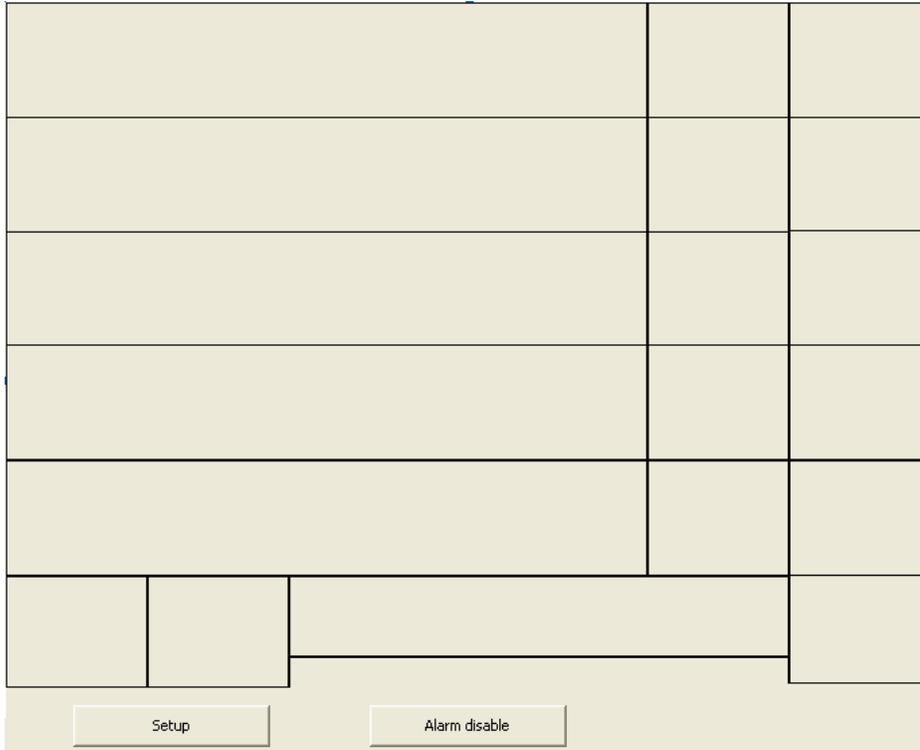
6.2   Setup

The "Setup Menu" is displayed when the "Setup" button is pressed.

Selecting "(No change)" closes the menu.

Setup Menu
Disable alarm sounds
Set time to re-engage alarms
Set beeper volume   ‣
Save setup   ‣
Restore setup   ‣
Reset to default
Help
Calibrate touch screen
(No change)

Selecting "Disable alarm sounds" disables alarm sounds and the green bell in the lower left corner changes to red and is overwritten with a line.

Selecting "Set time to re-engage alarms" allows you to set the amount of time an alarm will remain disabled when an alarm sounds and the "Alarm disable" button is pressed. The default is two minutes.

Selecting "Set beeper volume" allows you to set the volume for the ECG/SPO$_2$ beeper to High, Medium or Low or to turn it off.

High
Medium
Low
√Off

Selecting "Save setup" allows you to save up to five setups.
Configure the monitor as wanted and then select "Save Setup" from
the menu. You can then select the setup under which you want the
configuration stored.

Setup1
Setup2
Setup3
Setup4
Setup5

Selecting "Restore setup" restores any of the saved setups.
Selecting "Reset to default" resets the configuration to the default.
Selecting "Help" displays basic help.
Selecting "Calibrate Touch Screen" allows you to calibrate the screen
since there may be some difference in the location you touch the
screen and the location the monitor reads. Choosing this menu starts
the calibration. Follow the on-screen instructions:

1. Press "Calibrate".
2. Touch the two points as requested.
3. Press "OK" to finish the calibration.
4. Press "OK" again on the message that notifies you that the
   new calibration data is stored in the Patient Monitor registry.

The calibration can also be started from the "Patient Monitor" menu
in SimMan's main program.

6.3   Waveform Fields

6.3.1   Modifying a Waveform

When touching a waveform, you will be given a menu.
For example, this menu will display for the ECG
waveform.

Selecting "(No change)" closes the menu.

