

# USER GUIDE

## **Blood Pressure Assessment Simulator**

(Adult Arm Manikin, Model Name : BT-CEAB2)



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## 1. Cautions

**\* This Manual describes how to use BT-CEAB2 properly.**

**Read it carefully to avoid damaging the product and injuring yourself.**

**Pay attention to the following series of warnings.**

- ① Use only components provided or approved by BT Inc.
- ② Do not disassemble, repair or modify this product on your own.
- ③ Keep the product away from water. If the product gets wet, do not turn it on. You could be injured by electric shock.
- ④ Do not use the product near strong magnetic fields or high voltage power lines. The product might malfunction due to electromagnetic waves.
- ⑤ Do not use the product under a condition of lightning. It can cause the product malfunction and increases the risk of electric shock.
- ⑥ Do not use the product with temperatures below 0°C or above 40°C.  
(Operation temperature : 0°C ~ 40°C, Storage temperature : -10°C ~ 50°C)
- ⑦ Do not keep the product near hot places such as heaters. Deterioration of product or internal damage might occur.
- ⑧ Never clean the product with chemical substances such as solvent, benzene or thinner, as these may cause ignition, electric shock or cause the surface deterioration.
- ⑨ BT Inc. can change or adjust the product specification without any notice in order to improve the product.

## 2. Components of BT-CEAB2



### (1) Main body : Adult Arm Manikin (Left Arm)

- Arm model Manikin – 1EA

### (2) Display and input • output device (Option)

- ① Tablet PC – 1EA
- ② Tablet PC cover case – 1EA

### (3) Accessories

- ① Mount for Arm model – 1EA
- ② Power Adapter – 1EA
- ③ Exclusive sphygmomanometer (Cuff for adult, Spuit, T-connector, tube, Manometer) – 1sets
- ④ Battery holder – 1EA
- ⑤ Storage Case – 1EA

### 3. Features and Functions of BT-CEAB2



#### (1) Arm model

- 1-1. Radial artery spot
- 1-2. Brachial artery spot and auscultation spot
- 1-3. Power button
- 1-4. Power and battery connector
- 1-5. Speaker connector
- 1-6. Cuff tube connector



2-1



2-2



2-3

#### (2) Tablet PC

- 2-1. Tablet PC / Cover case
- 2-2. Tablet PC power adapter
- 2-3. Tablet PC data cable



3-1



3-2



3-3



3-4

### (3) Accessories

- 3-1. Exclusive sphygmomanometer
- 3-2. Mount for Arm model
- 3-3. Battery holder
- 3-4. Power adapter (12V DC, 1.5A)

## 4. Installation

### 4-1. Connect power adapter or battery cable

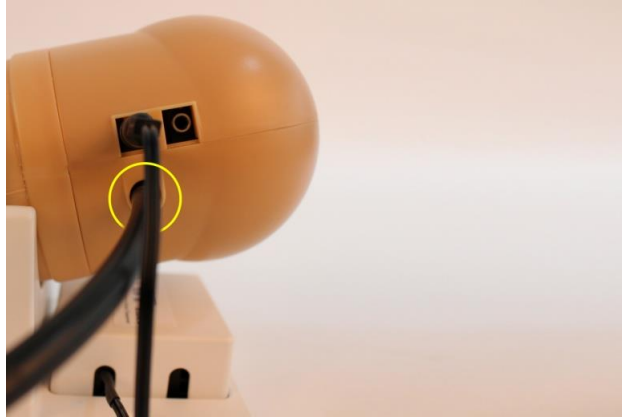


- **Using AC adapter power** : Connect the power cable from AC adapter to the power connector on the arm model.



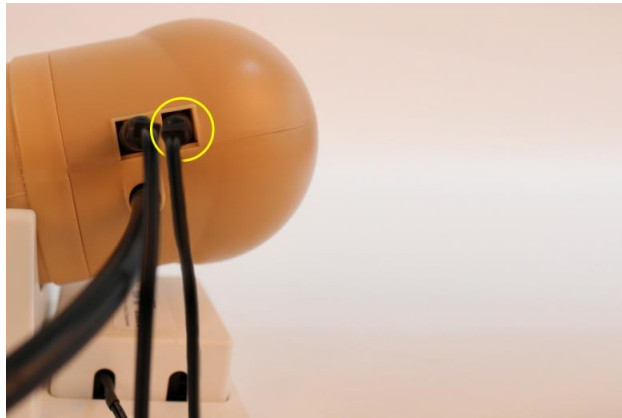
- **Using battery power** : Connect the power cable from battery pack to the power connector on the arm model.

#### 4-2. Connect sphygmomanometer tube



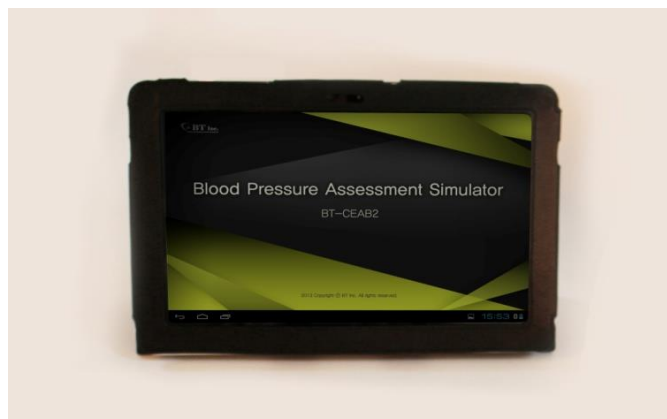
- Connect exclusive sphygmomanometer tube to the cuff tube connector of arm model.

#### 4-3. Connect speaker cable



- Connect speaker cable to the speaker connector of Arm model. (Speaker is optional purchase.)

