

# Cardiology Patient Simulator "K"

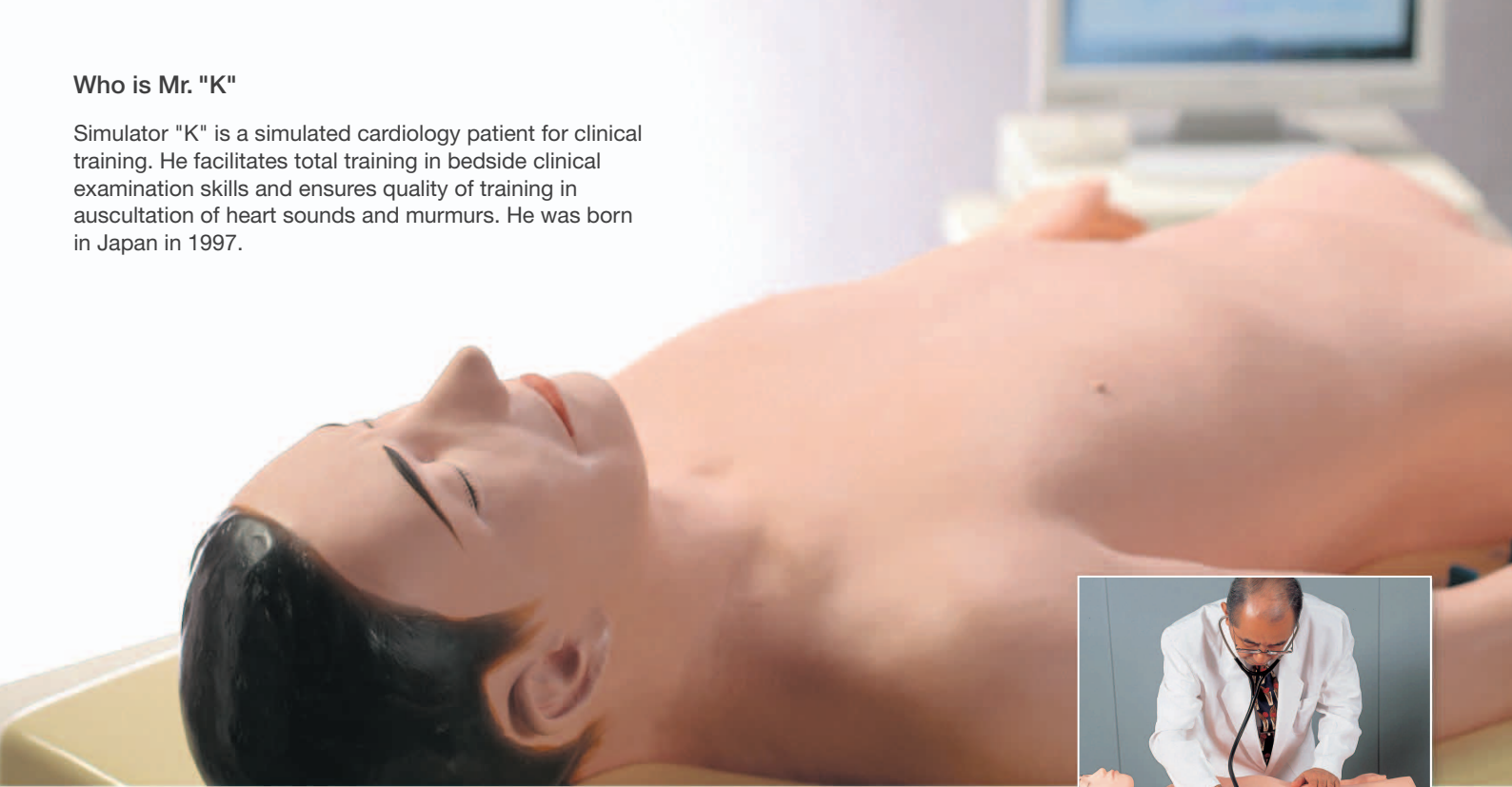
Japanese Patent No. 2990602 US Patent No. 6,461,165BI

Product No. M84-S



## Who is Mr. "K"

Simulator "K" is a simulated cardiology patient for clinical training. He facilitates total training in bedside clinical examination skills and ensures quality of training in auscultation of heart sounds and murmurs. He was born in Japan in 1997.



