



## **SHORT GUIDE**

## **ATB PC DEMO**

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## 1. SHORT INFO TO THE ATB PC DEMO

The measurement Program ATB PC DEMO is used to assess Surround Systems by measurement. This consists of the positioning of the speakers, the sound level adjustment, the subwoofer adjustment and an equaliser. The frequency range, in which the room has the greatest influence, is ranges up to 1000Hz. The high frequencies reflect the characteristic of the speakers. This is an area for qualified personal only. The ATB PC DEMO offers you a full value measurement system. Through the measurements, the Home Cinema System user can acquire the optimal sound reproduction quality.

You need a PC with Soundcard and Windows XP operating system, a PC Microphone (Multimedia microphone) and a test adapter to calibrate the Soundcard.

Before starting the measurement, the LINE output of the soundcard is connected to the MIC input of the soundcard using the calibration cable (Configuration guide for the cable under Help & Info in System-Correction Menu). After starting the measurement in System-correction Menu, a correction curve will generate automatically. As the quality of the soundcard is visible, the user can trust the measurement. The calibration is saved and is available for all following measurements.

For the measurement, the LINE output of the soundcard is connected to the stereo input of the surround amplifier. The microphone is setup at the hearing place and connected to the MIC input of the soundcard. The measurement displays the sound reproduction at the hearing place. For the adjustment of the subwoofer, there are Dolby Digital signals for Bass and also Middle-High tone signals available.

The professional user can purchase the Surround-Test DVD from the distributor. This contains all signals for setting up the optimal sound reproduction quality.

The stereo system owner can use the ATB PC DEMO program to find the optimal placement for his/her loudspeakers and adjust the subwoofer to fit.

## 2. AN INTRODUCTION TO THE MEASUREMENT SYSTEM

The ATB PC DEMO measurement program in connection with the soundcard of a computer is a precise and extensive Audio Analyser.

Following measurements are available:

Electrical und acoustical amplitude frequency response, SPL

Electrical and acoustical phase frequency response.

To be independent from the quality of the soundcard the program has an extensive correction function to compensate the not ideal soundcard parameter.

The ATB PC DEMO measurement program is because of state of the art measurement technology as easy to operate as a graphic analyser. So interested amateurs can use the measurement system.

The Windows ATB PC measurement program is built up in relation to the professional ATB precision program.

The optional DVD contains also signals for the "by ear" check of the surround reproduction.

The Audio Analyser is for loudspeaker development, to optimize the room acoustics, the installation of Car HiFi systems and measurement calibration of surround systems.

For cars, the measurement signals are available on the Auto-CD.

The Windows measurement program offers all the functions of the Windows operating system. For the soundcard, we have developed a new measurement technology that avoids errors of normal measurement technology. The measurement signal by an internal generator function is generated by the soundcard. With the external generator function, a CD or DVD player generates the measurement signal. Therefore, also older computers with simpler soundcards are adequate for the measurements. The very bad multiplex operation of the soundcard, which at the same time plays and records is avoided. Only the play function of the soundcard is used, that thanks to the speech identification program is also appropriate for measurement technology. Most of all Notebooks as well as external USB soundcards are ideal. The frequency response faults of the soundcards are avoided by using a correction curve. With help of the adapters fabricated according to the guide, it is easy to generate the correction curve. The frequency faults of the soundcard through unprecise and partly differing sampler rates are „worked around" through a new correlations method. The new correlation method also allows an acoustical measurement without determining the distance. In addition, not even time windows have to be set. This makes the operation as easy as with an octave analyser.

So that the measurement data can be further processed with a CAD program or saved in an existing databank, the ATB PC has an export function. The ATB data can be converted into following formats:

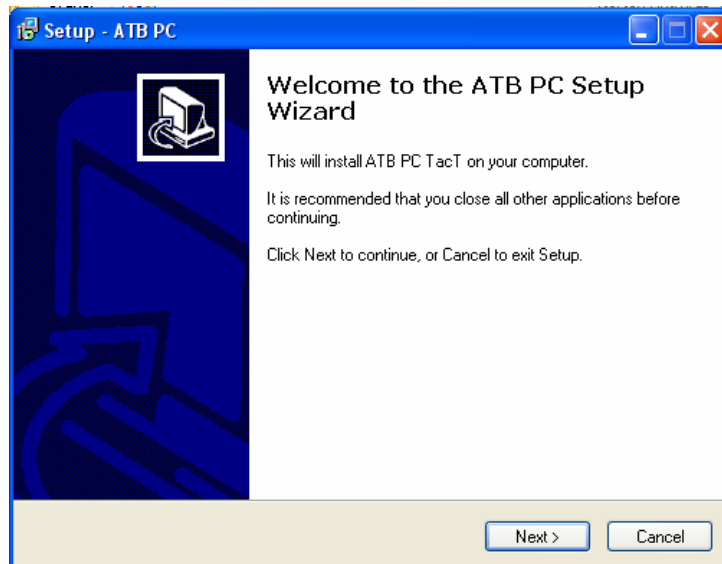
MLSSA, LAUD, IMP und CLIO.