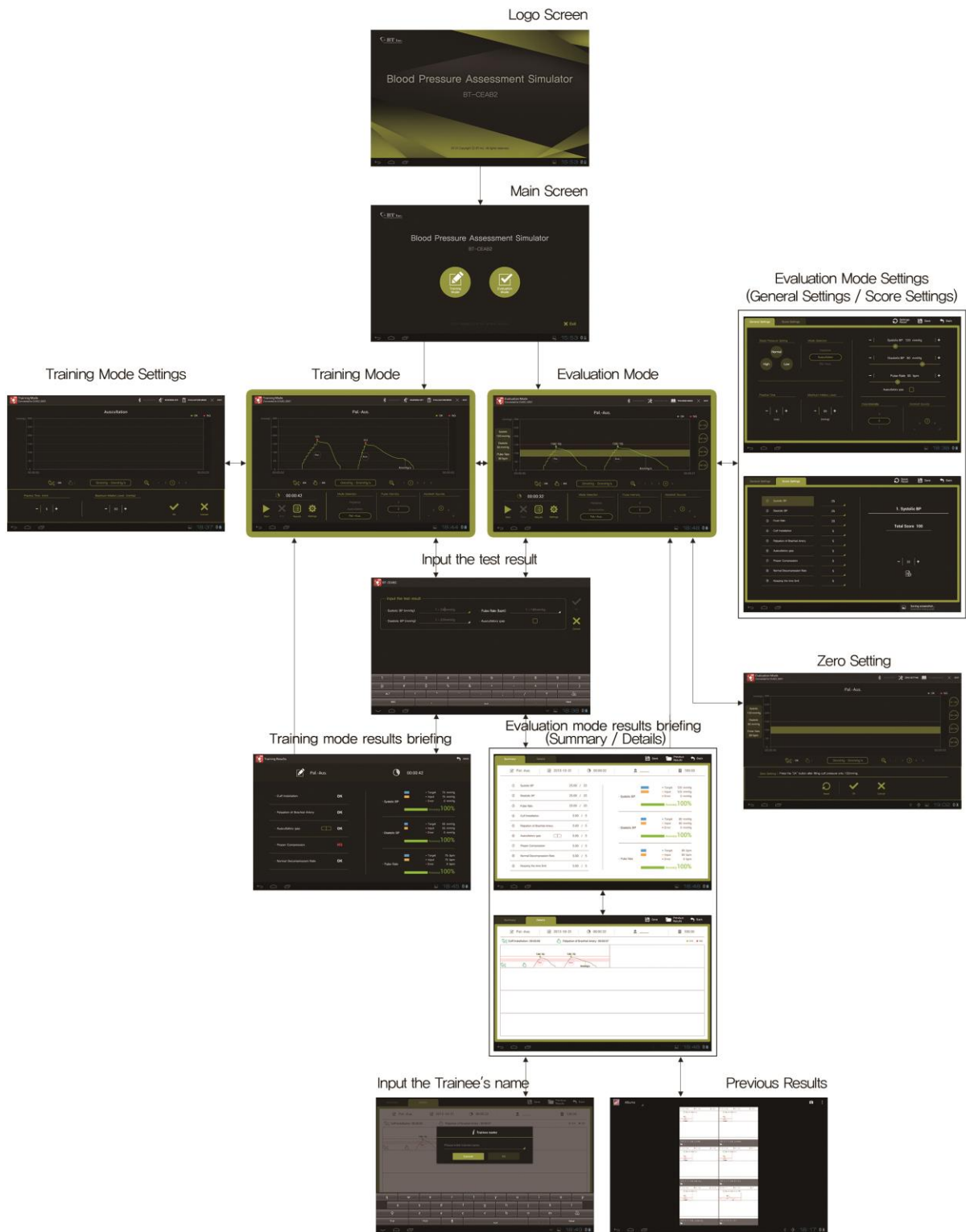
#### 4-4. Turn on the Tablet PC



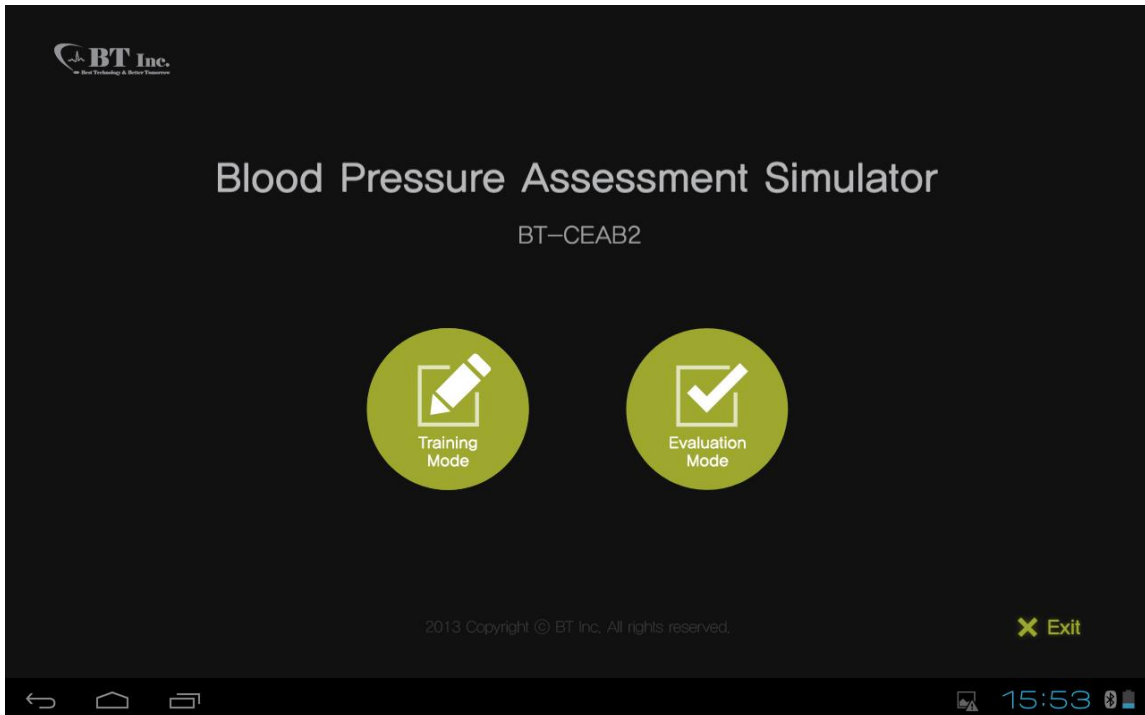
- To use tablet PC, press power button until pop-up menu is displayed.
- To start practice, touch the BT-CEAB2 application icon on the screen and access the program.
- To turn off, Press power button lengthily then press 'Ok'.
- To return to the screen from standby mode(sleep mode), press power button once.






## 5. Software Configurations and Users Manual



## 5-1. Main Screen



- Touch the 'Training mode' button  or 'Evaluation mode' button  to start.
- It is possible to do self-training with Training mode.
- Various situations are programmed and selected randomly and automatically in Training mode.
- Trainer can change the various parameters such as systolic BP / Diastolic BP / Pulse Rate / Training time / Standard pressurization / Pulse intensity / Korotkoff sounds / Auscultatory gap / Score in Evaluation mode.
- To terminate the program, press 'Exit'  button.

## 5-2. Training mode

### (1) Composition and directions of training mode screen







#### (Top)

- **Bluetooth** **BLUETOOTH** : This button shows the Bluetooth connection status between arm model and tablet PC.
- **Warning on/off** **WARNING ON** / **WARNING OFF** : Warning sounds ringing when excessive compression or fast decompression.
  - **Excessive compression** : When the cuff is over pressed, the system will give the warning alarm.
  - **Fast decompression rate** : When the decompression rate is higher than 5mmHg/sec, the system will give the warning alarm.
- **Evaluation mode** **EVALUATION MODE** : Switching to the Evaluation mode.
- **Exit** **EXIT** : Terminate the program.

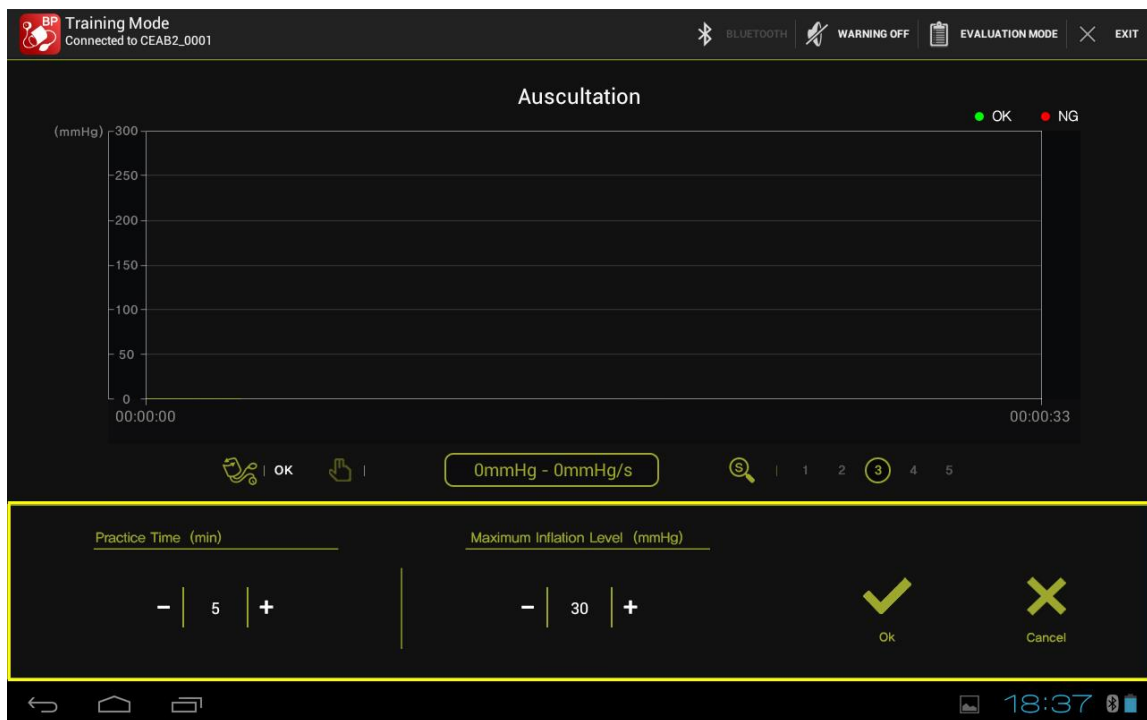
#### (Middle)


- The practice situation can be checked in real-time.  
(Cuff pressure graph, cuff installation status , brachial artery palpation , check moderate compression, cuff pressure and decompression rate )
- **Time scale change** : Graph expansion / reduction.

## (Bottom)

- **Practice time**  : Elapse time is displayed after start practice.
- **Start/Stop**   : Practice start / Stop.
- **Results**  : Check the practice results.
- **Mode Selection** : Select 'Palpation', 'Auscultation' and 'Palpation-Auscultation' mode is possible.
- **Pulse intensity** : Pulse intensity setting is possible in real-time.
- **Korotkoff sounds** : The intensity of Korotkoff sounds can be adjusted.
- After practice time is over, the training mode is terminated automatically.