ECG curve options
Change sweep rate ›
Change color
Change function
Clear
(No change)

Selecting "Change sweep rate" allows you to choose a sweep rate of
either 12.5 mm/s or 25.0 mm/s. These values are only approximate.

25 mm/s
12.5 mm/s

Selecting "Change color" allows you to change the color of the
waveform.

Red
Green
Blue
Yellow
White
Brown
Grey
Magenta
Cyan
(No change)

Selecting "Change function" allows you to display another waveform or clear the current waveform field.

Note: If you select to display a waveform already displayed in another waveform field, the waveform will be moved and its previous position cleared.

ECG
ABP
CVP
SpO2
CO2
Clear
(No change)

Selecting "Clear" will clear the current waveform field.

6.3.2 Selecting a New Waveform for an Empty Waveform Field

If no waveform is selected for the waveform field touched, the menu for selecting a new waveform appears.

Note: This is different from no displayed waveform. A waveform field may have a selected waveform and still not display a waveform if the instructor has not enabled the waveform.

ECG
ABP
CVP
SpO2
CO2
Clear
(No change)

6.4   Number Fields

6.4.1 Modifying a Number

This menu appears when you touch a number field that already contains a number. In this case the HR.

Selecting "(No change)" closes the menu.

HR options
Change upper limit
Change lower limit
Enable upper alarm
Enable lower alarm
Change color
Change function
Clear
(No change)

Selecting "Change upper limit" allows you to change the upper alarm limit.
Selecting "Change lower limit" allows you to change the lower alarm limit.
Selecting "Enable upper alarm" enables the upper limit alarm.

The limit is then displayed to the top right of the number.

SpO2   100
98

SpO2   ---
98
90

Selecting "Enable lower alarm" enables the lower limit alarm.

The limit is displayed to the bottom right of the number.
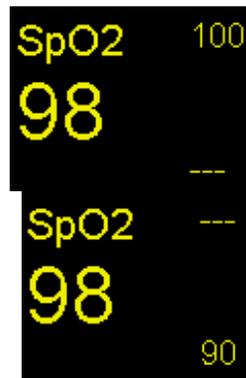
Selecting "Change color" allows you to change the color of the number.

Red
Green
Blue
Yellow
White
Brown
Grey
Magenta
Cyan
(No change)

Selecting "Change function" allows you to display another number.

HR
ABP
CVP
SpO2
CO2
RR
Core temp
NIBP
Train of four
HR SpO2
CO
Peri temp
Train of four ratio
FI O2
FI N2O
FI Anesthetic agent
ET O2
ET N2O
ET Anesthetic agent
Log time
Clear
(No change)

Selecting "Clear" clears the number field.

6.4.2 Selecting a Number for an Empty Number Field

If no number is selected for the touched number field, the menu for selecting a new number will appear.

HR
ABP
CVP
SpO2
CO2
RR
Core temp
NIBP
Train of four
HR SpO2
CO
Peri temp
Train of four ratio
FI O2
FI N2O
FI Anesthetic agent
ET O2
ET N2O
ET Anesthetic agent
Log time
Clear
(No change)

6.4.3 NIBP Menu

The "NIBP," Non Invasive BP, menu has two additional menu items. The monitor simulates a NIBP measurement by quickly increasing the numbers and then slowly decreasing them until the systolic and diastolic numbers are reached.

(Note that during this process the actual cuff on SimMan's arm does not inflate).

NIBP Options

Start measurement
Change interval
Change upper limit
Change lower limit
Enable upper alarm
Enable lower alarm
Change color
Change function
Clear
(No change)

Selecting "Start measurement" starts an NIBP measurement.
Selecting "Change interval" allows you to change the intervals at which the monitor performs an automatic measurement.

6.5 Alarms

The SimMan Monitor alarm works by the "numbers."
Once a limit is enabled, the monitor continuously checks to see if the number exceeds that limit. If a limit is exceeded, three things happen.
1. The alarm sounds from the pulse beeper of the link box. (Unless "Disable alarm sounds" is selected from the setup menu.)

2. The alarm window flashes a text message describing the cause of the alarm.
3. The exceeded limit is highlighted and starts flashing.

The student can then acknowledge the alarm by pressing the "Alarm disable" button. The alarm is then temporarily disabled, and the text turns white and stops flashing. A timer appears to the right of the text counting down the "Alarm re-engage time." When it reaches zero, the alarm is activated again.

