

WHERE IN TIME IS YOUR SUB-WOOFER

BY DOCTOR WHO

As our progress on the latest version of the DEQX cal software is progressing we have found some useful tools available in the current release version of DEQX cal v2.01 & v2.58

The first of the useful tools is a way to adjust for the time alignment of sub-woofer with the main single or bi-amp speakers using the room measurement to proved measured display of the difference in time of the two impulse response allowing accurate calculation of the required delay needed to time align both.

As you will see, using the existing 2.01 and 2.58 releases this process is a little convoluted, but once you've done it a few times it actually only takes several minutes to do. We plan to largely automate this in a future revision following the imminent Rev-3 release.

The steps required are listed below.

The following explains how to use the project viewer with the use of room measurements to see the delay required for the Main Speakers or Sub-Woofer and how to make the required adjustments in the configuration wizard.

First open the DEQX cal software and load your current project file and follow the next set of steps,

1. Create a room measurement as you would do using the Measure Room wizard and name this say "NO TIME Correction"
2. Following the room measurement open the project explorer from the View menu (fig.1)
3. In the viewer window select 'Room Measurement' and expand this folder to find the new room measurement (fig.2 & fig.3)
4. Select either the Left or Right main speaker and right click a new menu (fig.4) should appear select 'view', and a new viewer window should open with a frequency plot displayed. See (fig.5)
5. With the new viewer window selected click the small button icon 'time' above PDC control Panel button at the middle top of the DEQX cal window.
6. The viewer now shows the impulse response for the single or bi-amp speaker. Repeat the above steps for the Bass or Sub-woofer as shown in (fig.7, fig.8)
7. Align both viewer windows as shown in fig.9 change the view to 'Time' as previously for the single or bi-amp speakers.
8. Select 'single' or 'bi-amp' viewer window and click on the 'chart' button in tool bar then click on Axes Limits and un select the time Autoscale leaving the Max at 50ms. Repeat this for the Bass / Sub-woofer.
9. In fig.12 the impulse response time difference can be seen and calculated.

Use the first positive peak as the point of reference. As can be seen in fig.12 the sub-woofers impulse is at 33ms and the main speaker is at 16.3ms, so the subwoofer is lagging behind the main speaker by $33 - 17 = 16$ ms. This may seem counterintuitive because that represents about 16 feet of distance, but remember that filter delay can be particularly lengthy for bass, and especially if linear-phase filters are used for the subwoofer. So using Butterworth or Linkwitz Riley filters for subwoofers is recommended if video is used so that overall delay is less than half of one video frame (<20ms).

10. To correct this we need to add this delay of 16ms to the main speaker's single or bi-amp correction filter/s. Open your current configuration as shown in fig.13 double click the single or bi-amp speaker this opens the filter properties window, from the tab menu at the top to select Time/Level and in the box Delay/Offset type 16 (the difference in milliseconds of the two impulse responses in fig.12)
Do the same for both Left & Right speakers and resave the project
See fig.13, fig.14, fig.15 & fig.16
11. As can be seen displayed in fig.17 the 16ms of delay has been added to the filter properties for the single or bi-amp speaker.
12. To confirm the results re-measure room and repeat steps 2 – 9.As can be seen in fig.18 the impulse response for both the single or bi-amp speakers are now in correct time alignment with the Bass or Subwoofer.
13. **Note; don't move the microphone until you have done the verification measurement.**