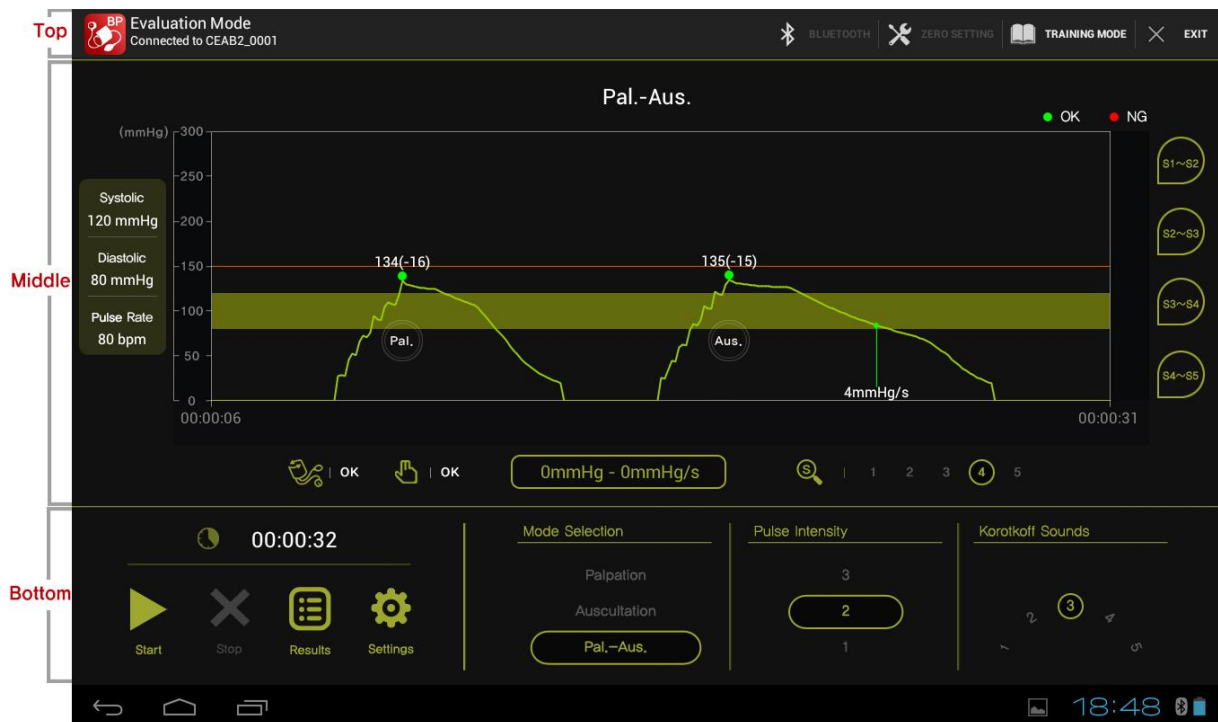
## (2) Settings



- **Settings**  : User can modify the Practice time and Maximum inflation level.
  - **Practice time** : User can set the practice time from 1minute to 60minutes.
  - **Maximum Inflation Level** : User can set the cuff inflation pressure limit within 10~50mmHg range.

## 5-3. Evaluation mode

### (1) Composition and directions of evaluation mode.








#### (Top)

- **Bluetooth** **BLUETOOTH** : This button shows the Bluetooth connection status between arm model and tablet PC.
- **Zero setting** **ZERO SETTING** : User can calibrate the pressure sensor of arm model.
- **Training mode** **TRAINING MODE** : Switching to the training mode.
- **Exit** **EXIT** : Terminate the program.

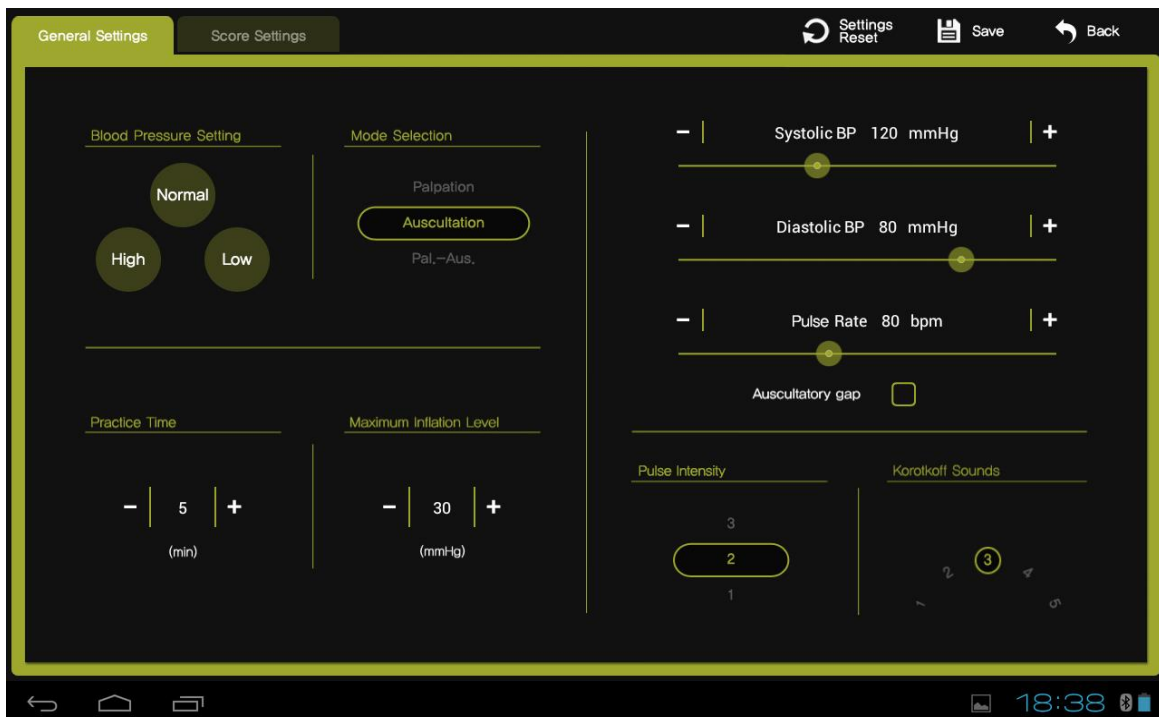
#### (Middle)


- The practice situation can be checked in real-time.  
(Cuff pressure graph, cuff installation status , brachial artery palpation , check moderate compression, cuff pressure and decompression rate )
- **Graph** : Compression limit and section of Systolic, Diastolic BP are displayed.
- Setting values of Systolic BP, Diastolic BP and Pulse Rate are displayed.
- **Time scale change** : Graph expansion / reduction.
- **S1~S5** : Section of Korotkoff sounds is displayed in real-time.

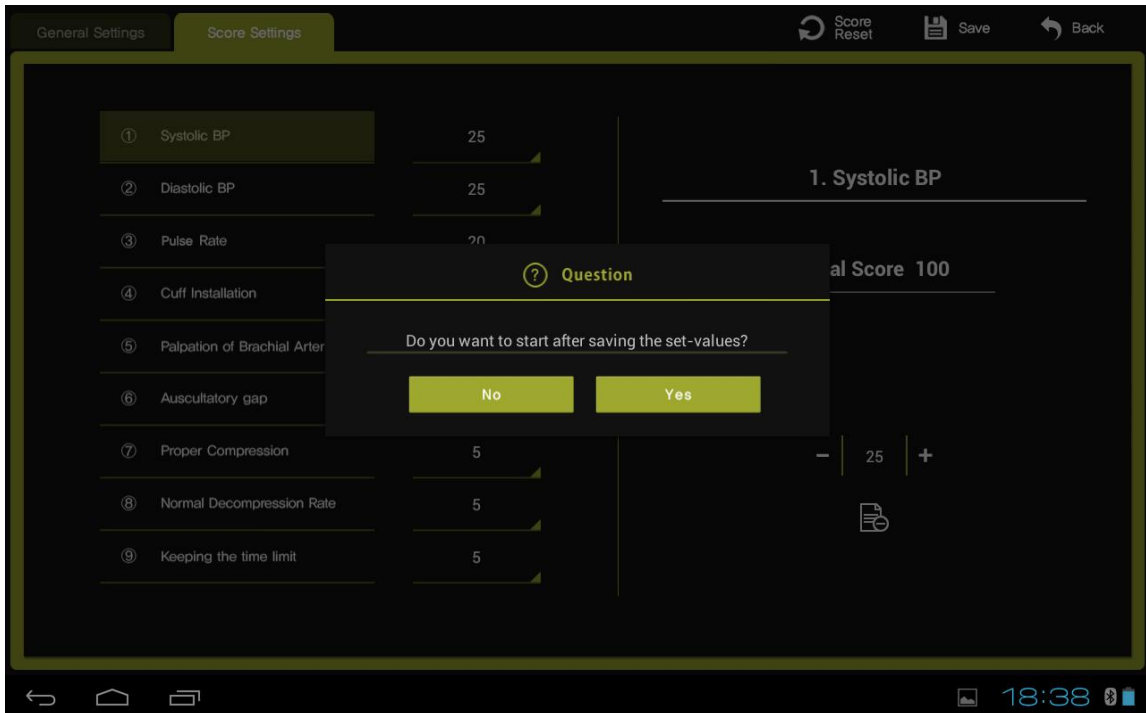
## (Bottom)




- **Practice time**  : Elapsed time is displayed right after starting examination.
- **Start/Stop**   : Examination start / Stop.
- **Results**  : Check the Examination results.
- **Settings**  : Setting mode is composed of general and score settings.
  - ※ In this mode, user cannot access the mode selection, pulse intensity, Korotkoff sounds before the examination is terminated.