When other alarm limits are broken simultaneously, the first non-acknowledged alarm will be shown. If all alarms are acknowledged, the alarm with the most time left (last acknowledged) will be shown.

7   Updating Manikin, Link and Monitor Software

The SimMan Manikin, Link and Monitor Software can be updated through a separate program.

Make sure the SimMan program is not running when you start the "Update Manikin Software" through the Windows "Start" button.

Select the desired target: Link, Manikin or Monitor.

Select the PC "Serial Port" used to connect the Link: COM1, COM2 or COM3.

The Link (and Monitor, if selected) must be powered on.

Click "Start" to begin downloading.
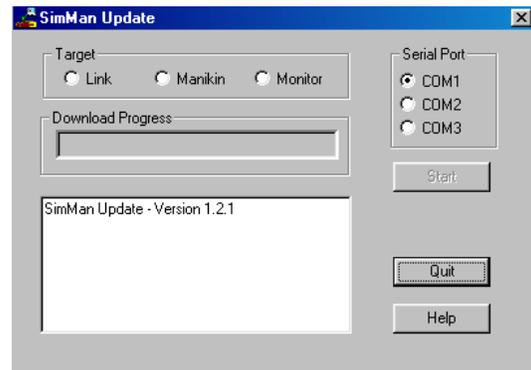
During download, the LED indicator on the Link will be turned off.

The progress bars will indicate progress of download.
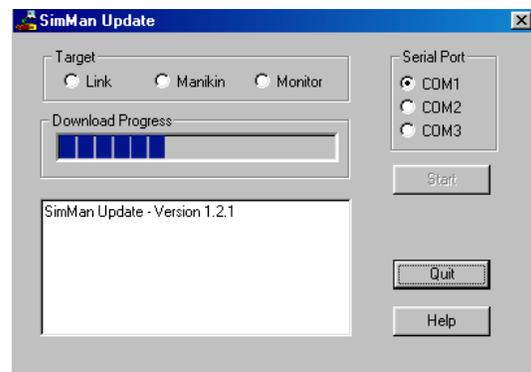
The Manikin, Link and Monitor programs, "man.hex" and "alink.hex" and CEMonitr.exe must reside in the /SimMan folder.
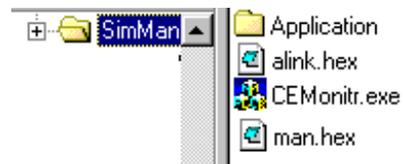
NOTE:
- Switch off power to the Monitor when updating Link or Manikin Software
- Always have power on the Link box when updating the Monitor Software

Appendix

I. SimMan Directory Structure

The root of the SimMan directory structure is the "SimMan" folder. All other folders of the SimMan software are related relative to this folder.

The location of the SimMan folder is determined during installation. The default location is "C:\Program Files\Laerdal Medical\SimMan."

a. Overview

These are the most important sub folders in the SimMan folder.

Application – Folders the SimMan main program and Scenario Builder and Event Handler Editor uses.

Profiles – Folder where all files belonging to particular SimMan users are located.

Sounds – Where all vocal sounds are stored.

```
SimMan
    Application
        help
        images
        inits
        Languages
        picts
        Profiles
            default
            StaaleH
                abc_handlers
                medic_handlers
                menus
                misc_handlers
                scenarios
                trends
            StaaleH2
        report
            als
            Templates
        sounds
        temp
        template
        text
```
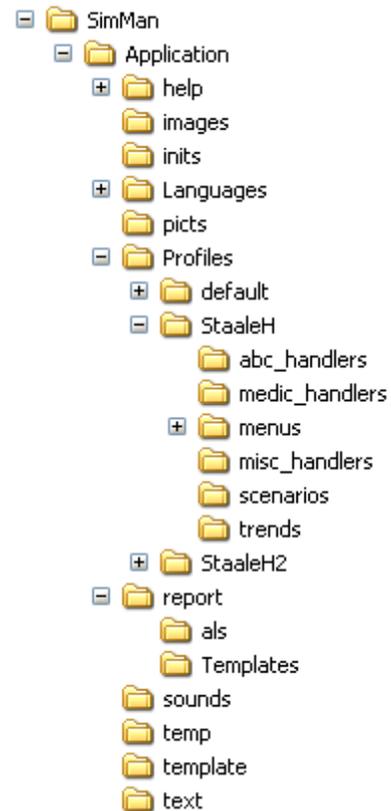
b. SimMan Users

Before starting SimMan, you must log in as a user. A folder with its own name is created in the "Profiles" directory for each user. When a new user is created, the files and folders in the "default" folder are automatically copied into the new user's folder.

