Phoenix3

Automated Speech Discrimination Tester

User Manual

Firmware Revision 3.00

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Introduction

The Phoenix3 Speech Discrimination Tester is the latest version of the popular Phoenix device originally released in 1998 by Soundbyte Solutions.

The original device was limited by having only the McCormick Toy Test (McTT) included. The Phoenix3 includes the McCormick Toy Test and the Bamford-Kowal-Bench (BKB) test in Male and Female voices.

Both speech tests utilise the same algorithm to determine the level at which 71% of the presentations are correctly identified. Further details of the algorithm can be found in the next section of this manual.

The original Phoenix device presented a short burst of wideband noise at the same time as a speech presentation. The Phoenix3 uses a Noise Cube to produce the background noise for the speech tests. This allows the user to position the noise source away from the speech source. In addition, 4 noise types are available and the background noise runs continually during the test. This is a much more realistic test environment for assistive listening devices.

The Phoenix3 also benefits from a wireless connection between handset and speaker, a much-improved navigation interface and a full colour touch screen.

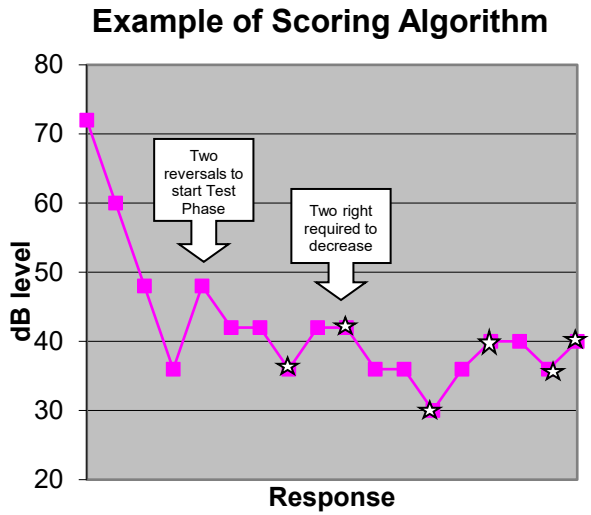
The Phoenix3 Adaptive Algorithm

The adaptive algorithm used by the Phoenix3 was developed by the Institute of Hearing research/Children's Hearing Assessment Centre, Nottingham in the late 1980's.

The algorithm will adjust the intensity of the speech stimuli depending on whether the previous stimuli was correctly or incorrectly identified. It calculates the level at which 71% of the presentations are correctly identified. The process has two stages:

1. The first homing in stage uses a 1 down 1 up rule requiring 2 reversals with a large step size. This is intended to quickly get to an approximate threshold level.
2. The second testing phase uses a 2 down 1 up rule, requiring 2 correct responses to lower the stimulus level, and 1 incorrect response to raise it. The step size is also smaller for this phase of testing.

An initial evaluation of the algorithm and IHR/CHAC Automated McCormick Toy Test can be found in the British Journal of Audiology 1989, 23 245-429, and further evaluation in the British Journal of Audiology 1994, 28, 165-179.



A reversal occurs each time the direction of movement of the stimulus level changes direction. The intensity of the stimulus of each reversal is recorded. The threshold is calculated as the average value of the reversals.

Six reversals are required to complete the test, but a running count of reversals and estimated threshold will be displayed at all times, should you wish to end the test early.

Example of a McCormick Toy Test run showing turning points and calculated hearing thresholds as the test proceeds.

Toy	Output level	Correct Response	Reversal Count	Calculated Threshold dBA
Homing in: Step size 12dB, 1 down 1 up rule				
man	72	Yes		
lamb	60	Yes		
shoe	48	Yes		
tree	36	No	1	
shoe	48	Yes	2	
Test phase: 2 reversals. Step size 6dB, 2 down 1 up rule				
man	42	Yes		
house	42	Yes		
shoe	36	No	1	36
plane	42	Yes		
house	42	Yes	2	39
plate	36	Yes		
man	36	Yes		
house	30	No	3	36
plate	36	No		
cow	40	Yes	4	37
fork	40	Yes		
key	36	No	5	36.8
plane	40	Yes	6	37.3

Using the Phoenix3

In the following sections we will be describing the operation of the Phoenix3 and how to perform the McCormick Toy Test, BKB Test and Warble Test. We will also describe how to check and make temporary adjustment to the Phoenix3 calibration.

The Phoenix3 uses a number of interface screens and button icons to control the function of the device.

Throughout this manual, any reference to a screen will be shown as SCREEN. Any reference to a user interface button which can be touched with a finger or stylus to perform a function will be shown as BUTTON.

System Start Up

The Phoenix3 system consists of a handset and speaker with a wireless connection between them.