## (2) General Settings

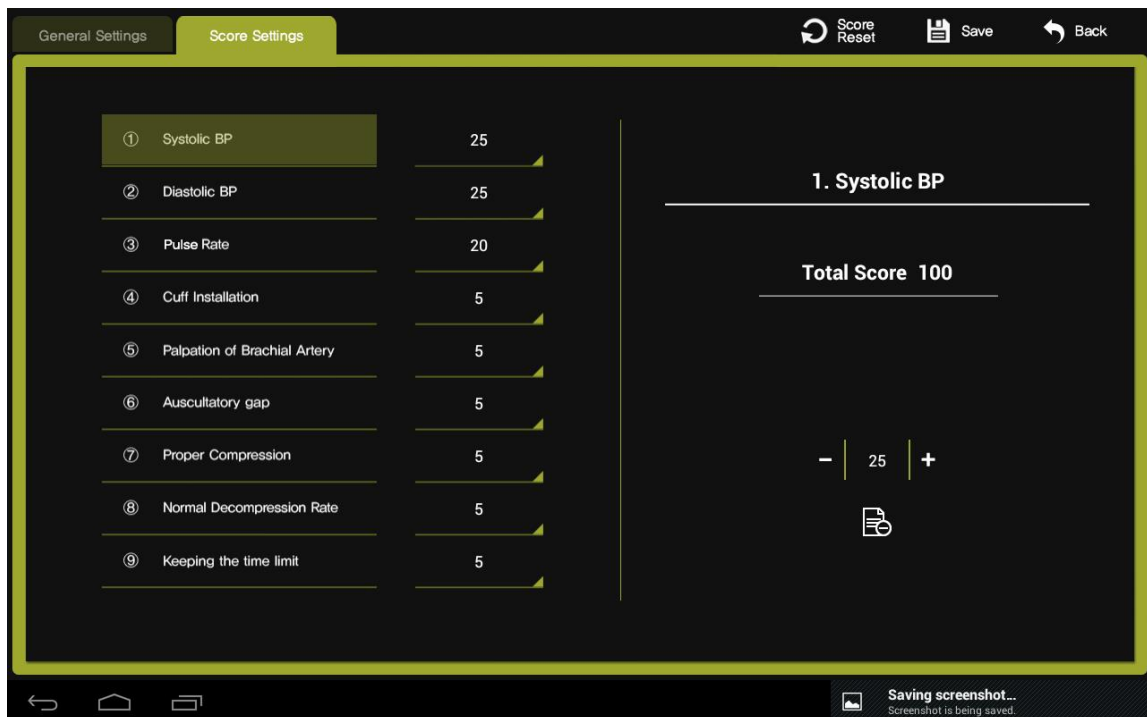




- **Blood Pressure Setting** : 'High', 'Normal' and 'Low'.
- **Mode Selection** : 'Palpation', 'Auscultatory' and 'Palpation-Auscultatory' mode.
- **Practice time** : 1 minute to 8 minutes.
- **Maximum inflation Level** : Within 10~50mmHg of over pressurizing.
- **BP setting range** : 35~240mmHg
- **Pulse Rate setting range** : 40~140bpm
- **Auscultatory gap** : Auscultatory gap will be set by manually or automatically.
- **Pulse Intensity** : Setting pulse intensity.
- **Korotkoff sounds** : Setting the intensity of Korotkoff sounds.
- 'Settings Reset'  button can reset the all parameters into default values.



- User can save the setting values by pressing 'save'  button.
  - The present set values are saved with 'Yes'  button and then practice will be started.
  - The saved set values are canceled with 'No'  button.

### (3) Score Settings



- First choose the item to change the score.
- Change the score by using **+** button or **-** button.
- The modified setting can be saved when the total score is 100points.
- By pressing the  button, user can remove item list.
- By pressing the 'Score Reset'  button, user can restore the default scores.



## 5-4. Input the test results

BT-CEAB2

Input the test result

· Systolic BP (mmHg) 1 ~ 244mmHg

· Diastolic BP (mmHg) 1 ~ 225mmHg

· Pulse Rate (bpm) 1 ~ 140mmHg

· Auscultatory gap 0

OK

Cancel



1 2 3 4 5 6 7 8 9 0

@ # \$ % & \* - + ( )

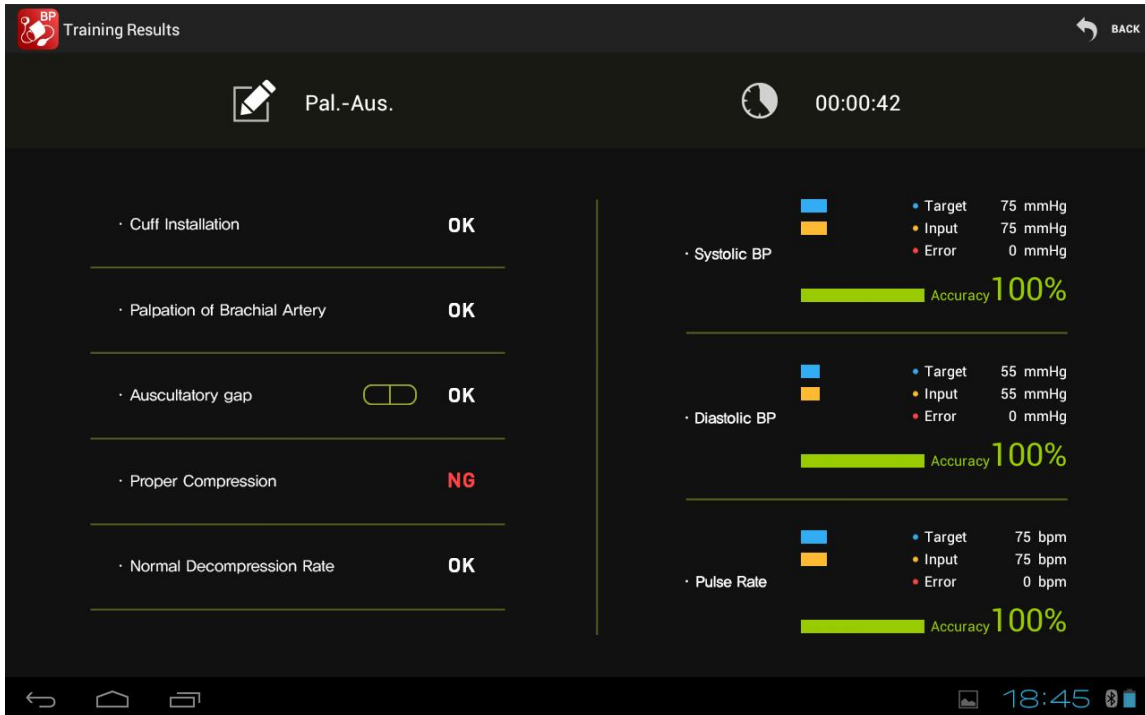
ALT ! " ' : ; / ? DEL

ABC , \_ . Next

18:38

- According to the training mode input items are changed.
  - **Palpation** : Systolic BP, Pulse Rate
  - **Auscultation** : Systolic / Diastolic BP, Pulse Rate, Auscultatory gap
  - **Palpation - Auscultation** : Systolic / Diastolic BP, Pulse Rate, Auscultatory gap
- User can type the results with keyboard. When the values are out of range, input is rejected.
- After input all results, press 'Ok'  button to save the result.
  - ※ **User can check the result without result saving in training mode.**
- To return previous screen, press 'Cancel'  button.