The program also has an Auto-Export function for simple processing or evaluation of the data with user specific programs.

### 3.1. INSTALLATION DER SOFTWARE

Download the program from the website.

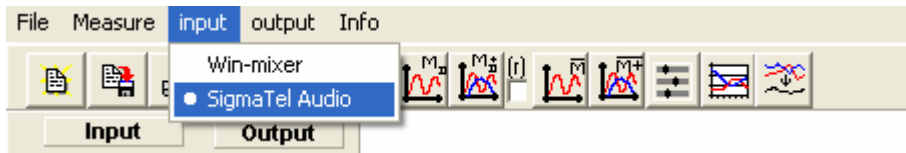
Run setup.exe.



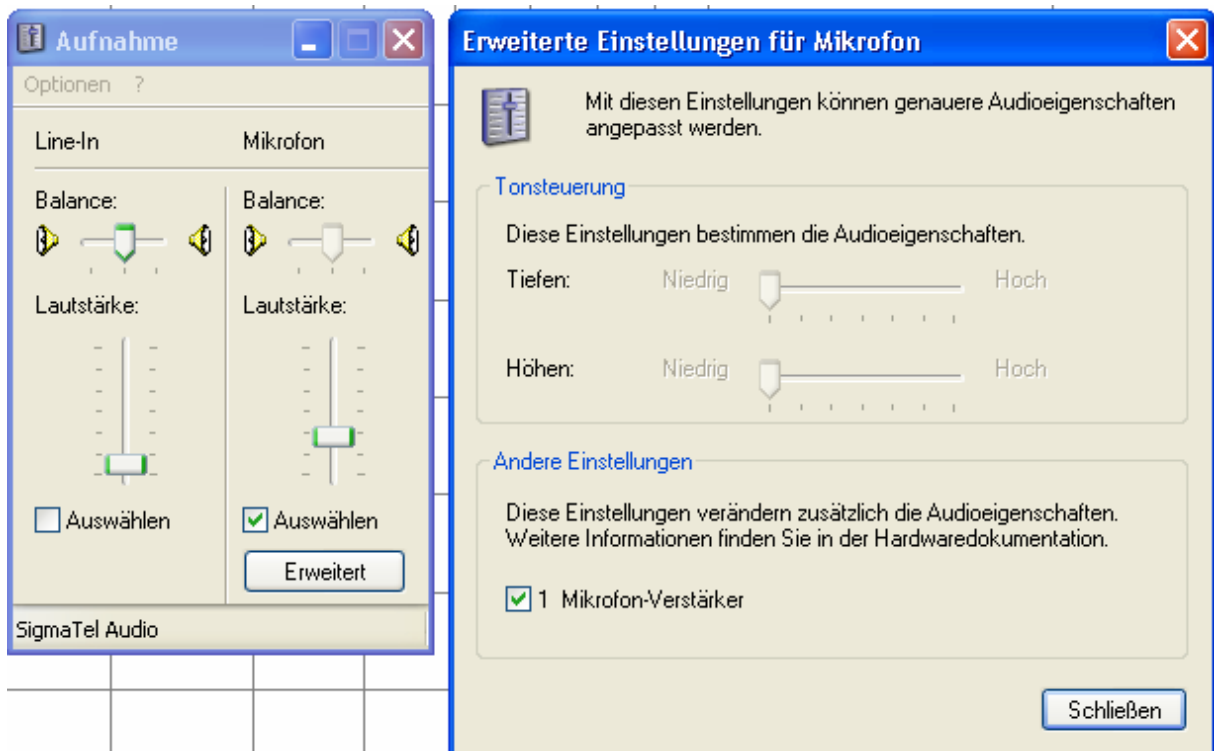
Please now follow the instructions of the Setup Program.

## 4. STARTING THE MEASUREMENT

### 4.1 SETTING UP THE SOUND CARD INPUT

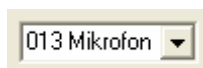


With one soundcard on the computer, it will be chosen from the program. With more than one soundcard, choose one by clicking in the menu.



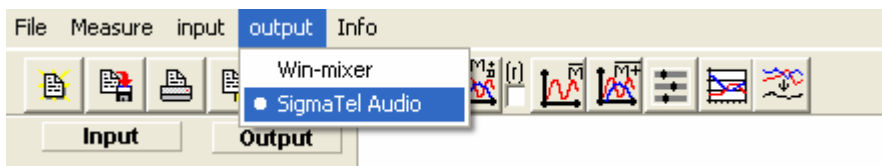
In the next step the Win-mixer is called up. In the RECORD menu the microphone is chosen. With the button EXPAND the menu is EXPANDED and OPTIONS for microphones is opened. Here you click on microphone amplifier. The options are also called Mic-boost or +20dB.

When using a microphone with preamplifier or when doing electrical measurements, LINE-IN is chosen. If a digital input's available, that can also be used.

