

# P630 Pro

## User Manual

### Volume 2





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## SURVEY

Lesson 1 – 4      Are for USERS  
Lesson 5 - 22     Are for TECHNICIANS

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Lesson 1	First exercise for user. "Run speaker tests".
Lesson 2	Same as lesson 1, but shows results as a status flag instead of colour coded curves.
Lesson 3	Same as lesson 2 but extended with the function "Chain".
Lesson 4	Exercise in using System Multiplexer.
Lesson 5	Setup of new type.
Lesson 6	Copy parameters from an existing type to a new type.
Lesson 7	Demonstration of Resonance mode.
Lesson 8	Demonstration of Scale mode.
Lesson 9	Demonstration of Edit/Convert mode.
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Lesson 12	User calibration of a compensation curve.
Lesson 13	Delete types.
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Lesson 17	Phase, THD and Rub & Buzz measurements at same time.
Lesson 18	How to use Ambient Noise check.
Lesson 19	How to work with Tolerance Files
Lesson 20	Demonstration of the output Compressor function
Lesson 21	Use of Loudness and adjustment of sensitivity
Lesson 22	Use of Sensitivity and Average tests.
Lesson 23	Master curve and Master compensation curve.
Lesson 24	Utilities 1: Process stored data and make a new reference.
Lesson 25	Utilities 2: Copy a reference from one PC to another PC.
Lesson 26	Utilities 3: Convert the A4M_STAT.DAT file to ASCII text file.
Lesson 27	Utilities 3: Export and import reference to/from ASCII text file.
Lesson 28	Demonstration of how to work with Bl and impedance test.
Lesson 29	Demonstration of how to work with Curve Editor in edit mode.

## Getting Started with P630 Pro

To get a quick start, use the demo program “p630prodemo.exe” or the live version “p630pro.exe”. The “p630prodemo” program is functioning without any P600 hardware.

Start the program by double click on the “p630prodemo” icon or on the file “p630prodmo.exe”.



Options:

<b>Run</b>	Run speaker tests. Operation mode
<b>Setup</b>	Setup and change parameters. Technician mode
<b>Global</b>	Change of global parameter. Global setup.
<b>Utility</b>	Utility functions. Technical mode
<b>Spl</b>	Setup of microphone sensitivity used for Spl scales.
<b>Pw. Mgr.</b>	Password Manager.
<b>Hw. Mgr.</b>	Hardware manager

In the following we go through all lessons. It is recommended to follow these lessons sequentially. Not all functions and possibilities are demonstrate, but hopefully adequately for a solid introduction to the most important parameters and functions.



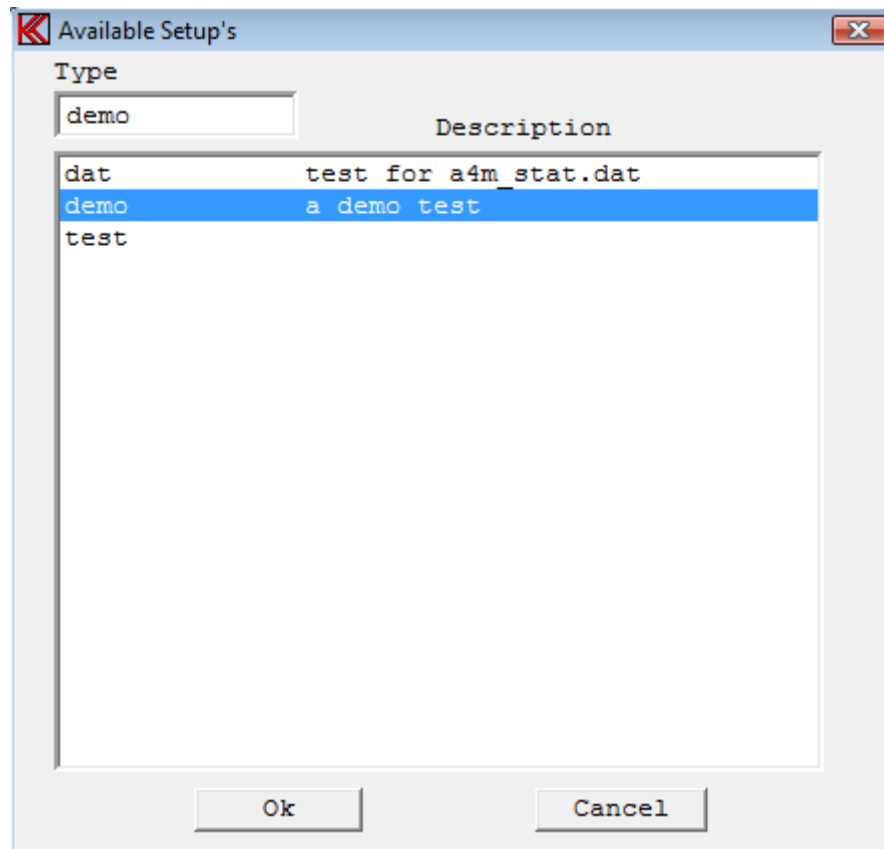
## Lesson 1

Let us pretend that a number of valid setups previously have been created in technician mode.

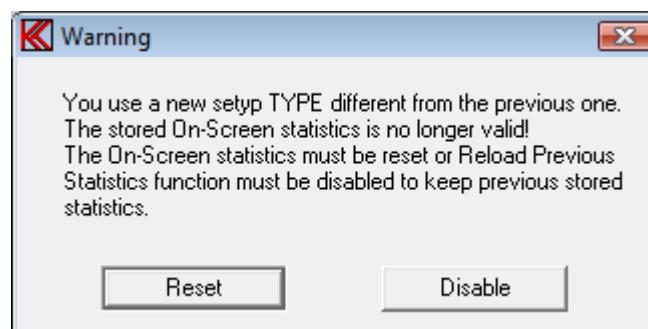
From the start-up screen:

**Step 1:** Select operator mode by activating “Run”.

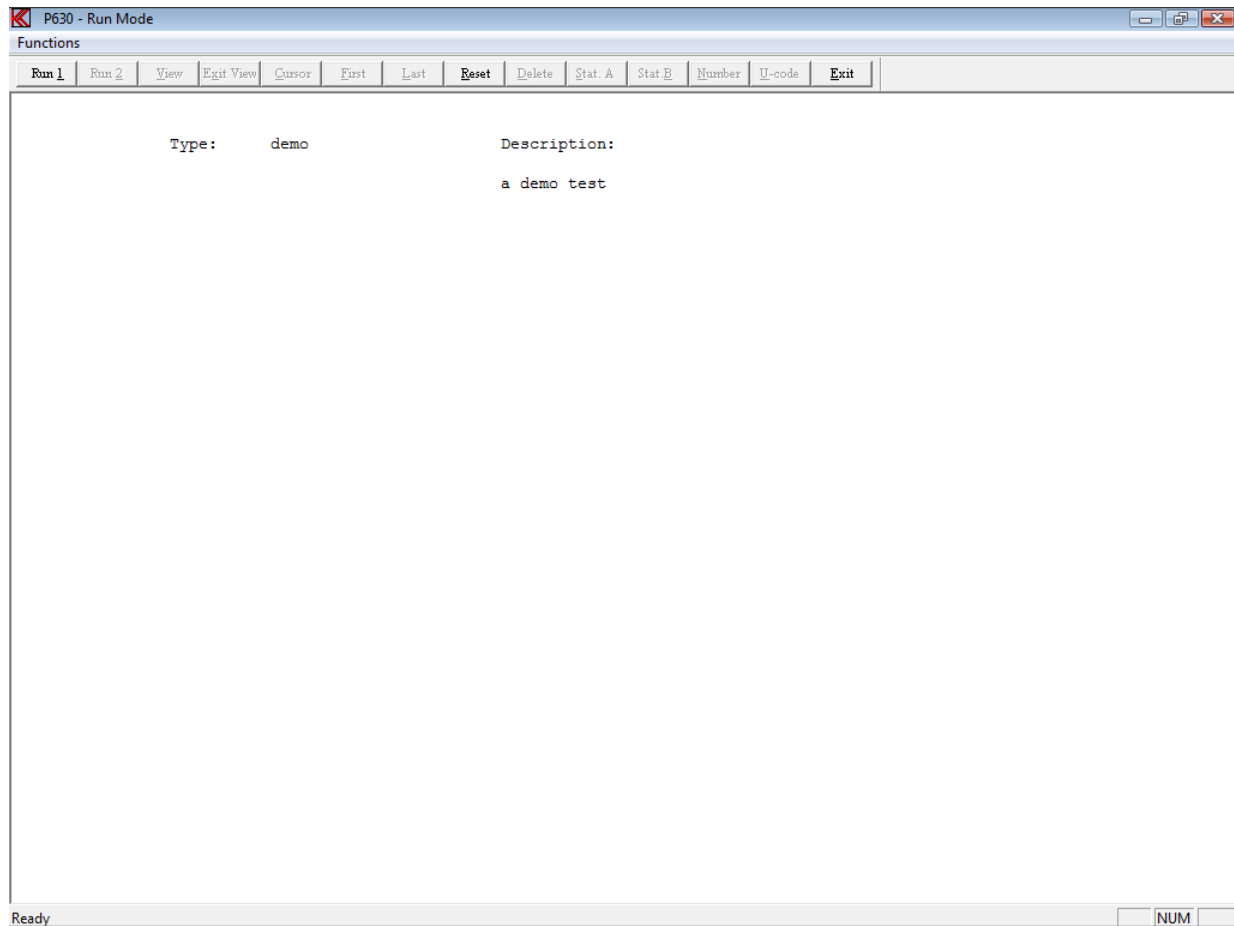
The following screen will appear:



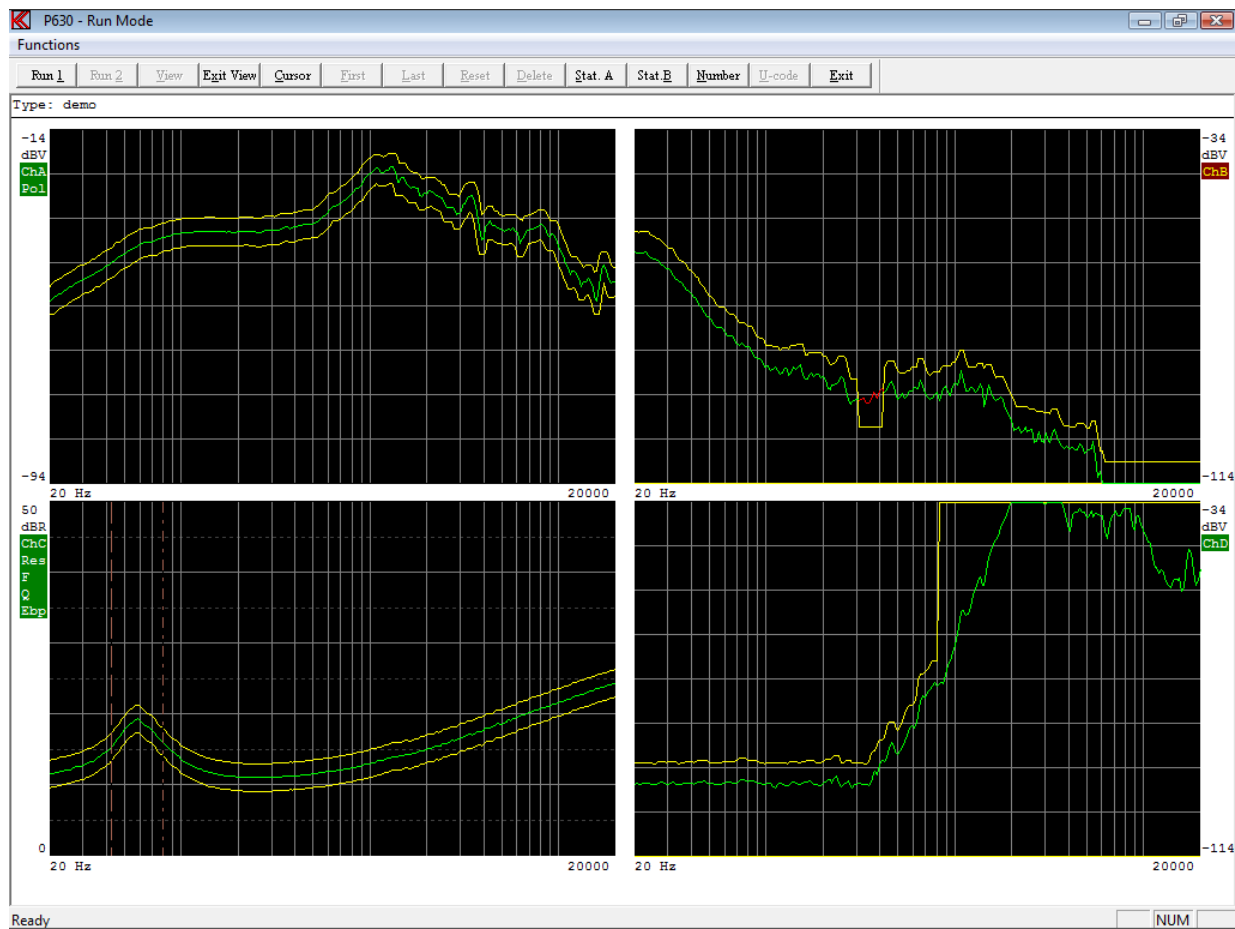
**Step 2:** A list of "valid types" appears.  
Select "demo" and select “Ok”.



If a previous type have been called earlier in “run” mode the program check, if the online statistics is activated, for changes for called “type”. This prevents errors in statistics. If the same “type” is called or the on-screen statistics is deactivated this warning is not displayed.



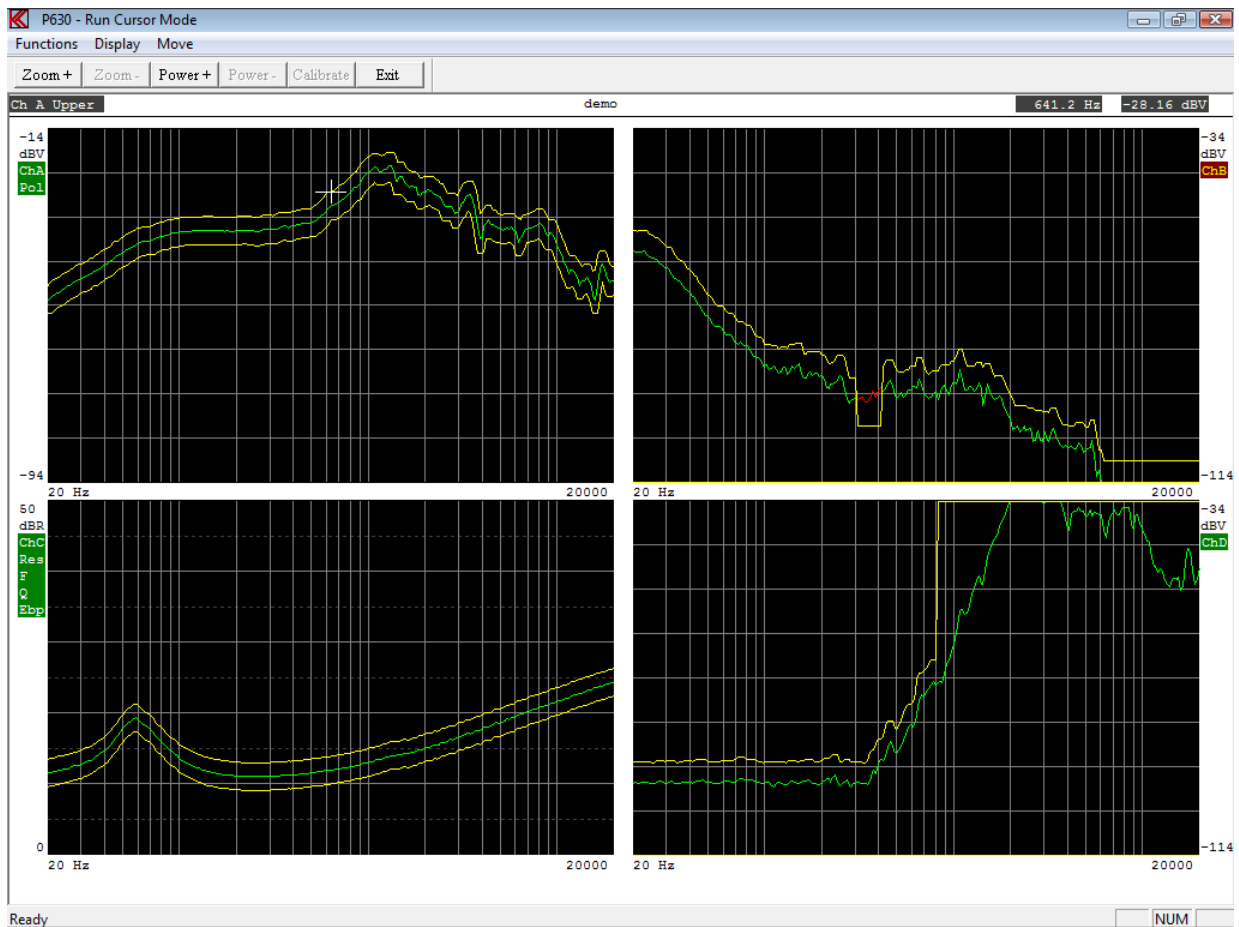
**Step 3:** Start a measurement, select “Run 1” or pressing key “1”.



If switch "Display Graph By Reject" is activated in global, the measured curves appear. Please notice that the data curves are changing colour from green to red, where data are rejected. See channel B. The test results are displayed as green flag for approved and red flag for rejected test on left and right sides.

Note: **U-code** is optional function.

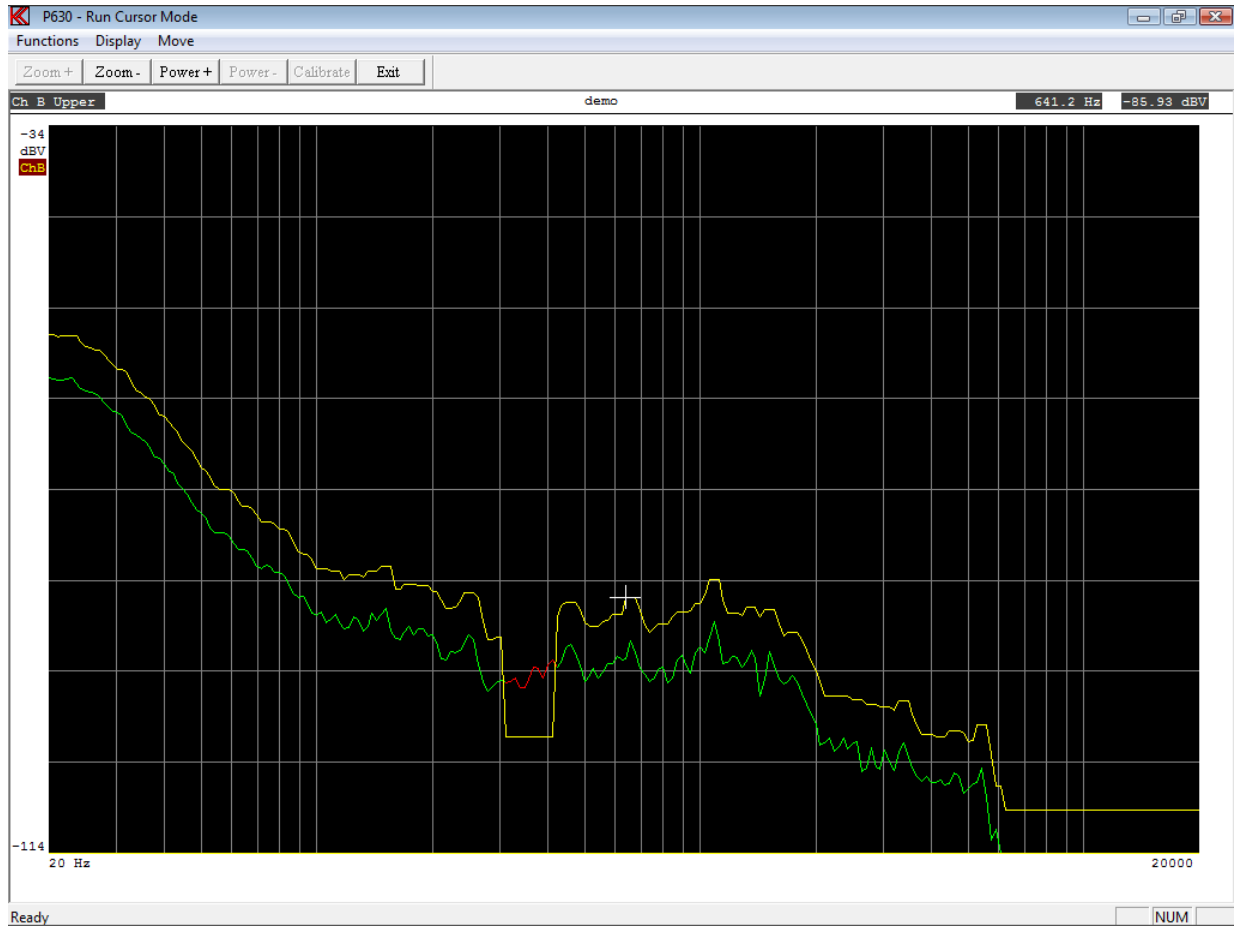
**Step 4:** Activate the cursor by activating "Cursor".



A cursor, an extended cross, appears in Ch. A. Corresponding values of frequency and level are shown in the upper right corner of the screen. Active channel and cursor focus (upper, lower or data) are shown in the upper left corner.

**Step 5:** Move cursor to the next channel (channel B) by pressing "+".

**Step 6:** Zoom in on active channel (channel B) by "Display Zoom In" or by pressing "Page Up",



Activating the arrow-keys can move the cursor. By activating “Move 0 Fast” or pressing “0” (nil), the cursor moves approx. 10 times faster.

**Step 7:**        Activate "Exit" to go one menu up.

This full sequence, step 1 - 7, has simulated a typical test sequence. Normally, the operator uses step 1 - 3 for starting up and then stays in step 3 for successive measurements. Only if a test is rejected, it can be interesting to search for the reason (step 4 - 6).

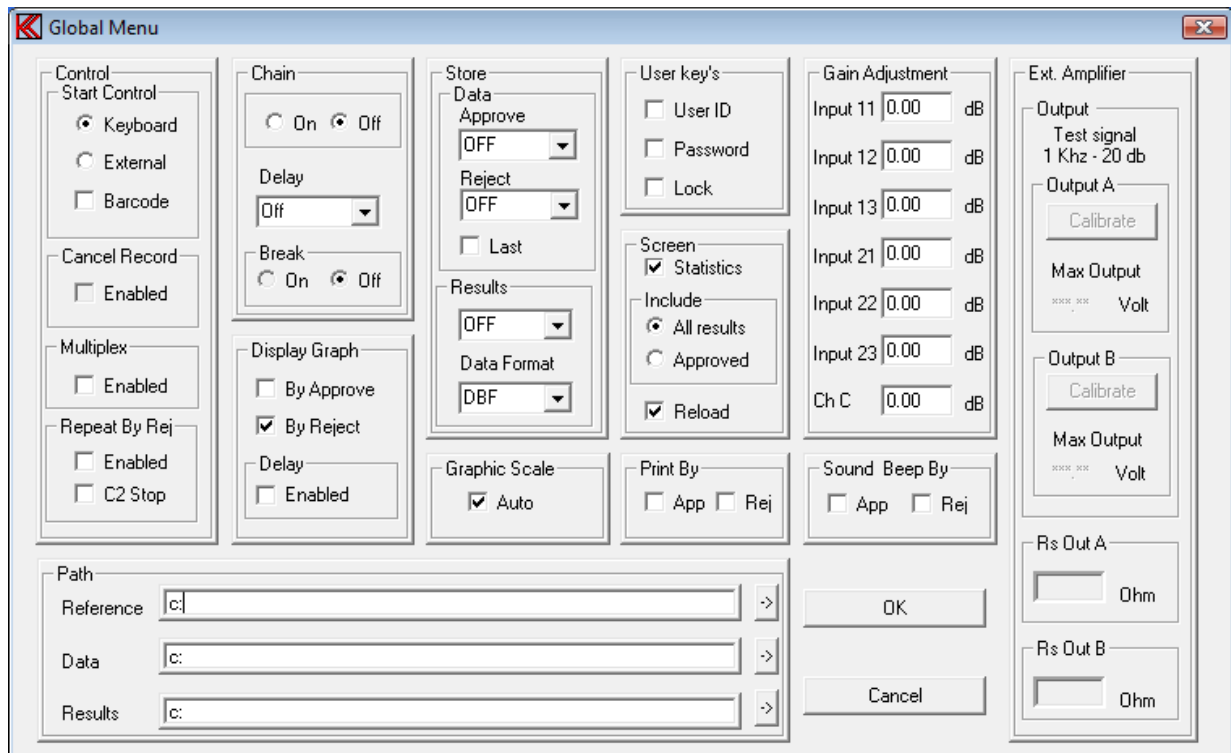
**Step 8:**        Activate "Exit" to exit.