The "default" folder is created during installation and contains the originally supplied Scenarios, Trends, Events, Menus, etc.

Note: After a software upgrade, the "default" folder has been upgraded with new scenarios, but the other user folders have not. See below for instructions on copying new scenarios from the "default" folder to other user folders.

c. First StartUp After Software Upgrade

When the software is upgraded with a new version, any new scenario, trend or handler files are only installed into the "default" user. The first time SimMan Software is started, it will give you the option to copy the new files to all existing SimMan users.
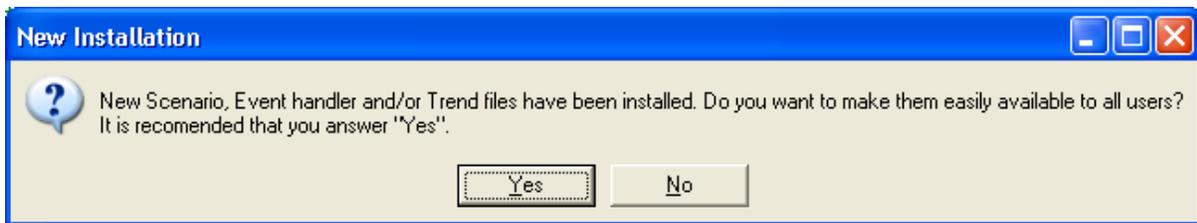
This dialog box is only shown once, so unless you prefer to copy these files manually, you should answer "Yes."

Once "Yes" is selected, the program will automatically copy all new files from the "default" user to all other users. If an existing file with the same name as a new one exists,,this message is displayed:
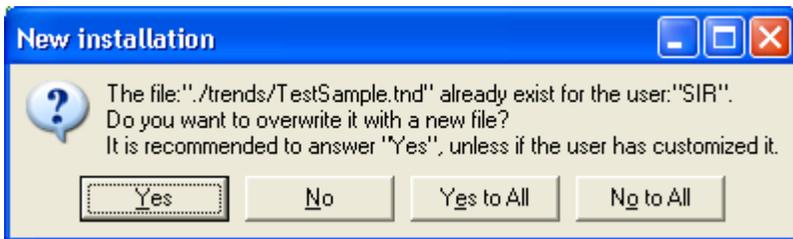
You must consider whether the user has made changes to the file he will want to keep. If you answer "Yes," the old file will be overwritten with the new one.

d. How to Import / Export Scenarios and Trends from / to Other Folders

There are two cases when you might want to manually copy files into the right folders to ease usage.
1. You want to copy a scenario/trend from another SimMan user on the same PC.
2. You want to copy a scenario/trend from another SimMan user on another PC.

Both cases are very similar. You must save the files into the respective user's folder in the "profile" folder. See Directory Structure Overview above, the user "StaaleH" has his own folder in the "profile" directory, with subfolders for the various file types. Locate the correct user and copy the files into the correct folder.

Note: Scenario and Handler files contain all Trends, Events and Sounds used by the Scenario / Handlers. Therefore, it is not necessary to copy those files when copying a scenario.

Be particularly careful when copying the files in the "menus" directory, they will overwrite the Event Menu changes you have made. You should not need to copy these files when copying a scenario or handler. Both scenarios and handlers have customizable menus. See 4.6 and 5.8.

After upgrading, new files will need to be copied from the "default" folder to each existing user's folder. This is not done automatically to prevent user-modified files from being unintentionally overwritten.

e. How to Edit the Default Frame0 of a Scenario

When you create a new scenario, it does always starts with a default frame0 that sets the state of the Manikin. If you are continually editing this frame, you can instead change it for future scenarios by opening the Scenario Editor, browsing to the "template" folder, and opening the DefaultFrame0 scenario.