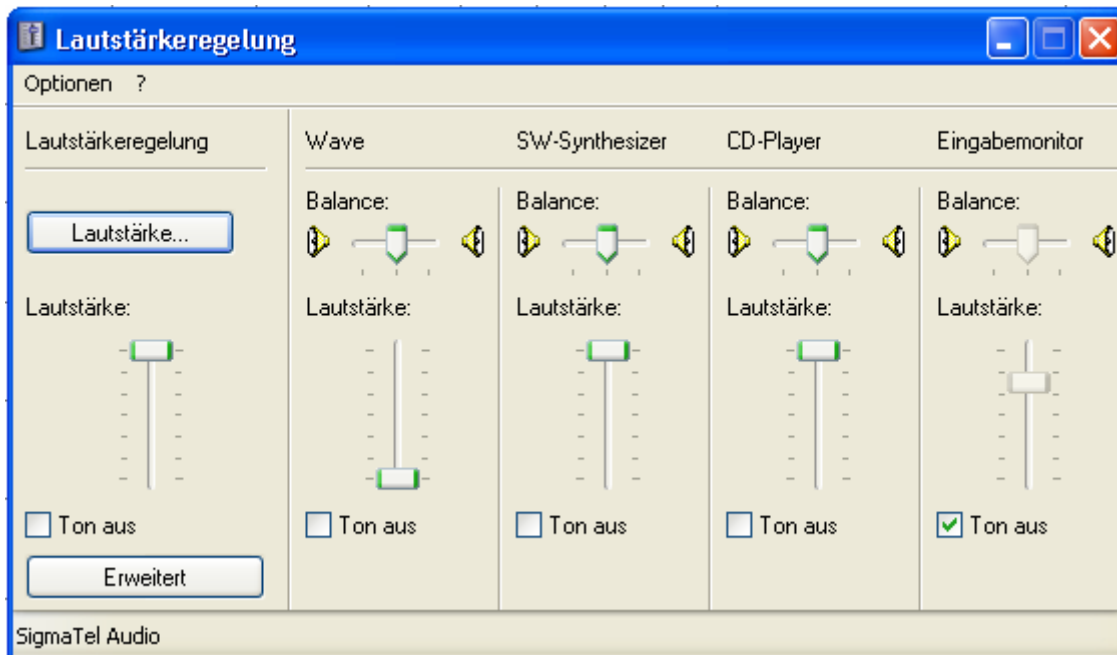


The inputs also can be chosen in the main menu.

## 4.2 SETTING UP THE SOUND CARD OUTPUT



With only one soundcard on the computer that is chosen from the program. When there are more than one soundcard, you click on the preferred one in the menu.



In the menu under sound level, the sound level control is brought to the top position and sound off not activated.

Under INPUT MONITOR, SOUND OFF activated, is checked.

Under WAVE, SOUND OFF must not be activated.

Under SOUND LEVEL CONTROL you can choose under EXPANDED the digital SPDIF output.

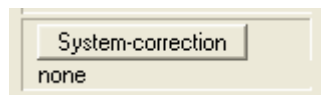


### 4.3 CALIBRATING THE SOUND CARD

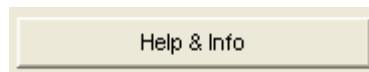
Before measurement, the soundcard is tested and a correction file is generated. The ATB PC program allows measurement using the internal generator. Here the measurement signal is generated by the soundcard. In the System-correction, a correction curve is generated for the input and output of the soundcard.

As an external generator, either a CD player or DVD player can be used. In that case, a correction curve for the CD or DVD player and the soundcard input is generated

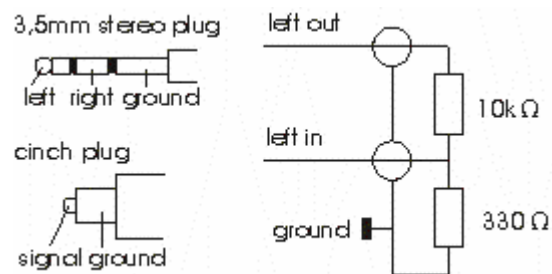
Here the system correction for the internal operation is shown. To do this the button in the main menu



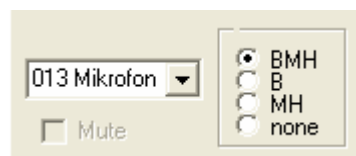
the System-correction menu is called up. In the menu a guide is opened with