## Lesson 2

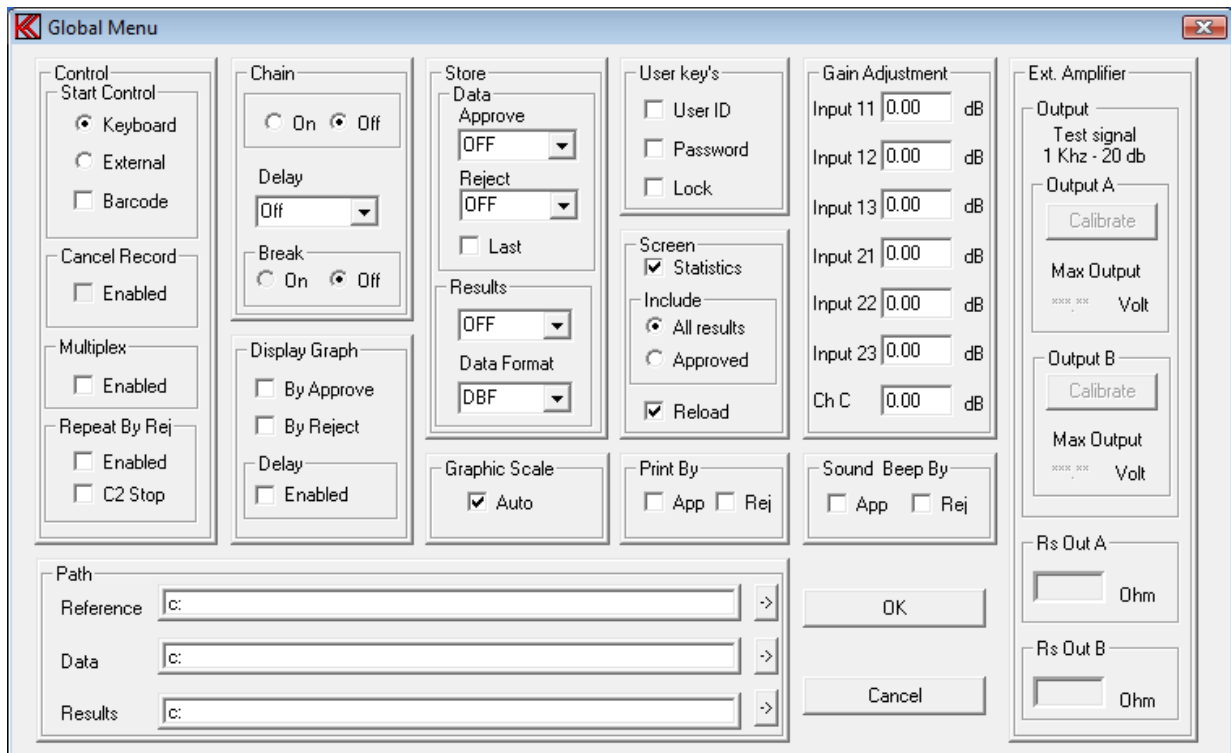
This lesson is like lesson 1, but without curve display “ON”.

**Step 1:** Go to "Change of global parameter", activate “Global”.

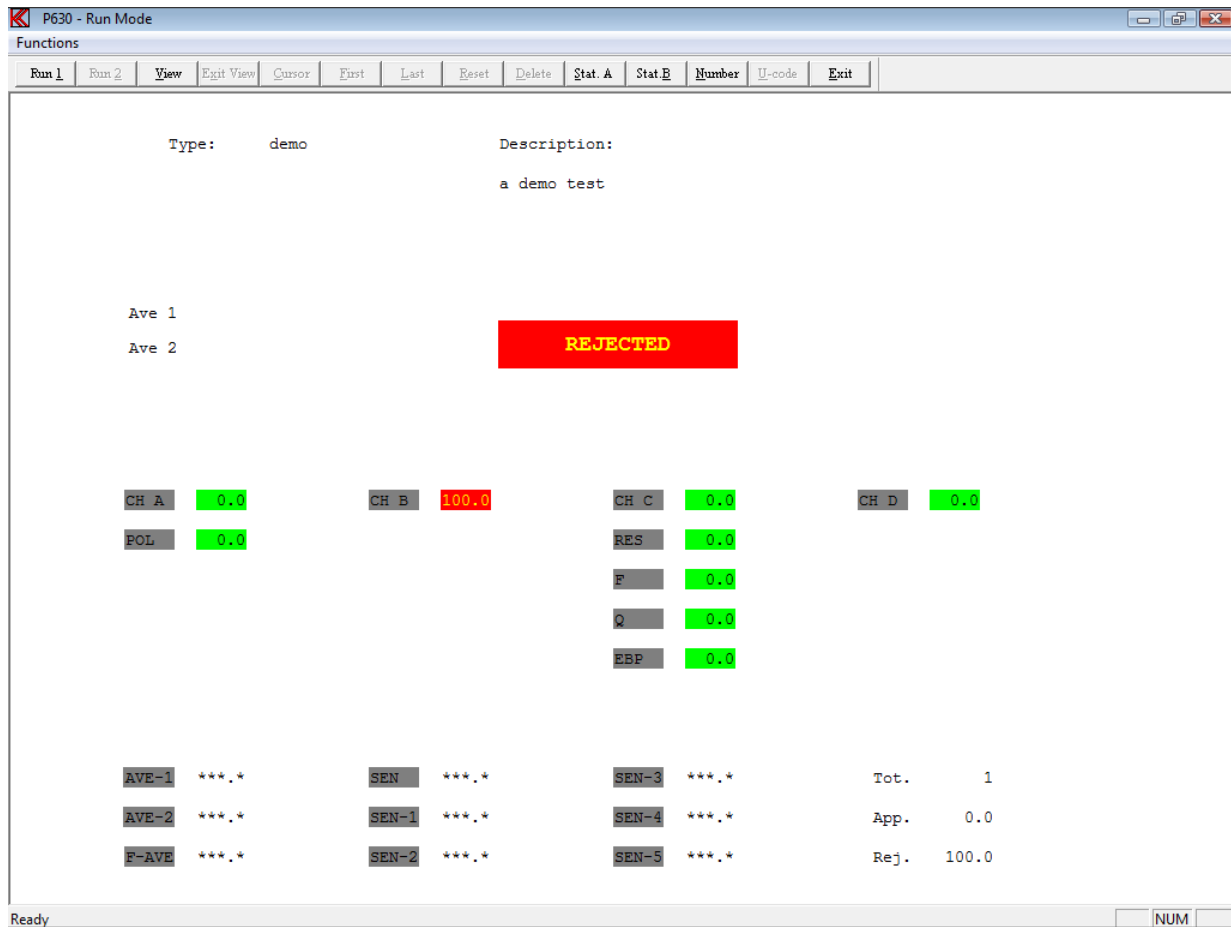


Note: Print is optional.

**Step 2:** Unmark “Display Graph By Reject”.



- Step 3:** Save changes and exit by activate “OK”.
- Step 4:** Select “Run speaker tests”, activate “Run”.
- Step 5:** Select type “demo”.
- Step 6:** Start test, activate “Run 1” or press key “1”.



The test sequence has been the same as step 3 in lesson 1, but this time with flags for test results - green for approved and red for rejected. If you wish to see the curves, identical to the curves in lesson 1, activate "View" for view result.

Note: **U-code** is a optional function.

**Step 9:** Exit, activate "Exit".

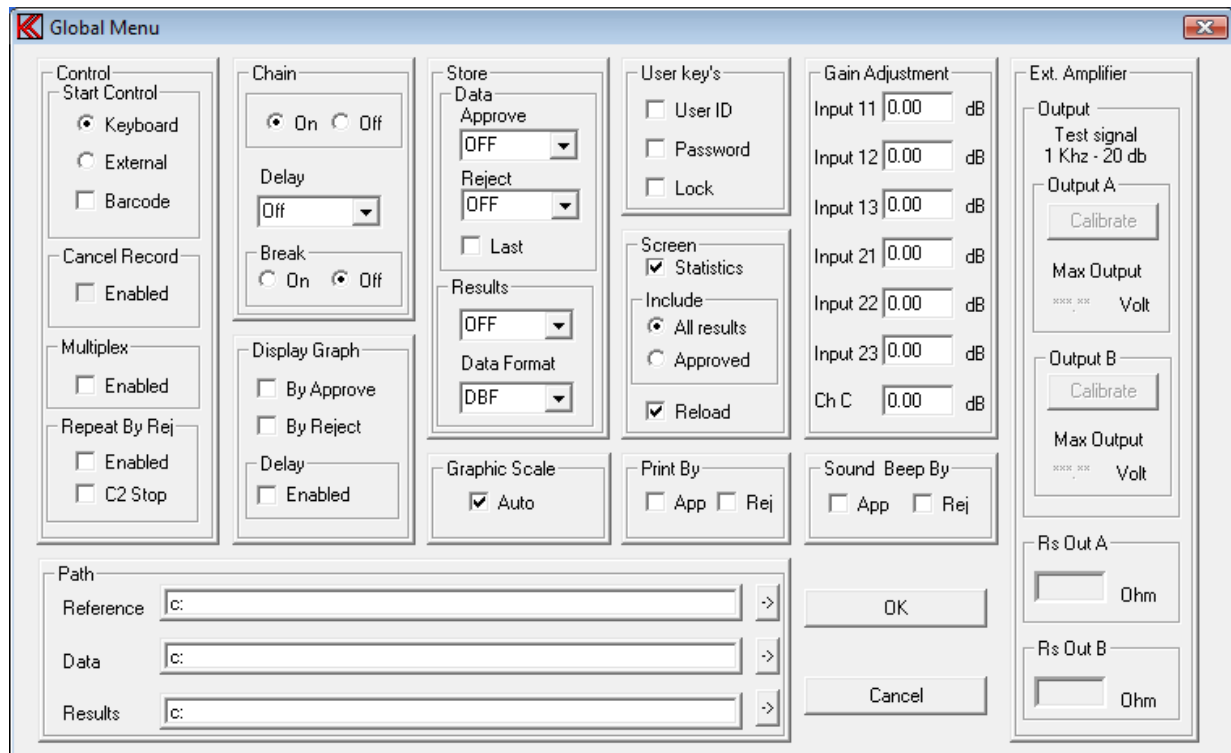


### **Lesson 3**

This lesson shows how the function “chain” works.

**Step 1:** Select "Change of global parameters", enter by activate “Global”.

**Step 2:** Change "Chain" from “OFF” to “ON”.



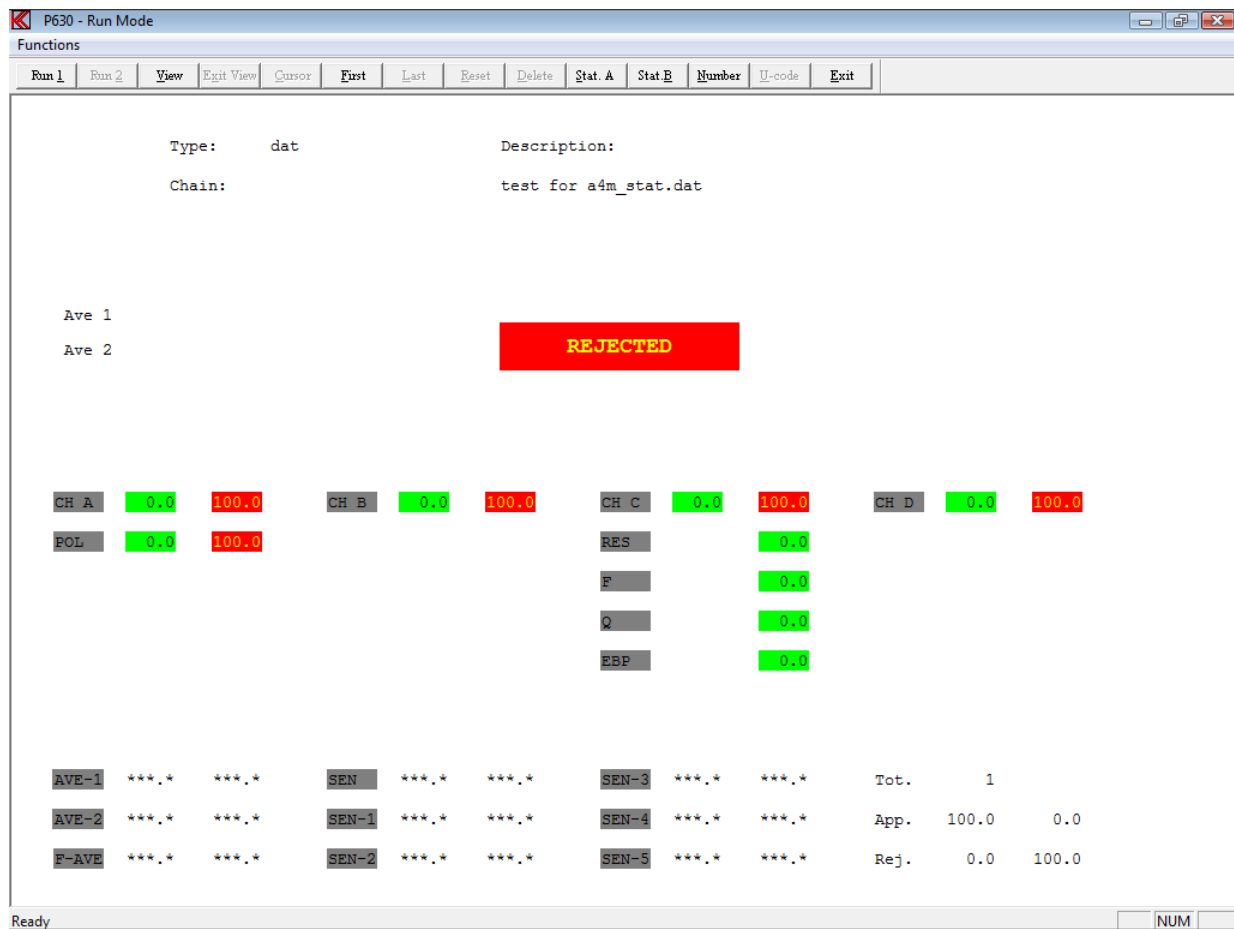
(Here you also have other options: changing the delay time and abort of test by rejected, however leave these items for the moment).

**Step 3:** Save and exit, activate “OK”.

**Step 4:** Select "Run speaker tests", activate “Run”.

**Step 5:** Select type "test".  
("Test" has previously been set up with the chain type “demo”).

**Step 6:** Start test, activate “Run 1” or press key “1”.



Please note that "test" is carried out and result flag is displayed. Immediately thereafter the chain type "demo" is activated and carried out and result flag displayed. The number of types in a chain is infinite. To see the "test" graph use the "first" function. Warning: Take care that a type does not chains back to a type previously used in the chain. If this happens the program will work in an infinite loop.

**Step 7:** Exit.

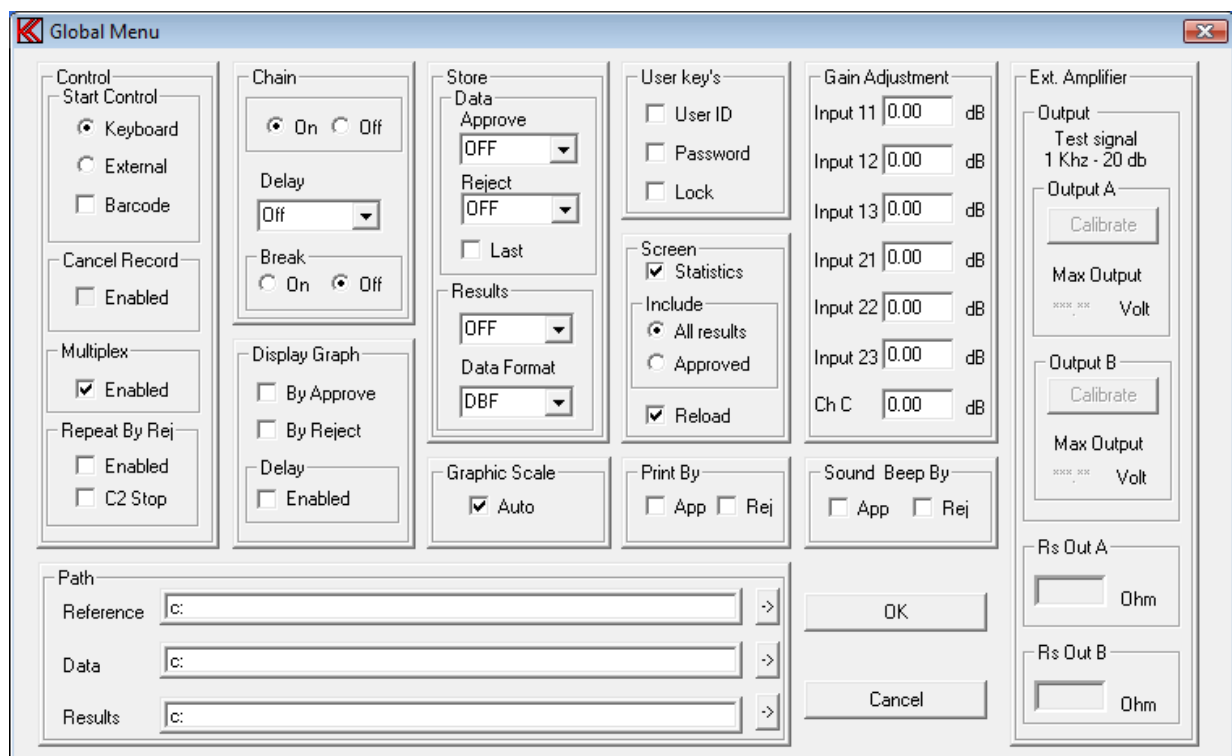
## **Lesson 4**

This exercise shows how the System Multiplexer works. The purpose with this System Multiplexer is to handle two different test stations or production lines with a single P630 system.

The handling time is thus utilised to make a test on the other test station and vice versa.

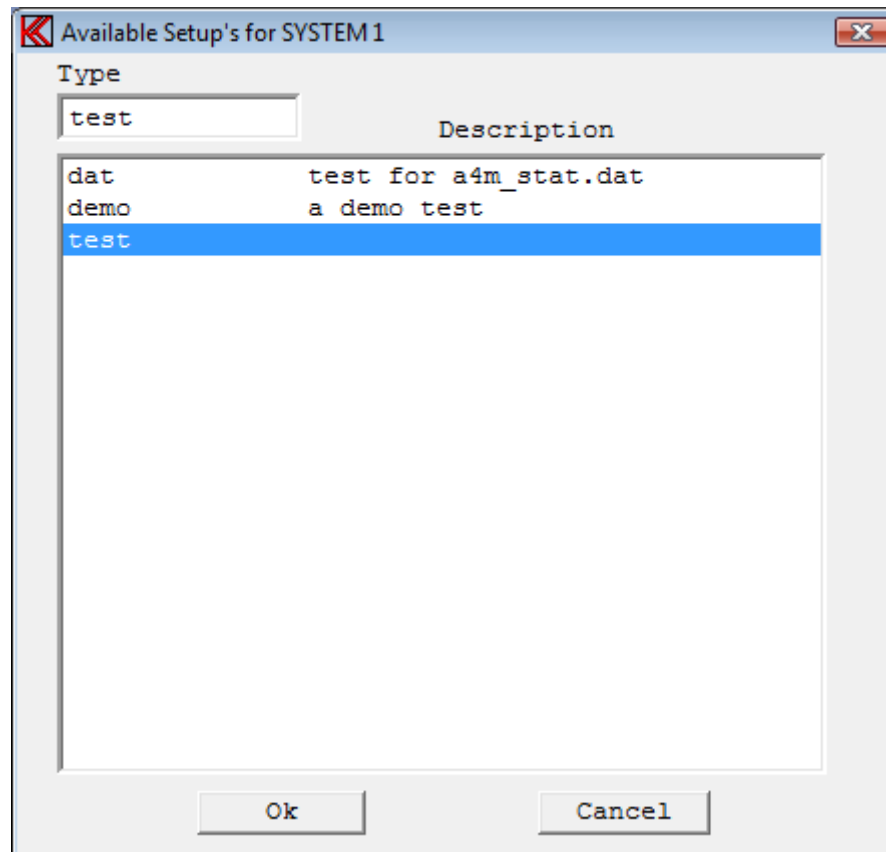
**Step 1:** Go to "Change of global parameters", press "Global".

**Step 2:** Enable "System Multiplexer" by flag "Control Multiplex". Set "Chain" off if not already done.

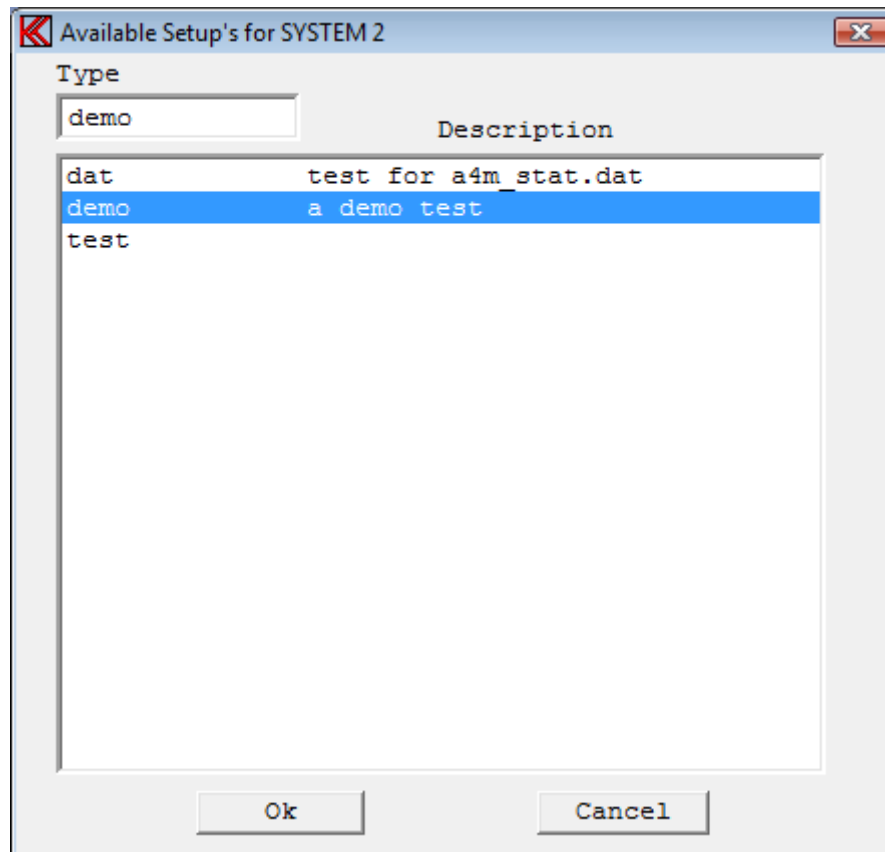


**Step 3:** Save and exit, press "OK".

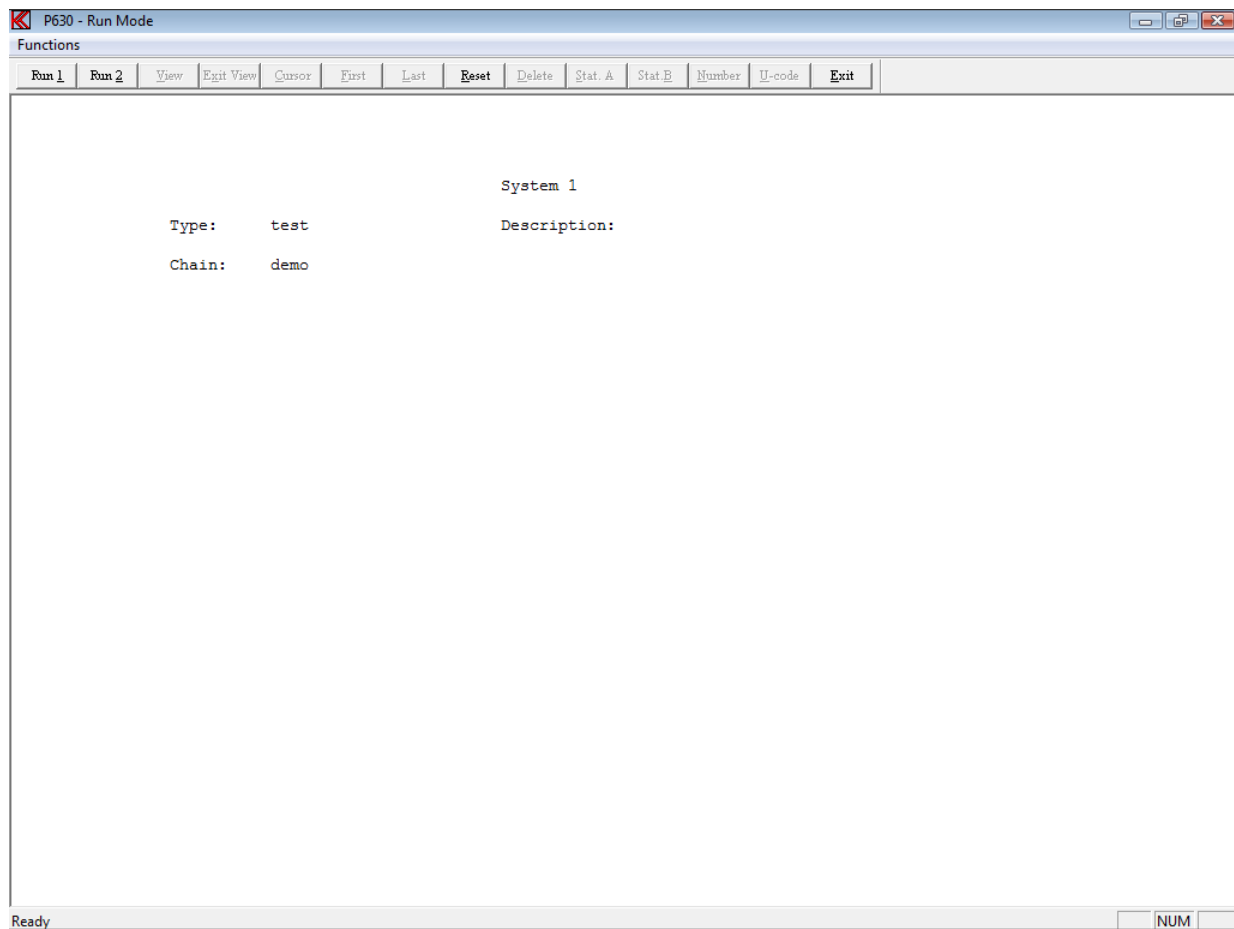
**Step 4:** Select "Run speaker tests", press "Run".