fig.1

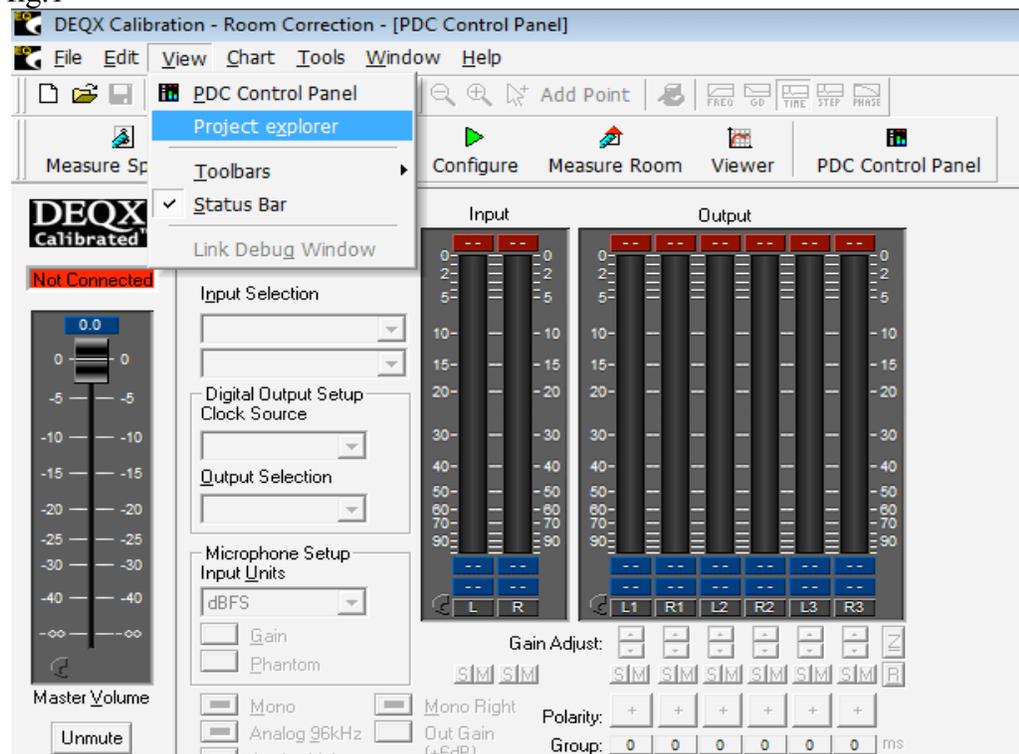


fig.2

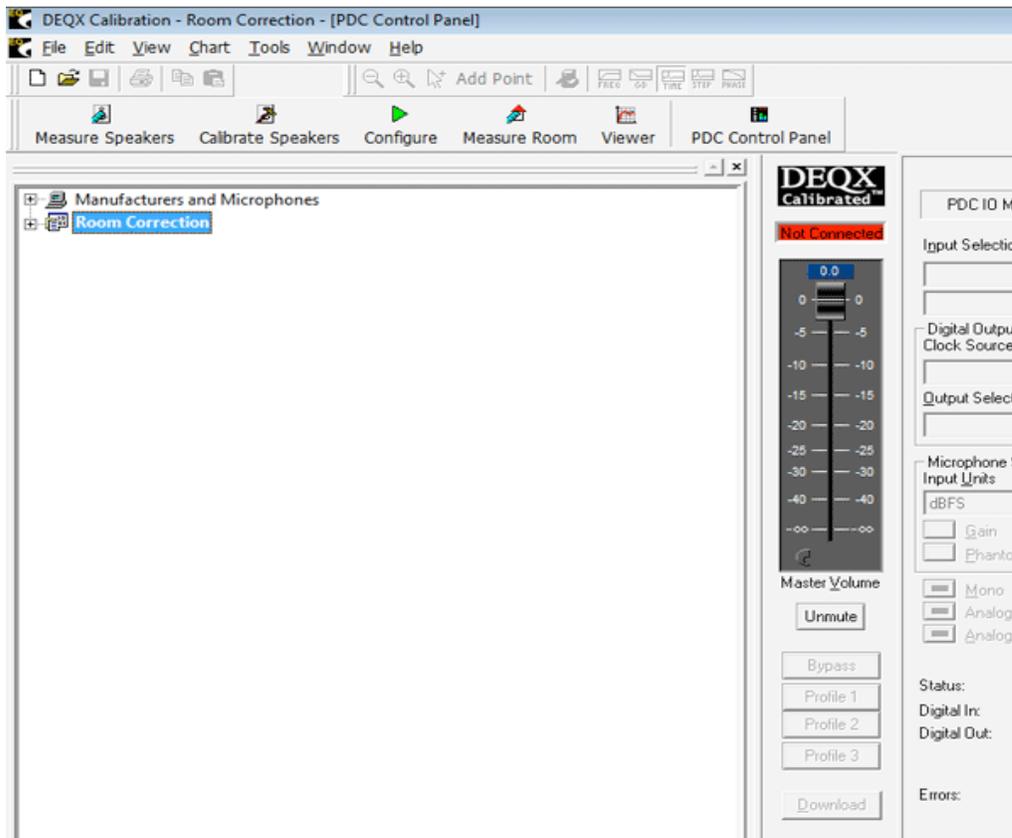
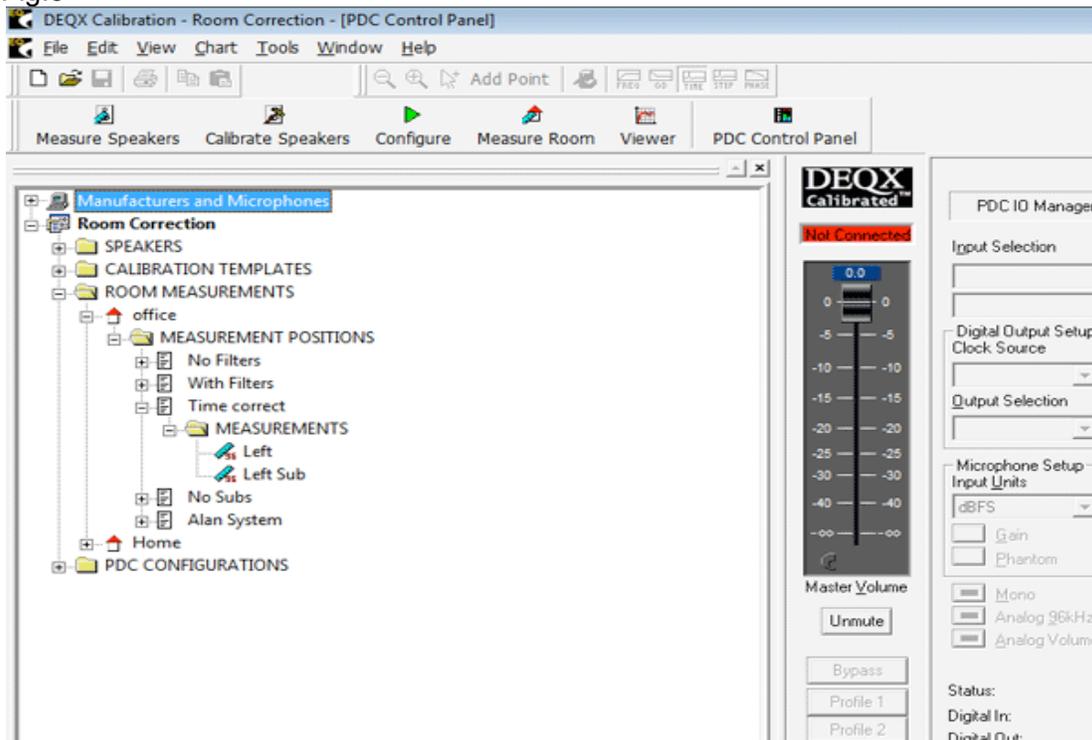
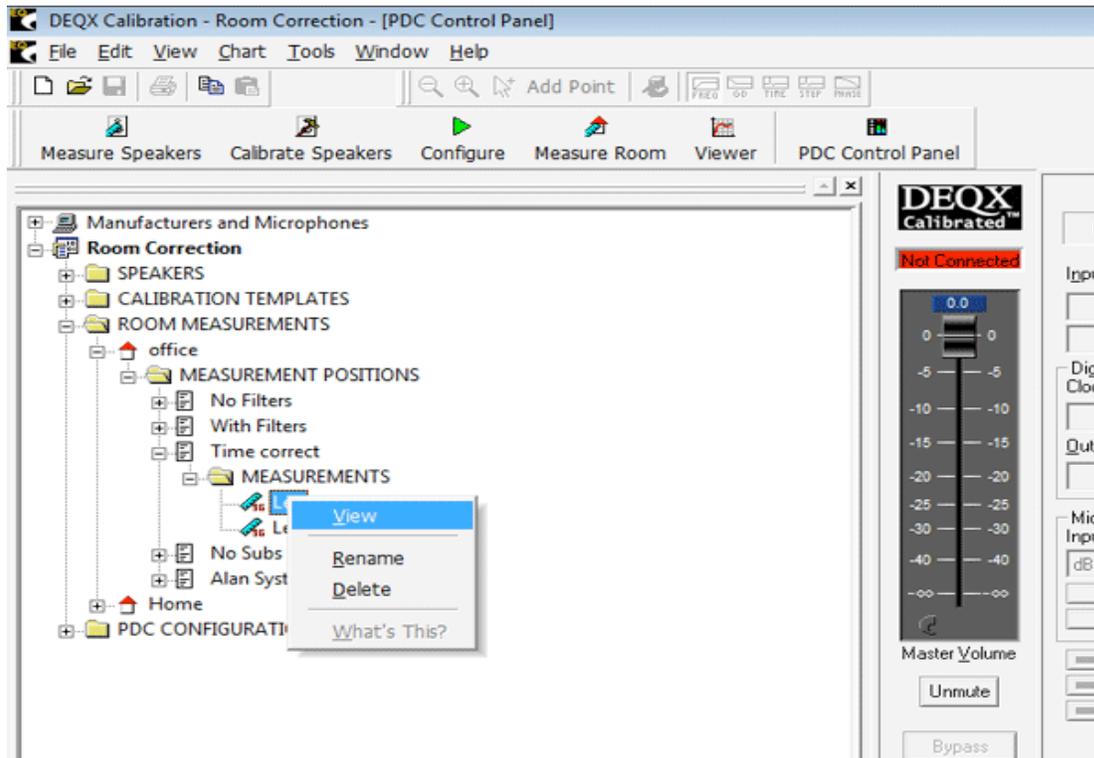