## Production supervision:

Tsunekazu Takashina, M.D., Ph.D., F.A.C.C., F.A.H.A.  
President, Japanese Educational Clinical Cardiology Society, Osaka

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Department of Mechanical and Environmental Informatics  
Graduate School of Information Science and Engineering,  
Tokyo Institute of Technology

## Obtaining reliable auscultation skills

Auscultation is a fundamental approach to cardiac patients, performed widely from general practitioners to cardiologists. Repeated practice is a necessity for learners to differentiate various heart sounds and murmurs. However, opportunities to learn with real patients are limited and could be insufficient. Simulator "K" offers hands-on experience in a diversity of cases.

## Real sounds, real instruments, real anatomy

Sounds are recorded from actual people and reproduced using a high quality sound system. An actual stethoscope can be used. Auscultation sites corresponding to heart valves are located precisely on a life-size manikin body molded from an actual person.

## Wide variety of the examples

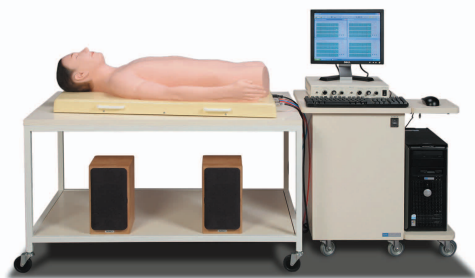
Simulator "K" contains 88 cases; 12 cases of normal heart sounds, 14 cases of heart disease simulations, 10 cases of arrhythmia simulations and 52 cases of ECG arrhythmia simulations.

## Comprehensive clinical examination training

Physical findings synchronize perfectly with each other.

## Construct an original education program

Sound volume, pulse strength, simulation speed and running time are controllable.



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**Observation of jugular veins**

Pulsation of jugular venous waves can be observed on both sides. The strength and timing of "a" and "v" waves which vary in each case can be observed just as with real cardiac patients.



**Palpation of cardiac impulses (RV, LV and DLV)**

Cardiac impulses are palpable at sites of Right Ventricle, Left Ventricle and Dilated Left Ventricle. Various cardiac impulses under different cardiac conditions are simulated.



**Palpation of arteries**

The carotid, medial, radial and femoral arteries are palpable at eight sites on the manikin. Slight variations of the arterial pulse waves under different cardiac conditions or arrhythmias can be detected by palpation.



**Heart sounds & murmurs**

In all cases listening can be performed at the four primary cardiac auscultation sites (aortic, pulmonic, tricuspid, and mitral). Auscultation of first sound (S1) and second sound (S2) can be learned in relation to synchronized electrocardiogram, arterial pulses and jugular venous waves.



**Respiratory sounds and observation of abdominal movement** (for cases HR: 60/ min)

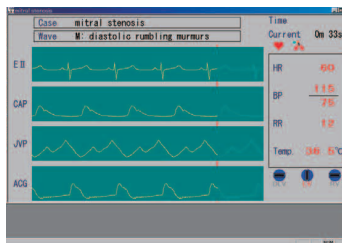
Tracheal and bronchial breath sounds and abdominal movement are simulated to facilitate understanding of respiratory related phenomena such as Ravelo-Carvallo sign, respiratory splitting and timing of murmurs.



**Group study**

External speaker system produces heart sounds respectively at each auscultation site (aortic, pulmonic, tricuspid, and mitral). Useful for pre-training demonstration, group discussions and problem-based learning exercises.