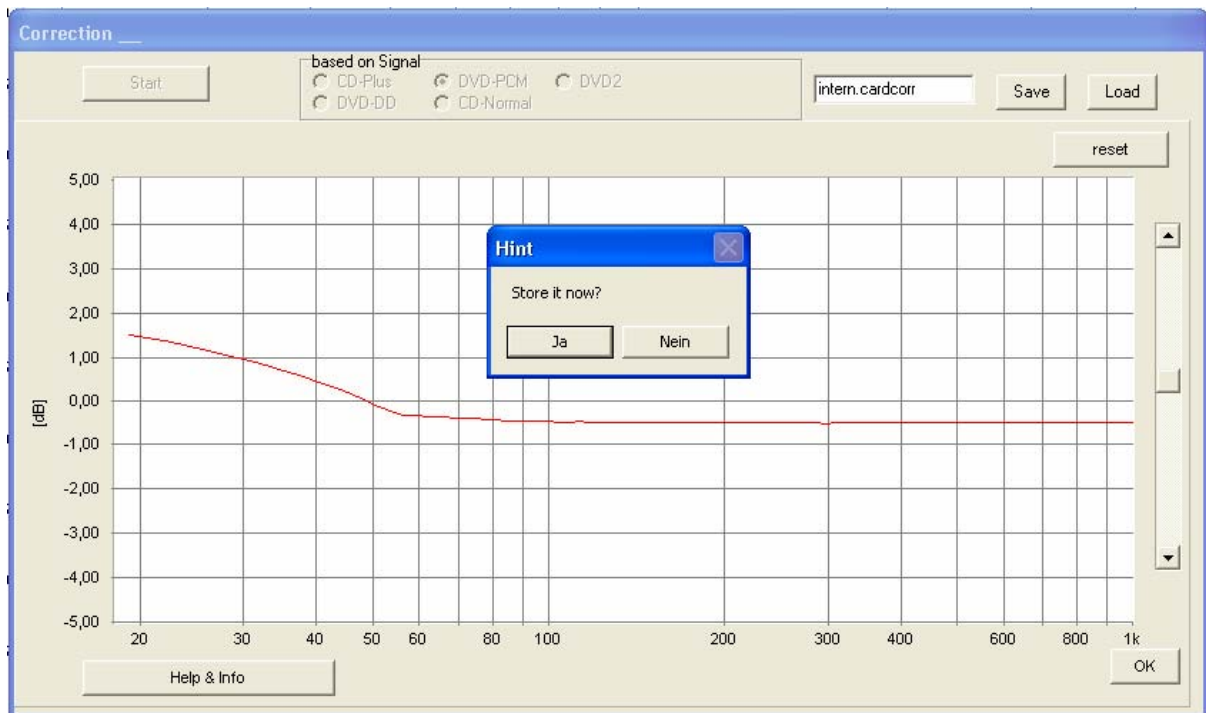
First of all the output of the soundcard is connected, using the test adapter cable, to the input of the soundcard. The test adapter has a circuit to adapt the soundcard output to the soundcard input. The circuit diagram is following:



After connecting the test adapter, for internal system correction the BMH signal with a frequency range of von 20Hz to 20kHz is switched on.

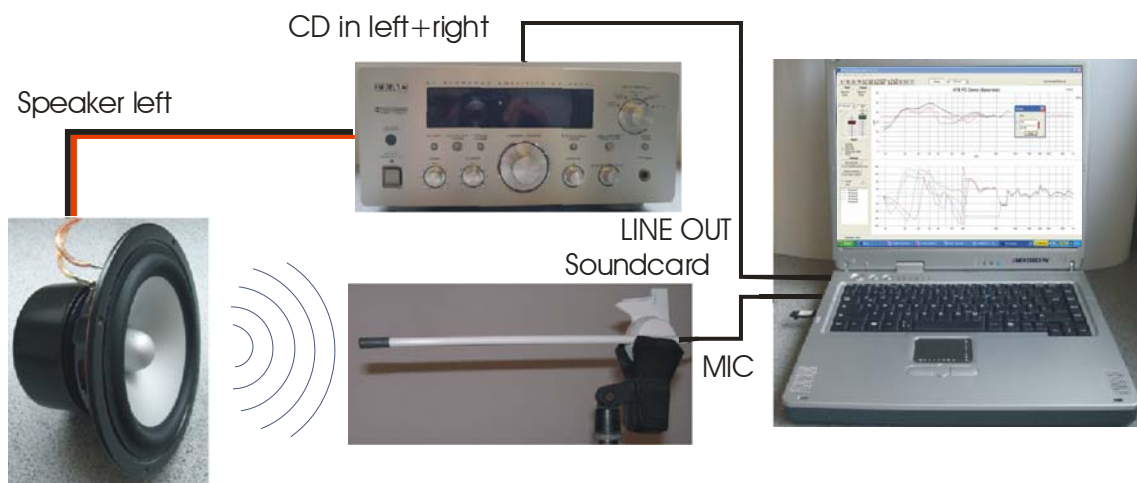


With START the measurement is started. Here the signal strengths are automatically setup. Following image appears, that suggests a successful calibration.