## 5-5. Training mode results briefing

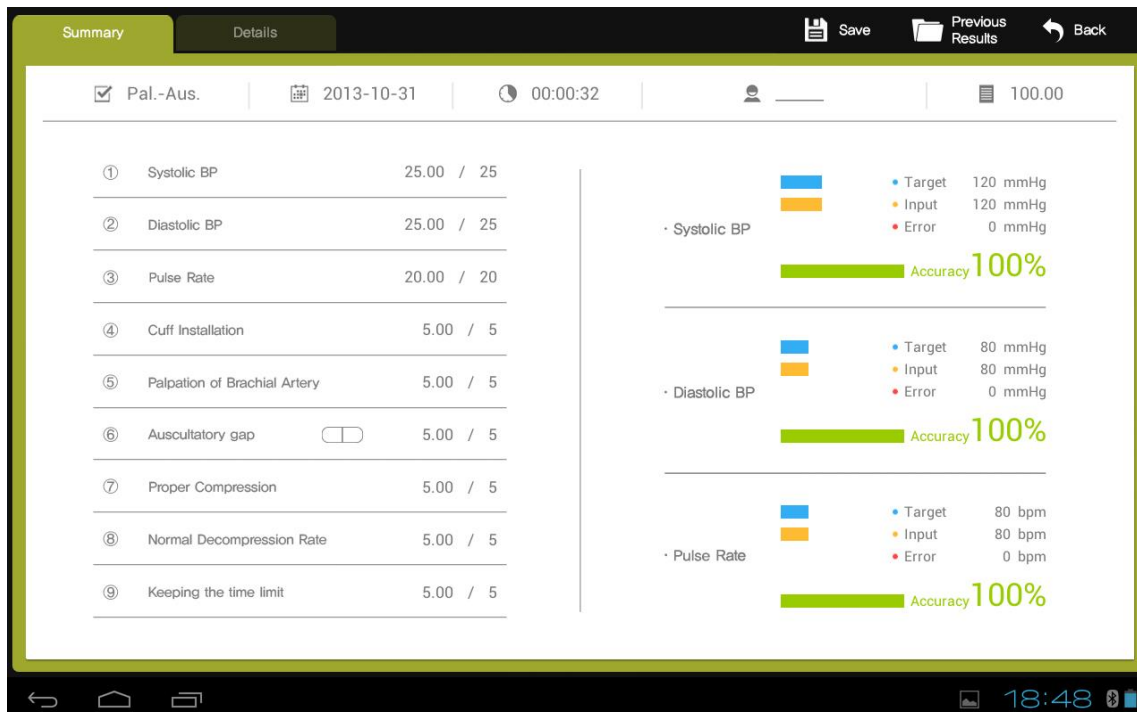


- **Cuff installation** : Cuff installation status is displayed with 'OK/NG'.
- **Palpation on Brachial Artery** : Palpating status is displayed with 'OK/NG'.
- **Auscultatory gap** : Recognition status of Auscultatory gap is displayed with 'OK/NG'.
- **Proper compression** : Check proper compression then displayed 'OK/NG'.
  - ※  $\text{Systolic pressure} < \text{Proper compression} \leq \text{Systolic pressure} + \text{Over-compression limit}$
- **Normal Decompression Rate** : Check suitable decompression rate then displayed 'OK/NG'.
  - ※  $2\text{mmHg/s} \leq \text{Normal decompression rate} \leq 5\text{mmHg/s}$
  - ※ **In the palpation mode, decompression rate is not measured.**
- **Systolic / Diastolic BP and Pulse Rate accuracy** : The score is given by the accuracy of input values of Systolic BP, Diastolic BP and Pulse Rate with percentage.
  - ※  $100 - \text{error} \text{ (error} \leq 100)$
  - ※ **If the error is over 100, the accuracy is displayed with 0%.**

## 5-6. Evaluation mode results briefing

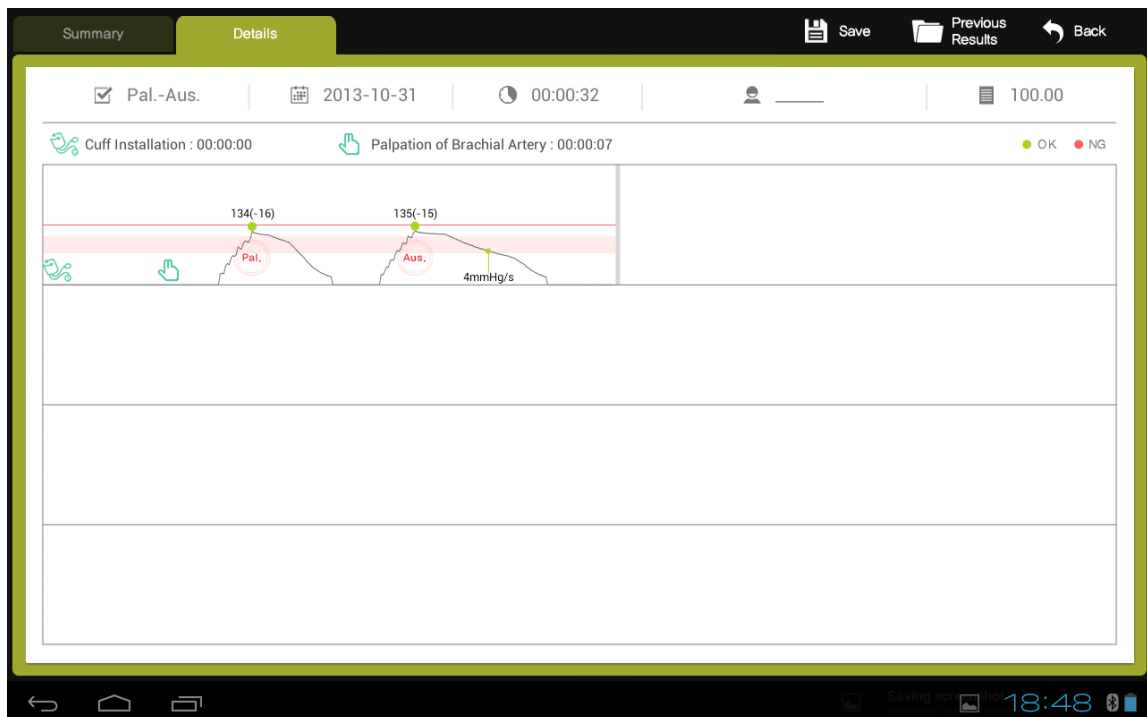
- Evaluation mode is made up of result summary and detailed view.