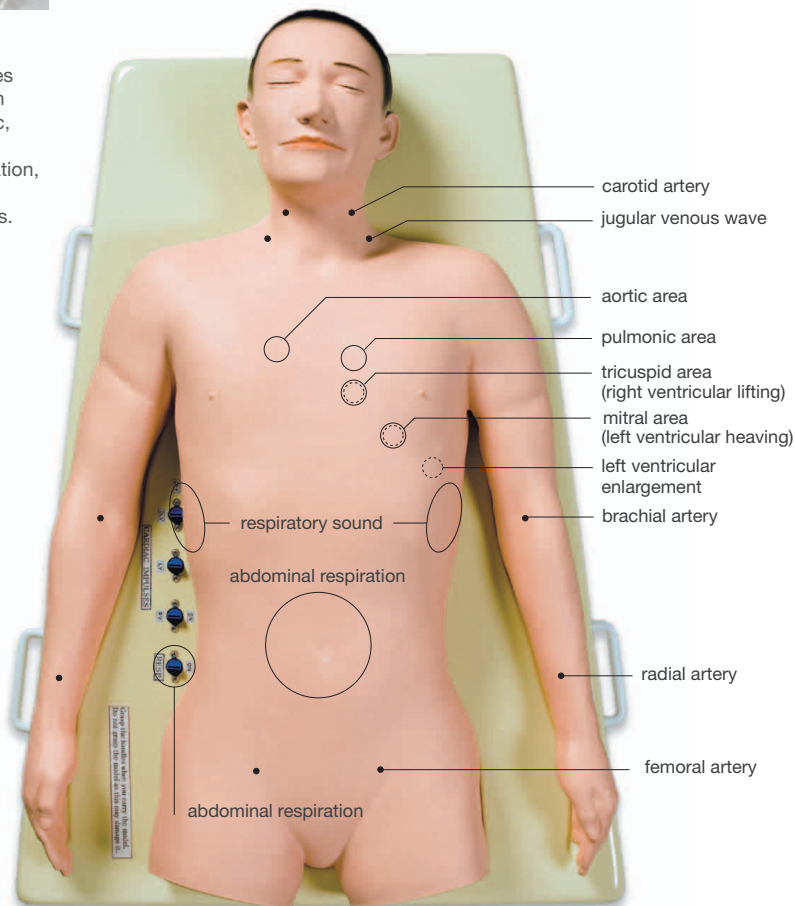
**Physical Findings of Simulator "K"**



**Monitoring screen**

Electrocardiogram (ECG), jugular venous pulse (JVP), carotid arterial pulse (CAP) and apex cardiogram (ACG)

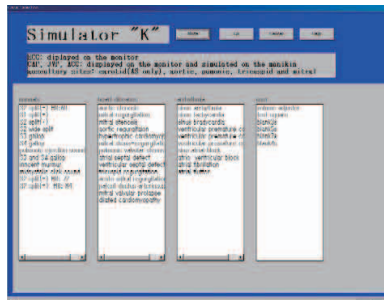
Each chart can be freeze-framed for in-depth learning. Case explanation windows for self-directed learning are provided.



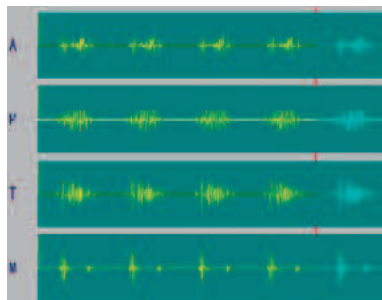
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## Cardiology Simulator "K" as a teaching aid

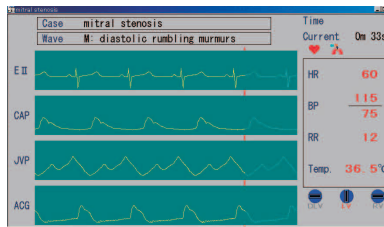
Compact and portable  
 Simple operation and maintenance  
 Standardized hands-on learning  
 Wide educational application: paramedics, cardiovascular nurses, medical students, physicians and cardiologist



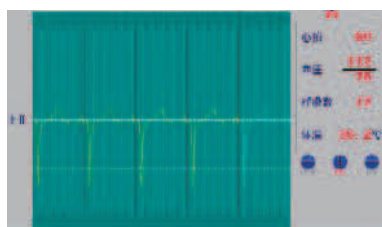
Opening window case list



Phonocardiogram



Sphygmogram



ECG

An abundance of cases for richly varied teaching/ learning programs

### Auscultation

Heart sounds at four main sites.  
 (Carotid auscultation is possible in some relevant cases.)  
 Respiratory sounds: trachea and vesicular.