Fig.3



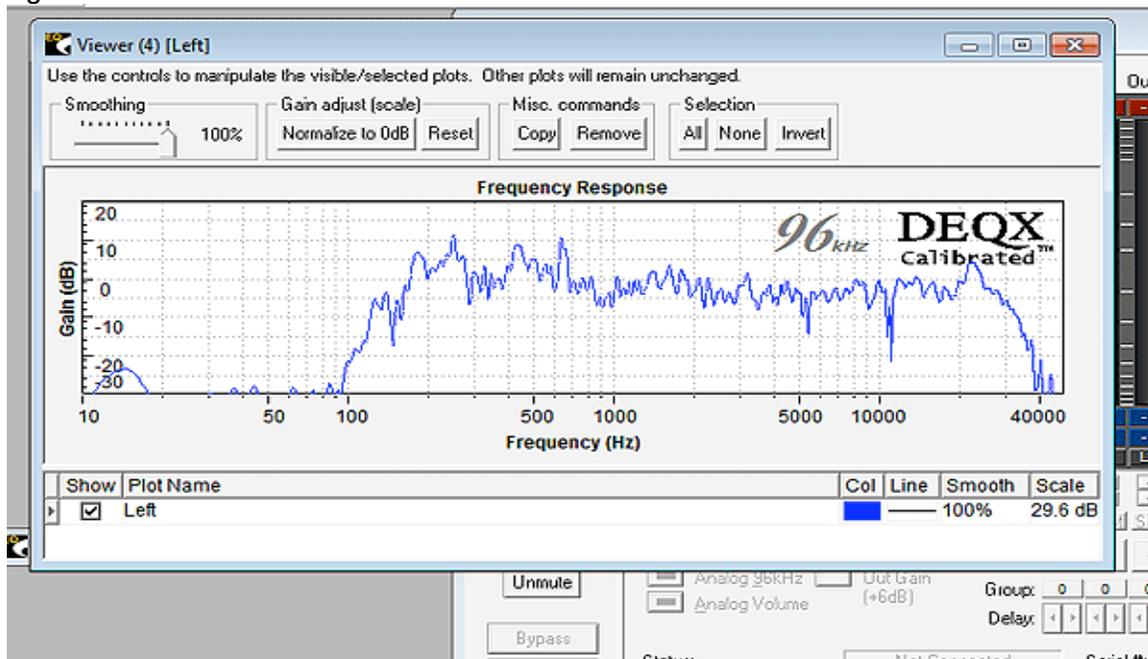
4. Select either the Left or Right main speaker and right click a new menu (fig.4) should appear select view a new viewer window should open with a frequency plot displayed. See (fig.5)

fig.4



5. With the new viewer window selected click the small button icon Time above PDC control Panel button at the middle top of the DEQX cal window.

Fig.5



6. The viewer now shows the impulse response for the single or bi-amp speaker. Repeat the above steps for the Bass or Sub-woofer as shown in (fig.7, fig.8)