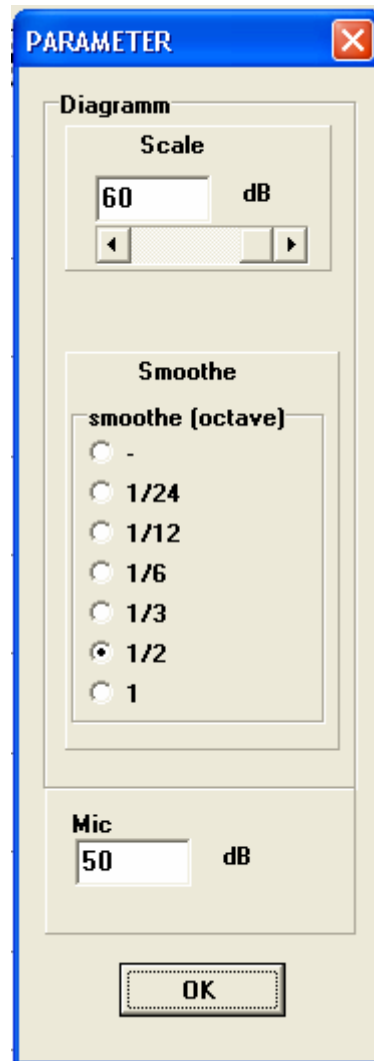
After saving, the correction curve is available for all following measurements and is automatically loaded at the start of the program.

#### 4.4 THE MEASUREMENT SETUP



With a double click on the desktop link atbpc.exe the program can be started.


Choose the menu point options  and set the value for smooth to 1 / 6



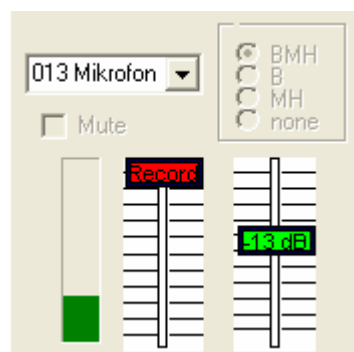
#### 4.5 THE MEASUREMENT

First of all the optimal positioning of the main speakers are to be found.

Choose the BMH output signal,

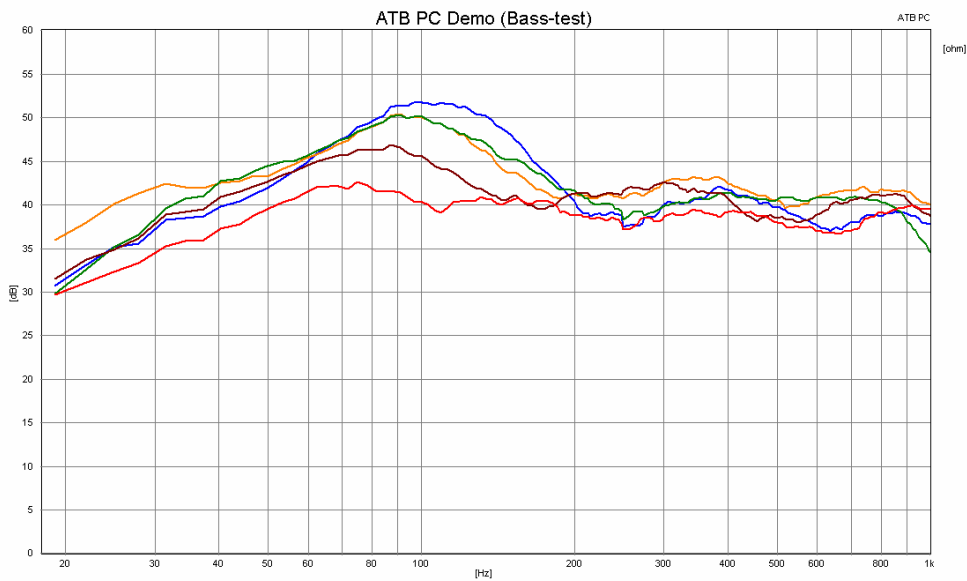
and click the measurement button. 


The output level display displays the microphone level.



With the linear level controller (Record), you can set the sensitivity of the microphone. The green bar should fill the display to one quarter.

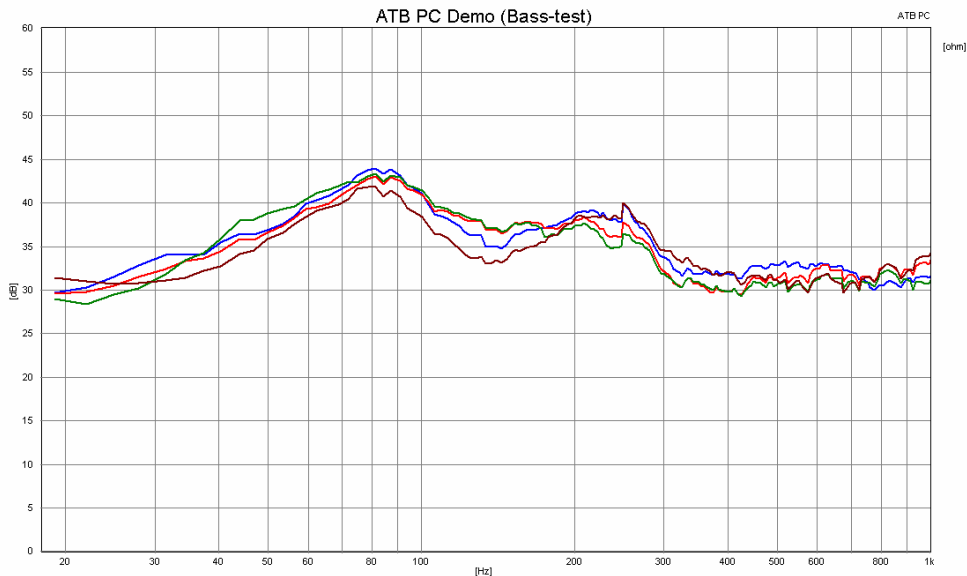
The microphone is over powered when the bar turns red.