**Step 5:** For system 1 select type "test".  
For system 2 select type "demo".



Now the multiplexer system 1 will carry out type "test" each time system 1, "1", is activated, and type "demo" by activating system 2, pressing "2".



**Step 6:**        Activate “Run 1” or press key “1” for start of test system 1.

**Step 7:**        Activate “Run 2” or press key “2” for start of test system 2.

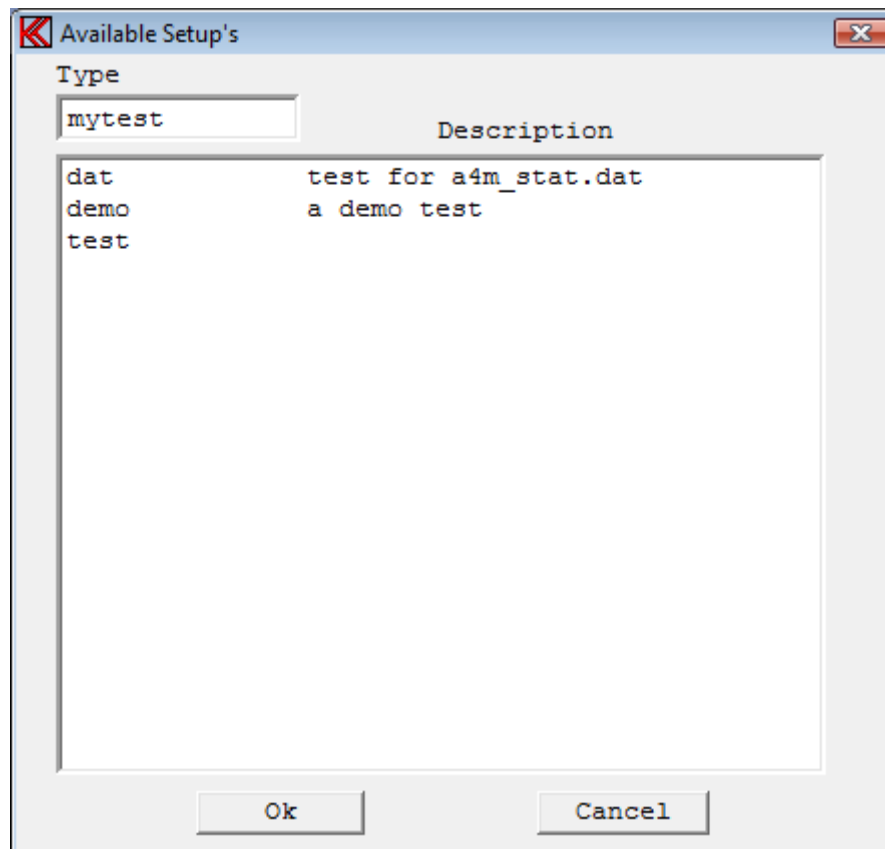
**Step 8:**        Exit Run Mode”.

## **Lesson 5**

The purpose of this lesson is to create a new type and in a simple way make a set of reference curves.

**Step 1:** Enter “Setup” for "Setup/change parameter".

**Step 2:** Write name of new test “mytest” in the Type field.



**Step 3:** As this type does not exist, the system asks:  
“Do you want to create the new type: mytest”.  
Respond, "YES" for Yes.  
The following pre-set standard setup will appear:

A predefined standard setup appears on the screen.

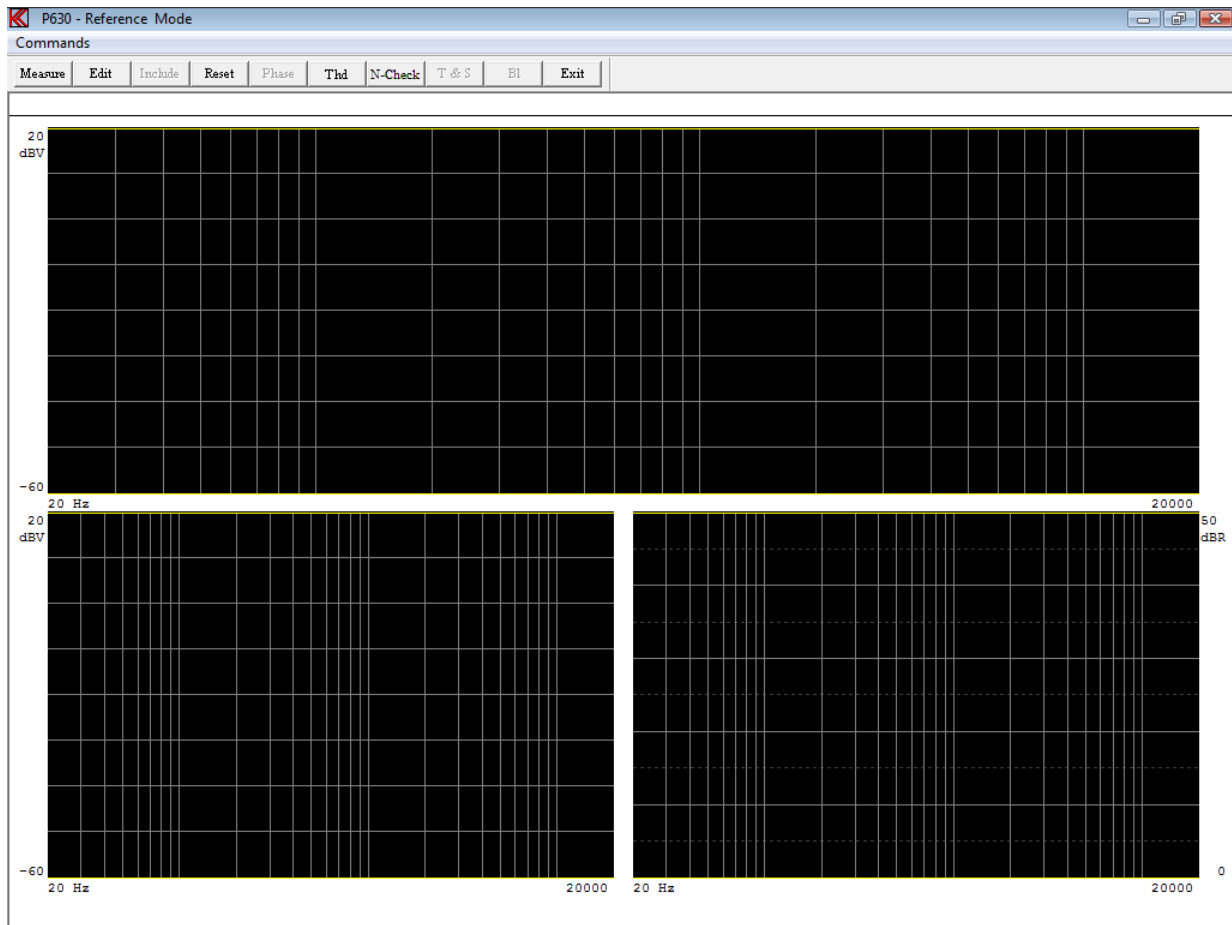
- Step 4:** To add a comment to the description field, enter at “Type Description” following: "This is my first test". Place the cursor on another field to enter the text. Example on the Help File field.
- Step 5:** Empty “Type Help File “ field by entering spaces if not already empty. We do not want to use a help file in current moment.
- Step 6:** Change output to 6 Volt. Delete and enter “6” in “Output Volt” field. To check correct entered value place cursor in “Output dB” and click one time. Note Volt field change to nearest valid number. In this case 5.9992 Volt.
- Step 7:** Change input selector the “mux” on Ch B to input 11 by scrolling to 11 and high light 11. Note - only when the field is high lighted it is selected.
- Step 8:** Set "Ch D" OFF by unmarks the “Input Status”. We do not want to use channel D.
- Step 9:** Change the filter settings in channel B to be active. Set “Filter Status Ch B” active.

- Step 10:** Select filter type to a TRK-HP, tracking high pass, by pressing “Filter Type” and select TRK-HP by clicking in the field “TRK-HP”. When selected the field turn to blue.
- Step 11:** Select Harmonic to 5th for Rub & Buzz measuring. Select 5 by “Filter Har.” Field and click on the field. When selected the field turn to blue.
- Step 12:** Select band with to “oo”. Select “oo” on “Filter Freq/Bw” and highlight to blue.

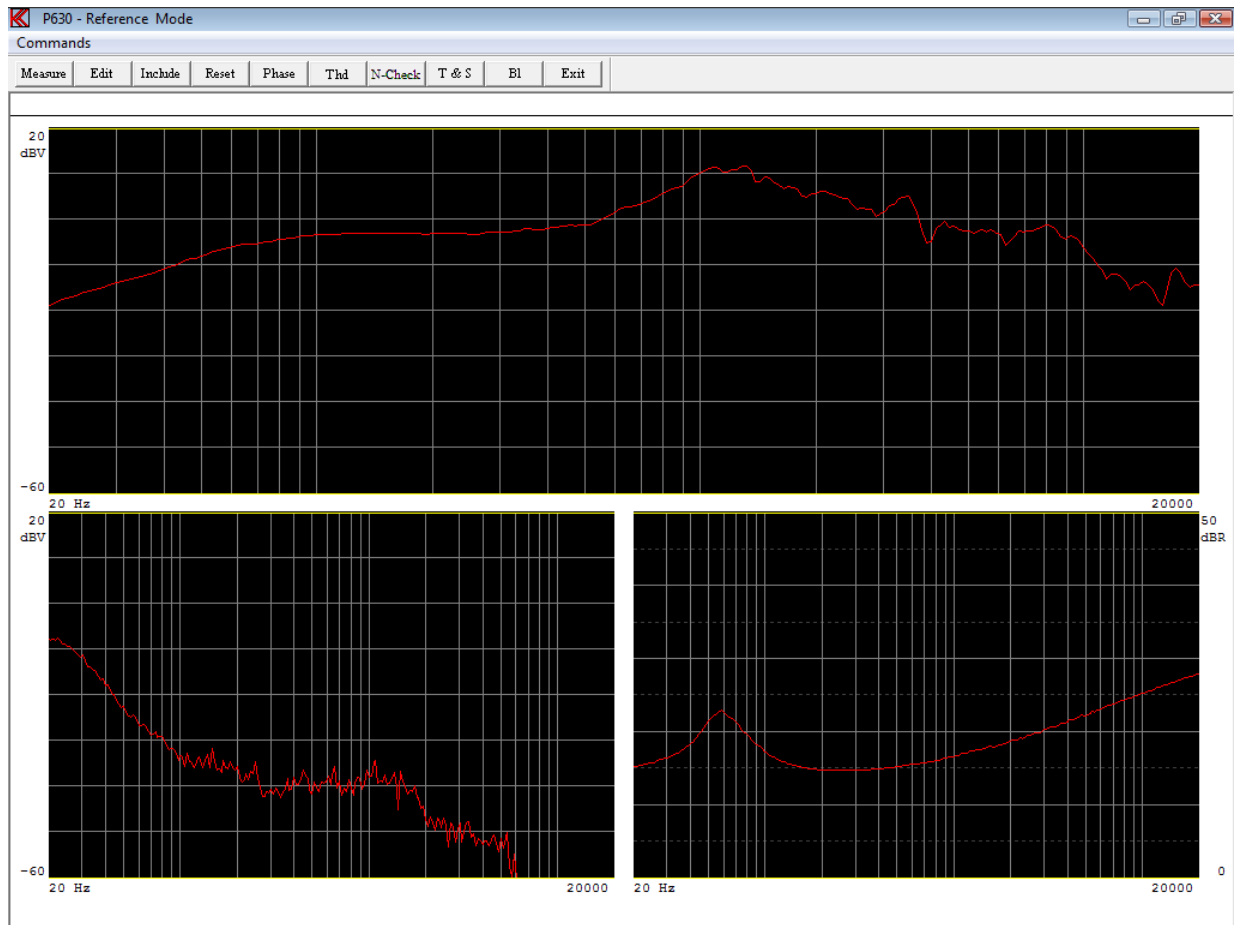
The screenshot shows the 'Setup Of Parameters' dialog box with the following configurations:

- Type:** Name: mytest, Chain: (empty), Status: (empty), Description: This is my first test, Help File: (empty), 3-Limit: ☐
- Sweep:** Reverse: ☐ Start: 20 Hz, Stop: 20000 Hz, Delay: 0 mSec, Points: 250 No, Time: 3.0 Sec.
- Reference:** Reference, Delete & exit, Save & exit, Exit
- Sensitivity Test:** Move: ☐ 1000 Hz
- I/O:** N.A.
- Output:** A, Output: 5.9992 Volt, -7.96 dB, 0 dB = 15.0 Volt
- Polarity Test:** On: ☐ Negative: ☐ After: ☐ Pulse Time: 60 mSec.
- Compress:** Range: Off dB, Ref. Ch: Off
- Loudness:** (test off, enter: 0.0) Form: Off, Test: 0.0
- Input:** Status: ☒ Ch A, ☒ Ch B, ☒ Ch C, ☐ Ch D; Mux: 11, 11, No Mux, 13; Detector: Log, Log, Log, Log; Gain: -20 db, (empty), 0.1 ohm, -20 db; Smoothing: Off, Off, Off, Off; 25.1 pt/oct
- Filter:** Status: ☒ Ch B, ☐ Ch C, ☐ Ch D; Type: TRK-HP; Har.: 5; Freq/Bw: oo; Gain: 0 db, 0 db, 0 db; Display: Absolute, Absolute, Absolute; Limit: 45 KHz, 45 KHz, 45 KHz

- Step 13:** All testing parameters now have the desired values. Go to "Reference". Select "Reference".



**Step 14:** A screen with three empty windows appears.  
Make a measurement, activate “measure” or press key "M".

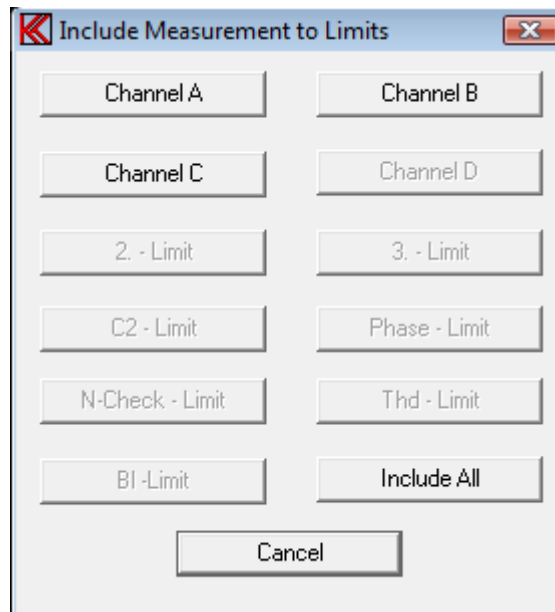


In channel A, the upper window, appears the frequency response as a red curve, two yellow curves, the lower and upper tolerance band appears at the bottom and the top of the window.

In channel B, lower left window, a Rub & Buzz measurement appears similar to channel A.

The last window shows the impedance curves. Channel C is always reserved as impedance channel.

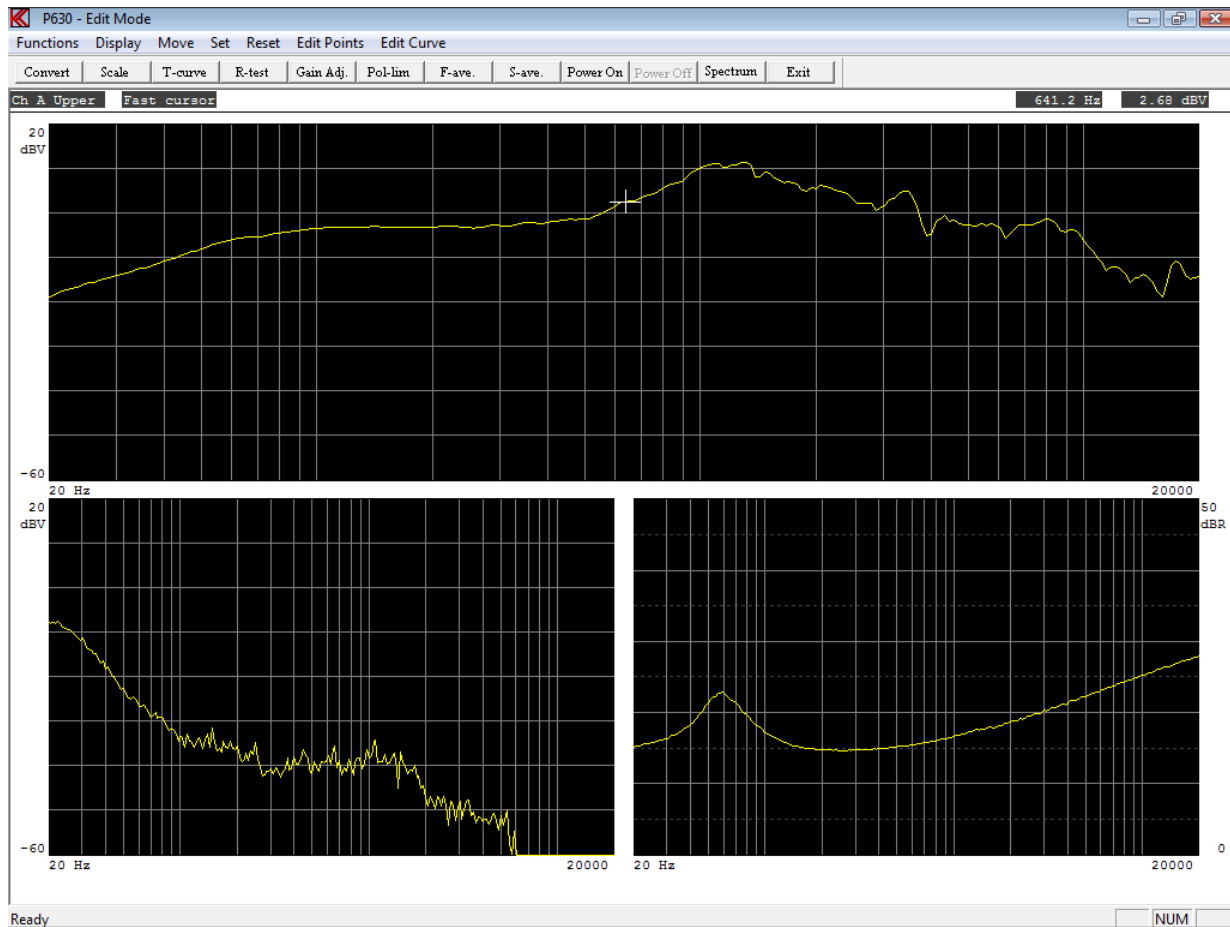
**Step 15:** “Include” the measuring data to the reference curve. Activate “Include All” or press key “I”.



The red measuring curve is now concealed behind two identical yellow upper and lower reference curves. By carrying out more measurements an envelope curve is formed by including each "good" measurement.

A number of "good" speakers can thus provide the basis for the reference curves.

- Step 16:** To further elaborate on the reference curves go to "Edit mode", activate "Edit" or press key "E".
- Step 17:** Check that the cursor is on "Ch A upper (reference curve)", if not, press "arrow up" until cursor is there.
- Step 18:** Activate "Fast cursor", by "Move, 0 Fast" or press key "0", "nil" (this makes the cursor go ten times faster than normally).



**Step 19:** Move upper reference curve 3.1 dB up. Activate “Move, 9 Move Up” or press key “9” twice. Using the numeric keyboard on the right of the keyboard makes this work easier.

**Step 20:** Move cursor to “Ch A lower (reference curve)”. Press once on “arrow up”.

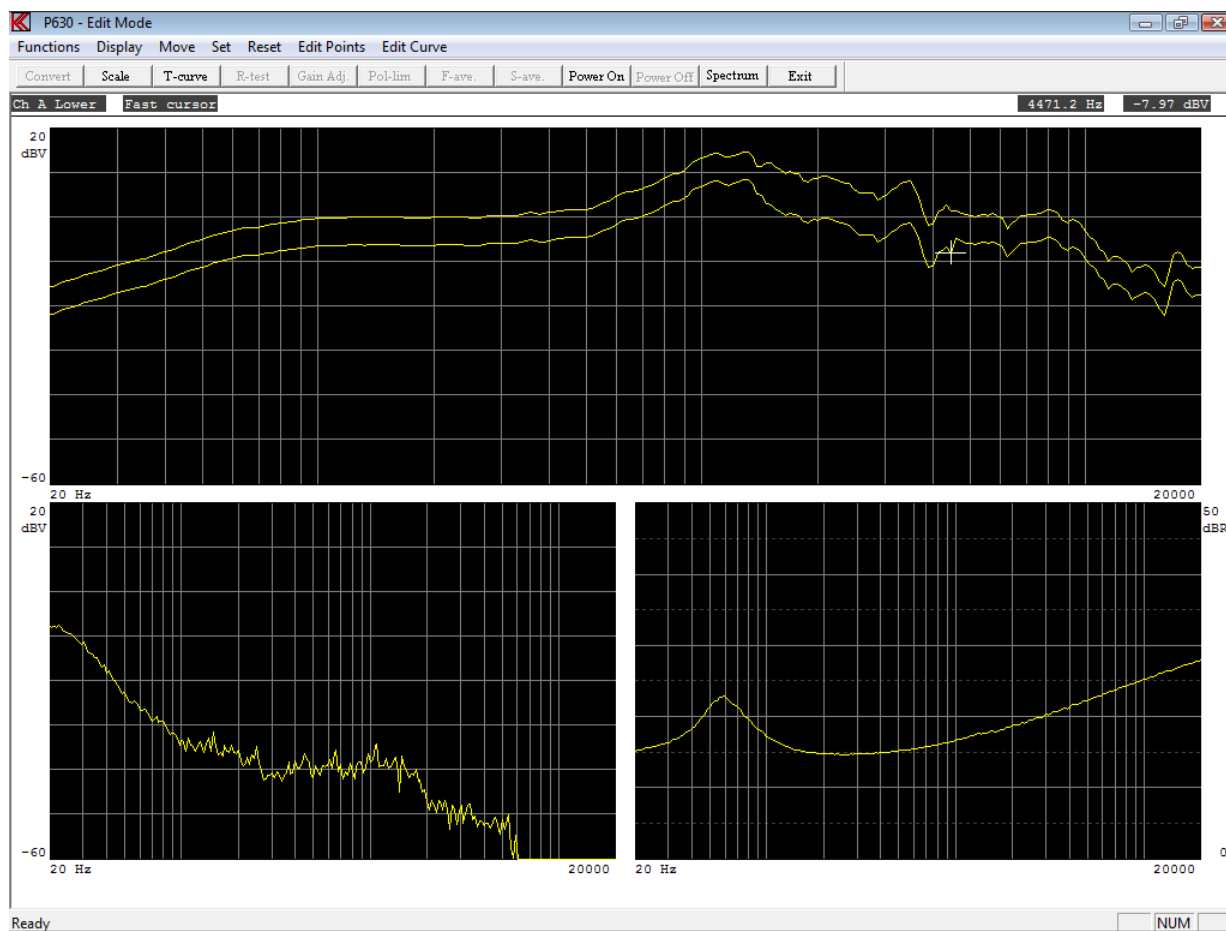
**Step 21:** Move lower reference curve -3,1 dB down. Activate “Move, 3 Down” or press key “3” twice.