Fig.6

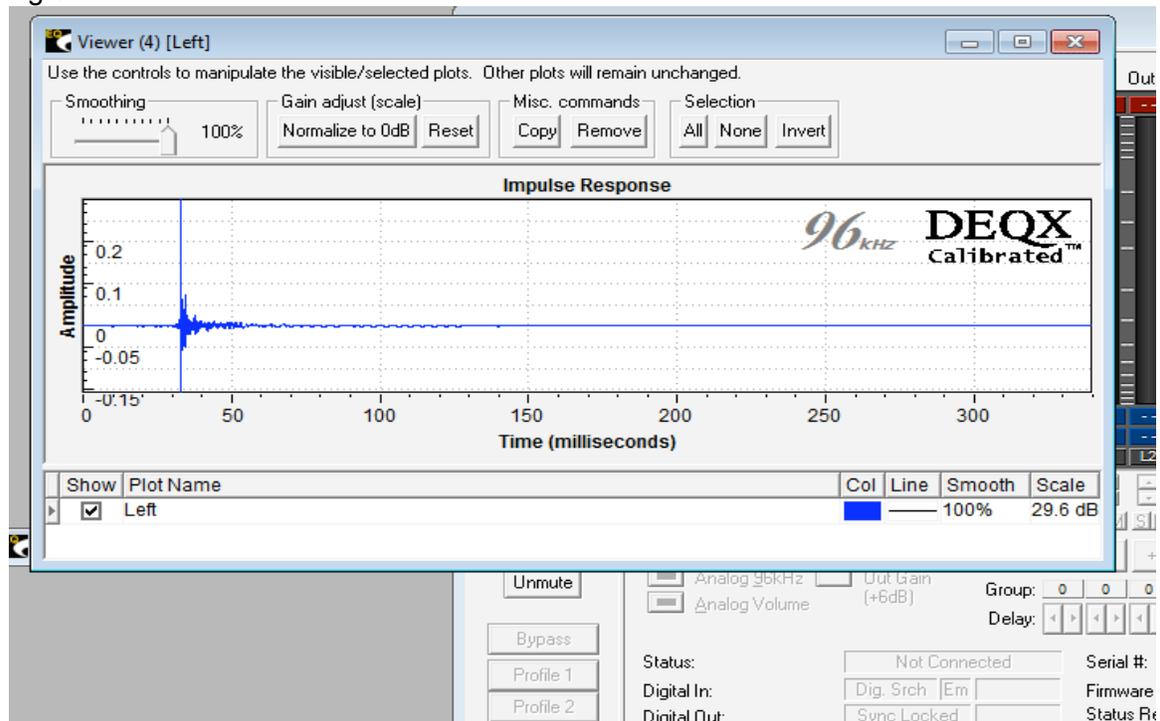


Fig.7

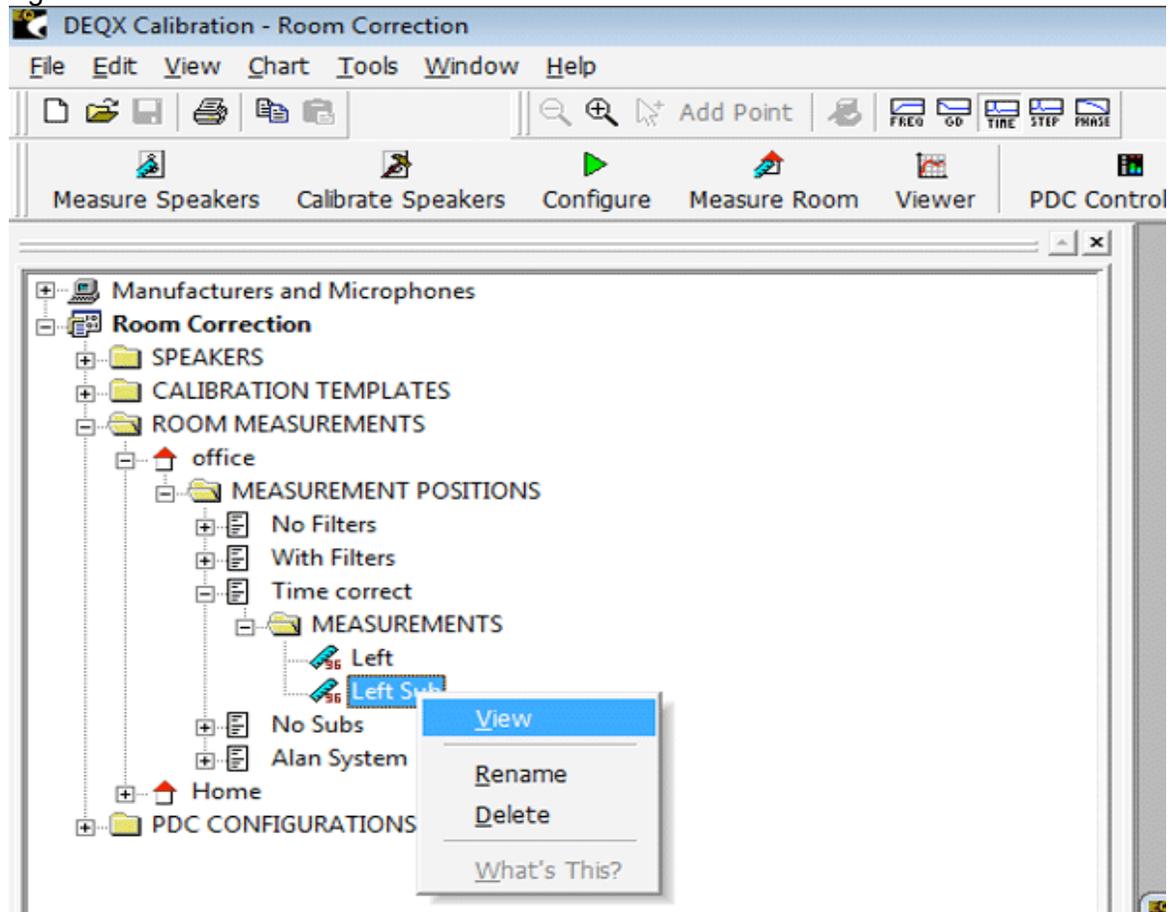
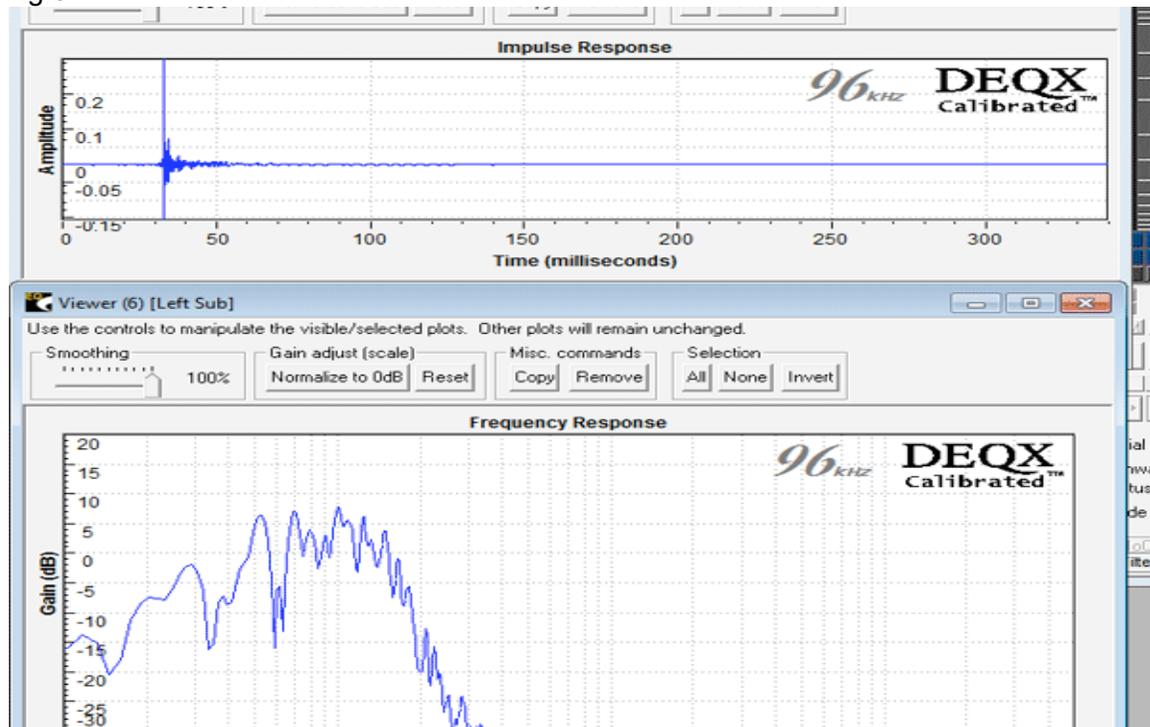
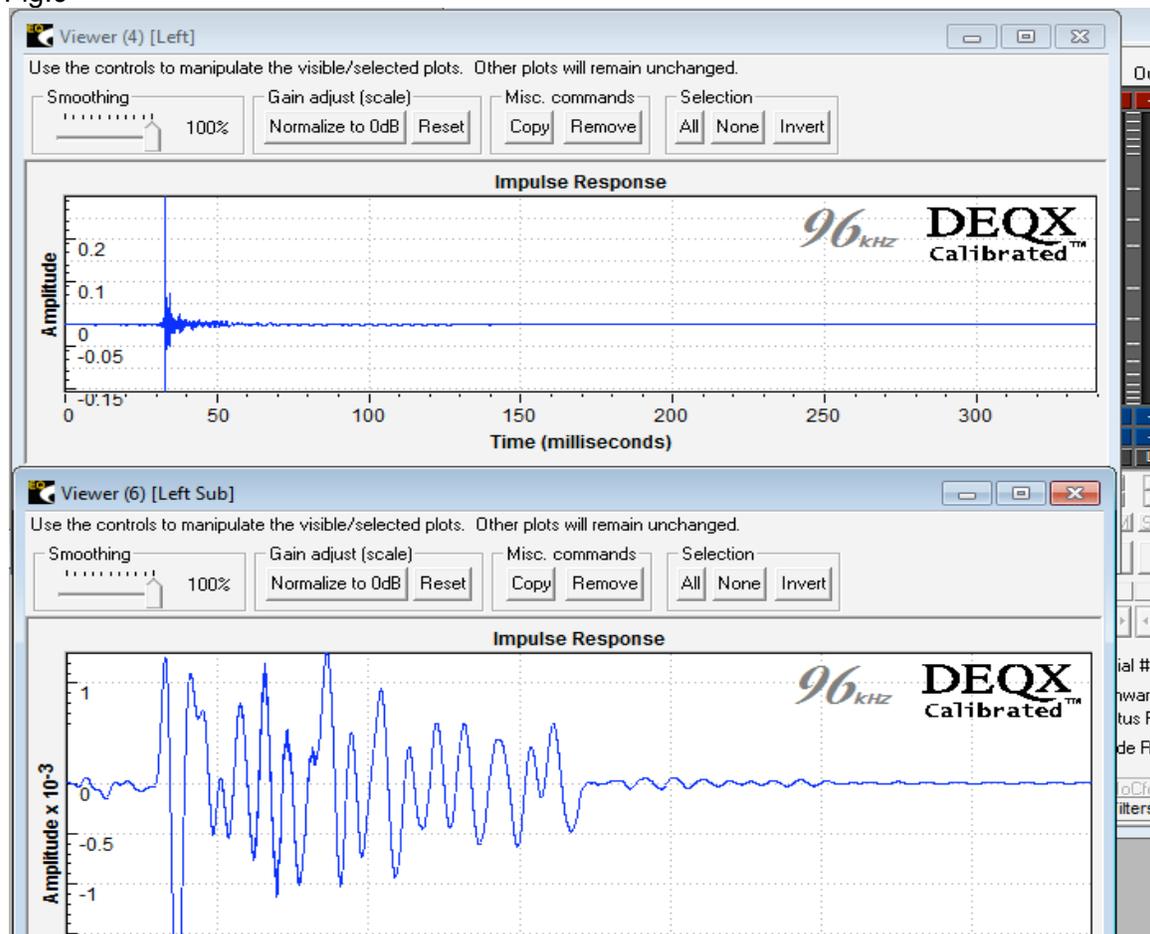


Fig.8



7. Align both viewer windows as shown in fig.9 change the view to Time as done for the single or bi-amp speakers.

Fig.9



8. Select single or bi-amp viewer window and click on the chart button in tool bar then click on Axes Limits and un select the time Autoscale leaving the Max at 50ms. Repeat this for the Bass / Sub-woofer.