The picture shows the first measurement. The positioning of the loudspeakers in the room is measured. On the first measurement, the speaker stands in the corner of the room, blue curve. On the next measurement, the speaker is turned to one side. The second measurement is started with „measure+“  . The result is the green curve. This function is also used for the following measurements. Up to 32 measurements are possible. The red curve shows a very appropriate positioning. The loudspeaker is positioned 80cm from the corner of the room with a wall distance of 30cm.

## 5. SETTING UP THE HIFI SYSTEM

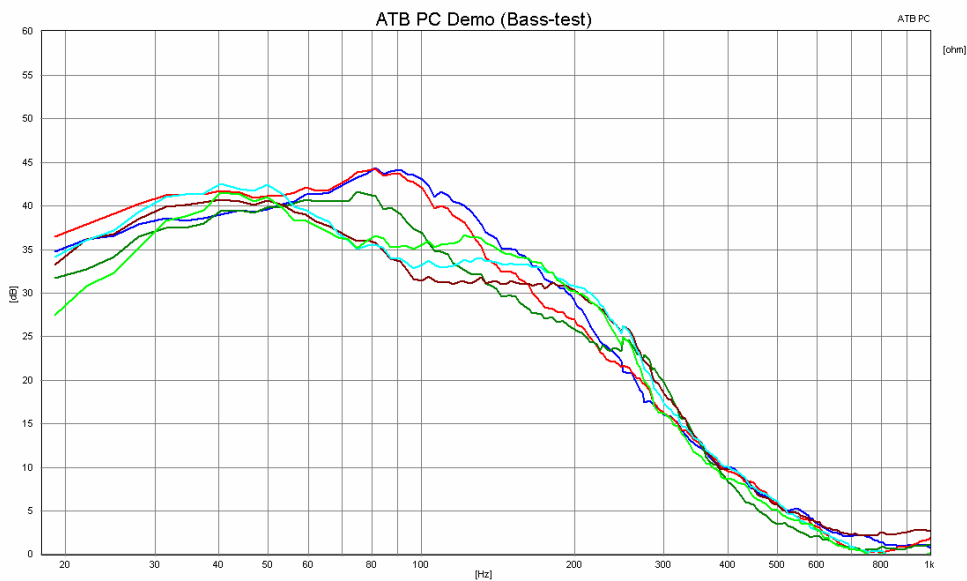
So that the sound quality of a HiFi system can be assessed, the measurements are carried out in listener position.



In the picture the frequency response of the main loudspeakers with different distances to the sidewalls are illustrated. The brown curve shows the corner position. With the blue curve, the distance measures 18cm, with 36cm distance green and 54cm red the difference is minimal.


### 5.1 THE SUBWOOFER

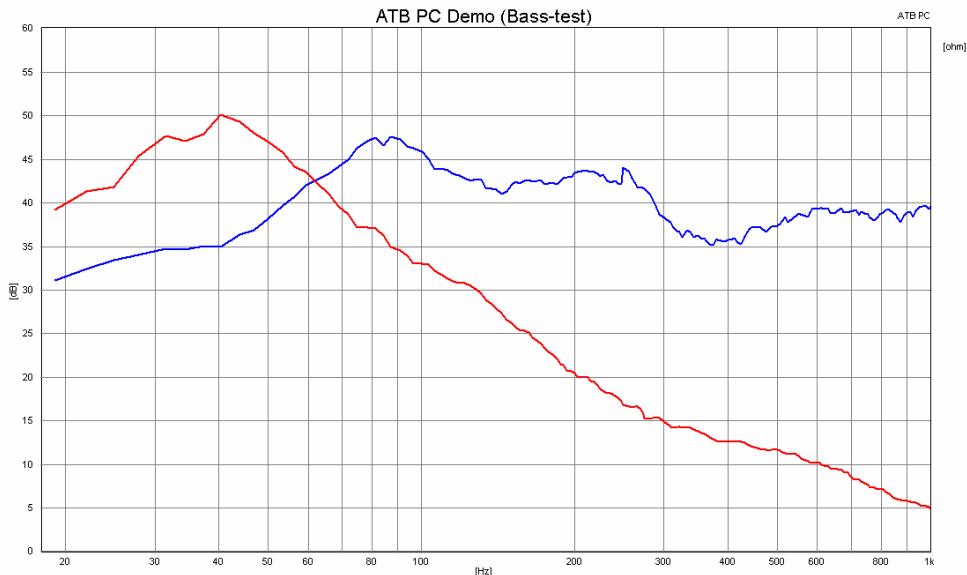
With a system that has an active subwoofer first, the optimal positioning of the box is looked for. For this, the highest frequency cut-off of the subwoofer crossover is chosen. During this measurement the main loudspeakers are not connected.