### (1) Summary



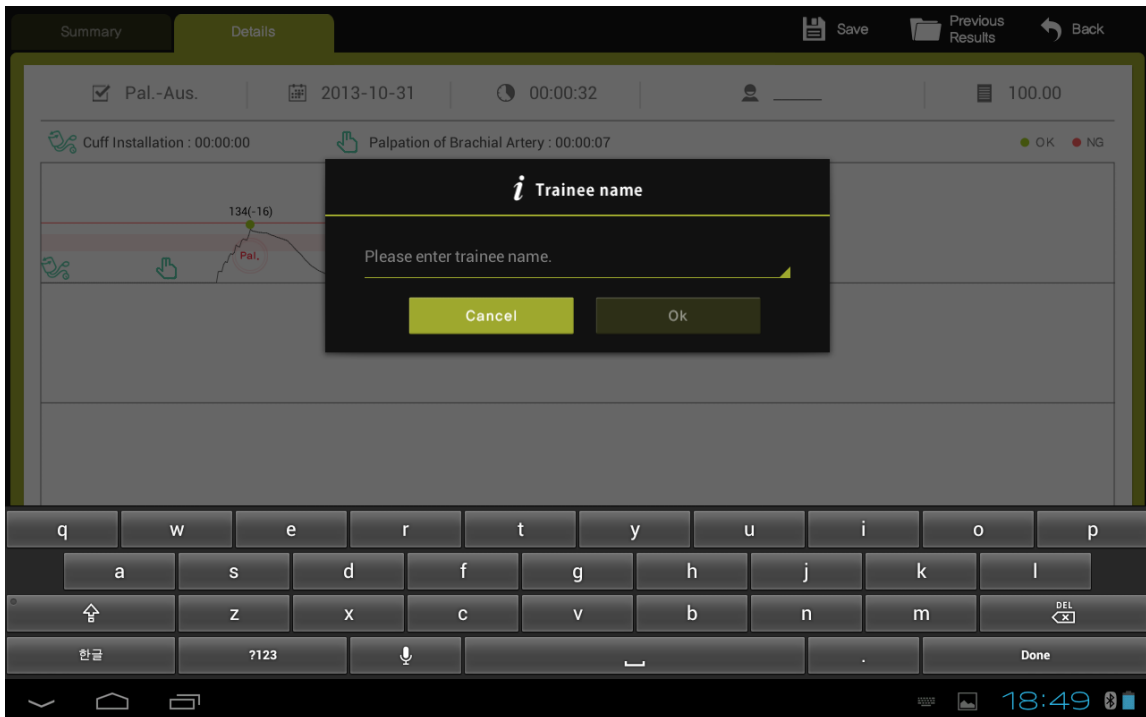
- ① **Systolic BP** : The score is given by accuracy and distribution points.  
 $\text{Score} = (\text{Accuracy} \times \text{Distribution points}) / 100$
- ② **Diastolic BP** : Based on accuracy and distribution score is displayed.  
 $\text{Score} = (\text{Accuracy} \times \text{Distribution points}) / 100$
- ③ **Pulse Rate** : Based on accuracy and distribution score is displayed.  
 $\text{Score} = (\text{Accuracy} \times \text{Distribution points}) / 100$
- ④ **Cuff installation** : The score is given by the cuff installation status.
- ⑤ **Palpation of Brachial Artery** : The score is given by the palpation status.
- ⑥ **Auscultatory gap** : The score is given by the recognition status of auscultatory gap.
- ⑦ **Proper compression** : The score is given by checking the proper compression range of the cuff pressure.  
 $\text{Systolic pressure} < \text{Proper compression} \leq \text{Systolic pressure} + \text{Maximum inflation level}$
- ⑧ **Normal Decompression Rate** : The score is given by checking the decompression rate within the normal range.  
 $2\text{mmHg/s} \leq \text{Normal Decompression Rate} \leq 5\text{mmHg/s}$   
**In the palpation mode, Decompression Rate is not measured.**
- ⑨ **Keeping the time limit** : The score is given by the keeping the practice time limit.
- ⑩ **Systolic / Diastolic BP and Pulse Rate accuracy** : The score is given by the accuracy of input values of Systolic BP, Diastolic BP and Pulse Rate with percentage.  
 $100 - \text{error} \text{ (error} \leq 100)$   
**If the error is over 100, the accuracy is displayed with 0%.**


## (2) Details

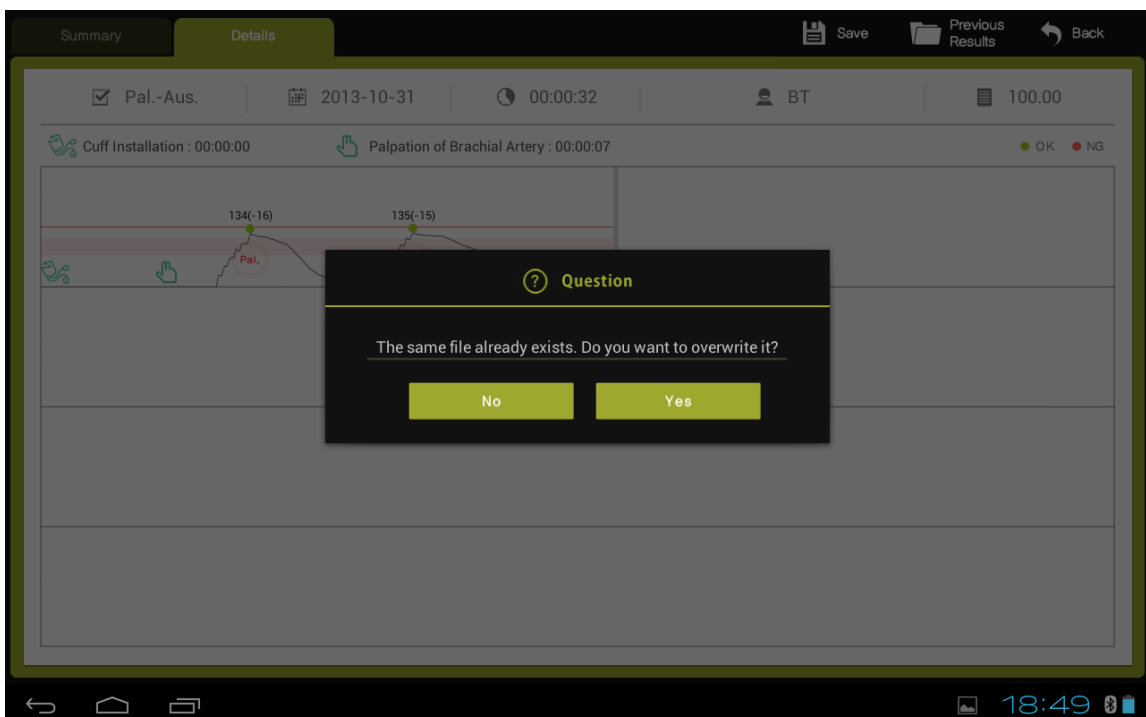


- The moment of Cuff installation  and Palpation of Brachial Artery  are displayed on the graph.
- ※ In Palpation-Auscultation mode,  in Palpation section,  in Auscultation section are displayed.

### (3) Save

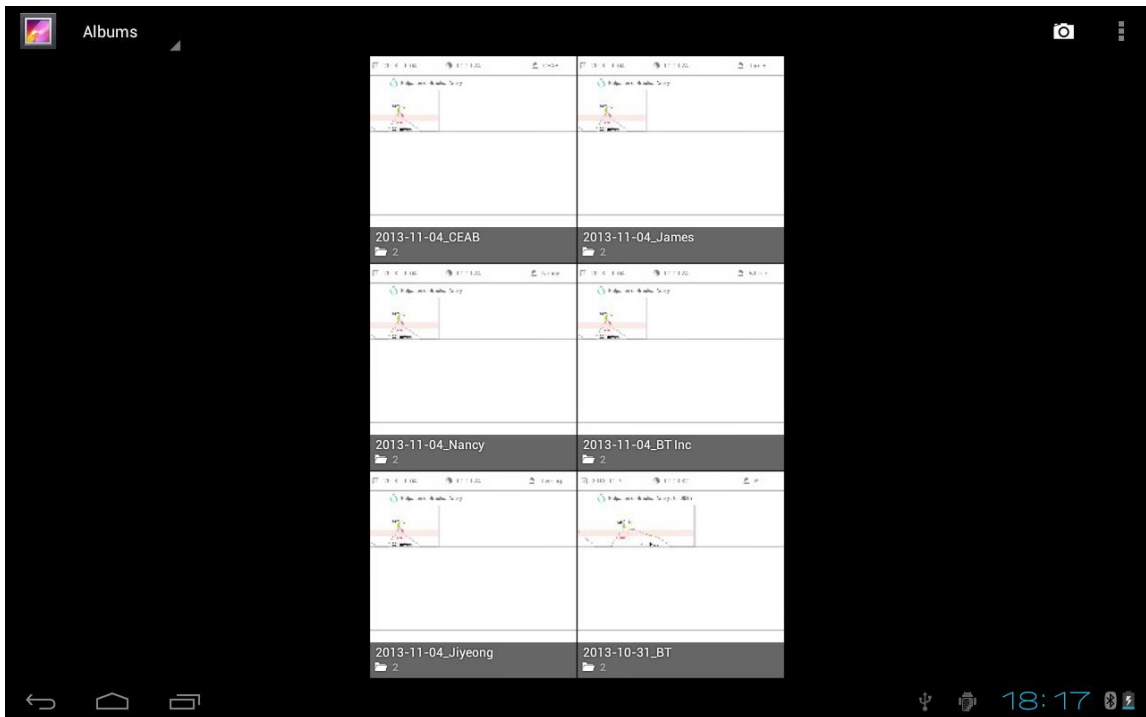




- Press 'save'  button then input the trainee's name.
- The result data is saved with image files and it is possible to review then in the gallery.



※ If the same name is existed already, you can change the name or overwrite it.