II. SimMan Program Files Overview

a. PC Programs

SimMan consists of these PC programs:

Name	Function	Filename
SimMan main program	The main program the instructor uses to control the training session.	SimMan.exe SimMan\Application folder
SimMan host program	Handles communication with the Manikin, Link box, and the Monitor.	Hs3kHost.exe SimMan folder
Scenario editor	Edits scenarios.	ScenarioEditor.exe SimMan\Application folder
Event handler editor	Edits the event handlers.	EventHandlerEditor.exe SimMan\Application folder
SimMan update program	Updates the Manikin, Link box, and Patient Monitor.	SimManUpdate.exe SimMan folder

b. Other Programs

In addition, there are separate programs for the Manikin, Link box, and the Patient Monitor. These programs are located in the respective units, but they can be updated using the SimManUpdate program. The files must be located in the same folder as the SimManUpdate program.

Program name	Filename
SimMan Manikin program	Man.hex
SimMan Link box program	Alink.hex
SimMan Patient Monitor program	CEMonitr.exe

c. Program Communication Problems

The programs need to communicate with each other for the SimMan system to work. Sometimes they will not for various reasons.

The SimMan host program communicates with the external devices. It is normally hidden, but it can be opened from the system tray on the Taskbar found at the bottom of the PC screen. Double-click on the "ECG-Heart" icon.
Once opened, the program displays a dialog which gives a good indication of communication status between the external devices and the PC.

"Connected clients" displays the number of PC programs that have connected to it. SimMan's main program, Scenario Builder and the Handler Editors can make a connection. It is not possible to close this program while the count is greater than zero.

The "Manikin" is green if the connection with the Manikin is OK, otherwise it is red.

The dialog also displays the external device version numbers and a colored square to the left of them. The colored square is green if the software version is ok, red if it is out dated, or gray if it has not made a connection.
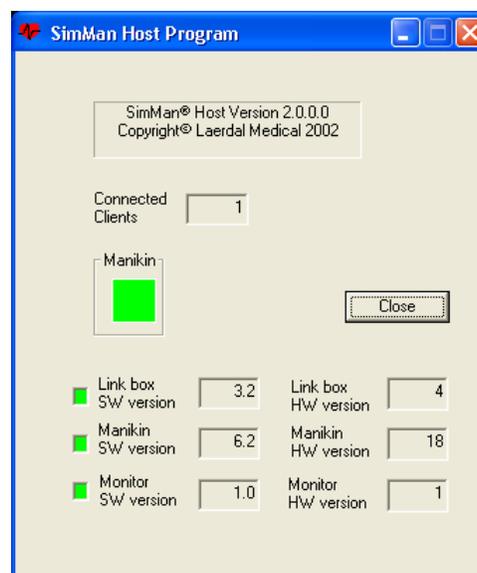
At startup, the SimMan host program tries to determine to which COM port the Link box is connected. It first tries the last successful COM port, but if it does not get a reply it will display this message.

"Abort" will close SimMan.

"Ignore" continues without connecting to the external devices.

"Retry" makes the program try the same port again. If a connection is still not found, an additional retry will make the program scan COM ports 1 through 9.

In some cases, other PC programs have occupied the COM port to which the SimMan is connected. We have experienced problems with programs that are used to communicate with personal organizers. The COM port may also be disabled if the IR-port is enabled on a laptop.

These problems are program specific or hardware specific to some programs and some PCs. Consult your program vendor or hardware vendor for solutions.

In other cases, the SimMan main program has problems communicating with the SimMan host program. This dialog will appear.
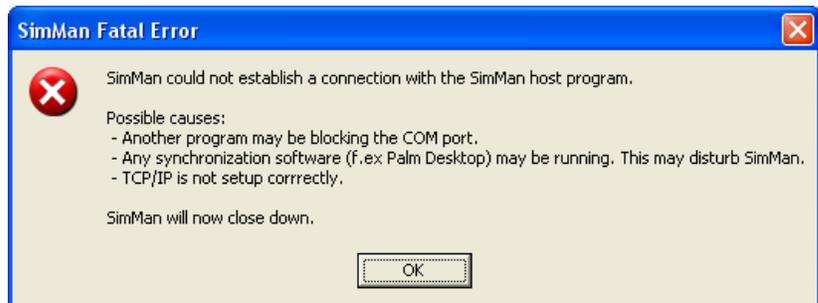
The SimMan main program uses TCP/IP to communicate with the SimMan host program.