Fig.10

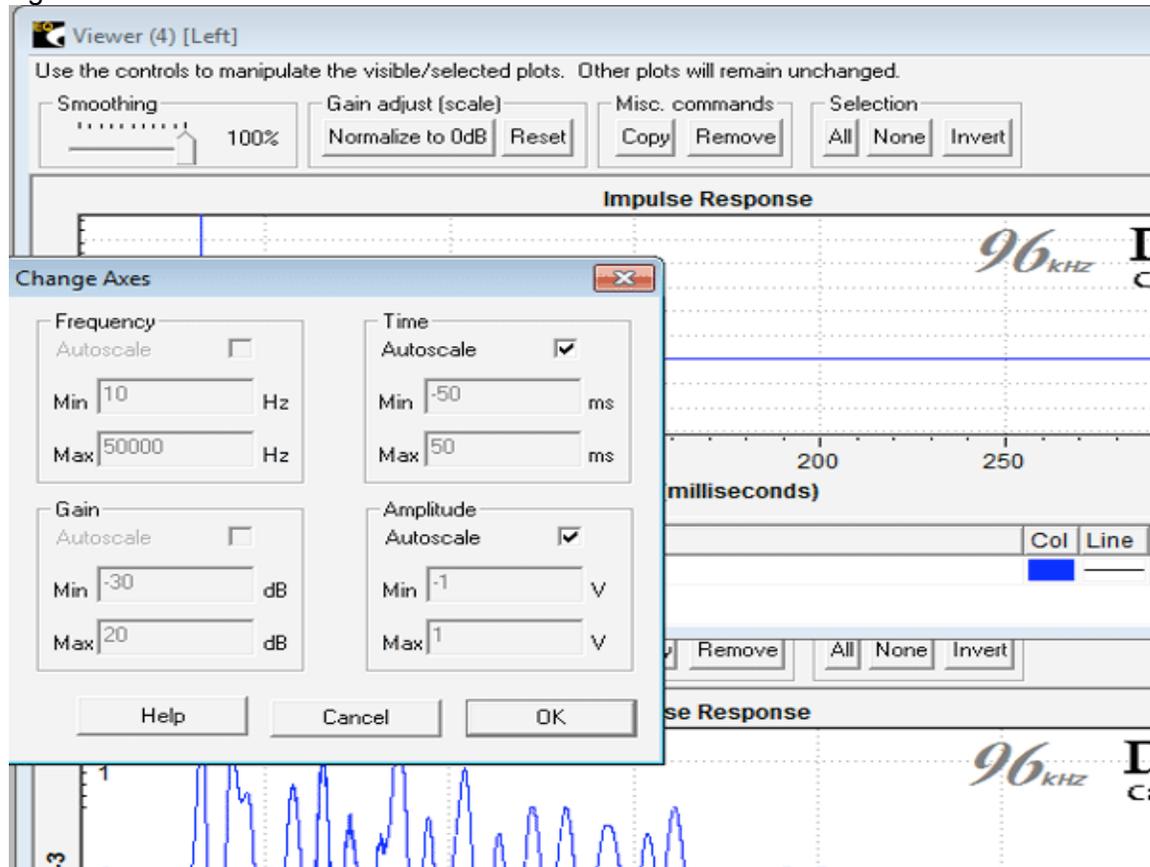
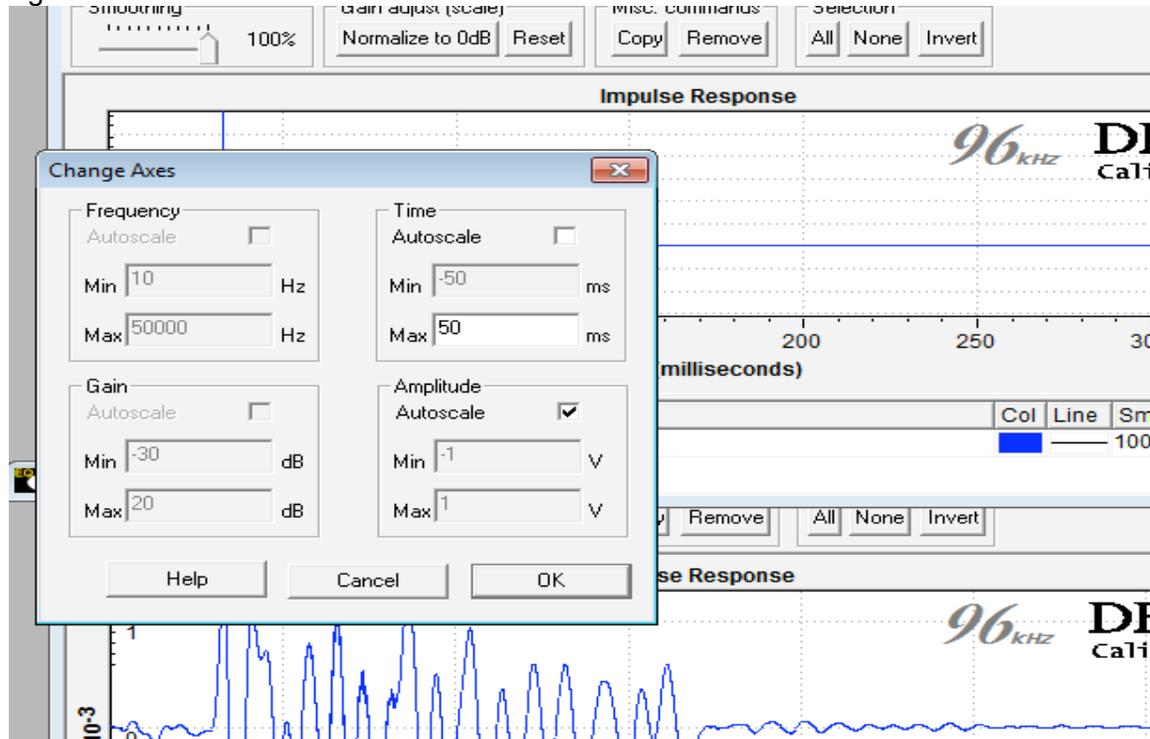
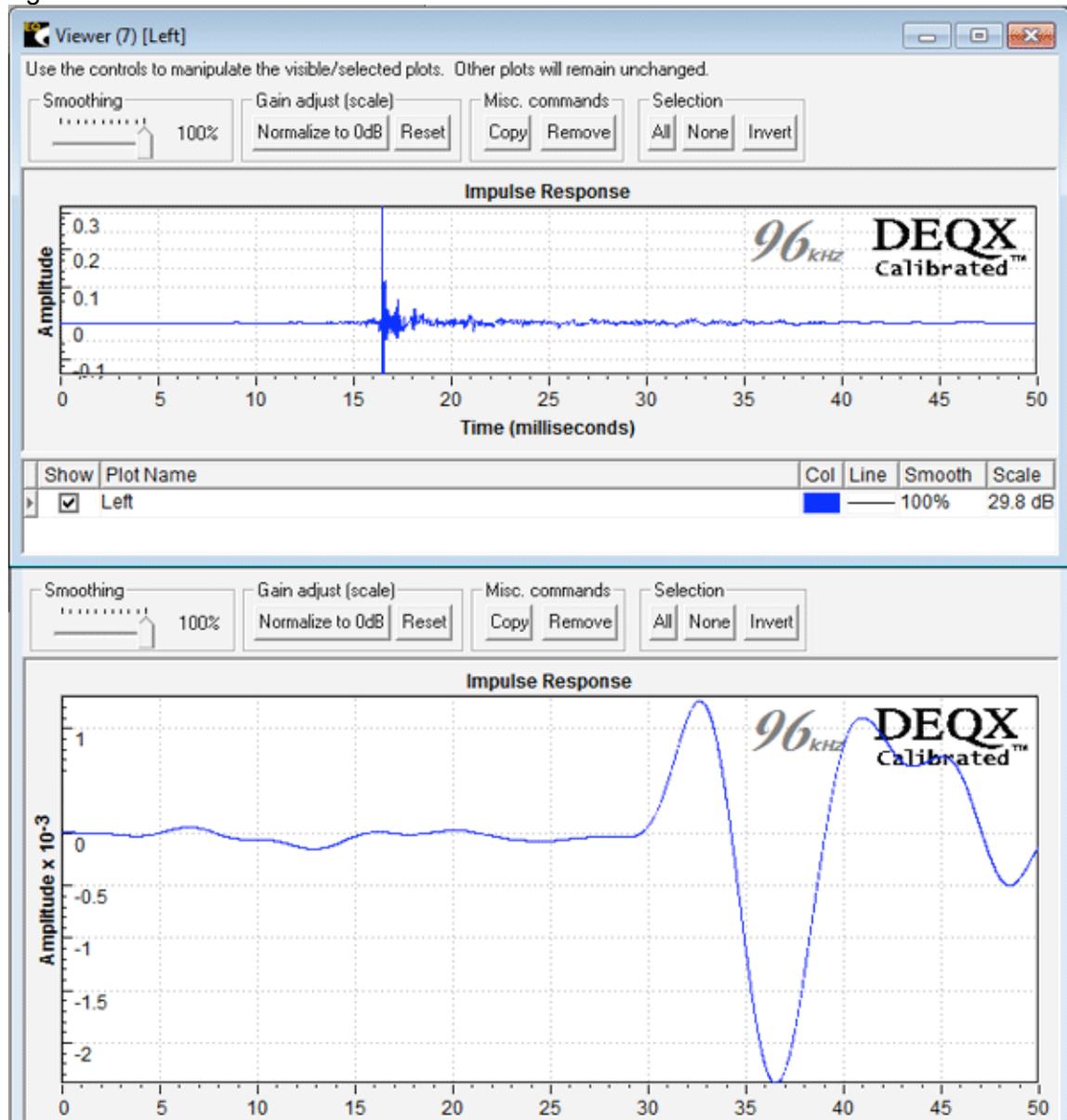