Next we want to move the entire envelope curve between 1474,0 - 4471.2 Hz -3,1 dB

**Step 22:** Move cursor to 1474.0 Hz. Press “right arrow” three times.

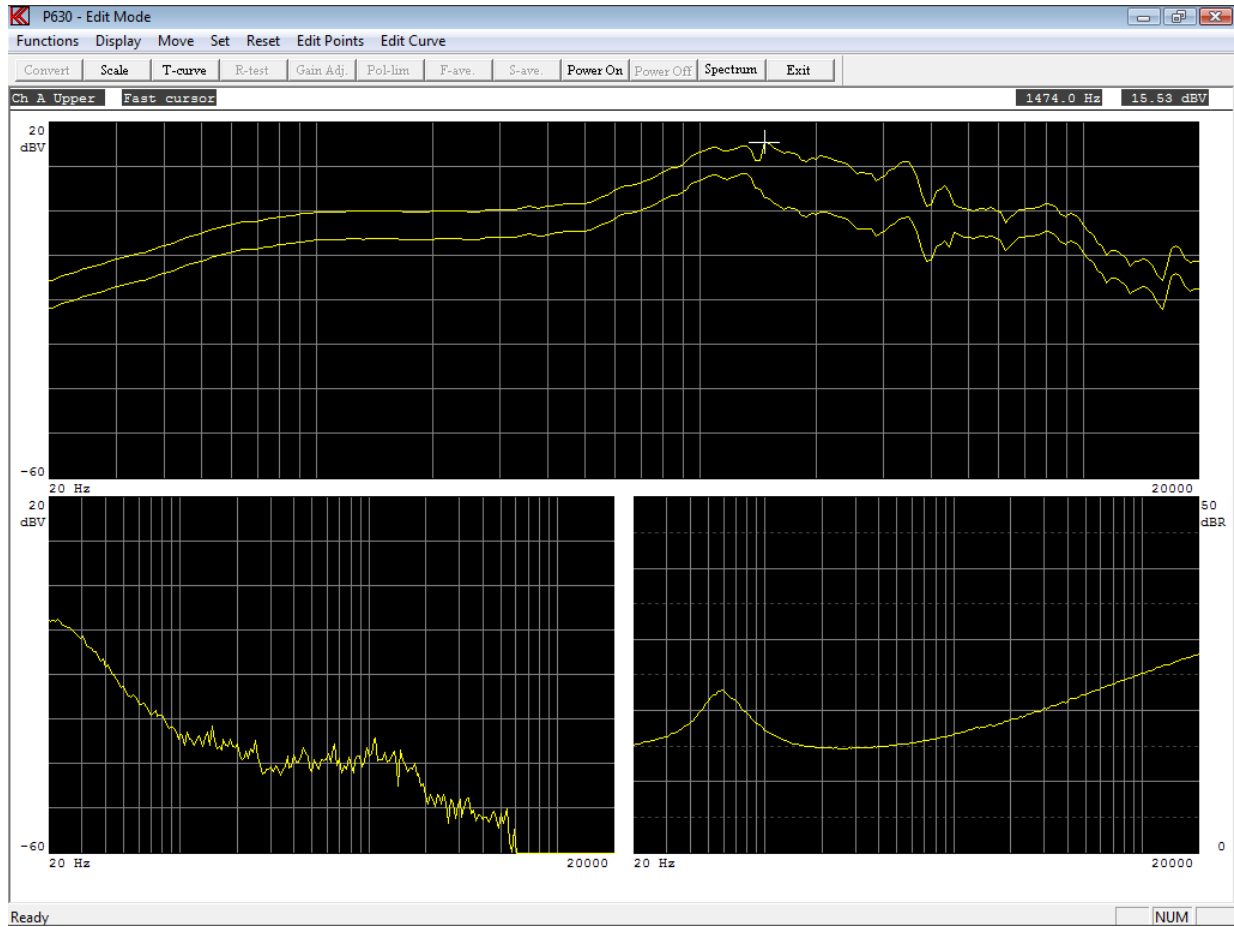
**Step 23:** Move the point 1474.0 Hz -3,1 dB down. Activate “Edit, Point 2 Down” or press key “2” twice.

**Step 24:** Press <CTL> “arrow right” four times or activate “Move, Move Part Right” tree times.



Next, move the entire envelope curve between 4471.2 Hz - 1474.0 Hz +3,1 dB.

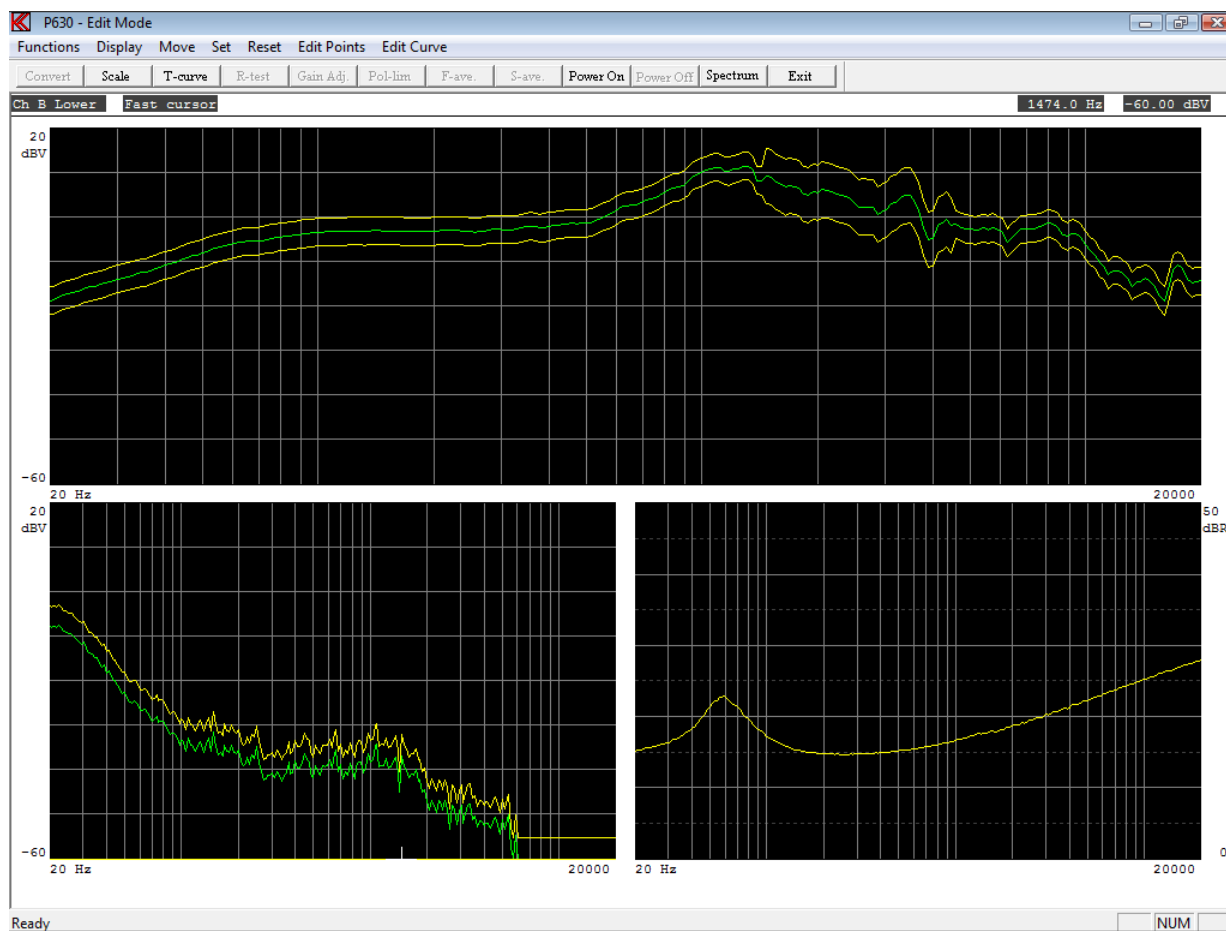
- Step 25:** Move cursor to upper reference curve. Press “arrow down” once.
- Step 26:** Move the point 3388.0 Hz 3,1 dB up. Activate “Edit Point, 8 Up” or press key “8” twice.
- Step 27:** Press <CTL> “arrow left” four times or activate “Move, Move Part Left” tree times.



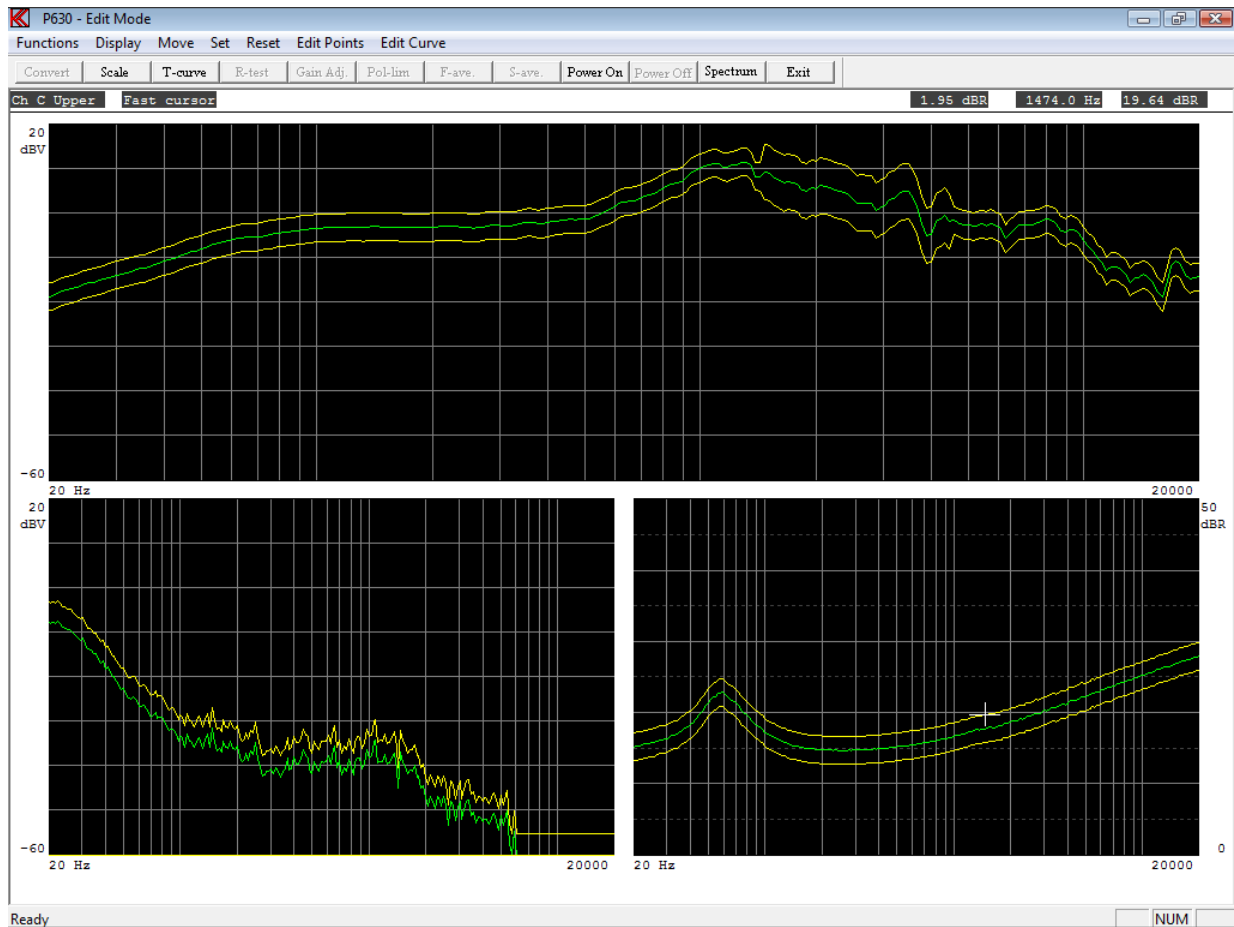
**Step 28:** Go to channel B. Press "+" once and the cursor moves to the next window, channel B.

**Step 29:** Move upper reference curve 4,7 dB up. Activate by "Move, 9 Move Up" or press key "9" three times.

**Step 30:** Reset lower reference curve. Press <CTL> "page down".



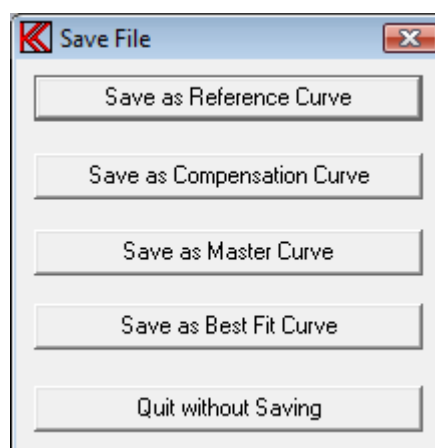
- Step 31:** Go to the impedance channel "Ch C". Press "+" once and the cursor moves to the next window, channel C.
- Step 32:** Move lower reference curve -2.0 dB down. Activate by "Move, 3 Move Down" or press key "3" twice.
- Step 33:** Move cursor to upper reference curve. Press "arrow down" once.
- Step 34:** Move upper curve 2.0 dB up. Activate by "Move, 9 Move Up" or press key "9" twice.
- Step 35:** Everything is now ready for test. Exit.



**Step 36:** Leave "Reference mode". Exit.

**Step 37:** The whole setup is now ready to store. Activate "Save & exit".

**Step 38:** Save setup as "Reference curve". Activate "Save as Reference Curve".



**Step 39:** Now "mytest" is ready to be used. Go to "Run" and test type "mytest" (see lesson 2).



## **Lesson 6**

This exercise shows how an existing type setup is copied to another or a new type.

Note: The step for entering password is not listed.

**Step 1:** Go to “Setup / change parameter” activate “Setup”.

**Step 2:** Select the type "mytest" (see lesson 5).

**Step 3:** Enter "mytestcopy" in field “Type Name”.

Note that when Name is changed the Description field is cleared.

**Step 4:** Enter new description “my new copy of mytest” in field “Type Description”

**Step 5:** Enable polarity test at 5 mSec. if not already done.

**Setup Of Parameters**

Type Name: mytestcopy Chain: Status: Description: my new copy of mytest Help File: -> ☐ 3-Limit

Sensitivity Test: ☐ Move 1000 Hz I/O: N.A. Output: A 5.9992 Volt -7.96 dB 0 dB = 15.0 Volt

Polarity Test: ☐ On ☐ Negative ☐ After Pulse Time: 5 mSec.

Compress: Range Off dB Ref. Ch B Loudness (test off, enter: 0.0) Form Off Test 0.0

Input Status: ☒ Ch A ☒ Ch B ☒ Ch C ☐ Ch D Mux: 11 11 No Mux Detector: Log Log Log Gain: -20 db 0.1 ohm Smoothing: Off Off Off 25.1 pt/oct

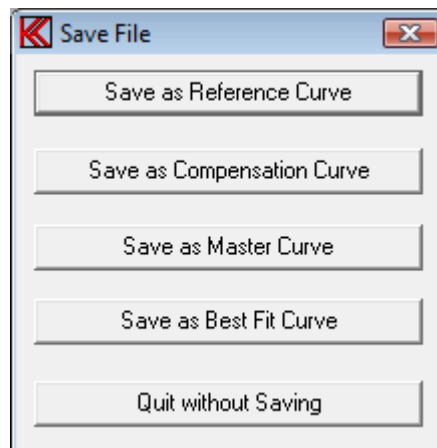
Sweep: ☐ Reverse Start: 20 Hz Stop: 20000 Hz Delay: 0 mSec Points: 250 No Time: 3.0 Sec. Reference Delete & exit Save & exit Exit

Auto Save: ☐ Data App. ☐ Data Rej. ☐ Results Data Path: c: Result Path: c:

Filter: Status: ☒ Ch B ☐ Ch C ☐ Ch D Type: TRK-HP Har: 5 Freq/Bw: oo Gain: 0 db Display: Absolute Limit: 45 KHz

**Step 6:** Save new setup by “Save & Exit”.

**Step 7:** Save setup as “Save as Reference Curve”.



**Remark:** Normally there is only little direct use for copying a type to a new type, but this feature is very useful when you only have a few corrections from a previously setup type. The corrections are made between step 3 and step 4.

## **Lesson 7**

This lesson shows how to install a resonance test.

Note: The step for entering password is not listed.

- Step 1:** Enter "Setup / change parameters" activate "Setup".
- Step 2:** Establish new type with name "resonance".
- Step 3:** "Create new type," press "YES".
- Step 4:** Write "Example of Rs, Q, F, & EBP" in field "Type Description".
- Step 5:** Set output to 6Volt.  
Reset field "Output Volt" and enter "6".
- Step 6:** Disable Polarity Test. Unmark "Sensitivity Test, On" if not already unmarked.  
(This test is not to be used in this example).
- Step 7:** Set "Ch A" OFF by unmark "Input Status Ch A".
- Step 8:** Set "Ch B" OFF by unmark "Input Status Ch B".
- Step 9:** Set "Ch D" OFF by unmark "Input Status Ch D".

The channel C is always the impedance channel. If you want to carry out an impedance measurement, f<sub>res</sub>, Q and F, this channel must be "ON". Make sure Rs = 0.1. Select Rs with Gain field in Ch C.

**Setup Of Parameters**

Type	Chain	Status
Name: Resonance		
Description: Example of Rs, Q and F		
Help File: <input type="text" value=""/> ->		<input type="checkbox"/> 3-Limit

Sensitivity Test <input type="checkbox"/> Move 1000 Hz	I/O: N.A	Output: A 5.9992 Volt -7.96 dB 0 dB = 15.0 Volt
---	----------	--

Polarity Test <input type="checkbox"/> On <input type="checkbox"/> Negative <input type="checkbox"/> After Pulse Time: 100 mSec.	Compress Range: Off dB Ref. Ch: 1	Loudness (test off, enter: 0.0) Form: 100 Test: 0.0
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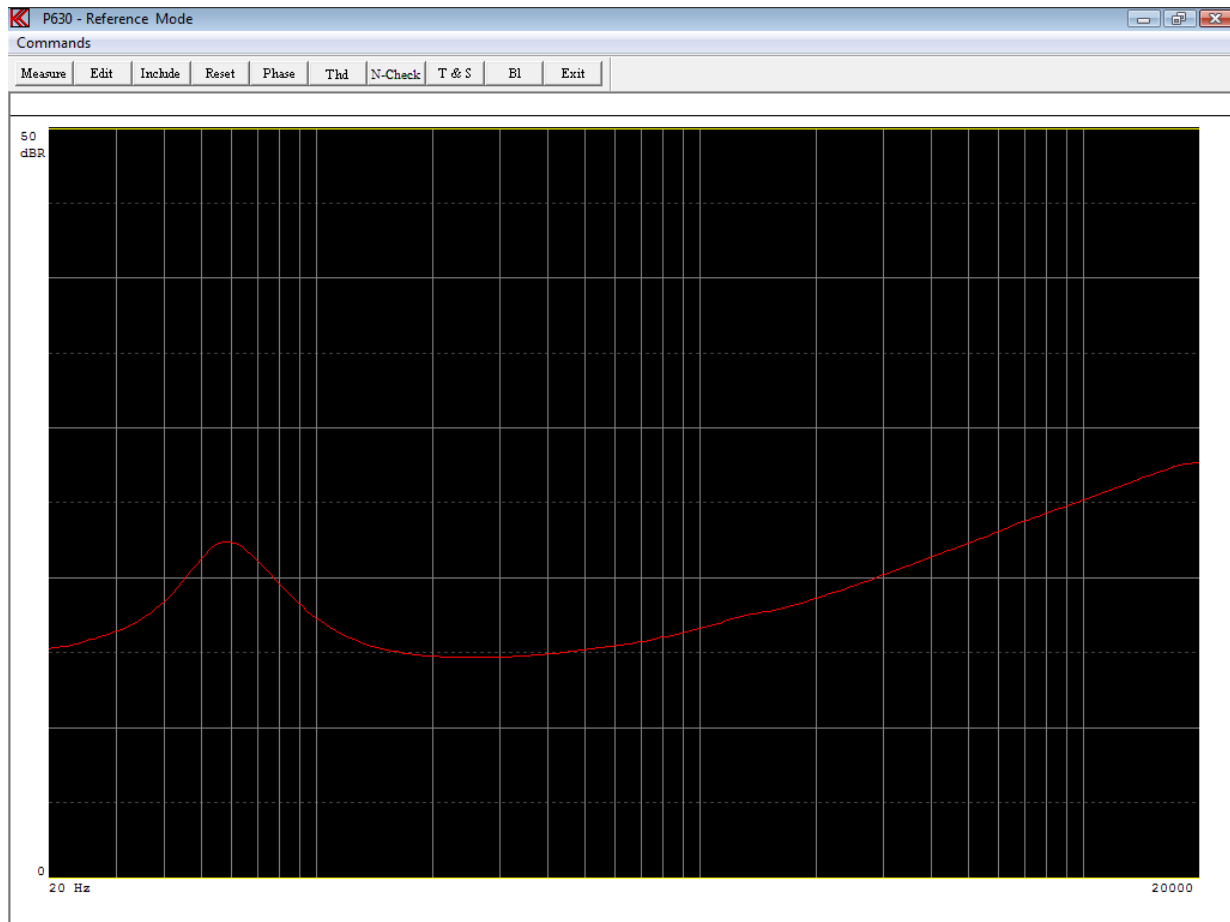
Input Status: <input type="checkbox"/> Ch A <input type="checkbox"/> Ch B <input checked="" type="checkbox"/> Ch C <input type="checkbox"/> Ch D Mux: 1 1 No Mux 1 Detector: 1 1 Log 1 Gain: 1 1 0.1 ohm 1 Smoothing: 1 1 Off 1 Off 25.1 pt/oct	Sweep <input type="checkbox"/> Reverse Start: 20 Hz Stop: 20000 Hz Delay: 0 mSec Points: 250 No Time: 3.0 Sec.	Reference Delete & exit Save & exit Exit
--	--	---

Auto Save <input type="checkbox"/> Data App. <input type="checkbox"/> Data Rej. <input type="checkbox"/> Results Data Path: c: <input type="text" value=""/> -> Result Path: c: <input type="text" value=""/> ->	Filter Status: <input type="checkbox"/> Ch B <input type="checkbox"/> Ch C <input type="checkbox"/> Ch D Type: <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> Har.: <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> Freq/Bw: <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> Gain: 1 1 1 1 Display: 1 1 1 1 Limit: 1 1 1 1
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**Step 10:** Go to “Reference settings” by clicking on “Reference”.

**Step 11:** Carry out a measurement. Click on “Measure” or press key “M”.



**Step 12:** Include measured data to the reference curve. Click on “Include” or press key “I”.

**Step 13:** Include channel C by clicking on “Channel C”.

**Step 14:** Go to “Edit mode” by “Edit” or press key “E”.

**Step 15:** Activate “Fast cursor”. Press key “0”, once or use “Move, 0 Fast”.

**Step 16:** Cursor is active on upper reference curve.  
Move upper reference curve + 1 dB up. Press "9" once or “Move, 9 Move Up”.