#### (4) Previous results

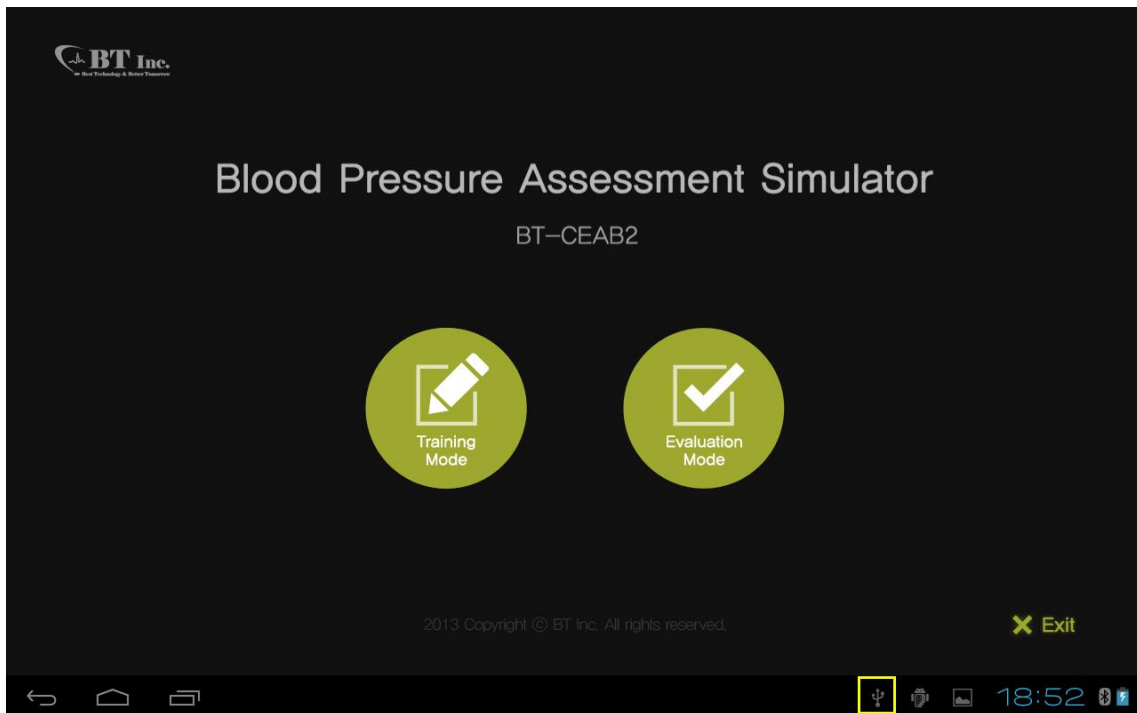


- To check previous results image in tablet PC gallery, press 'Previous Results'  button in the result page.
- To return previous screen, press  button.

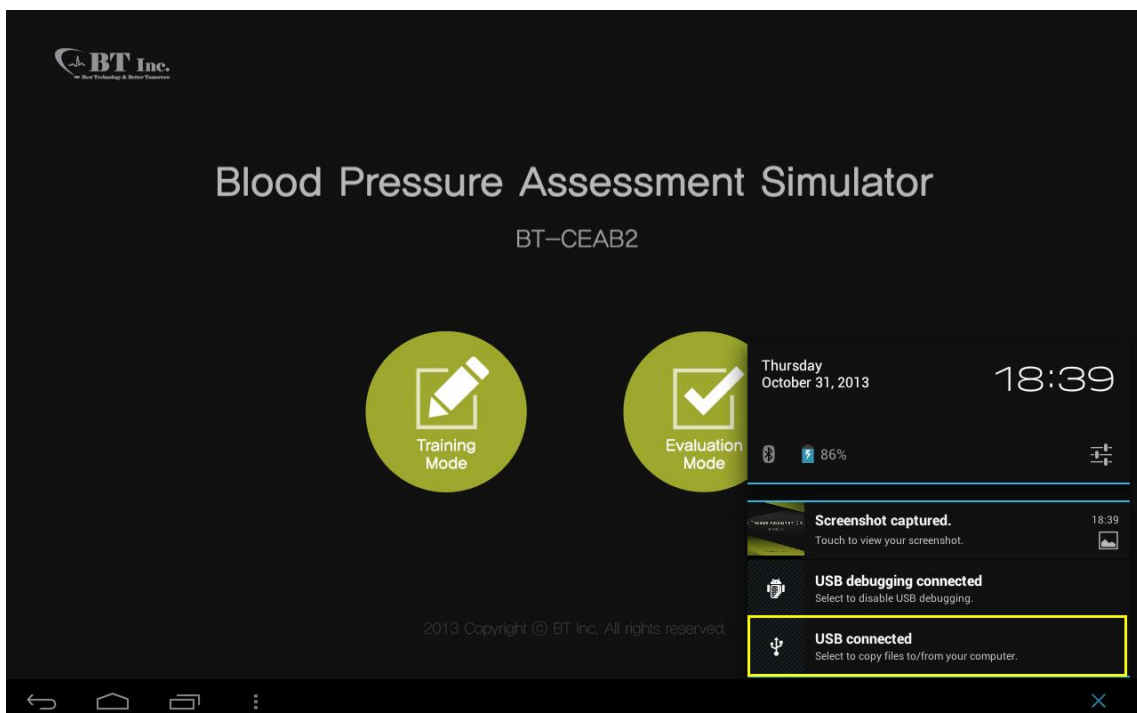
## 5-7. Printout the result

- Transmit saved result file to desktop PC

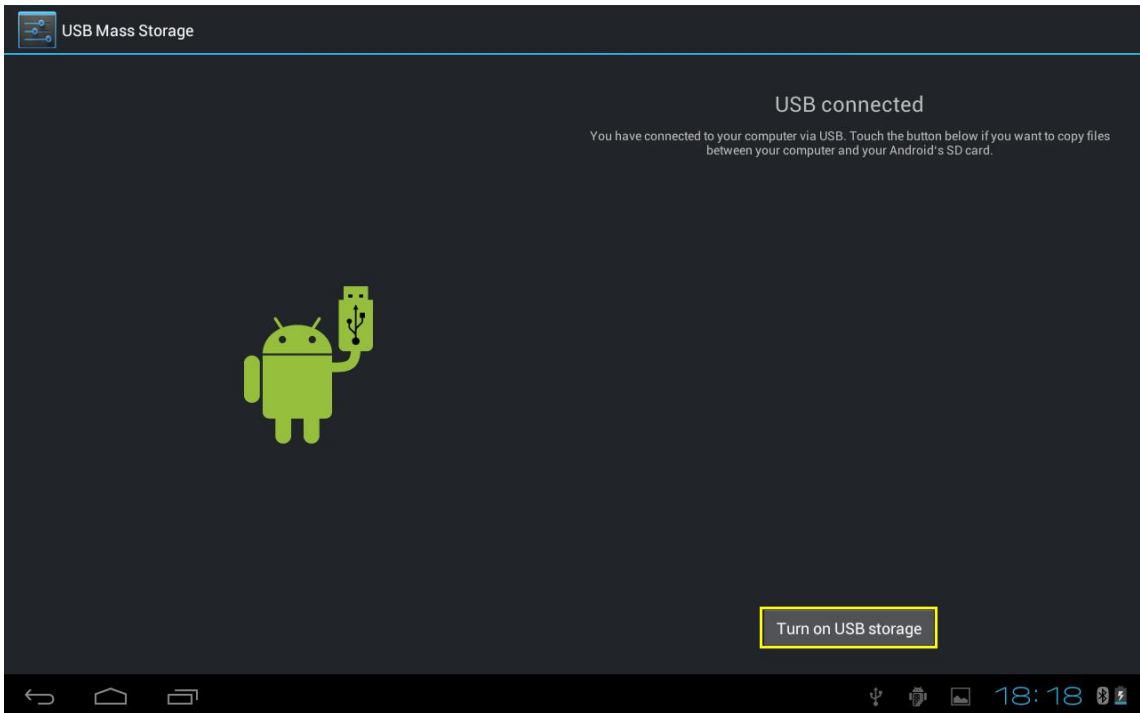
① Connect the tablet PC to a desktop PC with data cable.