Fig.11



9. In fig.12 the impulse response time difference can be seen and calculated. Use the first peak as the point of reference. As can be seen in fig.12 the sub-woofers impulse response is 16ms slower than the single or bi-amp's impulse.

Fig.12



10. To correct this we need to add a delay of 16ms to the single or bi-amp correction filter. Open your current configuration as shown in fig.13 double click the single or bi-amp speaker this opens the filter properties window; from the tab menu select Time/Level and in the box Delay/Offset type 16 (the difference in milliseconds of the two impulse responses in fig.12)

Do the same for both Left & Right speakers and save the project.

See fig.13, fig.14, fig.15 & fig.16

PDC configuration window

Fig.13

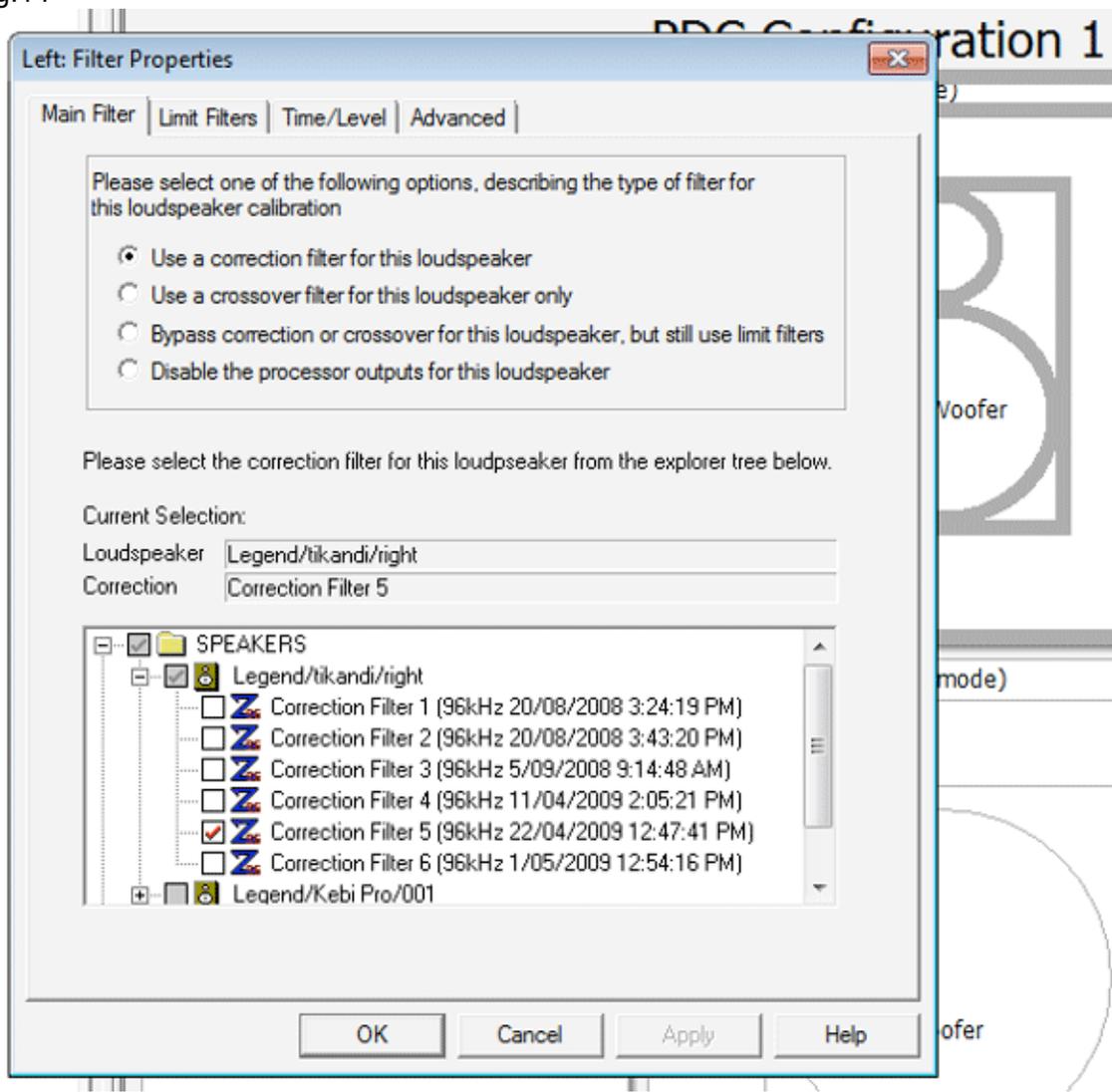
PDC Configuration 1 - Profile 1

The image displays a software interface for configuring PDC (Profile 1) with four channels. Each channel has a legend and a list of filter properties:

- Left - (Calibrated mode)**
 - Legend/tikandi/right
 - Correction Filter 5
 - 160Hz, 48dB/octave: Woofer
- Right - (Calibrated mode)**
 - Legend/tikandi/right
 - Correction Filter 5
 - 160Hz, 48dB/octave: Woofer
- Left Sub - (Calibrated mode)**
 - Legend/Kebi Pro/left
 - Correction Filter 5
 - 30Hz to 160Hz: Subwoofer
- Right Sub - (Calibrated mode)**
 - Legend/Kebi Pro/right
 - Correction Filter 5
 - 30Hz to 160Hz: Subwoofer