### Simulator movements and palpation

Artery pulses: palpable at eight sites.  
 – bilateral carotid, brachial, radial and femoral arteries –

Venous wave: Jugular venous waves are visible at both sides of the neck.

Apex beat: palpable at three sites.  
 – right ventricle, left ventricle and dilated left ventricle –

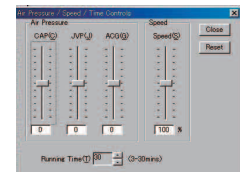
Thrills (palpable murmurs): thrills can be perceived on the chest wall.

### Dynamic graphs synchronized with cases

ECG interpretation in relation to real-time physical findings.  
 PCG and sphygmograms facilitate clearer understanding.

### Configuration and customization

Combination of display items can be modified to fit teaching session and examination.  
 Sound volume and simulation speed can be controlled.



### Built-in self learning aid

Explanation windows for each case help self-learning.

## Effectiveness Performance reports attest to efficiency and satisfaction



Takashina T., Shimizu M., Katayama H. :  
 A New Cardiology Patient Simulator.  
 Cardiology 1997; 88; 408-413

Cardiologists:  
 After a thorough examination on the Simulator "K", all cardiologists surveyed arrived at the same bedside diagnosis, consistent with that of the source material.

518 trainees- medical students, nurses, physicians:  
 After finishing a 3 hour-training session, trainees showed significantly better scores than their pretest results.

Trainees & Students say  
 "Simulator"K" is so realistic, I felt as if I examined a real patient. I'd like to have another series of training courses with this cardiology patient simulator! "  
 "I can concentrate on my auscultation and ECG study with the assistance of its perfect synchronization of heart sound and ECG display."

### Learning aids



CD-ROM: English / Japanese  
 "How To Examine a Cardiology Patient, With Special Reference To The ECG"  
 Produced by JECCS (Japanese Educational Clinical Cardiology Society)  
 Supervision by Tsunekazu Takashina, Masaya Kino

TEXT BOOK:  
 Bedside Physical Examination  
 – learned by a New Cardiology Patient Simulator "K"–  
 Edited, translated and supervised by Dr. T. Takashina  
 JECCS (Japanese Educational Clinical Cardiology Society)  
 36 basic cardiac cases, which are fully reproduced by simulator "K", are explained in detail.

\* Four copies come with the simulator

## Cases & Simulation Contents

Simulator K : Comprehensive patient simulation with sounds, pulses, apex and ECG

No.	Normal heart simulation (12 cases)	No.	Heart disease simulation (14 cases)	No.	Arrhythmia (10 cases)
A-01	S2 split (-) HR: 60	B-01	aortic stenosis	C-01	sinus arrhythmia
A-02	S1 split (+)	B-02	mitral regurgitation	C-02	sinus tachycardia
A-03	S2 split (+)	B-03	mitral stenosis	C-03	sinus bradycardia
A-04	S2 wide split	B-04	aortic regurgitation	C-04	ventricular premature contraction (1)
A-05	S3 gallop	B-05	hypertrophic cardiomyopathy	C-05	ventricular premature contraction (2)
A-06	S4 gallop	B-06	mitral steno-regurgitation	C-06	ventricular premature contraction (3)
A-07	pulmonic ejection sound	B-07	pulmonic valvular stenosis	C-07	sino-atrial block
A-08	S3 and S4 gallop	B-08	atrial septal defect	C-08	atrio-ventricular block
A-09	innocent murmur	B-09	ventricular septal defect	C-09	atrial fibrillation
A-10	midsystolic click sound	B-10	tricuspid regurgitation	C-10	atrial flutter
A-11	S2 split (-) HR: 72	B-11	acute mitral regurgitation		
A-12	S2 split (-) HR: 84	B-12	patent ductus arteriosus		
		B-13	mitral valvular prolapse		
		B-14	dilated cardiomyopathy		
Normal jugular venous waves, arterial pulses and cardiac impulses are simulated, as well as heart sounds such as S2 splitting in the pulmonic area and S3 and S4 gallop sounds in the mitral area.		The characteristic findings of the arterial and venous pulse waves are simulated. For example, in ventricular premature contraction, the venous pulsations are normal but arterial pulsation is barely palpable by the premature beat.		Characteristic heart sounds and pulse waves are simulated, Such as, ventricular premature beats.	

