Cardiology patient Simulator “K Plus”
Training System

Instruction Manual

Cardiology Patient Simulator "K"
Lung Sound Auscultation Trainer
This device is a simulator for medical education, which is designed to facilitate total hands-on training in bedside diagnostic skills for cardiac patients and auscultation skills for pulmonary disorder. The Simulator “K” training system includes 2 manikins for simulation trainings.

**Cardiology Patient Simulator “K”:**
Training in heart sound auscultation can be performed around auscultation sites accurately located on the manikin using actual clinical instruments. Other findings, jugular vain waves, artery pulses, cardiac impulses are also simulated in synchronization, allowing training in observation and palpation.

**Lung Sound Auscultation Trainer LSAT:**
A single-purpose simulator for lung sound auscultation training

*The simulator is designed for training in medical diagnosis education.*

*Do not use for other purposes.*

*Please read the instructions carefully before using.*

**Features**

**Simulator”K" Plus Training System**
A thorough medical examination training system for the human chest.
High quality auscultation training with plenty of important cases through an actual stethoscope, along with comprehension of the relationship between sounds and sites on the chest.
Monitor display which shows synchronized chart, explanation of cases and other operation aids that enrich training.
The external speaker system allows a shared, group learning experience.

**Cardiology Patient Simulator “K”:**
Synchronized physical findings for comprehensive bedside diagnosis training
Heart sound & murmur auscultation
Observation of jugular veins
Palpation of arteries: 8 sites
Palpation of cardiac impulses (RV and LV) 13 cases each.
Normal respiratory sounds and observation of abdominal movement (HR: 60/min)
Monitoring electrocardiogram (ECG), jugular venous pulse (JVP) and carotid arterial pulse (CAP) and apexcardiogram (ACG)

**Lung Sound Auscultation Trainer LSAT:**
Outstanding sound quality: Cases were recorded from actual patients
Accurate location and spread of lung sounds
The torso rotates on the base allowing examination of both front and back as in a real clinical procedure.
Efficient selection of the 35 cases based on classification standards of the American Thoracic Society.
Useful explanation windows - including illustrations, chest radiographs and CT images
DOs and DON’Ts

DOs

Please operate the system under the designated circumstances

- Power input: AC 220V-240V 50Hz, 60Hz/ Max220W
- Temperature range: 10 degrees C – 40 degrees C
- Relative humidity; less than 85 per cent (no condensation)

Safe disposition

To allow safe operation, please locate the units with sufficient space around the switches on each part of the system.

Inappropriate disposition may cause serious accident.

Follow the instruction on labels

“Warning label” indicates there is a danger of an electric shock when the part is opened up.

Never open any lids, caps or covers with warning labels.

There will be no compensation considered by the manufacturer for any damage or loss alleged to have been caused by the simulator, if the labeled part(s) have been opened inappropriately.

Handle with care

The models consists of special compositions of soft resin. Please handle them with the utmost care at all times.

Storage

Store the training set at room temperature, away from heat, moisture and direct sunlight.

DON’Ts

Do not discharge water while the unit is set above a power receptacle.

- There is a sewer valve for a tank at the bottom of the control box unit.
- To avoid short circuit, do not discharge water from the tank while the unit is set above a power receptacle.

Never wipe the models and pads with thinner or organic solvent.

Don’t mark on the models with pen or leave any printed materials in contact with their surface.

Ink marks on the models are not removable.

Index

Before installation

Product outline and Features / DO's and DON'Ts-----------------------------------------------1,2
Parts and Functions/ Set Includes-------------------------------------------------------------3
Installation-------------------------------------------------------------------------------------4,5
System start-up-------------------------------------------------------------------------------6
Operation

Simulator K-----------------------------------------------------------------------7-11
LSAT----------------------------------------------------------------------------------------12,13
System configurations-----------------------------------------------------------------14,15
System closing down---------------------------------------------------------------16
Name of the Parts

1. Control box
2. Cardiology model unit
3. LSAT model unit
4. Audio cable (long cable)
5. Control cable (short cable)
6. Air tubes
7. Power supply cable
8. PC (OS. Windows2000Pro)
   a 12chD/A PCI board (installed)
   a power supply cable / a mouse
   a 109 keyboard / Windows2000Pro.
9. TFT monitor
   a power supply cable / manual (Japanese)
   monitor cable
10. Audio distributor
11. Power amplifier
12. Speaker
13. Speaker cable

NO STETHOSCOPE IS INCLUDED.