Filter properties window

Fig.14



Filter properties window Time / Level tab

fig.15

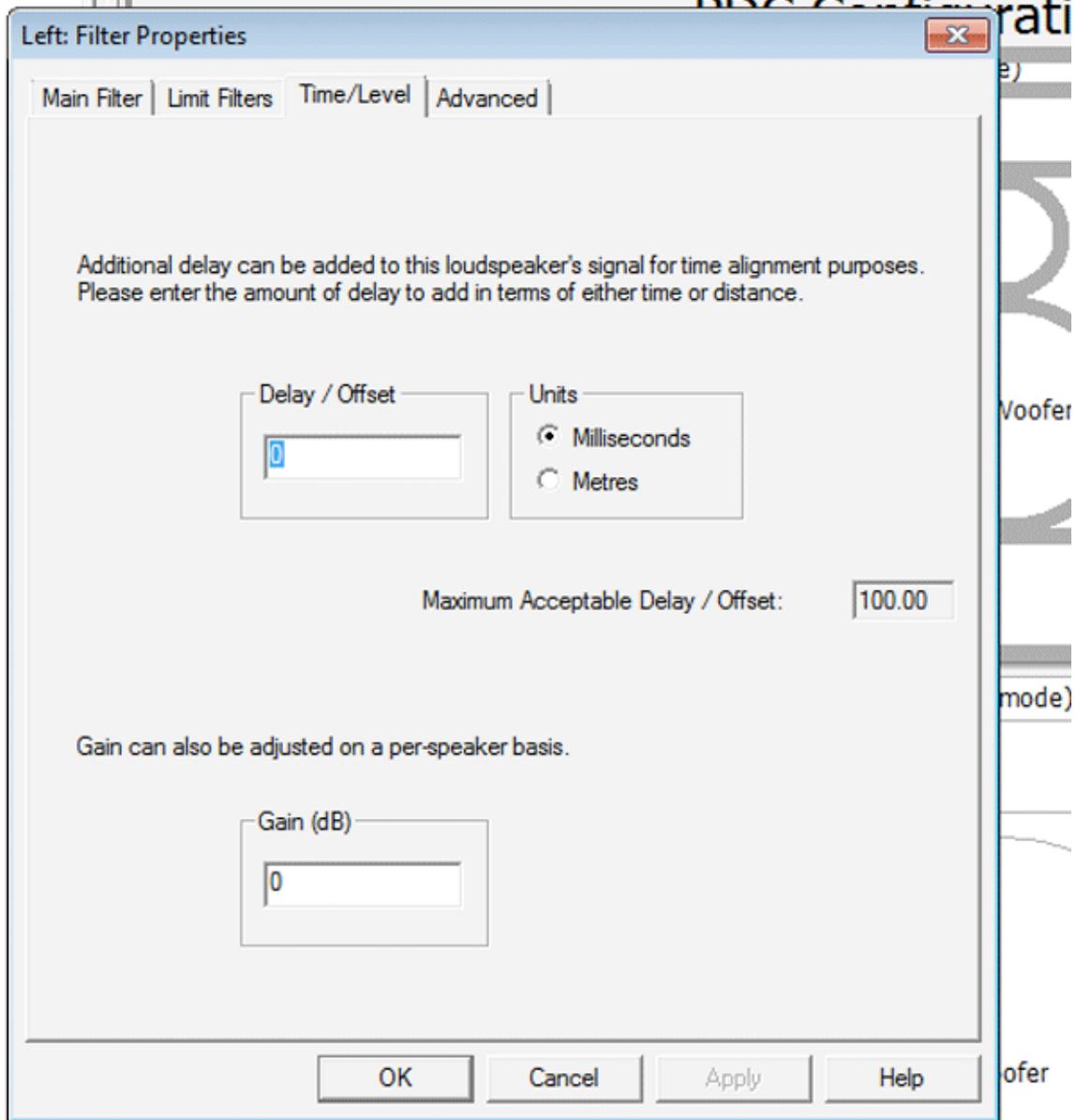
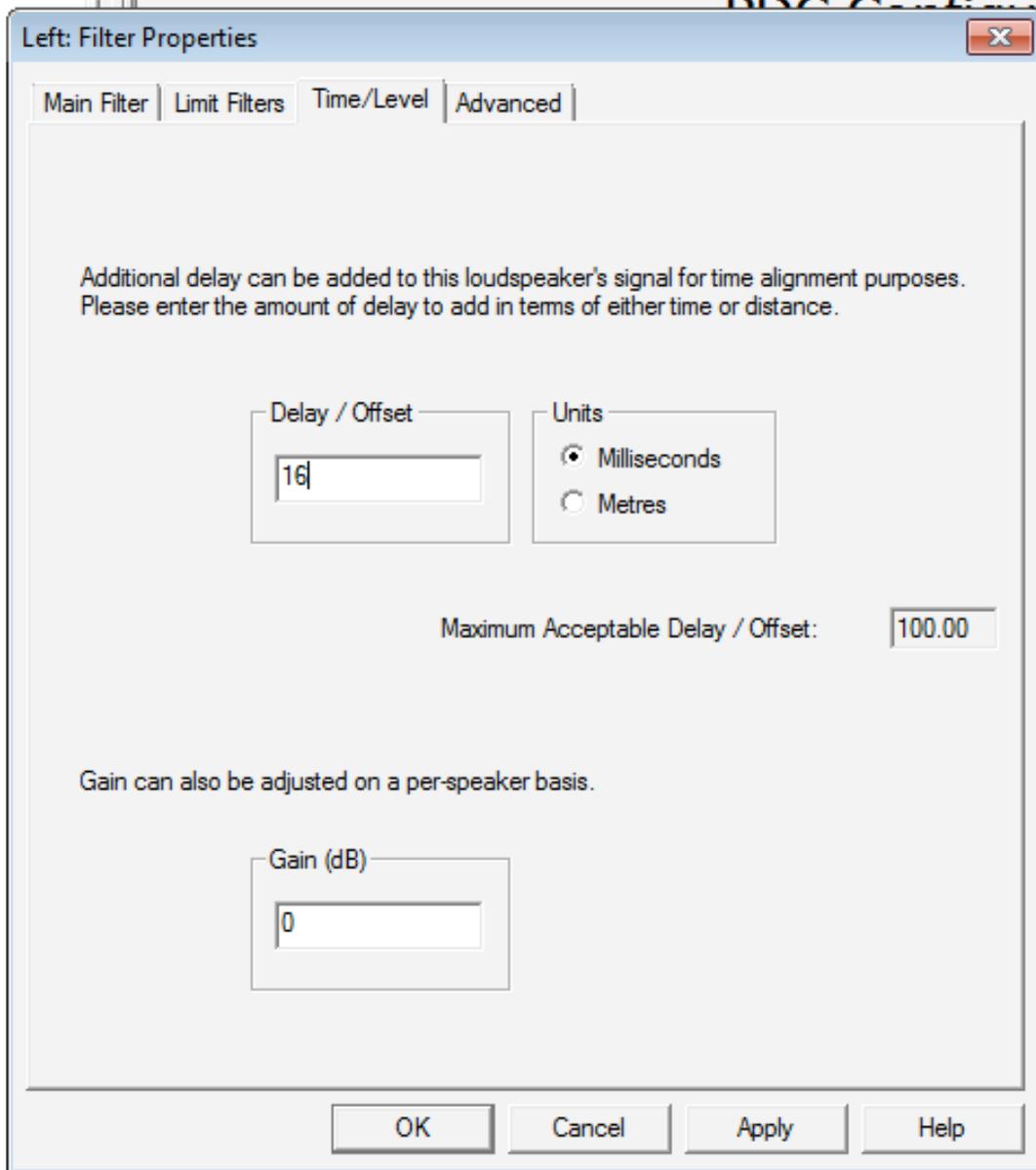
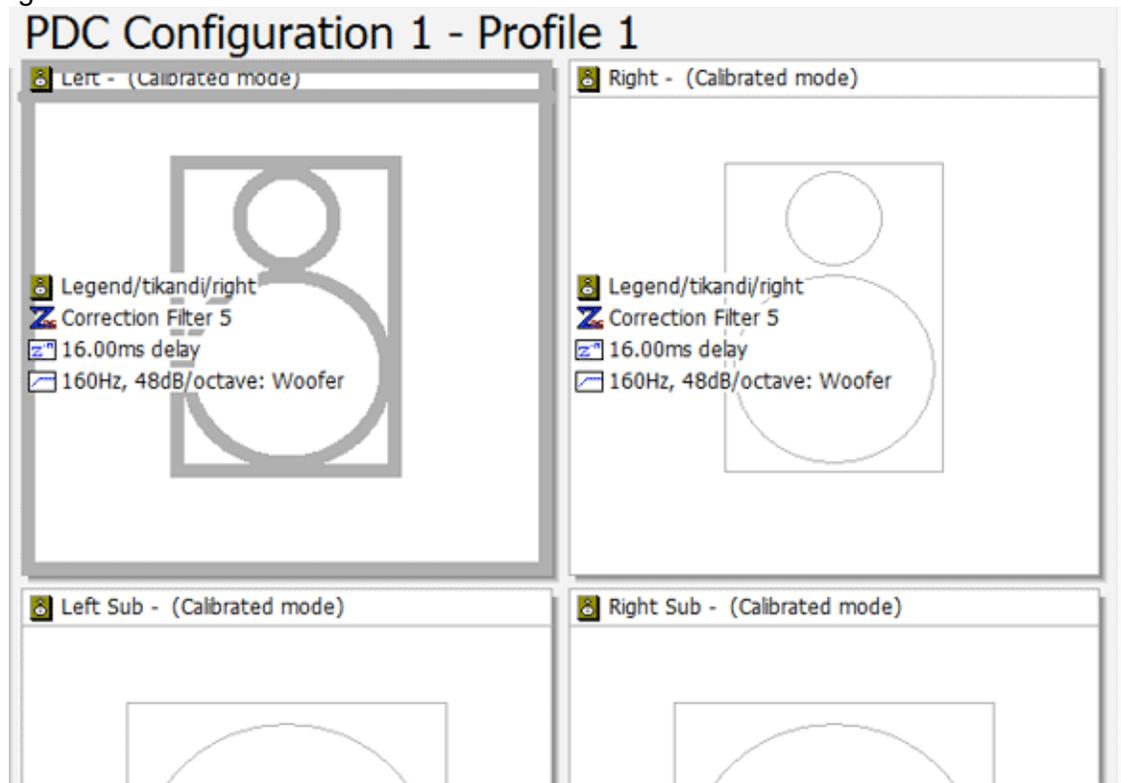