Turn on the Phoenix3 speaker using the switch on the rear. Then turn on the handset using the small slide switch on the top of the box. The handset will display a splash screen showing the firmware revision whilst it connects to the speaker.

The handset will take a few seconds to perform a series of self-tests and establish a communication link with the speaker.

If the unit fails to establish a link, an error message will be displayed. Switch off the speaker and the handset and try again.

Select a Test

Once connection is established, the SELECT A TEST screen will appear on the handset.

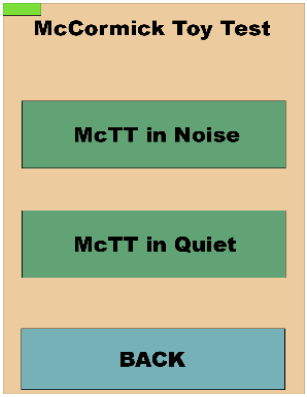
Select from McTT, BKB and WARBLE TONES.

Once the test is selected, the screen will change to display the options available for the selected test.

If you wish to check the calibration of the device then press CAL CHECK and follow the procedure in the Calibration section of the manual.

The following sections will describe the operation of each test available.

Performing the McCormick Toy Test

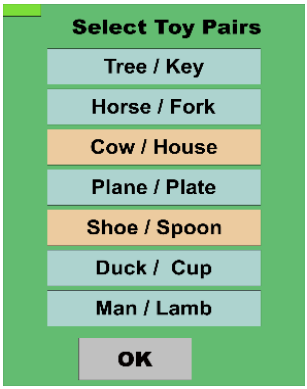


The McCormick Toy test options are McTT IN QUIET or McTT IN NOISE. Both options use the original IHR female voice recordings. If testing in noise, you will need to set the Noise Cube for the required noise type at 60dB and start the noise before commencing the test.

Pressing McTT IN NOISE, or McTT IN QUIET will take you to the SELECT TOY PAIRS screen.

Pressing BACK will return you to the SELECT A TEST screen.

Select Toy Pairs



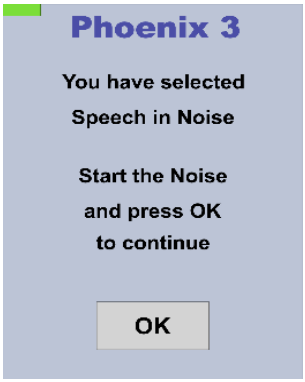
Before commencing a McCormick Toy Test with children, you should check that the child can identify each of the 14 toys. Exclude any toy pair for which the child can't identify one or both toys.

Touch the toy pair button to include / exclude the toys. Included toy pairs are shown in green. Excluded toy pairs are shown in red.

You must select at least two toy pairs to conduct a test. The Phoenix3 will not allow you to disable more than 5 pairs at any time.

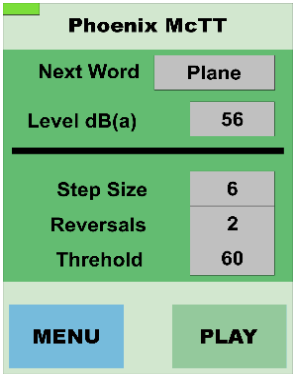
In this example, the toys COW, HOUSE, SHOE and SPOON will be excluded from the test. Touch OK when you have finished to move on to the Phoenix3 McTT screen.

Start the Background Noise



If you have selected Speech in Noise, you will be reminded to start the background noise before proceeding to the main test screen.

The Phoenix McTT Screen



This is the main screen for the McTT.

From here you can monitor the progress of the test and PLAY the next word.

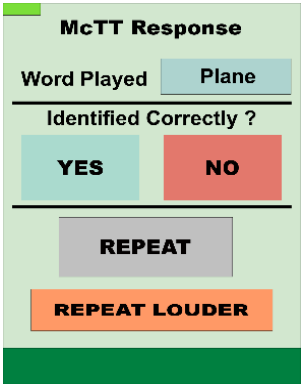
The step size, number of reversals and calculated hearing threshold are all updated as the test progresses.

The output level will initially be set to the maximum output level. It will change depending on the progress of the test.

The next word will be chosen at random. If you wish to specify which toys are to be used, then you will need to press MENU and then SELECT TOYS.

Press PLAY to play the current test word. As soon as the word has been presented, the display will change to the McTT RESPONSE screen.

McTT Response Screen



Here you can record the response to the test word.

If the toy is identified correctly, press YES. If not, press NO.

If you are unsure, press REPEAT to repeat the current word at the same level and then press YES or NO.

When testing at low levels with young children, they will sometimes become disinterested. In such cases, press the REPEAT LOUDER button.