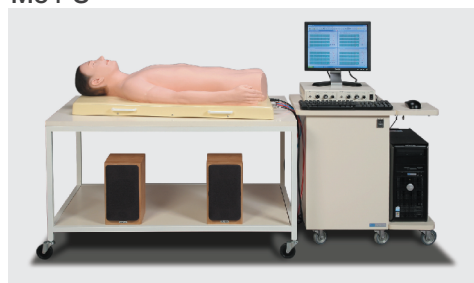
### Simulator K2: Arrhythmia simulation, auscultation training with ECG

A	B	C	D
A-01 normal sinus R	B-01 atrial flutter	C-01 VVI pacemaker	D-01 vpc (quadrigeminy)
A-02 sinus tachycardia	B-02 av block	C-02 atrial pacemaker	D-02 vpc (trigeminy)
A-03 sinus arrhythmia	B-03 av block & crbbb	C-03 vent pacemaker	D-03 vpc (bigeminy)
A-04 apc solitary	B-04 av block (digital)	C-04 av seq pacemaker	D-04 vpc (couplet)
A-05 apc bigeminy	B-05 av block (mobitz)	C-05 icrbbb	D-05 pvc (repetitive)
A-06 ectopic pacemaker	B-06 av block (mobitz)	C-06 crbbb	D-06 pvc (R-on-T type)
A-07 wondering pacemaker	B-07 av block (3:1&4:1)	C-07 clbbb	D-07 non-sustained VT
A-08 coronary sinus R	B-08 av & crbbb	C-08 clbbb	D-08 vent tachycardia
A-09 sinus bradycardia	B-09 paroxys atr tachy	C-09 clbbb (by ami)	D-09 vent flutter
A-10 ss syndrome	B-10 av junc R (svst)	C-10 wpw syndrome	D-10 vent fibrillation
A-11 atrial fibrillation	B-11 av junc R (pat)	C-11 wpw syndrome	D-11 vent R (sinus cond)
A-12 atrial flutter	B-12 av junc R	C-12 wpw syndrome	D-12 accel vent rhythm
A-13 atrial flutter fib	B-13 av junc contraction	C-13 vpc (solitary)	D-13 agonal rhythm

In addition to 36 patient simulations on the list above, the software allows in-depth study of ECG in various arrhythmias. The full size graphic ECG is displayed to practice reading the waves using pause and/or calibrator functions. Fifty-two pre-recorded cases are classified into 4 categories, comprised of 13 cases each.

## Cardiology Patient Simulator "K"

### M84-S



#### Set includes:

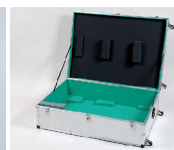
- 1 Cardiology model unit  
Manikin with base, 7 built-in speakers 4 ch. vital signs system  
size: 65 x 97 x 27H cm approx.10 kg  
packing size: 109 x 84 x 40 cm 23.5 kg
- 1 Controller-cum- PC table  
AC 120-240V, 50/ 60Hz  
size: 50 x 68 x 71H cm approx.44 kg  
packing size: 62 x 62 x 101cm 59 kg
- 1 PC  
Windows XP, 12ch.D/A PCI board, mouse, 112 keyboard, 15" TFT monitor, software & data installed  
packing size: 59 x 59 x 40 cm

- 1 Rib sheet  
Transparent vinyl
- 5 Replacement pulse tubes 5 variations, 1piece each
- 4 Text books  
A4, 102 pages
- 1 Amplifier  
size: 32 x 35 x 8H cm  
packing size: 46 x 46 x 15cm 10 kg
- 2 Speakers  
packing size: 62 x 41 x 40 cm

Specifications are subject to change.

#### Optional and replacement parts

- Replacement pulse tube
- 11256-061 carotid tube (black)
  - 11256-062 jugular tube (blue)
  - 11256-063 femoral tube (green)
  - 11256-064 radial tube (red)
  - 11256-065 brachial tube (yellow)



11256-040  
Manikin carrying case for Simulator "K"



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