Set includes

<table>
<thead>
<tr>
<th></th>
<th>&quot;K&quot; plus</th>
<th>SimulatorK</th>
<th>LSAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control box</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2. Cardiology Model unit</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>3. LSAT Model unit</td>
<td>1</td>
<td>1</td>
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<tr>
<td>4. Audio cable (long cable)</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>5. Control cable (short cable)</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>6. Power supply cable</td>
<td>4</td>
<td>3</td>
<td>2</td>
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<tr>
<td>7. Air tubes</td>
<td>4</td>
<td>4</td>
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<tr>
<td>8. PC (OS. Windows2000Pro)</td>
<td>1</td>
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<tr>
<td>9. TFT monitor</td>
<td>1</td>
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<tr>
<td>10. Audio distributor</td>
<td>(1)</td>
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<tr>
<td>11. Power amplifier</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12. Speaker</td>
<td>-2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>13. Speaker cable</td>
<td>-2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>14. Text book&quot;Bedside Physical Examination&quot;</td>
<td>4</td>
<td>4</td>
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<tr>
<td>15. Rib sheet</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>16. T shirt</td>
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<td>1</td>
<td></td>
</tr>
<tr>
<td>17. Pulse tube(replacement part)</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>18. Instruction manual</td>
<td>-1</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>
Installation : A1-A12

1) Raise the mouse table from the side of the control box and latch it firmly.
2) Attach the PC table to the side of the control box and fix it using the wing nuts.

3) Place the PC, TFT monitor and amplifier on the control box.

4) Plug the main power supply cable into the socket on the back-bottom of the control box.
5) Connect the keyboard and the mouse to the computer.
6) Connect the TFT monitor to the computer.
7) Connect the PC and the control box using the control cable.

8) Connect the control box and the Cardiology model unit with 4 air tubes, matching the indications (CAP, JAV, ACG, R) above the sockets. Be careful not to mix up the lines.
* The tubes can be detached safely by pushing the socket ring as illustrated below.
9) Connect the power amplifier to the computer.

10) Connect model unit(s) to the power amplifier with the audio cable(s).

11) Plug the power supply cables of the model units, the PC, the TFT monitor and the power amplifier into the outlets on the backwall of the control box.

12) Plug the main power supply cable from the control box and the LSAT model unit into outlets.
System set-up B1-B5

Before the session, Please set-up the system following the procedure below.

1) Turn on the power switch on the front wall of the control box.

2) Turn on the monitor.

3) Turn on the PC.

4) Turn on the power switch on the model unit bases with the LSAT torso in "FRONT" position.

5) Turn on the amplifier.

When you finish a session, please refer to the system close-down instruction.
Operation: Simulator "K": C1-C5

C1. Opening of the simulator "K" system

Going through procedure B1-B5, Microsoft Windows 2000Pro is started up.
Open the simulator "K" system by double-clicking at the icon.
It takes a little while for the air compressor to get the pressure ready.
(This process can be skipped by clicking "Start" button.)

C2. Choosing cases

Choose the mode using the "Mode" button and select up to four cases from the boxes.
Then open the cases by clicking "Go" button.
C3. Running the simulation

Click the window of a case to activate, and click the button on the toolbar to start running the simulation. Default duration time of the simulation is 30 min.

To open another set of cases, click button.

To quit the simulator "K" system, click . When you finish the session completely, follow the closing-down procedure.
**Physical findings replayed on the manikin body**

In "Simulator K" mode, thorough bedside examination including auscultation, palpation and observation can be performed. All findings are appropriately synchronized by the system to simulate an actual patient.