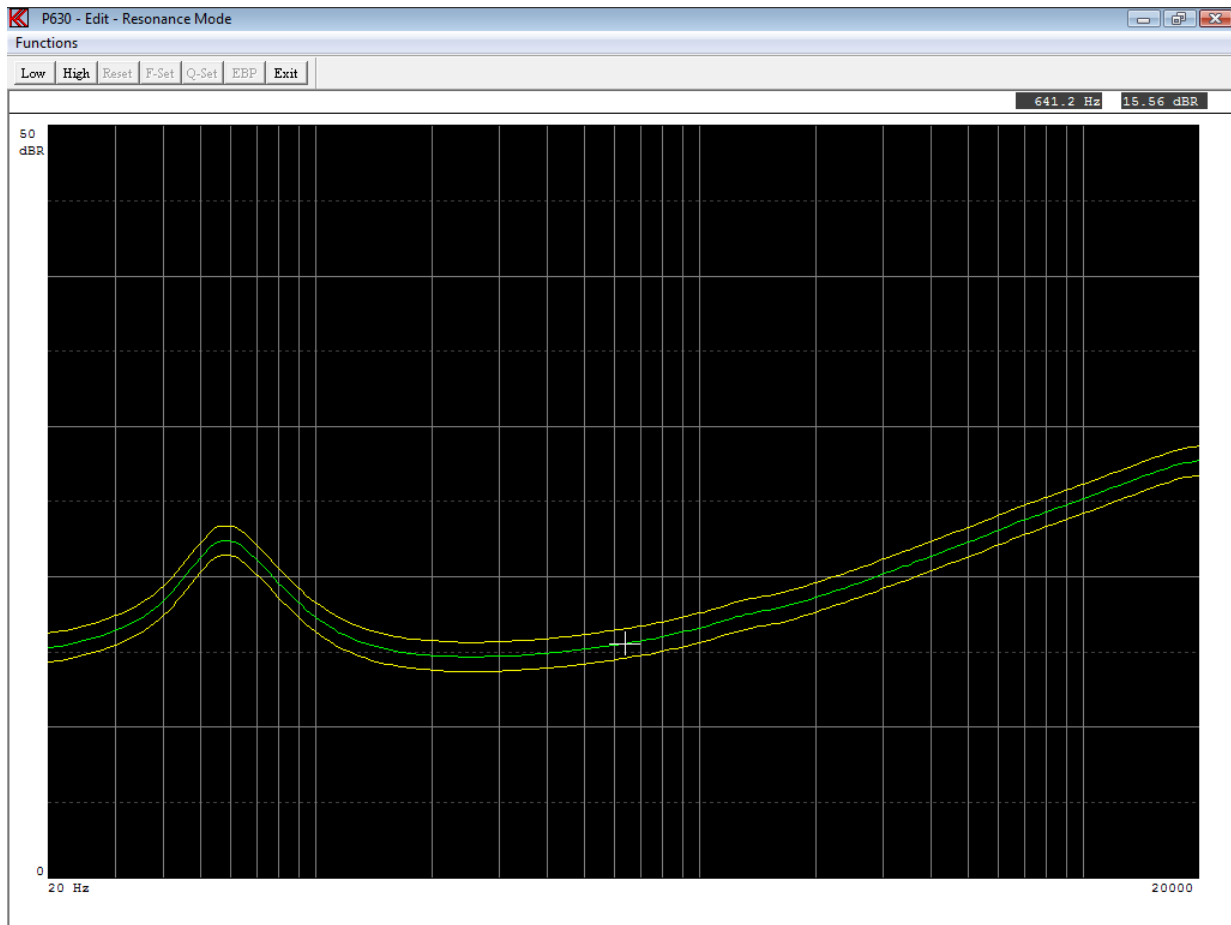
**Step 17:** Move cursor to lower reference curve. Press “arrow up” once.

**Step 18:** Move lower reference curve -1 dB down. Press "3" once or “Move, 3 Move Down”.

**Step 19:** Refresh display. Press "Page Down" once.

If you anytime want to update the graphic display, press "Page up" or "Page Down".

**Step 20:** Go to "Resonance test". Click on “R-test” or press key “R”.



**Step 21:** Activate "Fast cursor". Press key "0" once.

**Step 22:** Move cursor towards 47,2 Hz by using left arrow. Deactivate fast cursor by pressing "0", nil.  
Make the final movements using left or right arrow.

To carry out a resonance test the upper and lower frequency must be selected. The resonance frequency must be between these. This test is carried out in "run mode". By "opening" the reference curve between upper and lower test frequency and by placing the tolerance band appropriate, the following tests are made:

- a. Test resonance between lower and upper values.
- b. Test Q for upper limit.
- c. Using the factor  $F = f_{res}/Q$ :  
Test Q for lower limit and check factor F.

If the curve between "low" and "high" test frequencies is outside, but accepted with the upper and lower reference curves, this part of the curve is changing into red, "rejected".

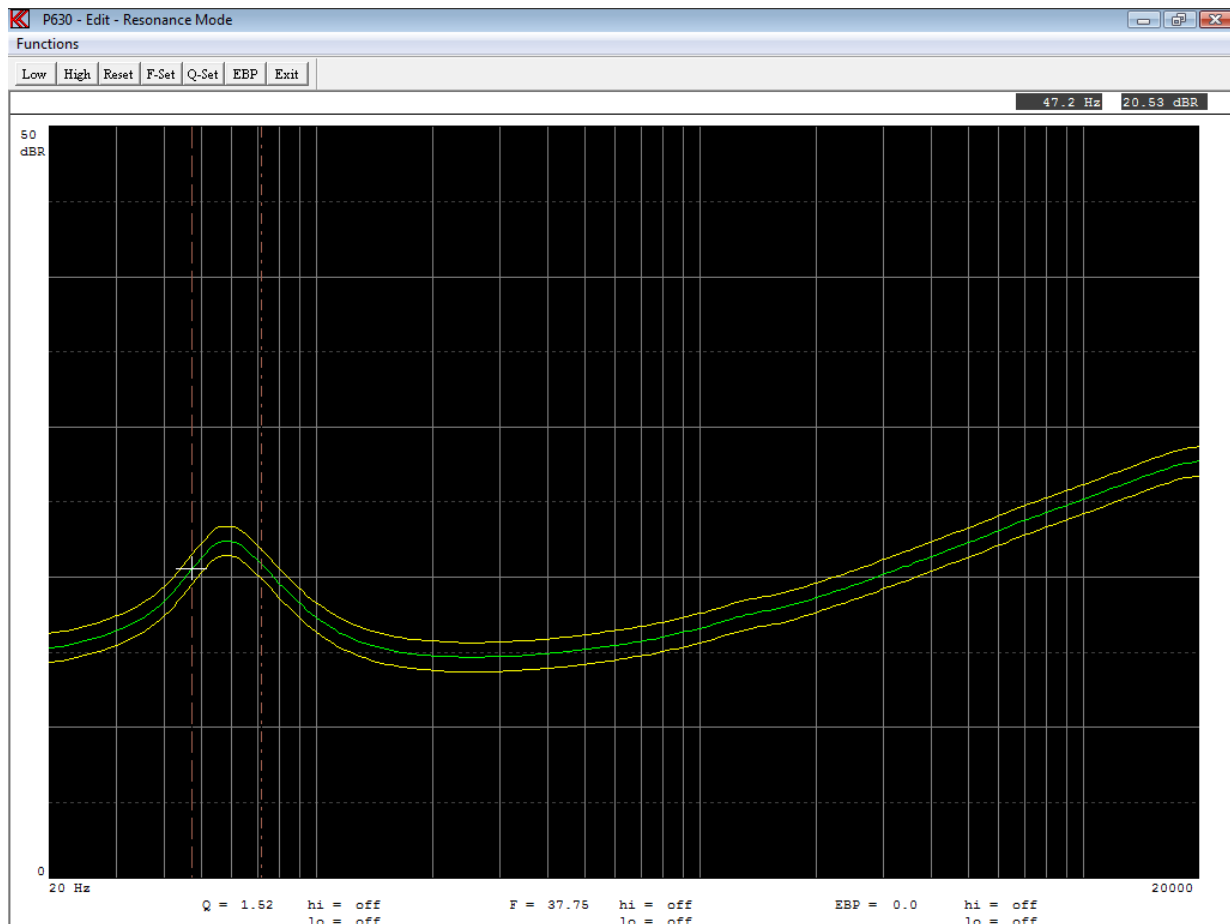
These tests are always carried out when "low" and "high" frequencies are active. If you don't want the test, reset freq. by "Reset" or key "4".

**Step 23:** Set "Low freq" by selecting "Low" or press key "1" (frequency is at 47.2 Hz).

A brown dot-and-dash line appears.

**Step 24:** Move cursor to 71,6 Hz by using right arrow.

**Step 25:** Set "High freq" by selecting "High" or press key "2".  
A brown dotted line appears at 71.6 Hz.

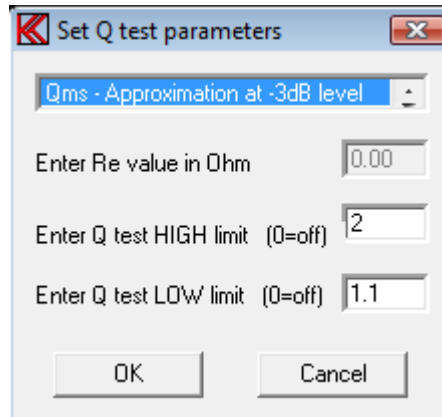


**Step 26:** Enter Q Set menu by enter "Q-Set" or press key "Q".

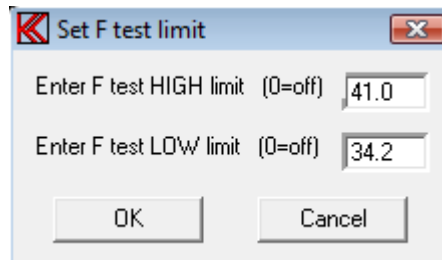
The screenshot shows the 'Set Q test parameters' dialog box. It has a title bar with a red 'X' icon and the text 'Set Q test parameters'. The dialog box contains the following fields and buttons:

- A dropdown menu with the text 'Qms - Approximation at -3dB level'.
- A text input field labeled 'Enter Re value in Ohm' with the value '0.00'.
- A text input field labeled 'Enter Q test HIGH limit (0=off)' with the value '0.00'.
- A text input field labeled 'Enter Q test LOW limit (0=off)' with the value '0.00'.
- Two buttons at the bottom: 'OK' and 'Cancel'.

- Step 27:** Select Q test: Qms - Approximation at –3dB level (default).
- Step 28:** Select Q test upper limit to 2.0.
- Step 29:** Select Q test lower limit to 1.1 and press “OK”.



- Step 30:** Enter F Set menu by enter “F-Set” or press key “F”.
- Step 31:** Select F test upper limit to 41.0 hertz.
- Step 32:** Select F test lower limit to 34.2 hertz and press “OK”.



- Step 33:** Enter EBP menu by enter “EBP”.
- Step 34:** Select “Use defined Re”.
- Step 35:** Enter Re to 4.10.
- Step 36:** Enter high limit to 170.0.
- Step 37:** Enter low limit to 140.0 and press “OK”.

**Set EBP test parameters**

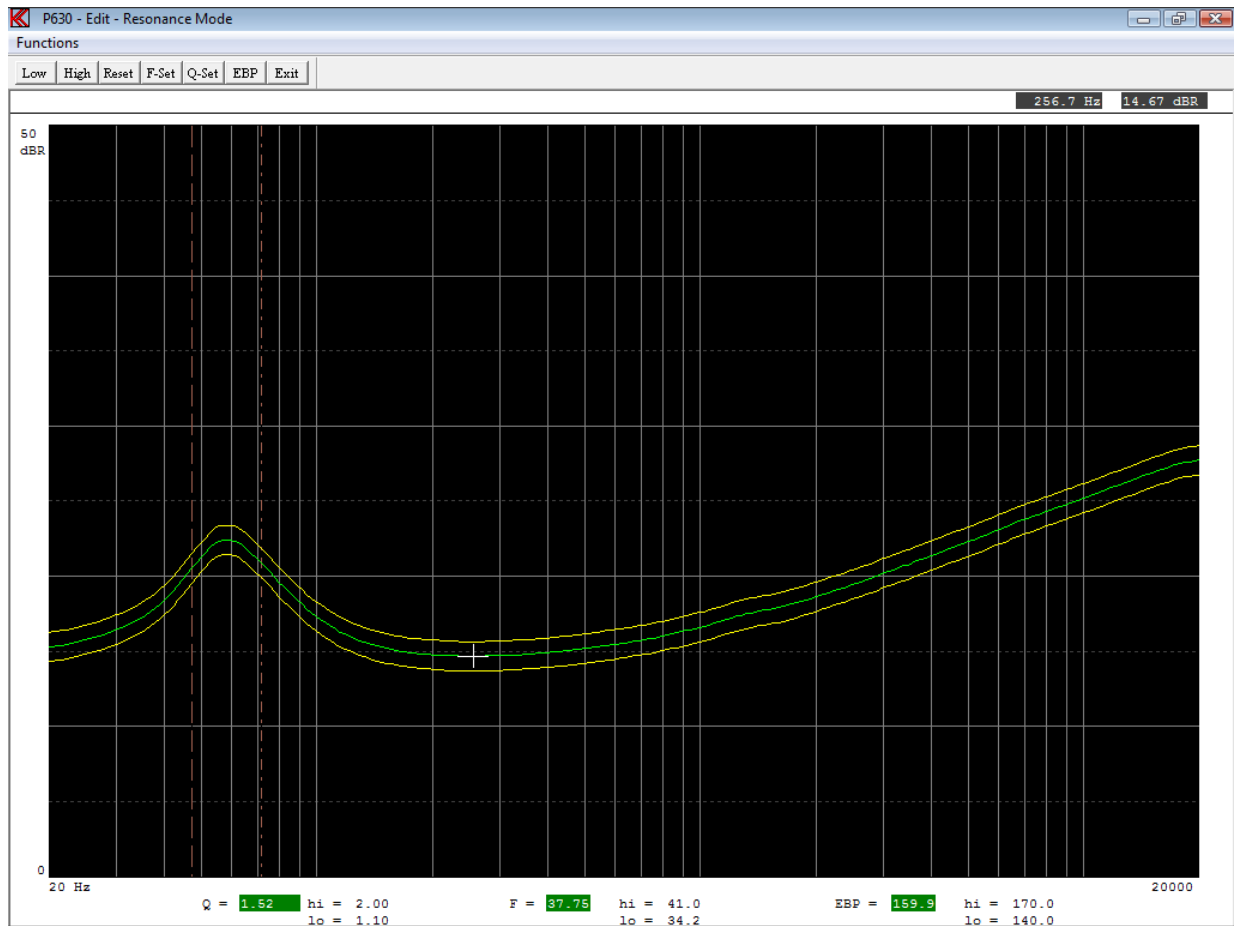
Use defined Re

Enter Re value in Ohm

Enter EBP test HIGH limit

Enter EBP test LOW limit (0=off)

OK Cancel



- Step 38:** Exit from Resonance mode.
- Step 39:** Exit from Edit mode.
- Step 40:** Exit from Reference mode.
- Step 41:** Save setup by “Save & exit”.

**Step 42:**      Save as Reference Curve.

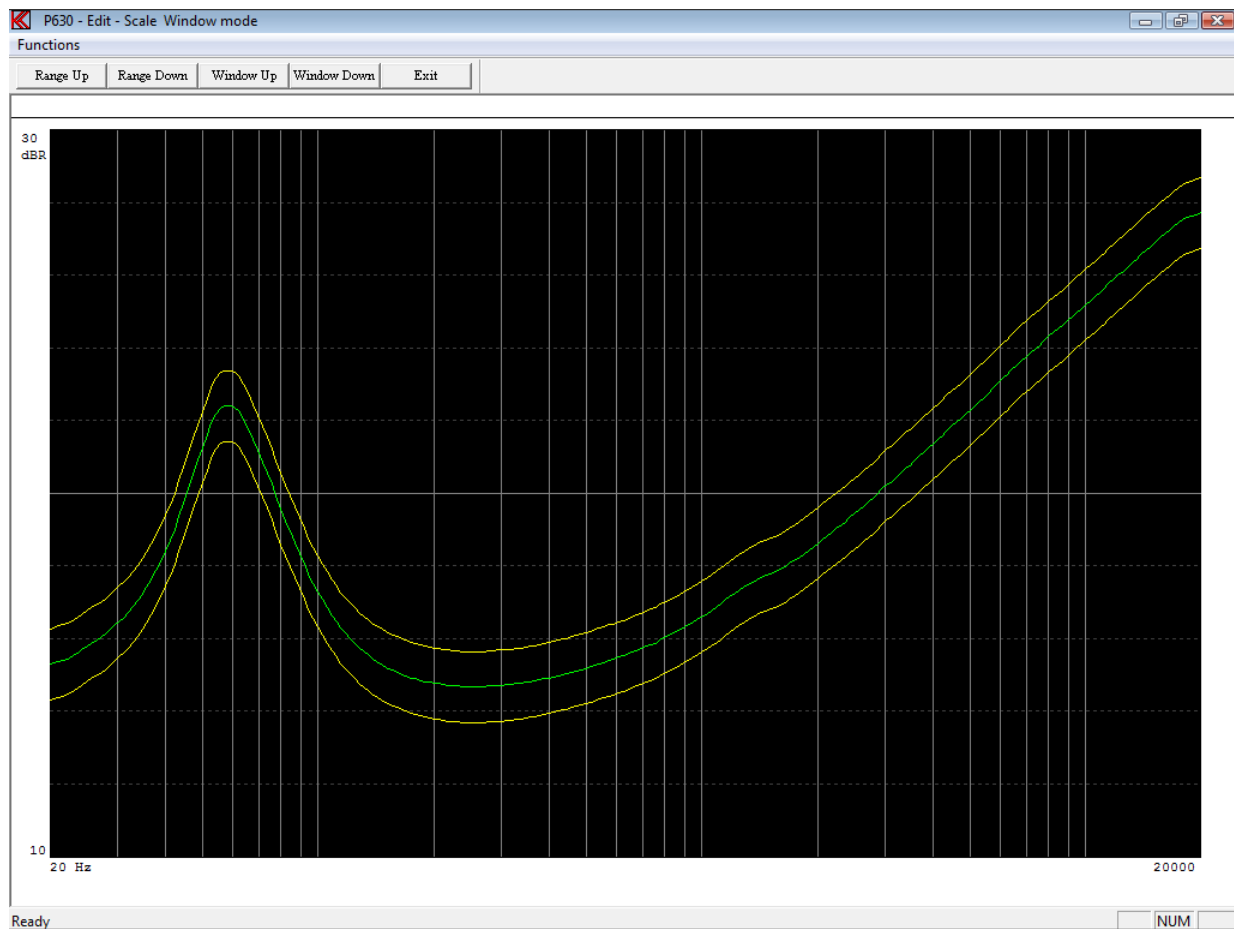
Now, the test can be exercised, see lesson 1 or 2. All test data are stored in the statistic file A4STAT.DBF or A4STAT.TXT if "Store statistics" in global setup is "ON".

## **Lesson 8**

This lesson shows how the "Scale" operation functions. Scale is a constant "zoom" function of graphic display.

Note: The step for entering password is not listed.

- Step 1:** Enter "Setup / change parameters" activate "Setup".
- Step 2:** Select type "resonance" (see lesson 7).
- Step 3:** Enter in the field Type Name "Rscale".
- Step 4:** Write, "scaled version" in "Type Description" field.
- Step 5:** Go to "Reference settings" by clicking on "Reference".
- Step 6:** Carry out a measurement. Click on "Measure" or press key "M".
- Step 7:** Go to "Edit mode" by "Edit" or press key "E".
- Step 8:** Go to "Scale mode" by "Scale" or press key "S".
- Step 9:** Enlarge range. Activate "Range Down" twice or press key "2" twice.
- Step 10:** Move window up. Activate "Window UP" twice or press key "3" twice.



**Step 11:** Exit Edit - Scale Window mode.

**Step 12:** Exit Edit mode.

**Step 13:** Exit Reference Mode.

**Step 14:** Enter "Save & Exit".

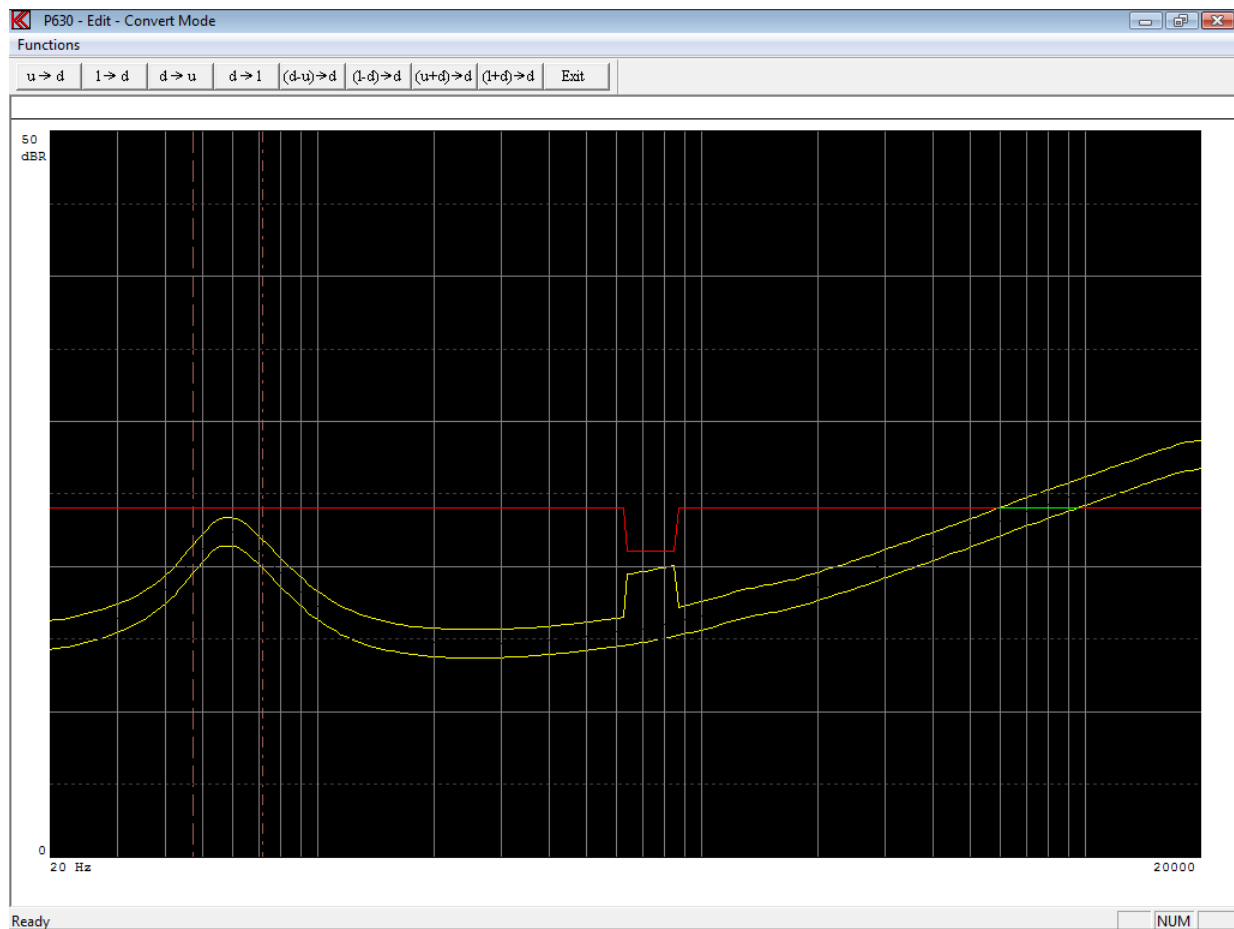
**Step 15:** Save as Reference Curve.

## **Lesson 9**

This lesson gives a simple example of how to convert between data and reference curves.

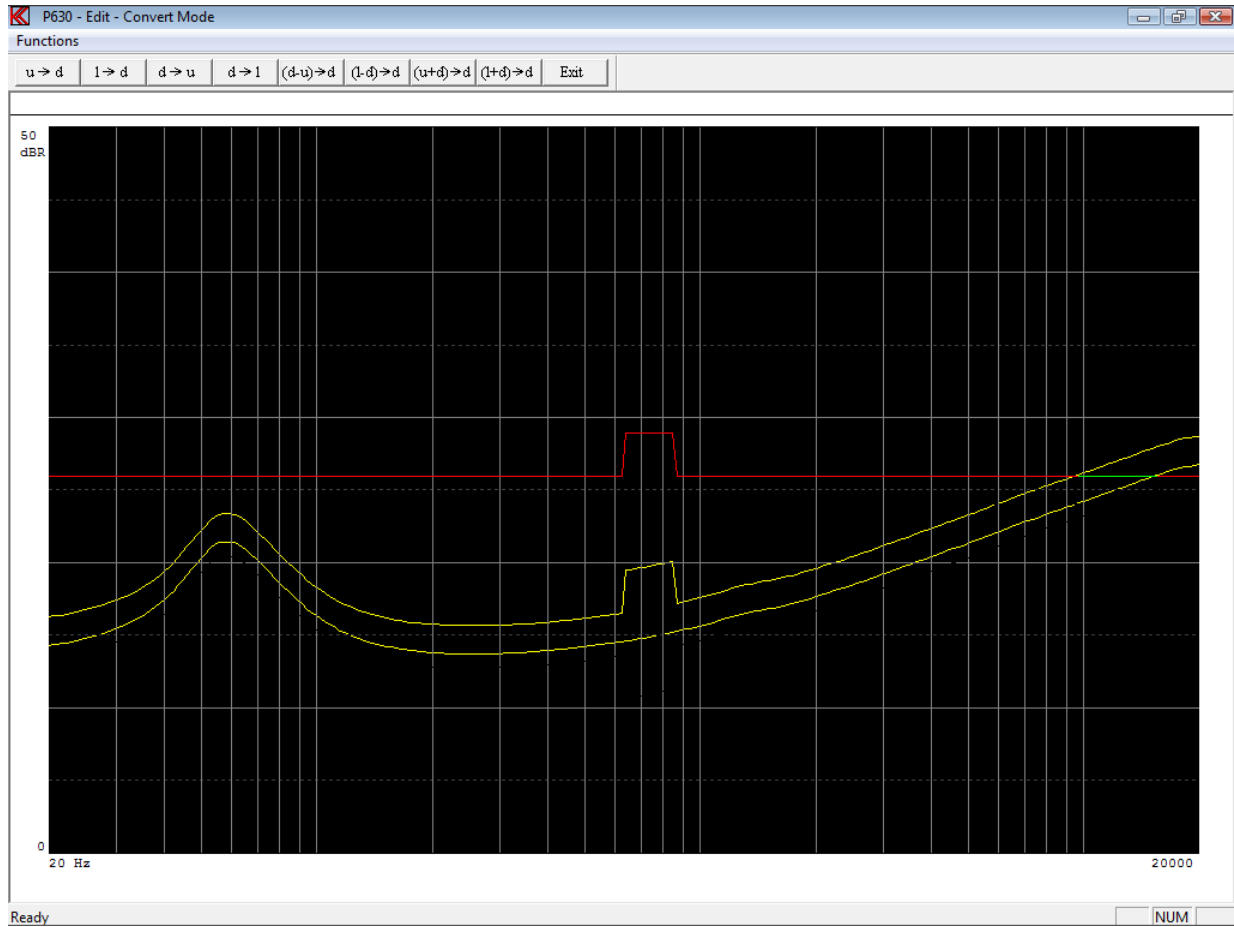
Note: The step for entering password is not listed.