The Repeat Louder function

The Repeat Louder function will save the current test status and add 12 dB to the output level before playing the current word. The function of the screen buttons will change as follows:

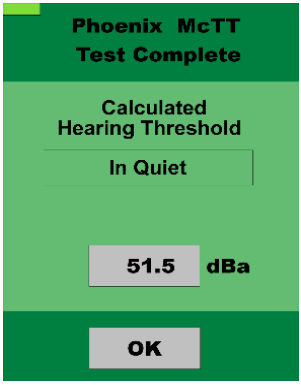
REPEAT will repeat the word at the elevated level.

NO will change the test word and play at the elevated level.

REPEAT LOUDER will increase the output level again.

YES will return the system back into test mode at the point at which REPEAT LOUDER was first pressed.

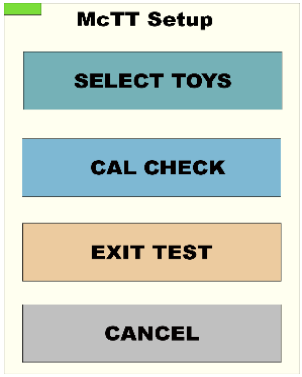
McTT Test Complete Screen



The TEST COMPLETE screen will be displayed when the final reversal has been achieved. The calculated hearing threshold will be displayed.

This screen will remain visible until OK is pressed. You will then return to the SELECT A TEST screen.

McTT Setup Menu



This menu can be selected at any time during a test by pressing the MENU button.

SELECT TOYS will display the select toy pairs screen. You can do this at any time during the test.

CAL CHECK will take you to the CALIBRATION CHECK screen.

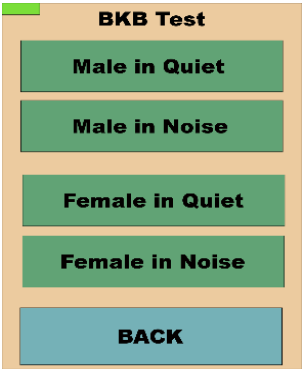
EXIT TEST will return you to the SELECT A TEST screen

Pressing CANCEL will return you to the Phoenix3 McTT screen

Performing the Phoenix BKB test

The BKB test can be used on older children and adults. The test subject is asked to repeat back the phrase they heard and the response is simply scored as correct or incorrect. This is different to the published methodology where selected target words are scored based on the phonemes correct.

Select Noise Type and Gender

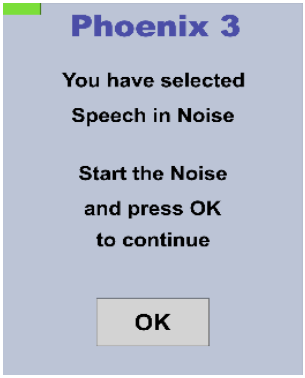


Selecting BKB from the SELECT A TEST screen will display the BKB Test screen

If testing in noise, you will need to set up the Noise Cube to provide the required noise at a level of 60 dBA.

Pressing BACK will return you to the SELECT A TEST screen.

Start the Background Noise



If you have selected Speech in Noise, you will be reminded to start the background noise before proceeding to the main test screen.

The Phoenix BKB Screen

This is the main screen for the BKB.

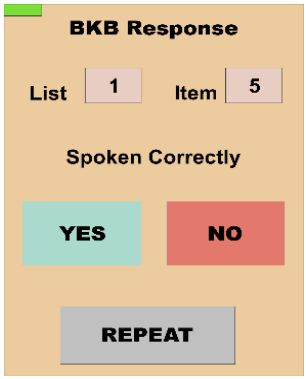
From here you can monitor the progress of the test and PLAY the next phrase. The output level will initially be set to the maximum output level and will change depending on the progress of the test.

The test will be initialised at List 1. The step size, number of reversals and average values will be updated as the test progresses.

If you touch MENU and then SELECT BKB LIST you will be able to choose from any of the lists available. You can also perform a calibration check, exit the current test and return to the SELECT a TEST screen.

The same algorithm used for the McTT will be used here. For a full description see the section Phoenix3 Adaptive Algorithm (page 5).

BKB Response Screen

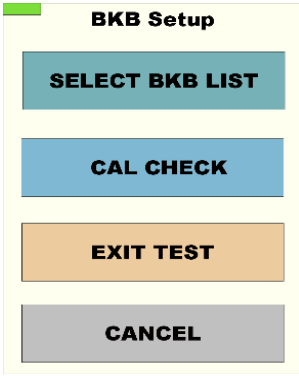


As soon as the current sentence has been presented, the display will change to the BKB Response screen.

Here you can record the response to the test phrase. If the phrase is repeated correctly press YES, if not, press NO. If you are unsure, press REPEAT to repeat the current phrase at the same level and then press YES or NO.