(1) Auscultation: Heart sounds and murmurs
- Generated digitally by 4 built-in speakers (5 speakers for aortic stenosis) on the manikin.
- Synchronized phonographs are shown on the monitor for further comprehension during training.

The following are auscultory sites on this simulator:
- aortic area: A
- pulmonary area: P
- tricuspid area: T
- mitral area: M
- carotid artery area (aortic stenosis only)

Please note: During auscultation, turn off the valve switches for cardiac impulses and respiration. The noise from the mechanism may interfere with the proper sounds.
(2) Auscultation / Palpation: Respiration
Tracheal and vesicular breath sounds and abdominal movement are simulated in cases with HR 60. This is helpful to study Rivelo-Carvallo phenomenon, respiratory splits and murmurs.

Please note: Turn on the valves switches for respiration to replay the abdominal movement.

(3) Palpation: Artery pulses
Pulses can be felt at 8 sites: the bilateral carotid, brachial, radial and femoral arteries.
Pulse waves are monitored on the screen simultaneously.
The pulses at the radial and femoral artery are designed to delay.

(4) Observation: Jugular vein wave
The movement of the jugular vein wave can be inspected on both sides.

(5) Palpation: Cardiac impulses
By turning on the valve switches on the model unit base in accordance with the indication on the case window, cardiac impulses accompanying each case can be replayed.
These impulses allow palpation and inspection at the right ventricle (RV), the left ventricle (LV) and the dilated left ventricle (DLV).

(6) Electrocardiograph (ECG)
Grid can be displayed like a real electrocardiograph when the simulation is paused.

C5. Run the simulation: Advanced arrhythmias auscultation training
In "K2" mode, various arrhythmias can be learned by observing electrocardiographs and auscultating heart sounds.
(1) Heart Sounds: The same as in Simulator “K.” However, carotid artery areas are not available for auscultation.
(2) Electrocardiograph: The same as in simulator “K.”
D1. Open the LSAT system

Going through procedures B1-B5, Microsoft Windows 2000Pro is started up. Open the LSAT system by double-clicking at the icon.

D2. Chosing a case

Choose a group of cases by clicking one of the category buttons. Then select a case by clicking a name listed in the box on the right side.

Please note: <H> indicates that the case is replayed with normal heart sounds. Most cases are provided with 2 options, with and without heart sounds.

By clicking OK button on the top, or double clicking at the case name, the selected case is opened up.
D3. Running the simulation

Click button on the toolbar to start running the simulation.

Default duration of the simulation is 30 min.
Changes and differences in lung sounds on each area can be distinguished using an actual stethoscope.
The numbers at the left side of the sound chart indicates the number of speakers embedded in the torso model.
Both posterior and anterior lung sounds are programmed for training.

The posterior/anterior sounds can be switched over by rotating the torso model.
Please note: The sound sets are played on only one side at a time. It is not possible to play both posterior and anterior sound simultaneously.
To open another set of cases, click button.

To quit the LSAT system, click

When you finish the session completely, follow the shut-down procedure.

Explanation button opens useful explanation window for each case.
System configuration E1-E4

E1 : Display preferences

By clicking monitor button, display configuration window is opened up. When the 'Free' setting is marked each element can be selected separately to create user's own display. The prepared display settings can also be switched over by using function keys during the simulation.

Simulator K

F1: Standard
F2: ECG and PCG
F3: PCG
F4: ECG
F5: Free

LSAT

F1: All area
F2: Right area
F3: Left area
F4: None
F5: Free

E2 : Sound Volume

By clicking the volume button, volume adjustment window opens to adjust the sound volume of each embedded speaker.
E2 : Air pressure, simulation speed and time of duration.

By clicking the volume button, the speed/time control window opens to adjust air pressure for cardiac impulses (Simulator K only), speed of simulation and duration of the running time.