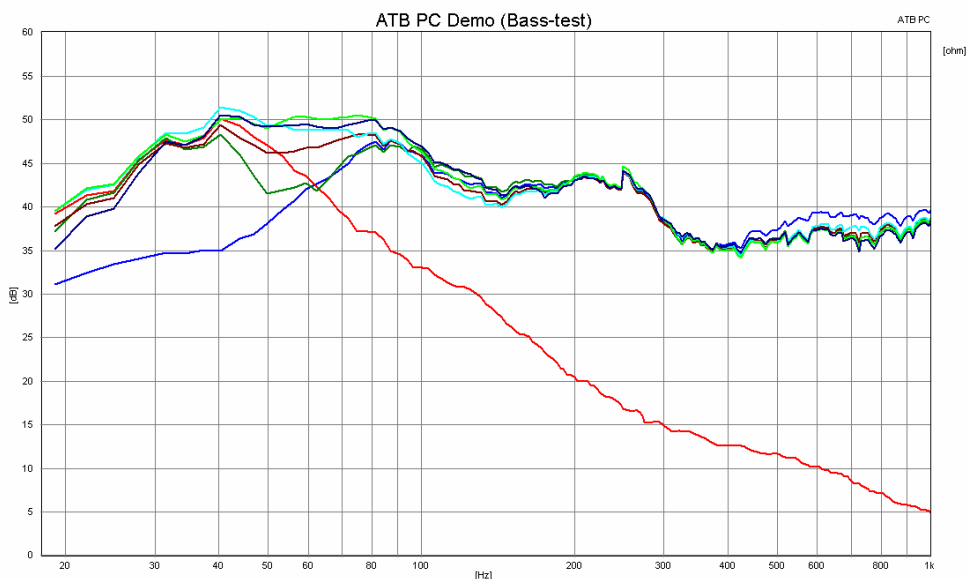
The measurements show the frequency sweeps of the subwoofer. The red and blue curves show a too strong over-rise. The green curve is ideal. The light green, light blue and brown show a deletion.

To setup the subwoofer crossover the main speakers are put to the optimal position and measured without the bass. Afterwards the subwoofer is connected and setup. Here the

measurement function „Add. duration measure“  is used. With this measurement function, the measurement is constantly repeated, so that a change of the setup is immediately monitored.

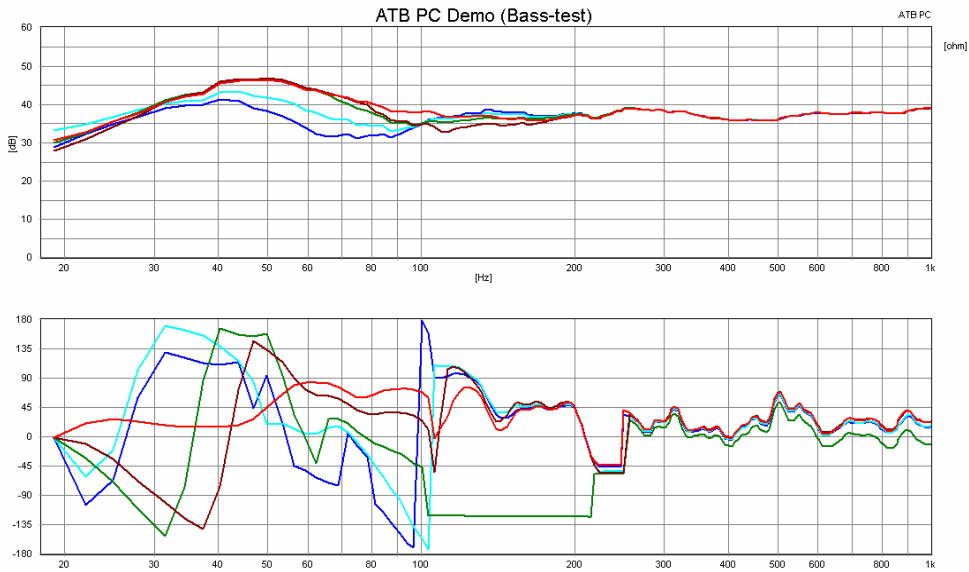


The red curve shows the subwoofer and the blue the main speaker. On the subwoofer crossover, the crossover frequency and sound level are setup, so that both curves accomplish each other. The sound level frequency curves of the speakers fit well together. When the loudspeakers are run together, the phase frequency curves also have to fit each other.



The picture shows the resulting frequency sweep with different phase settings of the subwoofer crossover. The green curve with a  $180^\circ$  setting of the controller creates a large breakdown. The brown curve with  $90^\circ$  looks a lot better. The next settings up until  $0^\circ$  can not exactly be judged. By ear though, there is still a big difference between the settings. This is due to the impulse response that is only correct when the phase curves fit.

The ATB PC has an acoustical phase measurement that is unique. For the measurement, the microphone is positioned between one of the main speakers and the subwoofer. If both loudspeakers are further apart than 1m, they can be put closer together. This will not influence the phase measurement.