Once you have selected a response, you will be returned to the main Phoenix BKB screen.

BKB Setup Menu



This screen allows the user to perform the following options:

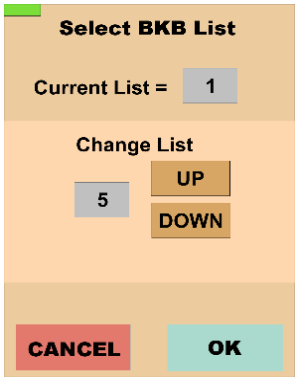
SELECT BKB LIST. This allows the user to change the current list to use in the test.

CAL CHECK will show the calibration check screen.

EXIT TEST will return to the SELECT A TEST screen.

CANCEL simply returns to the main Phoenix BKB screen.

Select BKB List



This screen is used to change the selected BKB list. You can choose any list from those available.

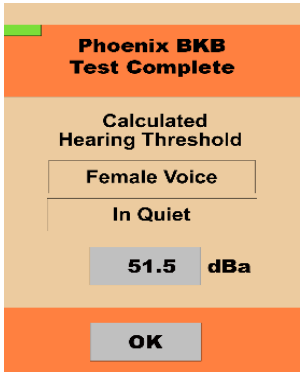
Touch UP to increase the list number.

Touch DOWN to decrease the list number.

OK will return to the test with the new list selected.

CANCEL will return to the test without changing the list number

BKB Test Complete

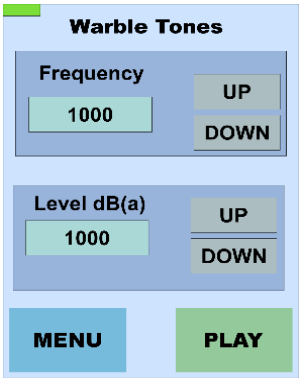


This screen will be shown after 6 reversals.

The screen will display the voice type and if the test was conducted in quiet or in noise.

The calculated hearing threshold is also displayed. This information should be recorded at the end of the test.

Using Warble Tones



If you select Warble Tones from the SELECT A TEST screen then the WARBLE TONES screen will be shown.

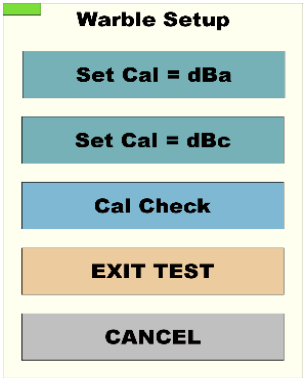
Use the frequency UP and DOWN buttons to change the set frequency.

Use the Level UP and DOWN buttons to set the output level.

The output level is calibrated in free field conditions as dBA or dBc.

Selecting MENU will display the WARBLE SETUP menu screen.

Warble Setup Menu



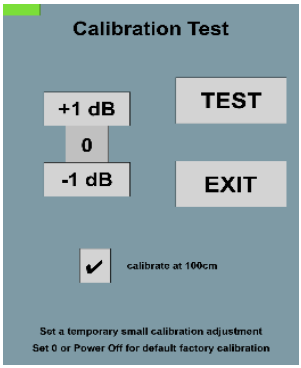
This screen allows you to select the calibration type dBA or dBc for the warble output.

You can also check and adjust the calibration of the Phoenix3 by pressing Cal Check.

Press EXIT to return to the SELECT A TEST screen.

Press CANCEL to return to the Warble Tones screen.

Calibration Test



This screen allows you to test the calibration of the Phoenix3 in your particular test environment.

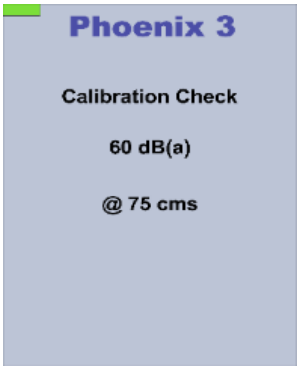
Using a SLM set to read dBA at 60dB, press the TEST button.

Measure the output and if necessary, you can adjust the output in 1dB steps with the +1dB and -1dB buttons.

The indicator between the buttons shows the calibration adjustment that will be applied to the output levels for all tests.

The standard distance is 75cm, but if required, the output will be boosted to be correct at 100cm by putting a tick in the box.

Calibration Check



This screen will be displayed during the calibration test procedure.

The output signal will measure 60 dBA at a distance of 75cms. If you have selected to calibrate at 100 cm this will also be indicated on this screen.

This adjustment will remain until the Phoenix3 is powered off, in which case, the factory settings will be restored.

Once you are satisfied that the output is correct, press EXIT to return to whichever test you had selected.

Please take a look at our website for details of other products.

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