Please note: The running speed affects the sound frequency. When the simulation runs rapidly, the pitch of the sounds becomes higher and makes a higher tone accordingly.

E3 : Display color preference

By the control button, color control window is opened.

E4 : Toolbar

From the toolbar button, elements of toolbar can be selected.
System Closing-Down : F1-F12

After the session, please close the system safely following the procedure below.

1) Click the "X" mark and quit the simulation system.

2) Quit the windows.

3) Turn off the monitor.

4) Turn off the power switch on the base of model unit(s).

5) Turn off the amplifier.

6) Turn off the power switch on the side of control box.

Please note: After a long session or use for a certain period, please drain the water from the compressor by pushing the drainage button at the bottom of the control box.
### Simulator "K"

**Total Synchronicity of 88 Real Case Physical Findings**

<table>
<thead>
<tr>
<th>Normal cases</th>
<th>Heart diseases</th>
<th>Arrhythmias</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2 split(−) HR:60-</td>
<td>Aortic stenosis</td>
<td>Sinus arrhythmia</td>
</tr>
<tr>
<td>S1 split(+)</td>
<td>Mitral regurgitation</td>
<td>Sinus tachycardia</td>
</tr>
<tr>
<td>S2 split(+)</td>
<td>Mitral stenosis</td>
<td>Sinus bradycardia</td>
</tr>
<tr>
<td>S3 wide split</td>
<td>Aortic regurgitation</td>
<td>Ventricular premature contraction (1)</td>
</tr>
<tr>
<td>S3 gallop</td>
<td>Hypertrophic cardiomyopathy</td>
<td>Ventricular premature contraction (2)</td>
</tr>
<tr>
<td>S4 gallop</td>
<td>Mitral steno-regurgitation</td>
<td>Ventricular premature contraction (3)</td>
</tr>
<tr>
<td>Plumonic ejection sound</td>
<td>Pulmonic valvular stenosis</td>
<td>Sino atrial block</td>
</tr>
<tr>
<td>S3 and S4 gallop</td>
<td>Atrio-septal defec</td>
<td>Atrio-ventricular block</td>
</tr>
<tr>
<td>Innocent murmur</td>
<td>Ventricular septal defect</td>
<td>Atrial fibrillation</td>
</tr>
<tr>
<td>Mid-systolic click sound</td>
<td>Tricuspid regurgitation</td>
<td>Atrial flutter</td>
</tr>
<tr>
<td>S2 split(−) HR:72</td>
<td>Acute mitral regurgitation</td>
<td></td>
</tr>
<tr>
<td>S2 split(−) HR:84</td>
<td>Patent ductus arteriosus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mitral valvular prolapse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dilated cardiomyopathy</td>
<td></td>
</tr>
</tbody>
</table>