In Windows 95, TCP/IP was not installed by default; it is in newer Windows versions.

A personal firewall, used to protect your PC from intrusion through the internet, may also block communication between the SimMan main program and host program by default. The personal firewall must be configured to allow these two programs to communicate locally on the same PC. This has nothing to do with a firewall that is running external to the PC. Such a firewall will never cause problems for SimMan. Contact your personal firewall vendor for configuration instructions.

We have observed that a personal organizer synchronization programs may also cause this error. If you get this error and have such a program, attempt to disable it.

III. Factors that Influence Head Speaker Sound Quality

There are two issues regarding sound quality, sound volume and noise. They are somewhat interrelated. To get a good result, the recording of the sound has to be good and the playback must be optimized.

a. Recorded Sound Quality

It is not possible to get good quality from a poorly recorded sound. Recording a new sound may sound easy, but there are a few things you should consider. You must have a good microphone, it doesn't have to be expensive. You must also think about echo from the walls of the room and noise from the environment.

Most important, is the volume of the recorded sound. If the volume is too low, the playback volume will also be low. SimMan only has limited sound volume gain. If sounds are recorded at very high volume, the recorder will have to clip the highest volume peaks, which add a lot of noise. The optimum is to record the sounds at the highest possible volume, without the recorder ever having to clip.

To set the recording volume using the standard Windows volume control, double click the speaker icon in the system tray found on the task bar. (Note: The symbol may be temporarily hidden if you are running Windows XP, unhide it by clicking the "<" button.) The "play control" dialog will appear, go to options, properties and select to adjust the volume for recording. (Ensure that the microphone control is enabled.) When the microphone volume control displays, select it and you are ready to go.

A smart tip here is to go to the SimMan "Tools menu" and select "Mic controls." Select "Activate Microphone Amplifier" and deselect it again. Now you can adjust the microphone recording volume by adjusting "Mic in."

You cannot visualize the recorded volume of a sound using the Windows "Sound recorder" program. We recommend using another program, such as Goldwave (www.goldwave.com), but there are many other inexpensive programs.

The speaker in the Manikin are not able to reproduce low frequency signals in the sounds, but still these low frequency signals influence the sound quality. It is therefore recommended that the low frequency signals become filtered from the sounds. Signals with a frequency of lower than 150 Hz should be filtered away. Goldwave can perform this task. Apply a Highpass filter with a cutoff frequency of 150 Hz.

b. Sound Playback Optimization

The big issue regarding playback is volume control. Sound volumes that are too low cannot be heard well. Sound volumes that are too high cause distortion. If the volume optimized to its maximum level, as described below, still is too low for your needs, you will need to purchase a set of PC speakers with an external power supply and connect them to the speaker output and place them as close to the Manikin head as possible.

Vocal sounds are played back using the Windows sound system. There is also an amplifier in the Link box. The volume control beside the sound selection list in the SimMan program, adjusts this amplifier. Since SimMan uses the PC and Windows sound system for playback, their volume controls also influence the playback volume. The SimMan program sets the Windows output volume to about 80% at startup. Some laptops also have a physical volume control for the speaker output.

The Windows "Play Control" controls the Windows output volume and can be accessed by double clicking the speaker icon on the task bar. The overall slider to the left and the wave slider control the volume. You can also adjust these two sliders in parallel by going to the SimMan "Tools menu" and selecting "Mic controls." Deselect "Activate Microphone Amplifier" if you don't need it. Now you can adjust the two volume levers by adjusting the "Master out."

Warning: If the output volume from the PC is too high, the Link box amplifier will become overloaded switch itself off. You will clearly hear this; almost no sound will be coming out of the speaker. If this happens you must reduce the Windows sound level.
Distortion in speaker sound will be caused if the total level is too high. You will have to adjust it to a level acceptable to you.