In the phase frequency sweep the different acoustical phase sweeps of the main speakers and the subwoofer are illustrated. The blue curve shows the 180° turn of phase. The phase setting of 0° is shown with the red curve. At 0° the frequency sweep is the best balanced. The 0° setting is only for this single loudspeaker the right one.

## 6. SETTING UP THE SURROUND SYSTEM

The optimal operation of a surround system is not possible without measurements. The optimal positioning is found as described for a HiFi system. With a surround system following settings are also to be made.

### 6.1 DISTANCING

The distance between the single speakers is found best with a ruler. It does not depend on a cm, as the delay is usually in 0,34cm steps.

### 6.2 SOUND LEVEL ADJUSTMENT

The most impressive surround sound quality is only achieved, when all loudspeakers have the same sound level at the place of hearing. To set the sound level every amplifier or receiver generates a test signal that is reproduced from the loudspeaker one after another. The test signal is switched on and the loudspeakers are first setup to the same sound level by ear. This setting is then controlled with the ATB. The microphone is then placed at the place of hearing at ear height. The test signal is switched on the amplifier. Then the

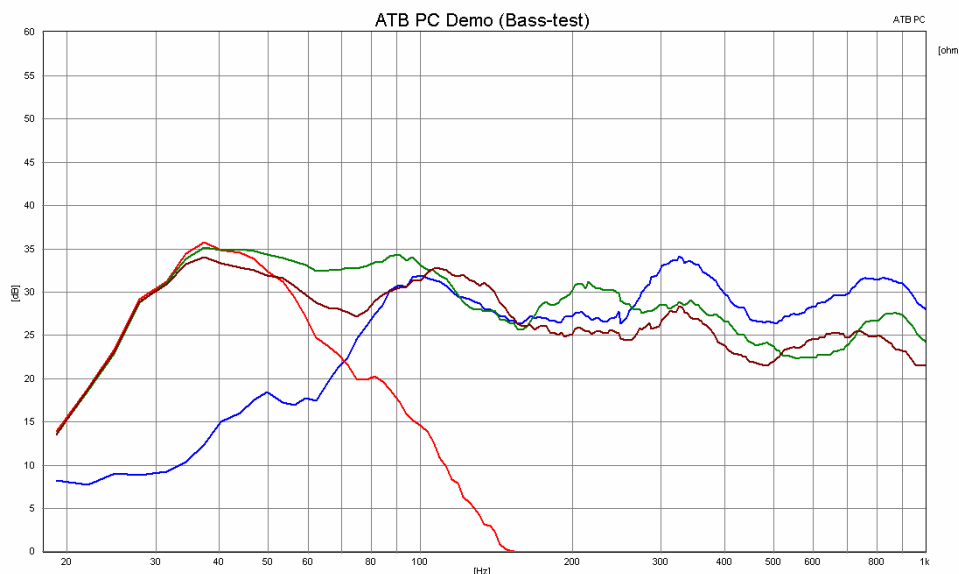
measurement is started with „Duration Measure“



. The measurement curve shows a maximum for frequencies lower than 1kHz. This is set at the same height for all loudspeakers.

### 6.3 ADJUSTING THE SUBWOOFER

To adjust the subwoofer to the surround system the ATB PC DEMO program has the measurement signals MH, middle-high ton, and B, bass. The MH signal is used for measurement, when the front loudspeakers are driven with the setting Small. This setting cuts down the low frequency range of the loudspeaker. The MH signal has a frequency range accordingly. The B signal corresponds to the frequency range of the amplifiers subwoofer output.



The picture shows the frequency range of satellite and subwoofer.



A subwoofer satellite is to be setup by measurement. The microphone is positioned at the hearing position at ear height. The first step is measuring the satellites.

Attention: When changing the connections, the input of the surround amplifier is switched off and the subwoofer sound level controller turns down to zero.

Both loudspeakers are connected to the output of the soundcard. The measurement signal MH is chosen. The measurement is started with the function DURATION MEASURE. The sound level is raised, until the measurement curve corresponds with the blue curve.

After that, the subwoofer is connected to the soundcard output.

The highest crossover frequency for the subwoofer crossover is chosen, i.e. 200Hz. As measurement signal B is chosen. The measurement is started with ADD. DURATION MEASURE. The sound level controller of the subwoofers is turned up, until the red curve appears. The sound level of the loudspeaker is now adjusted.

The next step consists in the adjustment of the phase. For this, the subwoofer is connected to the satellite that is nearest to the subwoofer. The measurement signal BMH is chosen the measurement is started with ADD. DURATION MEASURE. Next to the switchbox, there is a small area with a tick. So that the last measurement is not written over, the tick is erased with a click on that area. The phase adjuster of the subwoofer is turned, until the green curve corresponding frequency sweep is measured. The crossover from subwoofer to satellite should be visible now not more. Then the other satellite is measured together with subwoofer, the brown curve. That one does not necessarily have to be as well balanced as the green one.

The sound level of the subwoofer is also a matter of taste. An adjustment by ear is by all means a good idea.

It is easier and more precise to use the surround test CD to adjust the surround system.