### Simulator "K2"

**ECG: Arrhythmia simulation**

<table>
<thead>
<tr>
<th>A-1 Normal sinus R</th>
<th>B-1 Atrial Flutter</th>
<th>C-1 VVI pacemaker</th>
<th>D-1 VPC (quadrigeminy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-2 Sinus tachycardia</td>
<td>B-2: AV block</td>
<td>C-2 Atrial Pacemaker</td>
<td>D-2 VPC (trigeminy)</td>
</tr>
<tr>
<td>A-3 Sinus arrhythmia</td>
<td>B-3: AV block &amp; CRBBB</td>
<td>C-3 Vent Pacemaker</td>
<td>D-3 VPC (bigeminy)</td>
</tr>
<tr>
<td>A-4 APC solitary</td>
<td>B-4: AV block (digital)</td>
<td>C-4 AV Seq Pacemaker</td>
<td>D-4 VPC (couplet)</td>
</tr>
<tr>
<td>A-5 APC bigeminy</td>
<td>B-5: AV block (mobitz)</td>
<td>C-5 CRBBB</td>
<td>D-5 PVC (repetitive)</td>
</tr>
<tr>
<td>A-6 Ectopic pacemaker</td>
<td>B-6: AV block (mobitz)</td>
<td>C-6 CRBBB</td>
<td>D-6 PVC (R-on-T type)</td>
</tr>
<tr>
<td>A-7 Wondering pacemaker</td>
<td>B-7: AV block (3:1&amp;4:1)</td>
<td>C-7 CLBBB</td>
<td>D-7 Non-sustained VT</td>
</tr>
<tr>
<td>A-8 Coronary sinus R</td>
<td>B-8: AV &amp; CRBBB</td>
<td>C-8 CLBBB</td>
<td>D-8 Vent tachycardia</td>
</tr>
<tr>
<td>A-9 Sinus bradycardia</td>
<td>B-9 Paroxysm atr tachycardia</td>
<td>C-9 CLBBB (by AMI)</td>
<td>D-9 Vent Flutter</td>
</tr>
<tr>
<td>A-10 S S Syndrome</td>
<td>B-10 AV Junc R (SVST)</td>
<td>C-10 WPW syndrome</td>
<td>D-10 Vent Flutter</td>
</tr>
<tr>
<td>A-11 Atrial Fibrillation</td>
<td>B-11 AV Junc R (PAT)</td>
<td>C-11 WPW syndrome</td>
<td>D-11 Vent R (Sinus Cond)</td>
</tr>
<tr>
<td>A-12 Atrial Flutter</td>
<td>B-12 AV Junc R</td>
<td>C-12 WPW syndrome</td>
<td>D-12 Accel Vent Rhythm</td>
</tr>
<tr>
<td>A-13 Atrial Flutter Fib</td>
<td>B-13 AV Junc Contraction</td>
<td>C-13 VPC (solitary)</td>
<td>D-13 Agonal Rhythm</td>
</tr>
</tbody>
</table>
**Breath sounds**

**Normal**
- Standard
- mildly weak
- mildly strong
- mildly rapid
- loud heart sound

**Abnormal**
- Weak: left lower area
- Weak: left upper area
- Weak: whole left through
- Absent: whole left through
- Weak: right lower area
- Weak: right upper area
- Weak: right left through
- Absent: whole right through
- Consolidation

**Adventitious sounds**

**Coarse crackles**
- Right lower area
- Both lower areas
- Right middle area
- Left lower area
- Both upper areas
- Whole thorax

**Fine crackles**
- Both lower areas
- Both lower and middle area
- Whole thorax 1
- Whole thorax 2

**Wheezes**
- Upper and middle area
- Around trachea and upper area 1
- Around trachea and upper area 2 (polyphonic)

**Rhonchi**
- Whole thorax
- Around trachea and upper area
- Around trachea and upper area (polyphonic)
- With an inspiratory wheeze

**Miscellaneous continuous sounds**
- Stridor
- Squawk

**Miscellaneous**
- Pleural friction rub: left lower area
- Pleural friction rub: left lower and middle area
- Hamman’s sign
- Vocal fremitus (palpable at both side of the chest)
<table>
<thead>
<tr>
<th>KYOTO KAGAKU CONTACT &amp; ORDERING INFORMATION</th>
</tr>
</thead>
</table>

**Inquiries & Ordering:**  
Telephone +81-75-605-2510  
Facsimile: +81-75-605-2519  
URL: [http://www.kyotokagaku.com/](http://www.kyotokagaku.com/)  
Email: rw-kyoto@kyotokagaku.co.jp

**Head Office:**  
Kyoto Kagaku Co. Ltd.  
15 Kitanekoya-cho, Fushimi-ku  
Kyoto, Japan 612-8388

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**USA & North America:**  
Kyoto Kagaku Co., Ltd. US Office  
3109 Lomita Boulvard, Torrance, CA 90505  
Telephone +1-310-325-8860  
Facsimile +1-310-325-8867  
Email:t_takayama@kyotokagaku.co.jp

**MEM Training Centre:**  
Kyoto Kagaku Co., Ltd. Tokyo Branch  
5-20-4 Koishikawa Bunkyo-ku Tokyo, Japan 112-0002