- Step 1:** Enter “Setup / change parameters” activate “Setup”.
- Step 2:** Select type “resonance” (see lesson 7).
- Step 3:** Go to “Reference settings” by clicking on “Reference”.
- Step 4:** Carry out a measurement. Click on “Measure” or press key “M”.
- Step 5:** Go to “Edit mode” by “Edit” or press key “E”.
- Step 6:** Activate “Fast cursor”. Press key “0” once or use “Move, 0 Fast”.
- Step 7:** Write points up. Press “8” three times or use “Edit Points, 8 Up” tree times.
- Step 8:** Move part of curve to the right. Press “CTL arrow right” once.
- Step 9:** Select Curve Convert mode. Click “Convert” or press key “C”.
- Step 10:** Convert Data minus Upper Limit to Data. Click on “(d-u)->d” or press key “5”.  
The difference between these two curves appears.



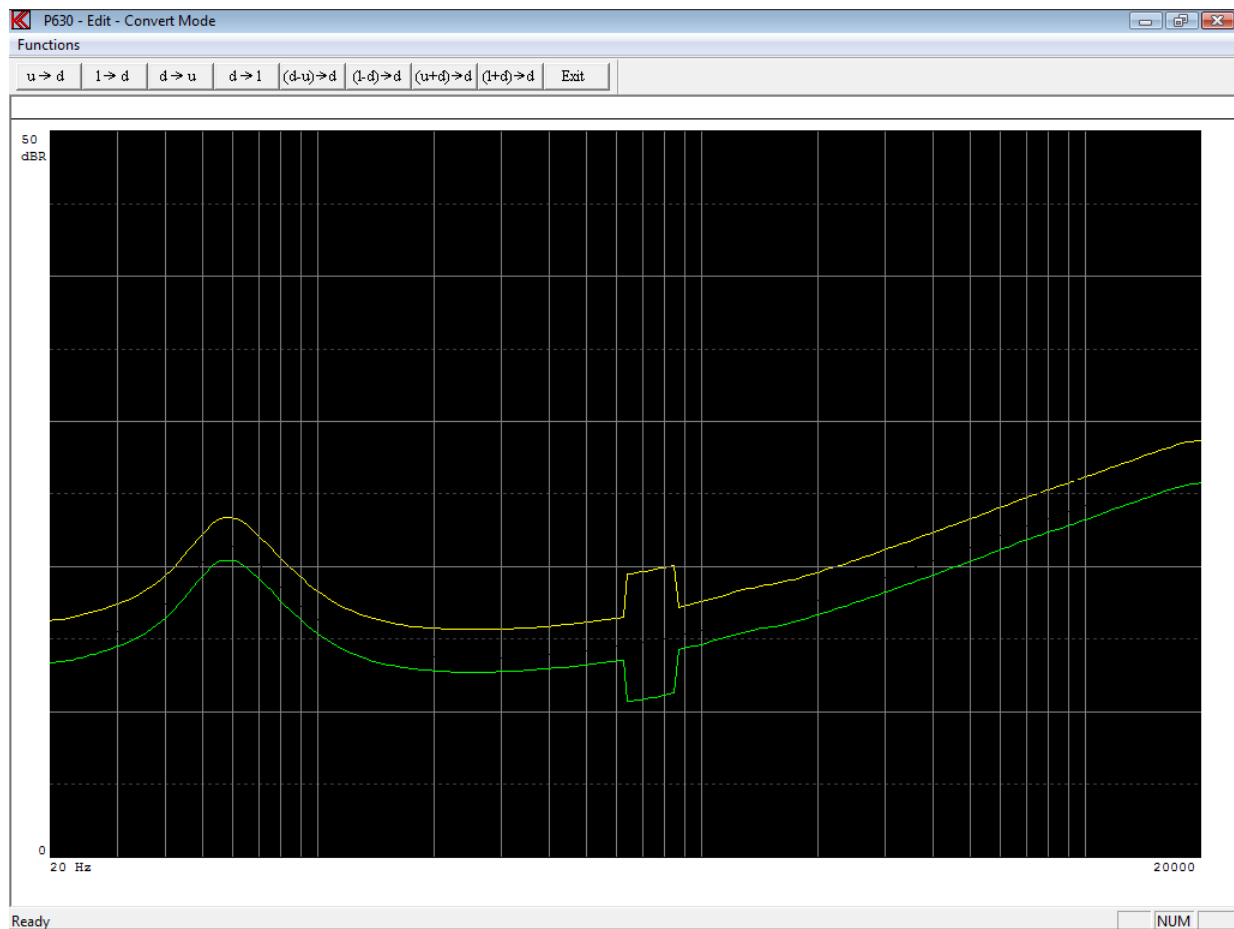
**Step 11:** Convert Lower Limit plus Data to Data. Click “(l+d)->d” or press key “8”.

**Step 12:** Convert Lower Limit minus Data to Data. Click “(l-d)->d” or press key “6”.



**Step 13:** Convert Lower Limit minus Data to Data once more. Click “(l-d)->d” or press key “6”.

**Step 14:** Copy Data to Lower Limit. Click “d -> l” or press key “4”.



- Step 15:** Exit from “Convert mode”.
- Step 16:** Exit from “Edit mode”.
- Step 17:** Exit from “Reference mode”.
- Step 18:** Exit from “Setup Of Parameters”.

## Lesson 10

This lesson shows how the function "Chain" is activated.

Note: The step for entering password is not listed.

**Step 1:** Go to "Setup / change parameter" activate "Setup".

**Step 2:** Select the type "mytest" (see lesson 5).

**Step 3:** Write "resonance" in the field "Type Chain".

The screenshot shows the 'Setup Of Parameters' dialog box with the following settings:

- Type:** Name: mytest, Chain: resonance, Status: (empty), Description: This is my first test, Help File: (empty), 3-Limit: (unchecked).
- Sensitivity Test:** Move: (unchecked), 1000 Hz, I/O: N.A.
- Polarity Test:** On: (unchecked), Negative: (unchecked), After: (unchecked), Pulse Time: 50 mSec.
- Compress:** Range: Off dB, Ref. Ch: Off.
- Loudness:** (test off, enter: 0.0), Form: Off, Test: 0.0.
- Input:** Status: Ch A (checked), Ch B (checked), Ch C (checked), Ch D (unchecked); Mux: 11, 11, No Mux, 13; Detector: Log, Log, Log, Log; Gain: -20 db, (empty), 0.1 ohm, -20 db; Smoothing: Off, Off, Off, Off; 25.1 pt/oct.
- Sweep:** Reverse: (unchecked), Start: 20 Hz, Stop: 20000 Hz, Delay: 0 mSec, Points: 250, Time: 3.0 Sec.
- Auto Save:** Data App. (unchecked), Data Rej. (unchecked), Results (unchecked), Data Path: c:, Result Path: c:.
- Filter:** Status: Ch B (checked), Ch C (unchecked), Ch D (unchecked); Type: TRK-HP, Har.: 5, Freq/Bw: oo, Gain: 0 db, Display: Absolute, Limit: 45 KHz.

**Step 4:** "Save & Exit".

**Step 5:** Save as Reference Curve.

When a setup has a valid type in the chain field, and chain is ON in global setup, the test sequence will continue until chain type is not found or is empty. If chain break is ON the chain function is terminated by "rejected" test.

If it turns out that a chain type by accident chains itself or another type earlier in the test sequence. The program can be terminated by “CTL + ALT + DEL” all at same time. Then select P630 program end “End Task”.

## **Lesson 11**

This sequence shows how to use a compensation curve.

A compensation curve can be used in different ways.

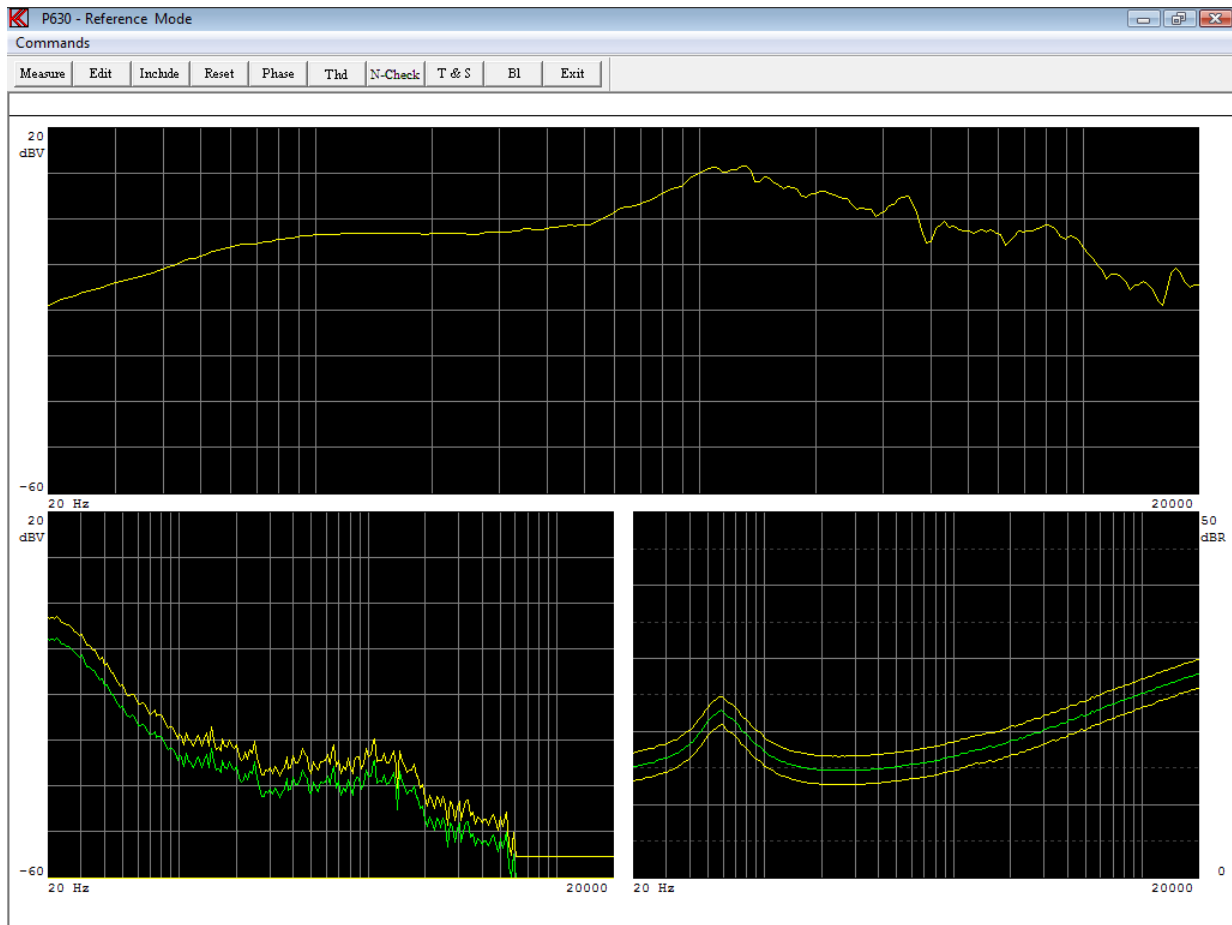
The function subtracts the compensation curve from measured data in channel A before listing and presentation.

This function can be used to:

- A. Comparison of difference between test stations. Each test station has its own compensation curve.
- B. Test of differences. If a reference loudspeaker frequency curve is stored as compensation, only differences will be shown. This makes it easier to evaluate the frequency curve variations.

Note: The step for entering password is not listed.

- Step 1:** Go to “Setup / change parameter” activate “Setup”.
- Step 2:** Select type “mytestcopy” (see lesson 6).
- Step 3:** Enter “Reference mode”. Click “reference”.
- Step 4:** Carry out a measurement. Press key “M” or click “Measure”.
- Step 5:** Go to “Edit mode”. Press key “E” or click “Edit”.
- Step 6:** Check cursor to be on channel A.  
Reset reference. Press key “CTL END” or click “Reset, Channel Limit”.
- Step 7:** Exit “Edit Mode”.
- Step 8:** Include data to reference curve. Click “Include” or press key “I”.
- Step 9:** Include channel A.



**Step 10:** Exit Reference Mode.

**Step 11:** Save & Exit.

**Step 12:** Save as Compensation Curve.

Now we are ready to edit the reference curve in channel A.

**Step 13:** Go to “Setup / change parameter” activate “Setup”.

**Step 14:** Select type “mytestcopy”.

**Setup Of Parameters**

Type	Chain	Status
mytestcopy		Compensation Curve
Description		
Help File		

☐ 3-Limit

---

**Sensitivity Test**  
☐ Move 1000 Hz

**I/O**  
 N.A

**Output**  
 A Output  
 5.9992 Volt  
 -7.96 dB  
 0 dB = 15.0 Volt

---

**Polarity Test**  
☐ On ☐ Negative ☐ After  
 Pulse Time 50 mSec.

---

**Compress**  
 Range Off dB  
 Ref. Ch Off

**Loudness** (test off, enter: 0.0)  
 Form Off  
 Test 0.0

---

**Input**  
 Status ☒ Ch A ☒ Ch B ☒ Ch C ☐ Ch D  
 Mux 11 11 No Mux 13  
 Detector Log Log Log Log  
 Gain -20 db 0.1 ohm -20 db  
 Smoothing Off Off Off Off  
 Off 25.1 pt/oct

---

**Sweep**  
☐ Reverse  
 Start 20 Hz  
 Stop 20000 Hz  
 Delay 0 mSec  
 Points 250 No  
 Time 3.0 Sec.

Reference  
 Delete & exit  
 Save & exit  
 Exit

---

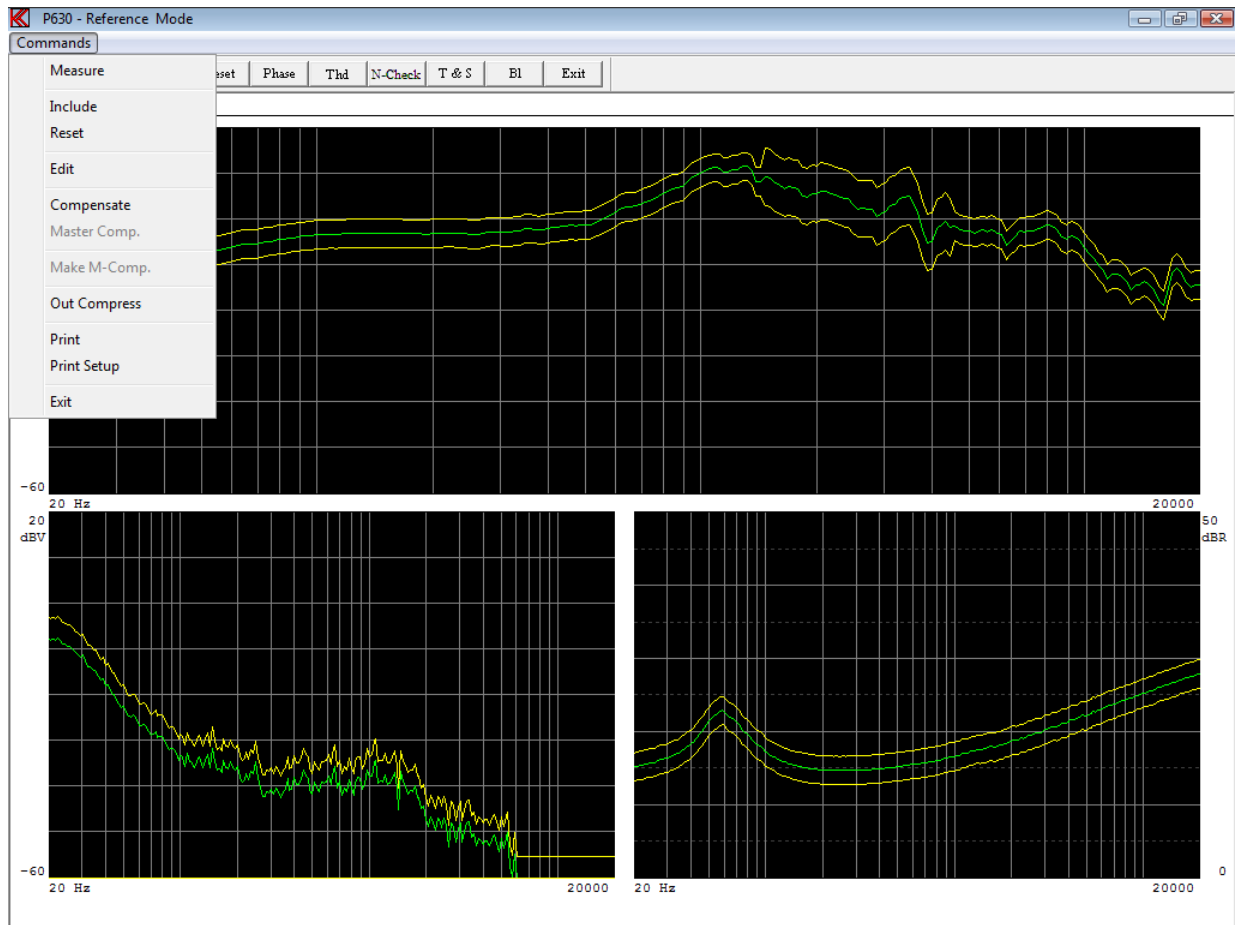
**Auto Save**  
☐ Data App. ☐ Data Rej. ☐ Results  
 Data Path  
 c:  
 Result Path  
 c:

---

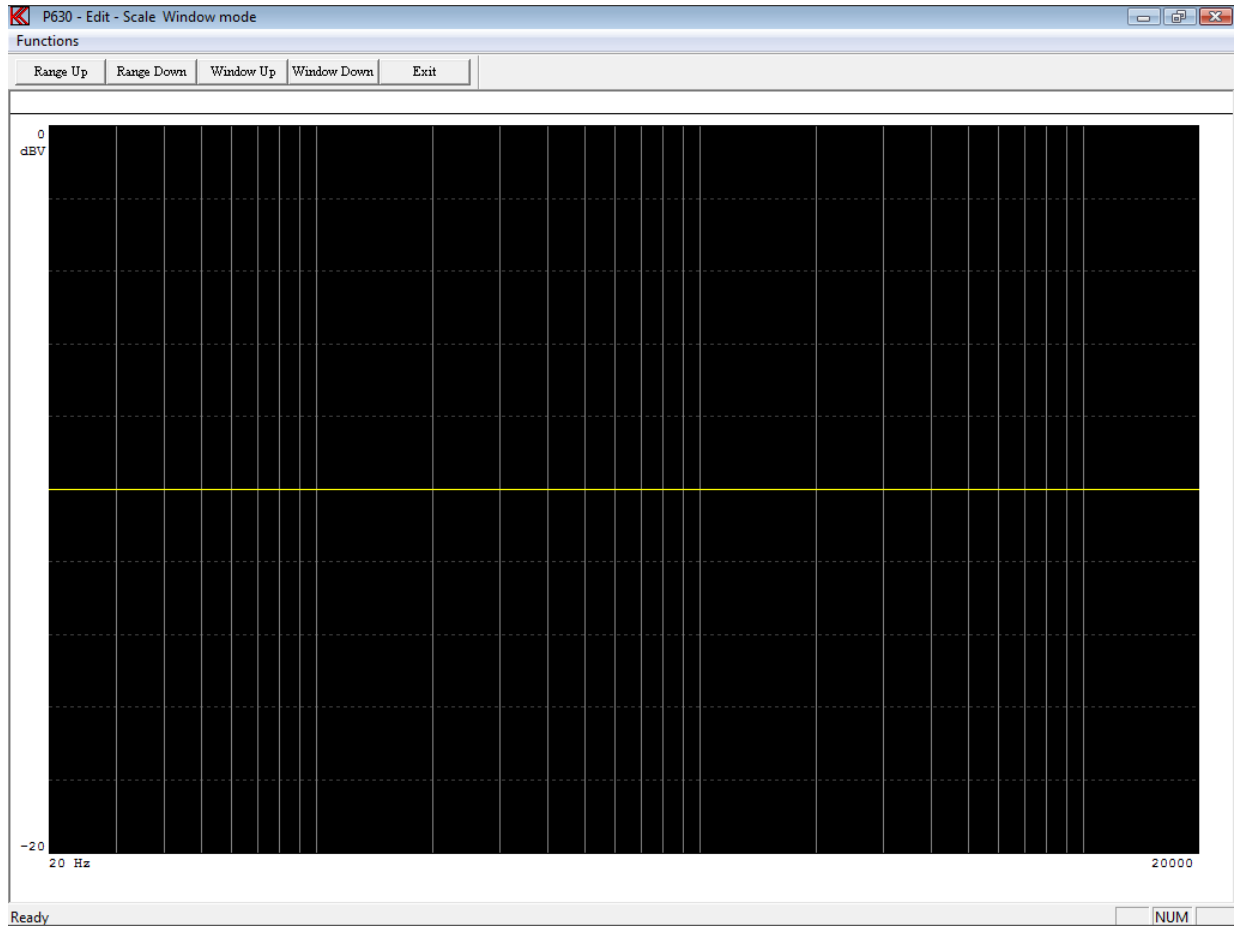
**Filter**  
 Status ☒ Ch B ☐ Ch C ☐ Ch D  
 Type TRK-HP  
 Har. 5  
 Freq/Bw oo  
 Gain 0 db 0 db 0 db  
 Display Absolute Absolute Absolute  
 Limit 45 KHz 45 KHz 45 KHz

**Step 15:** Go to “Reference mode” click “Reference”.

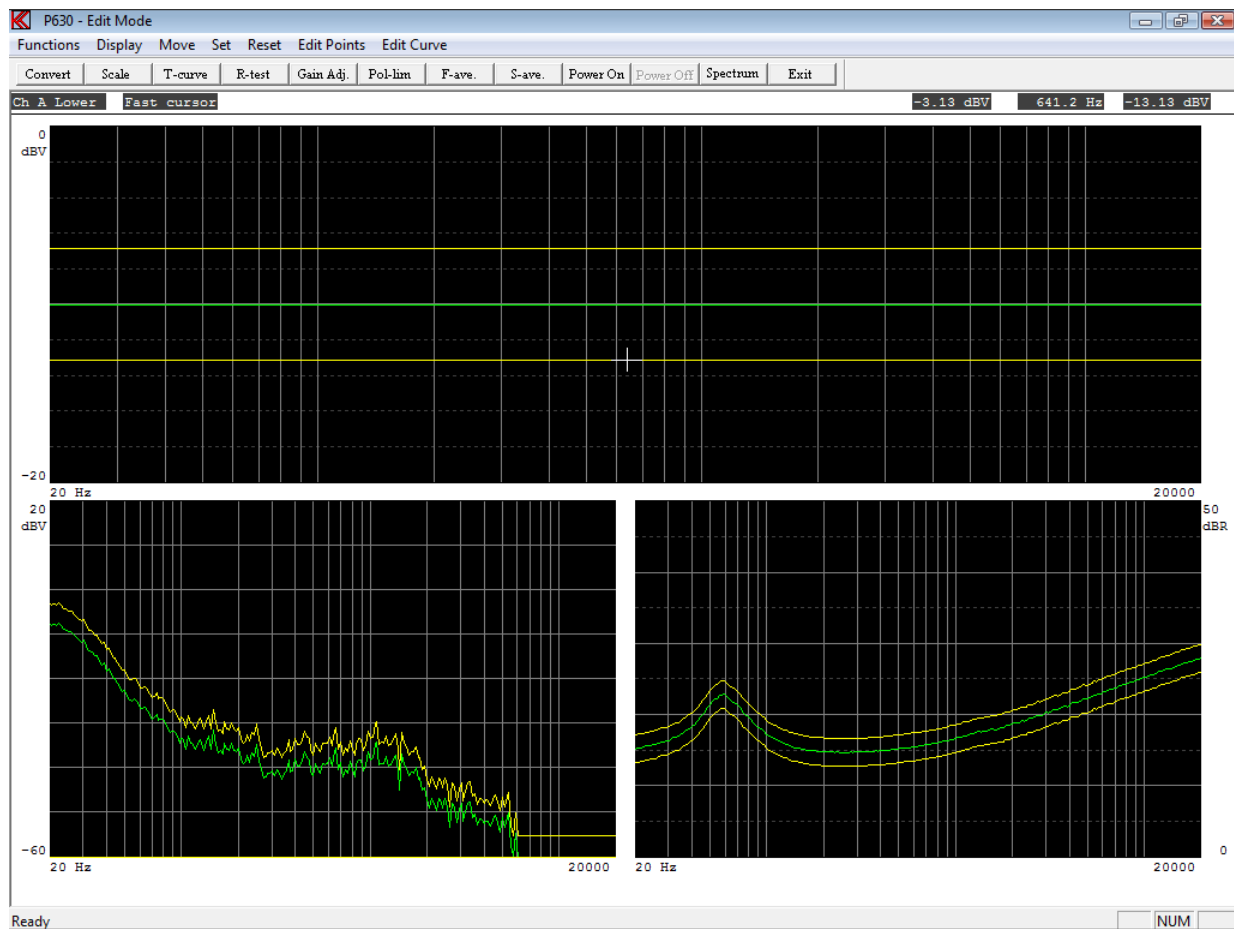
**Step 16:** Carry out a measurement. Press key “M” or click “Measure”.