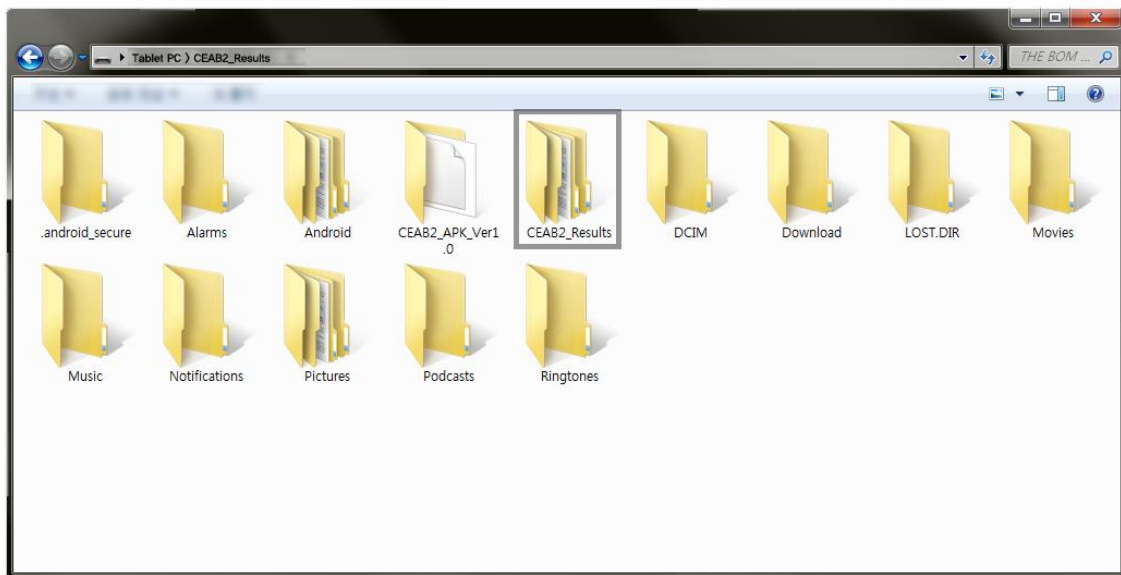
② When USB is connected, press USB icon.



③ Press 'USB connected' message box.



④ After press 'Turn on USB storage' button, user can check the result file at the desktop PC.



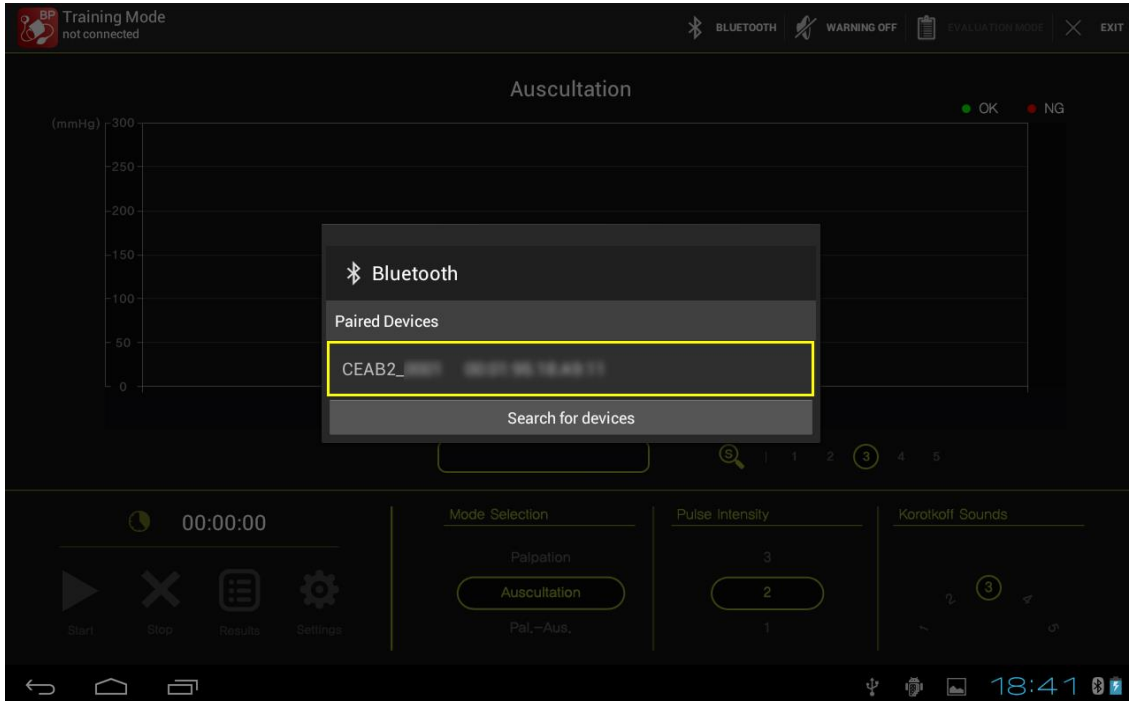
⑤ Saved file route : My computer > Tablet PC > CEAB2\_Results.


⑥ Result file checking or printing are possible.

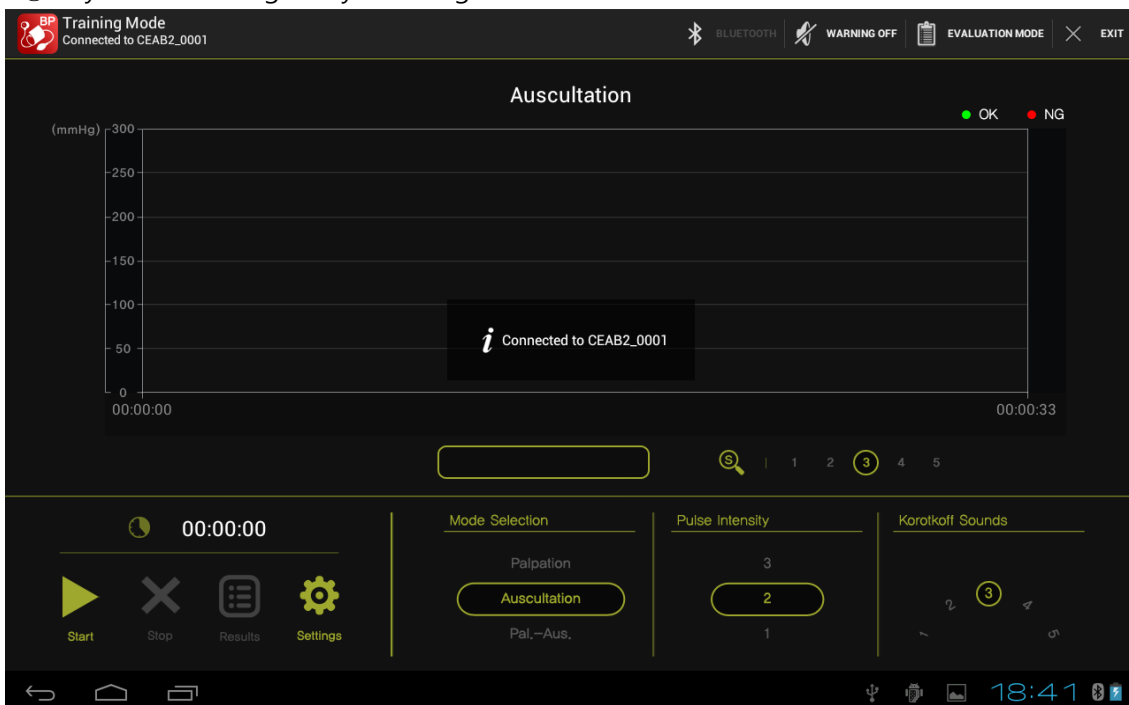


## 6. Bluetooth connection

- Arm model and tablet PC are connected by Bluetooth. If user have to reconnect Bluetooth because of communications problem, please follow the explained procedures.



- ① Check the power of arm model is turned on.
- ② Press 'Bluetooth'  button, and then check device pairing.
- ③ Try connection again by selecting device.



- ④ It is connected automatically after the device is connected successfully.

## 7. Q&A

### 1. Radial artery and Brachial artery isn't palpated.

- Check arm model power.
- Change battery if user is using the battery.
- Check the communication status between arm model and tablet PC.
- If Bluetooth is not connected, following '6. Bluetooth connection' step.
- Call purchasing office or selling store if above steps don't work.

### 2. The practice or evaluation mode is not displayed after pressing 'Start' button.

- Check arm model power.
- Check connection between the cuff tube and arm model.
- Check the Bluetooth connection of tablet PC.
- If Bluetooth is not connected, following '6. Bluetooth connection' step.
- Call purchasing office or selling store if above steps don't work.

### 3. Tablet PC and arm model are not connected.

- Turn off the arm model and tablet PC for a minute.
- Turn on the arm model first, and then tablet PC.
- Surrounding environment might interrupt Bluetooth connection.
- Check wireless network set-up on the tablet PC.
- On the wireless network setting screen, Wi-Fi should be turned OFF, Bluetooth should be turned ON.
- Following '6. Bluetooth connection' step.
- Call purchasing office or selling store if above steps don't work.

### 4. Tablet PC is not turned on.

- Charge the tablet PC with AC adapter.
- Check the output voltage of adapter using multimeter (if you have).
- Remove Micro SD card and external equipment etc.
- Call purchasing office or selling store if above steps don't work.

### 5. Tablet PC doesn't work.

- Restart tablet PC.
- Check tablet PC battery.
- Charge tablet PC with adapter.
- Call purchasing office or selling store if above steps don't work.