IV. <u>SimMan XML Event Log Format</u>

The reports are stored in XML format. XML stands for extended Markup Language and is thought of as an extension to HTML, Hyper Text Markup Language, although XML is quite different and is not handled in the same way.
HTML is the format used on the Internet to format and display text and pictures. XML is used on the Internet as a common text language for transferring data.
The advantage of using XML to store the logs is that the logs can later be processed in different ways. It is possible to customize how the logs are displayed and it is also possible to import the data into a database that recognizes XML.
Together with the log files having the "xml" extension, there are two other needed file types for processing the logs. First you have the XML schema file called "SimManLogSchema.xsd." This file describes the data types used in the SimMan log files. The other file types are the XML Style Sheets, these files describe how the log files are displayed and have the "xsl" extension. The process of utilizing a style sheet to display a log file is called parsing. The SimMan program print log performs this process when printing a log. The user then selects which style sheet to use and the printout looks different based on his / her choice.

Note: If you want to save the log as it is printed, you can save the log when it is displayed in the browser during the print process. The log is then saved in HTML format. As mentioned above, this format contains layout information.

SimMan customers are free to customize the log print format or import the log data into the database of their choice; however, this requires expertise in XML. SimMan currently only supports the printing of those formats listed in the print dialog and is currently not supporting any particular database.

V. Available ECG rhythms

a. Adult Rhythms

QRS type	Basic rhythms	Pacing	Unifocal PVC Std / RonT	Coupled PVC	Multifoc. PVC	PAC	PJC	Default	Rates	Default	Blood pressures	Default	Strengths
			Premature complexes					**Heart rates**		**Blood pressure**		**Pulse strength**	
A-G	Sinus	X	X	X	X	X	X	80	10, 12, 14, … 120, 124, … 140, 145, … 160, 170, 180,190,200	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	A. tach.		X	X	X			180	90 (2:1), 140 (MAT), 150, 160, 170, 180, 200, 220, 240 260	100/70	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	A. flutt.		X	X	X			100	75, 100, 150	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	A. fib.		X	X	X			160	30 (3°blk), 50, 60, 70, 80, 90, 100, 110, 120, 140, 160, 180, 200	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	Junct.		X	X	X			50	30, 50, 60, 70, 80, 100, 110, 120, 140, 160	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	Idiov.		X	X	X			40	10, 20, 30, 40, 50, 60	100/70	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	V. tach	X						180	120, 140, 160, 180, 200, 220, 240	70/40	Systolic max 300 Diastolic max 210	weak	normal weak absent
N/A	Torsades des Pointes							200	200	70/40	Systolic max 300 Diastolic max 210	weak	normal weak absent
None	V. fib. Very Coarse							N/A	N/A	0/0	N/A	absent	absent
None	V. fib. Coarse							N/A	N/A	0/0	N/A	absent	absent
None	V. fib. Standard							N/A	N/A	0/0	N/A	absent	absent
None	V. fib. Fine							N/A	N/A	0/0	N/A	absent	absent

None	V. fib. Very Fine							N/A	N/A	0/0	N/A	absent	absent
None	Asystole							N/A	N/A	0/0	N/A	absent	absent
None	Agonal Rhythm							N/A	N/A	0/0	N/A	absent	absent
None	Ventricular Standstill							N/A	N/A	0/0	N/A	absent	absent
A-G	1o AVB		X	X	X	X	X	80	10, 20,30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 140, 160	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	2o AVB #1	X	X	X	X			60	50 (5:4), 60 (4:3), 75 (3:2)	110/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	2o AVB #2	X	X	X	X			60	60, 70, 90	100/70	Systolic max 300 Diastolic max 210	normal	normal weak absent
A-G	3o AVB	X	X	X	X			40	30, 50Wide complex QRS) 60 (Narrow complex QRS)	70/40	Systolic max 300 Diastolic max 210	weak	normal weak absent
N/A	Pacemaker							80	Atrial Pacemaker	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
N/A	Pacemaker							80	AV sequential pacemaker, pacing the atrium and the ventricle (A-V interval 0.15sec)	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
N/A	Pacemaker							80	Ventricular Pacemaker. No atrial activity.	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
N/A	Pacemaker							80	Ventricular Pacemaker. Atrial (P) rate = 90.	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
N/A	Pacemaker							100	Ventricular Pacemaker. Atrial (P) rate = 90.	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
N/A	Pacemaker							80	Ventricular Pacemaker. Atrial fibrillation.	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent
N/A	Pacemaker							80	Loss of capture	120/80	Systolic max 300 Diastolic max 210	normal	normal weak absent