- Step 17:** “Compensate” measuring data. Select “Commands, Compensate”.
- Step 18:** Go to “Edit mode” click “Edit” or press key “E”.
- Step 19:** Reset Ch A. Press key “CTL END” or click “Reset, Channel Limit”.
- Step 20:** Exit “Edit Mode”.
- Step 21:** Go to Include data menu. Click “Include” or press key “I”.
- Step 22:** Include channel A.
- Step 23:** Go to "Edit mode". Click “Edit”.
- Step 24:** Go to "Scale mode". Click “Scale” or press key ”S”.
- Step 25:** Set "page up". Click “Range Down” twice or “Range UP” six times.
- Step 26:** Move window. Click “Window Up” twice.



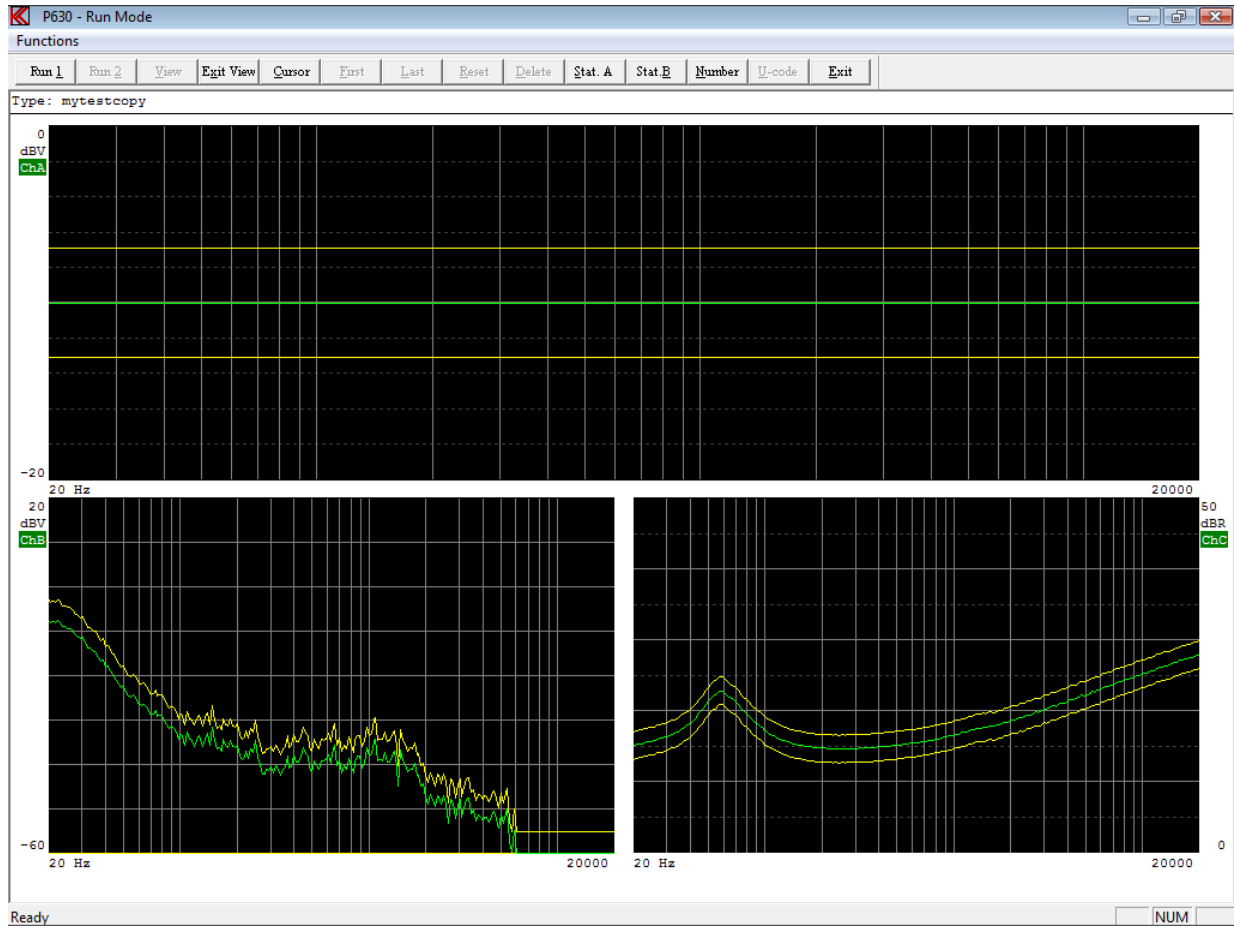
- Step 27:** Exit “Edit – Scale Window mode”.
- Step 28:** Choose "Fast cursor". Press key “0” or click “Move, 0 Fast”.
- Step 29:** Move curve 3,1 dB up. Click “Move, 9 Move Up” twice or press key “9” twice.
- Step 30:** Move cursor to "lower limit". Press “arrow up” once.
- Step 31:** Move curve -3,1 dB down. Click “Move, 3 Move Down” twice or press key “3” twice.



- Step 32:** Exit Edit Mode.
- Step 33:** Exit from Reference Mode.
- Step 34:** Save & Exit.
- Step 35:** Save as Reference Curve.

Now the type is ready to be used. Carry out lesson 1 or 2 for a test.

When you make a measurement and view the result you get the following screen picture. The compensated frequency curve is shown as a straight line as the (simulated) frequency curve is exactly identical.





## **Lesson 12**

This lesson shows how user calibration of an existing compensation curve can be made.

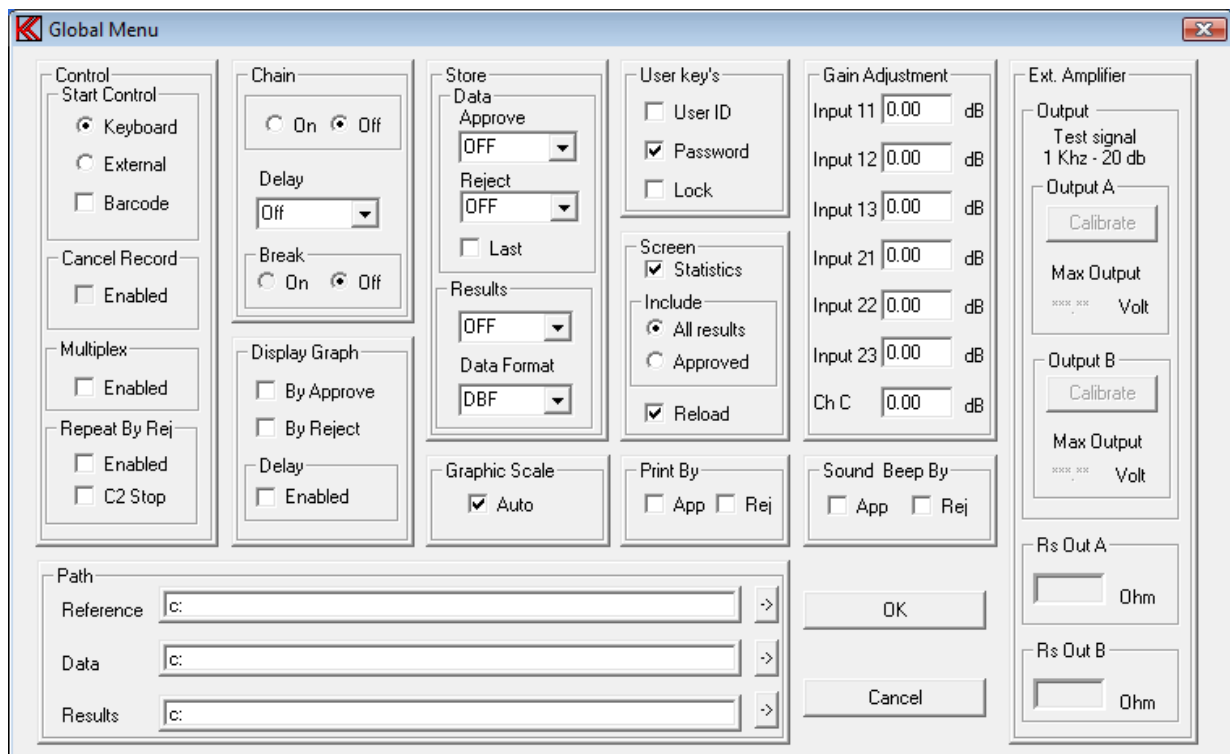
Recalibrations of a compensation curve can be necessary even several times every day as a function of changing environmental conditions (e.g. temperature and humidity) by which the speaker performance is dependent.

However, to avoid grave operator mistakes, some limitations have been set up in the program. A correction, which exceeds 3 dB, but not 6 dB, is only performed after a warning the operator has to respond on. If the corrections exceeds 6 dB calibrations will not be allowed by the program. Instead you must use the normal calibration procedure as described in lesson 11.

Note: The step for entering password is not listed.

**Step 1:** Go to "Change of global parameters", press "Global".

**Step 2:** Enable “User Key’s Password” flag. Be sure “Multiplex” is off.



**Step 3:** Save parameters. Click “OK”.

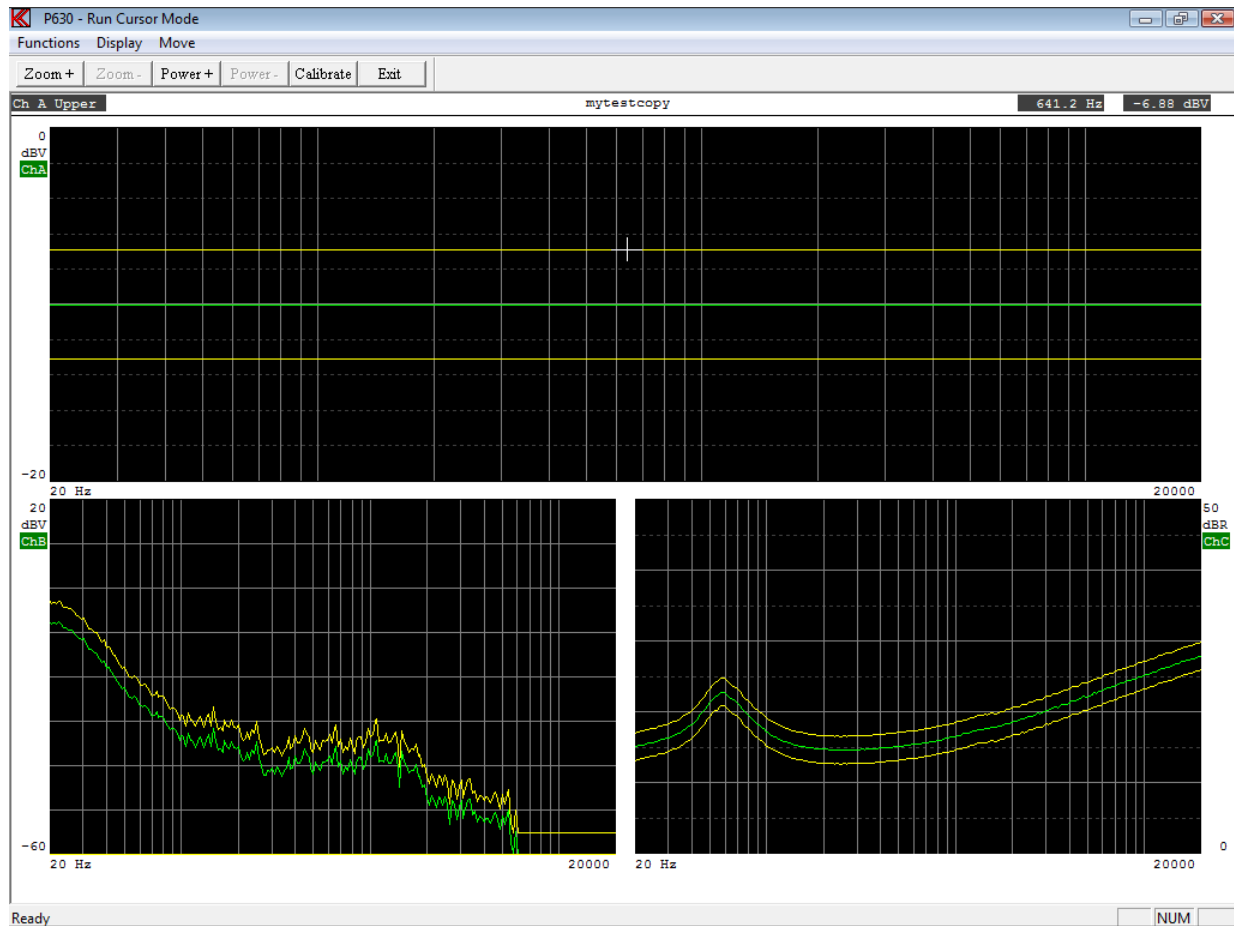
**Step 4:** Activate run menu, click “Run”.

**Step 5:** Select type “mytestcopy” (see lesson 11).

**Step 6:** Carry out a measurement, click “Run 1” or press “1”.

**Step 7:** View results; click “View” (if store data approve / reject is off in global menu).

**Step 8:** Select cursor menu, click “Cursor” or press key “C”.



Here you see the results (green) of the actual measurement compensated with the compensation curve.

If you during testing observe a general trend (due to change in humidity, temperature etc.) you should:

- a) Remount the reference speaker
- b) Recalibrate the compensation curve.

**Step 9:** Calibrate, click “Functions Calibrate” or press key “A”.

**Step 10:** Enter password. Note: The “user password” may be different from the technician one.

You will still see the “old” curve, but the compensation curve has now been recalibrated, providing that the changes do not exceed 3 dB.

If the changes lies between 3 - 6 dB, you will be prompted before the changes takes place.

If the changes are more than 6 dB no recalibration will be carried out. In such case you must make a new calibration curve (see lesson 11).

**Step 11:** Exit Run Cursor Mode.

Check by making a new measurement:

**Step 12:** Carry out a measurement. Click “Run 1” or press key “1”.

**Step 13:** View results, click “View” if not in view mode.

Check that everything the curve act as expecting. This to avoid a bad measurement is used as a compensation (noise etc.). In the off-line version the measured data always is the same so you cannot see any changes.

**Step 14:** Exit Run Cursor Mode.

**Step 15:** Exit Run Mode.



## **Lesson 13**

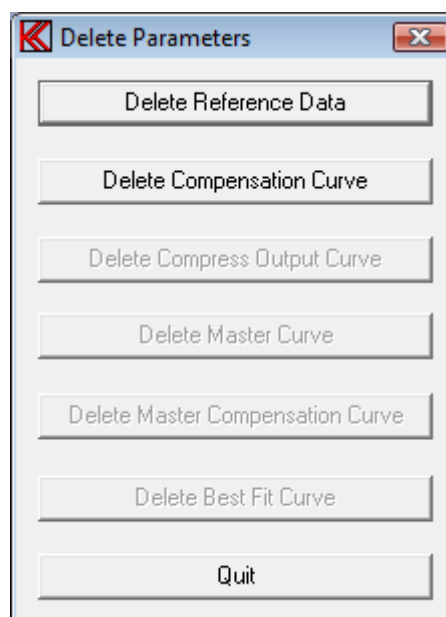
This exercise shows how to delete a type.

Note: The step for entering password is not listed.

**Step 1:** Go to “Setup / change parameters”. Click “Setup”.

**Step 2:** Select type to be deleted. Choose “mytestcopy”.

**Step 3:** Assume that we want to delete only the compensation curve. Click on “Delete & Exit”.



**Step 4:** Select “Delete Compensation Curve”.

**Step 5:** Confirm by pressing, “Yes”.

**Step 6:** Go to “Setup”.

**Step 7:** Choose “mytestcopy”.  
The comment in status field "compensation curve" has now disappeared.

**Setup Of Parameters**

Type  
 Name: mytestcopy Chain: Status:  
 Description:  
 Help File: -> ☐ 3-Limit

Sensitivity Test  
☐ Move 1000 Hz I/O: N.A. Output: A 5.9992 Volt -7.96 dB 0 dB = 15.0 Volt

Polarity Test  
☐ On ☐ Negative ☐ After Pulse Time: 50 mSec.

Compress  
 Range: Off dB Ref. Ch: Off

Loudness (test off, enter: 0.0)  
 Form: Off Test: 0.0

Input  
 Status: ☒ Ch A ☒ Ch B ☒ Ch C ☐ Ch D  
 Mux: 11 11 No Mux 13  
 Detector: Log Log Log Log  
 Gain: -20 db 0.1 ohm -20 db  
 Smoothing: Off Off Off Off

Sweep  
☐ Reverse Start: 20 Hz Stop: 20000 Hz Delay: 0 mSec Points: 250 No Time: 3.0 Sec.

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
 Data Path: c: Result Path: c:

Filter  
 Status: ☒ Ch B ☐ Ch C ☐ Ch D  
 Type: TRK-HP Har: 5 Freq/Bw: oo Gain: 0 db 0 db 0 db Display: Absolute Absolute Absolute Limit: 45 KHz 45 KHz 45 KHz

Buttons: Reference, Delete & exit, Save & exit, Exit

- Step 8:** Delete "mytestcopy". Click "Delete & Exit".
- Step 9:** "Delete Reference Data"
- Step 10:** Confirm. "Yes".
- Step 11:** Go to "Setup / change parameters". Click "Setup".  
The type "mytestcopy" is no longer in the type list.
- Step 12:** Exit. Press "Cancel".

## Lesson 14

This lesson shows how to measure THD distortion.

Note: The step for entering password is not listed.

**Step 1:** Go to “Setup / change parameters”. Click “Setup”.

**Step 2:** Select "mytest".

To measure THD the filter must be placed to collect all harmonic frequency 2. and up. To make this:

Select the tracking high pass filter, TRK-HP.

Place filter corner at 2. harmonic.

**Step 3:** Select “Filter Har.” to 2. harmonic and click on “Filter Har.” field. When turning blue on 2 filters is then selected to 2. harmonic.

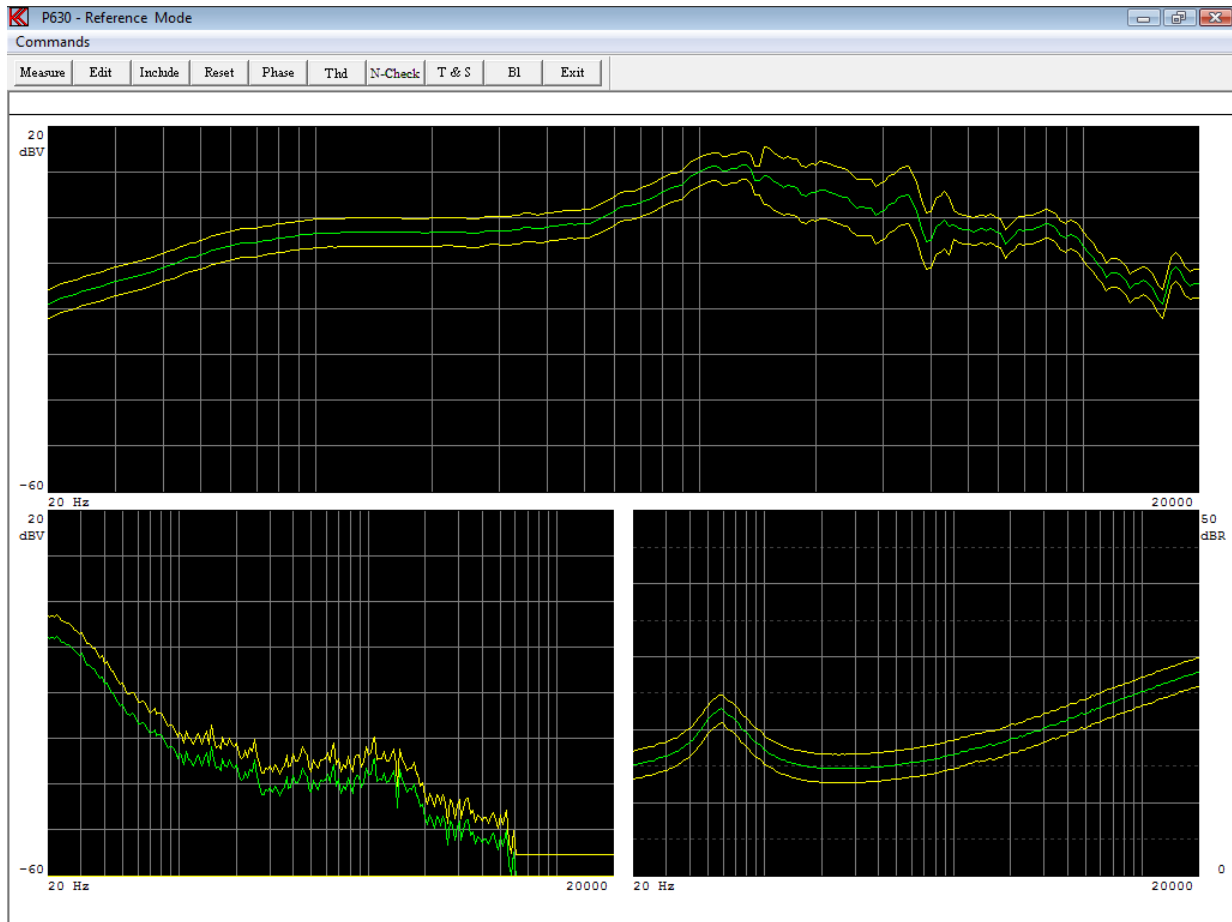
The filters have a high-end limit at 45 kHz.

To void noise, the limit can be set to 22 kHz.

**Step 4:** Select the 22 kHz at field “Filter Limit” and click on field to turn blue.

**Step 5:** Go to Reference menu, click “Reference”.

**Step 6:** Make a measurement, click “Measure”.



The absolute value of the THD curve is now displayed in Ch B.

To get the actual THD value in dB, you must calculate the difference between the frequency curve in Ch A and the distortion curve in Ch B.

**Step 7:** Exit Reference Mode.

**Step 8:** Select the display type to relative. Select “Filter Display” to “Relative” and click on field.

To utilise this function, Ch A and Ch B (or Ch D) must use the same input amplifier to obtain the same gain.

**Setup Of Parameters**

Type  
 Name: mytest Chain: resonance Status:   
 Description: This is my first test  
 Help File:   
☐ 3-Limit

Sensitivity Test  
☐ Move 1000 Hz  
 I/O: N.A  
 Output: A Output: 5.9992 Volt  
 -7.96 dB  
 0 dB = 15.0 Volt

Polarity Test  
☐ On ☐ Negative ☐ After  
 Pulse Time: 50 mSec.

Compress  
 Range: Off dB  
 Ref. Ch: Off

Loudness (test off, enter: 0.0)  
 Form: Off  
 Test: 0.0

Input  
 Status: ☒ Ch A ☒ Ch B ☒ Ch C ☐ Ch D  
 Mux: 11 11 No Mux 13  
 Detector: Log Log Log Log  
 Gain: -20 db 0.1 ohm -20 db  
 Smoothing: Off Off Off Off  
 Off 25.1 pt/oct

Sweep  
☐ Reverse  
 Start: 20 Hz  
 Stop: 20000 Hz  
 Delay: 0 mSec  
 Points: 250 No  
 Time: 3.0 Sec.