fig.16



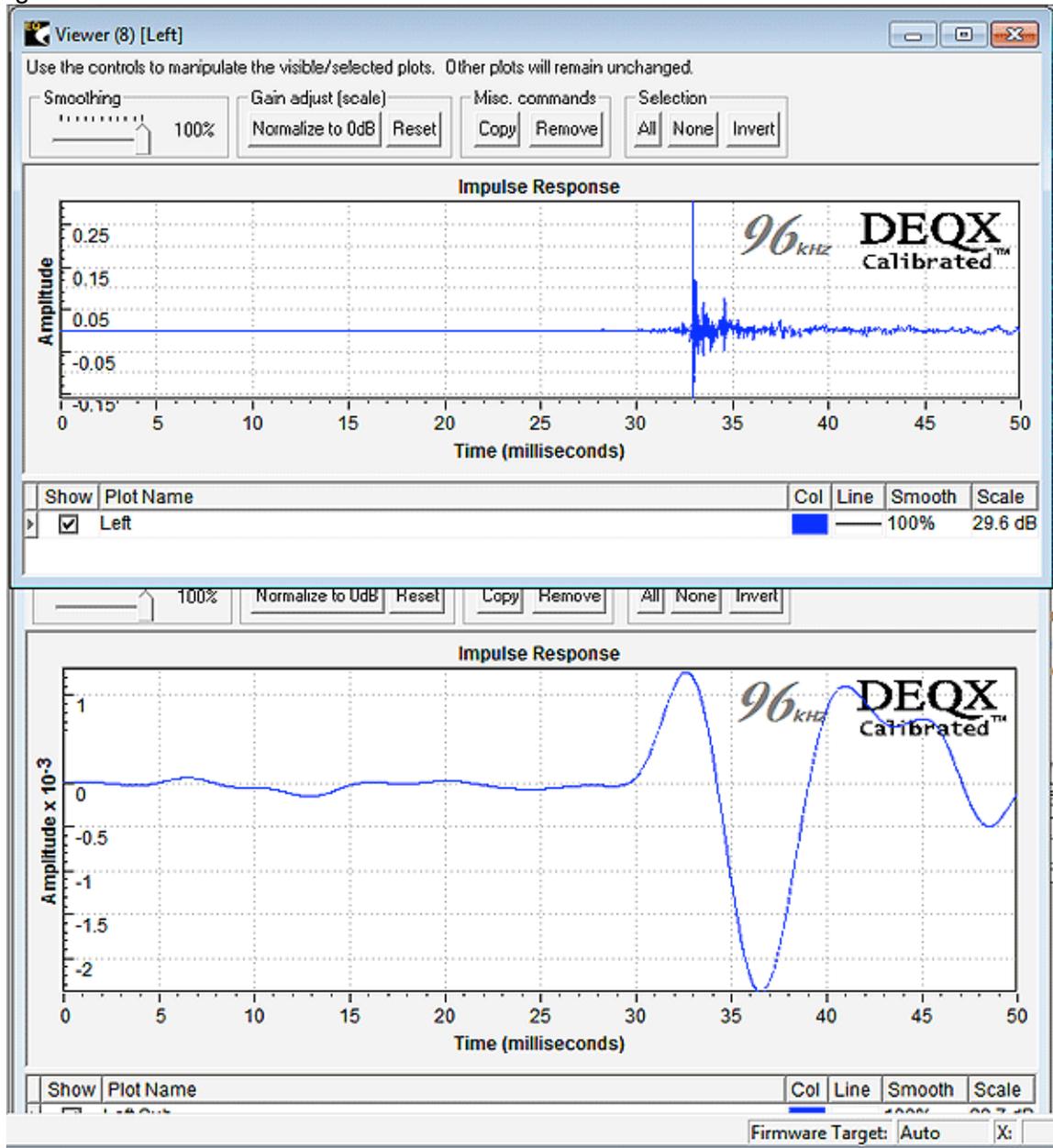
11. As can be seen displayed in fig.17 the 16ms of delay has been added to the filter properties for the single or bi-amp speaker.

fig.17



12. To confirm the results re-measure room and the repeat steps 2 – 9 and as can be seen in fig.18 the impulse response for both the single or bi-amp speakers are in correct time alignment with the Bass or Subwoofer

fig.18



So now you know where your Sub-Woofer is in time!

Thank you, The DOCTOR.