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
 Data Path: c:  
 Result Path: c:

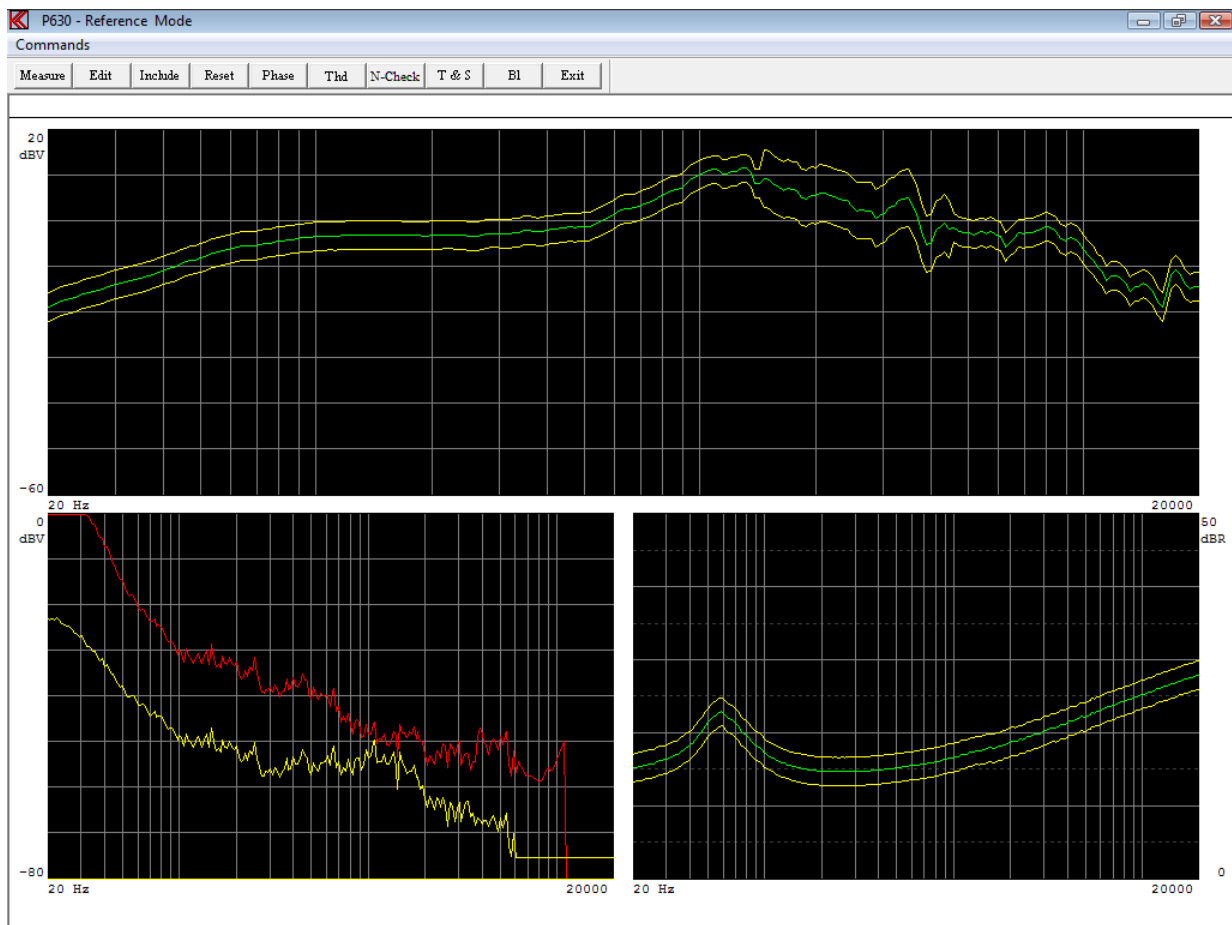
Filter  
 Status: ☒ Ch B ☐ Ch C ☐ Ch D  
 Type: TRK-HP  
 Har.: 2  
 Freq/Bw: oo  
 Gain: 0 db 0 db 0 db  
 Display: Relative Absolute Absolute  
 Limit: 22 KHz 45 KHz 45 KHz

Reference  
 Delete & exit  
 Save & exit  
 Exit

**Step 9:** Go to Reference menu, click “Reference”.

**Step 10:** Make a measurement, click “Measure”.

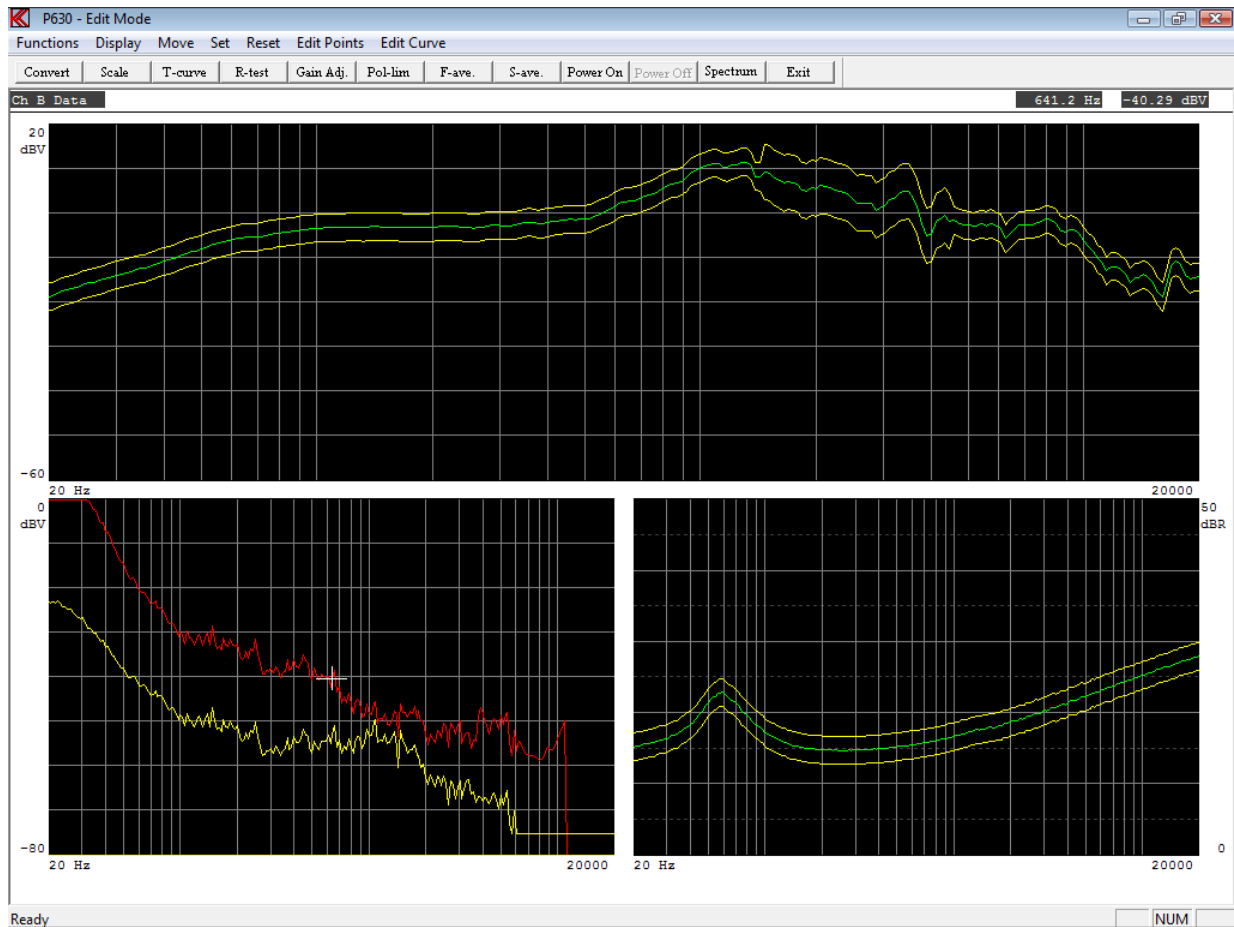
Ch B is now displaying the difference between Ch A and Ch B starting from top of window (0 dB).



**Step 11:** Enter Edit menu, click “Edit”.

**Step 12:** Select Ch B, press “+” once.

**Step 13:** Select data curve, press “arrow down” once.  
The cursor now shows -40.29 dBV. This value is the THD value at cursor, 641.2 Hz.  $-40.29 \text{ dBV} = 0.967 \%$ .



**Step 14:** Exit Edit Mode.

**Step 15:** Exit Reference Mode.

**Step 16:** Select the display type to relative. Select “Filter Display” to “Relative%” and click on field.

This Relative% has same function as Relative. The readout is in percent however the scale is still logarithmic.

**Setup Of Parameters**

Type  
 Name: mytest Chain: resonance Status:   
 Description: This is my first test  
 Help File:   
☐ 3-Limit

Sensitivity Test  
☐ Move 1000 Hz

I/O  
 N.A.

Output  
 A Output: 5.9992 Volt  
 -7.96 dB  
 0 dB = 15.0 Volt

Polarity Test  
☐ On ☐ Negative ☐ After  
 Pulse Time: 100 mSec.

Compress  
 Range: Off dB  
 Ref. Ch: 100

Loudness (test off, enter: 0.0)  
 Form: Off  
 Test: 0.0

Input  
 Status: ☒ Ch A ☒ Ch B ☒ Ch C ☐ Ch D  
 Mux: 11 11 No Mux 11  
 Detector: Log Log Log Log  
 Gain: -20 db 0.1 ohm 0.1 ohm 0.1 ohm  
 Smoothing: Off Off Off Off  
 Off 25.1 pt/oct

Sweep  
☐ Reverse  
 Start: 20 Hz  
 Stop: 20000 Hz  
 Delay: 0 mSec  
 Points: 250 No  
 Time: 3.0 Sec.

Reference  
 Reference  
 Delete & exit  
 Save & exit  
 Exit

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
 Data Path: c:  
 Result Path: c:

Filter  
 Status: ☒ Ch B ☐ Ch C ☐ Ch D  
 Type: TRK-HP  
 Har.: 2  
 Freq/Bw: oo  
 Gain: 0 db  
 Display: Relative%  
 Limit: 22 KHz

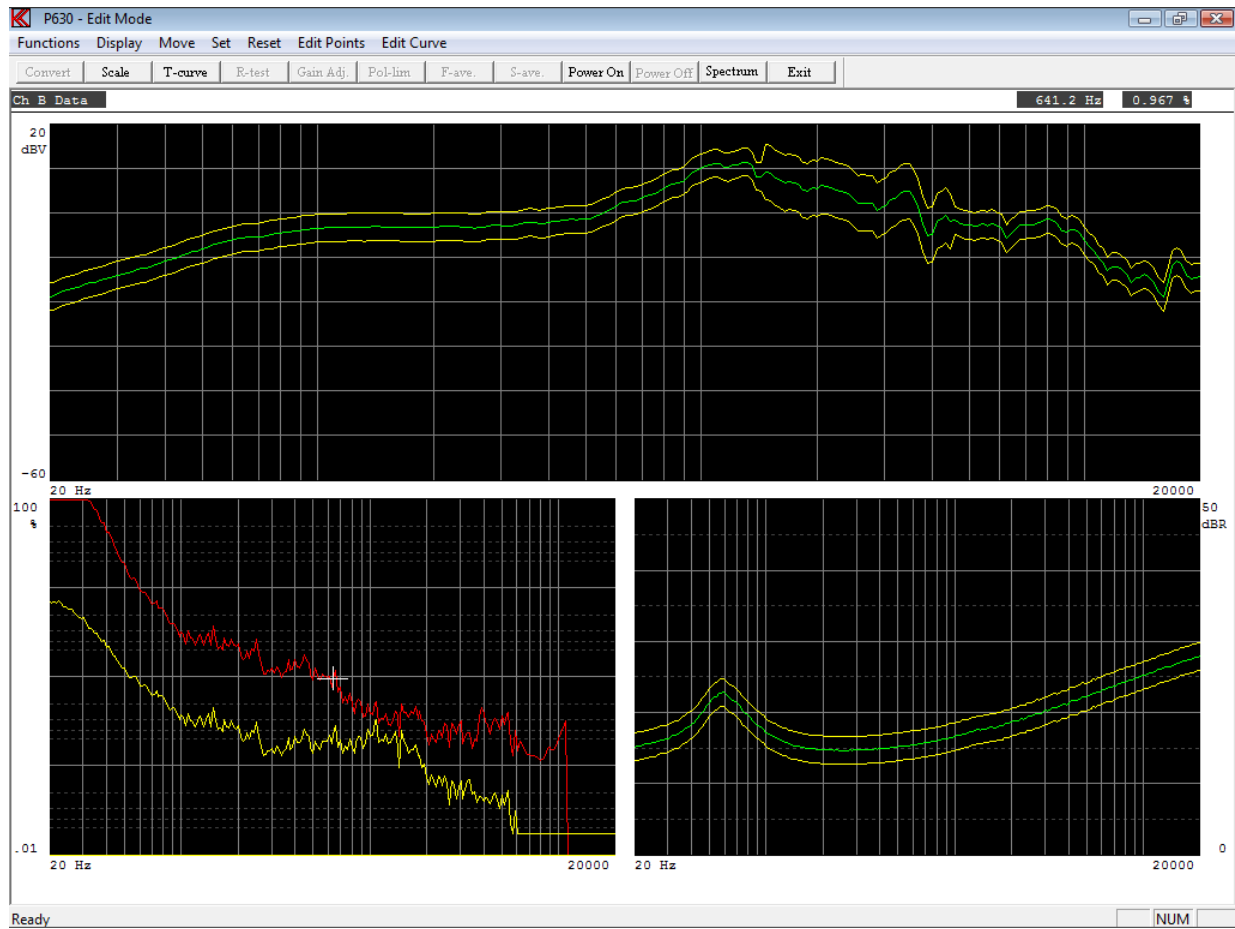
**Step 17:** Go to Reference menu, click “Reference”.

**Step 18:** Make a measurement, click “Measure”.

**Step 19:** Enter Edit menu, click “Edit”.

**Step 20:** Select Ch B, press “+” once.

**Step 21:** Select data curve, press “arrow down” once.  
 The cursor now shows 0.967 %. This value is the THD value at cursor, 641.2 Hz.



To generate a proper reference curve for channel B, see lesson 5.

**Step 22:** Exit Edit Mode.

**Step 23:** Exit Reference Mode.

**Step 24:** Exit Setup Of Parameters.



## Lesson 15

This lesson shows how to setup a test for Rub & Buzz measurement.

Note: The step for entering password is not listed.

**Step 1:** Make a new setup. Enter the name “rubbuzz” as type name.

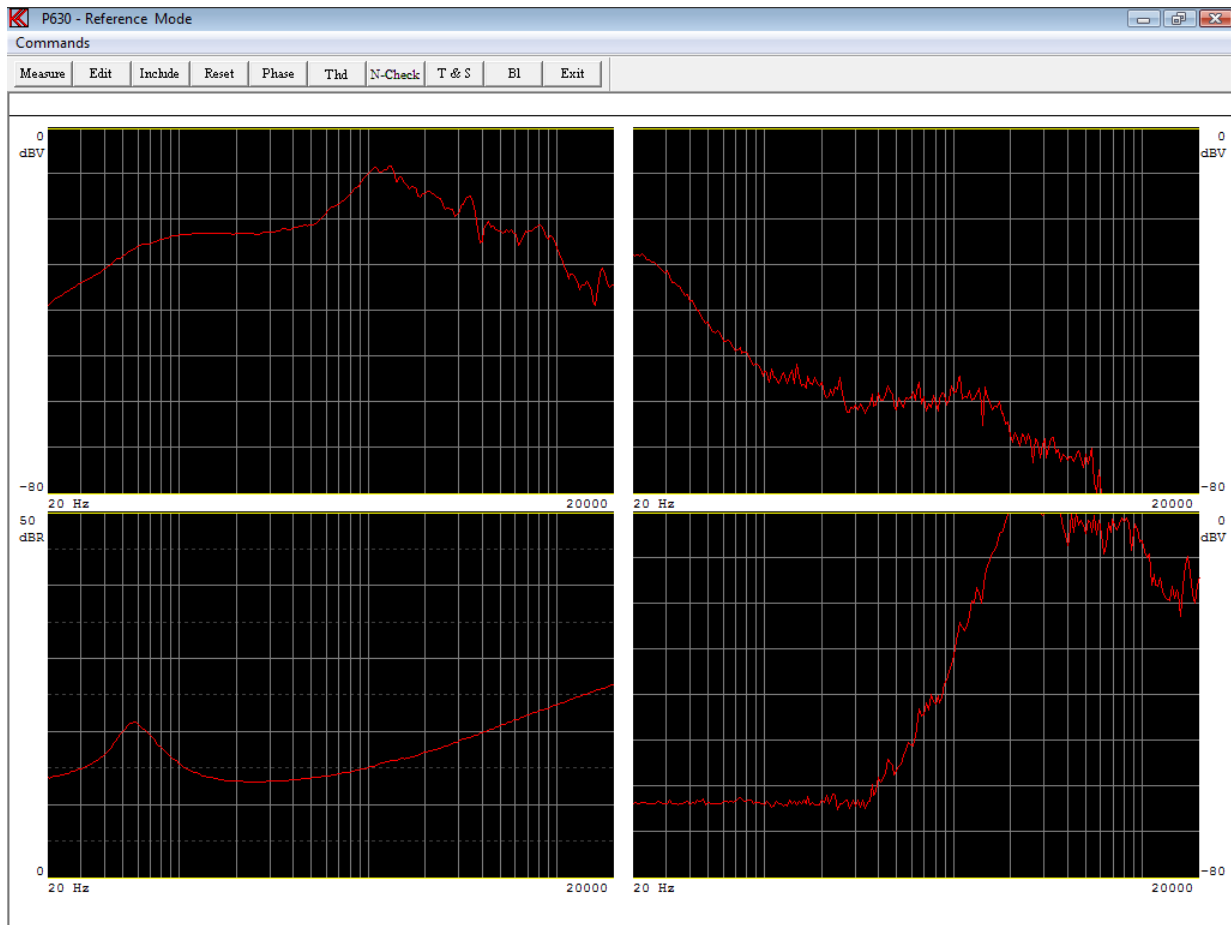
**Step 2:** Select Channel B and D to input “11” and set gain for Channel A to 0 db.

**Step 3:** Enable Filter B.

The filter type TRK-HP and FIX-HP is made for Rub & Buzz measurements. The TRK filter is a tracking filter there keep same distance in harmonic from the generator to the filter. As general setup it is recommended to start with the 5<sup>th</sup> harmonic and a full bandwidth. Some speakers need a higher harmonic than the 5<sup>th</sup> harmonic. In most cases from 5-10 harmonic. The overall filter for the Rub & Buzz measurement is the TRK-HP filter.

**Step 4:** Select the 5<sup>th</sup> harmonic for filter B.

**Step 5:** Enter the Reference mode and make a measurement.



Make notice of the resonance frequency of the impedance curve in channel C. In this case approximate 60 Hz. For second filter channel the FIX-HP filter is selected. This filter is the best to detect problems generated around the resonance frequency. To find the best frequency setting for this filter the resonance frequency must be known. In our case 60 Hz. Use following guideline to select the filter frequency.

Resonance frequency up to 50-70 Hz. Use filter frequency 20 times higher.

Resonance frequency from 50-70 to 300-500 Hz. Use filter frequency 10 times higher.

Resonance frequency higher than 300-500 Hz. Use filter frequency 5 times higher.

**Step 6:** Exit Reference mode and enable filter D.

**Step 7:** Select filter D as FIX-HP with a filter frequency of 2000 Hz.  
The value is calculated to  $60 \times 20 = 1200$  Hz however in this offline version the filter data is simulated to 2000 Hz.

**Step 8:** Enter Reference mode and make a measurement.

**Step 9:** Include all data to reference curves.

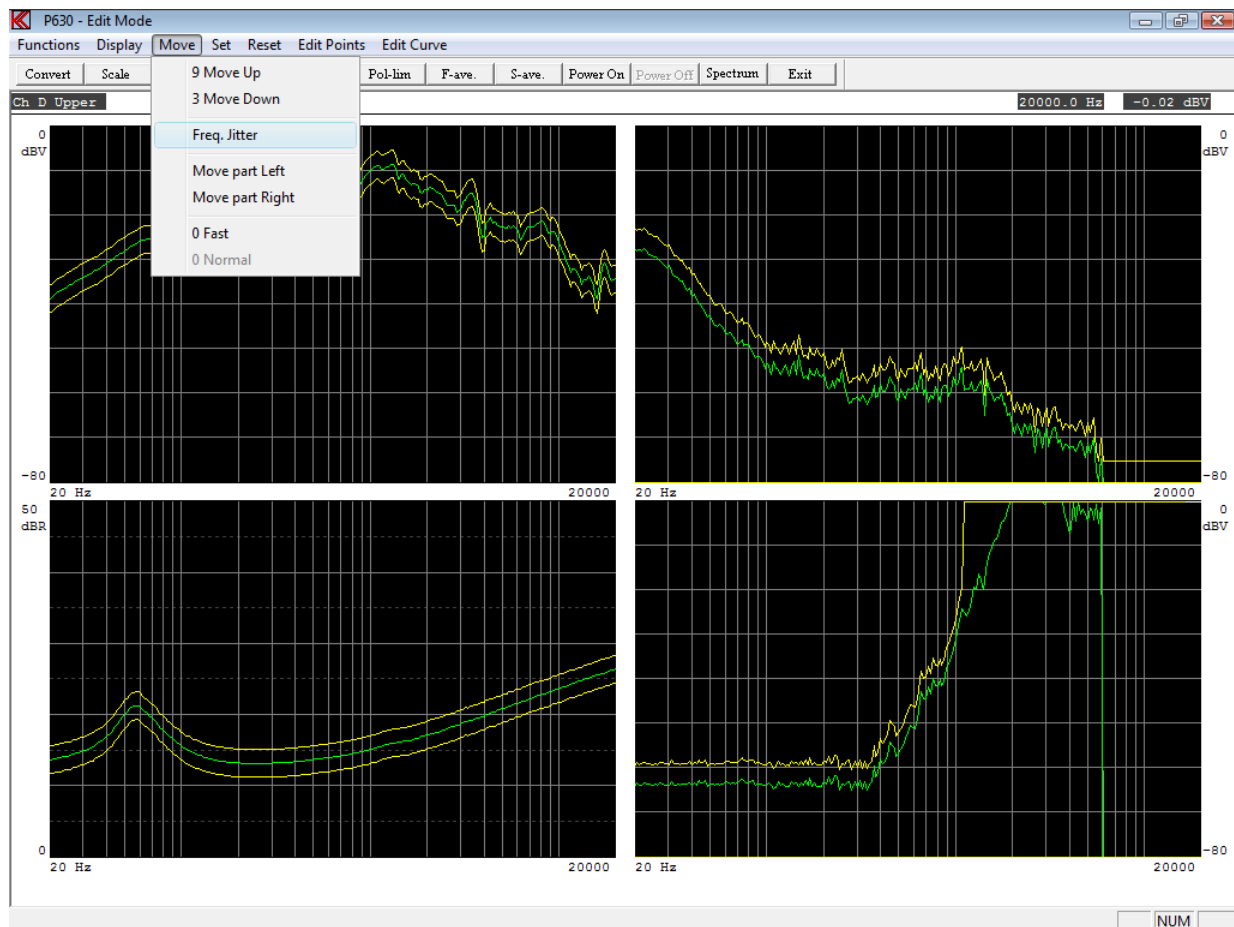
**Step 10:** Enter Edit Mode.

**Step 11:** Select "Fast Cursor. Select "0"

- Step 12:** Move Upper limit in Channel A 3.13 db up. Hit “9” twice.
- Step 13:** Select cursor to lower limit. Hit arrow up 1 time.
- Step 14:** Move Lower limit 3.13 db down. Hit “3” twice.
- Step 15:** Select Channel B. Hit “+” once.
- Step 16:** Reset lower limit in Channel B. Hit “Ctrl Page down”.
- Step 17:** Move cursor to upper limit. Hit arrow down once.
- Step 18:** Move upper limit 4.69 db up. Hit “9” tree times.
- Step 19:** Select channel C. Hit “+” once.
- Step 20:** Move upper limit 1.95 db up. Hit “9” twice.
- Step 21:** Select lower limit. Hit arrow up once.
- Step 22:** Move lower limit 1.95 db down. Hit “3” twice.
- Step 23:** Select channel D. Hit “+” once.
- Step 24:** Reset lower limit. Hit “Ctrl Page Down”.
- Step 25:** Select upper limit. Hit arrow down once.
- Step 26:** Move upper limit 4.69 db up. Hit “9” tree times.

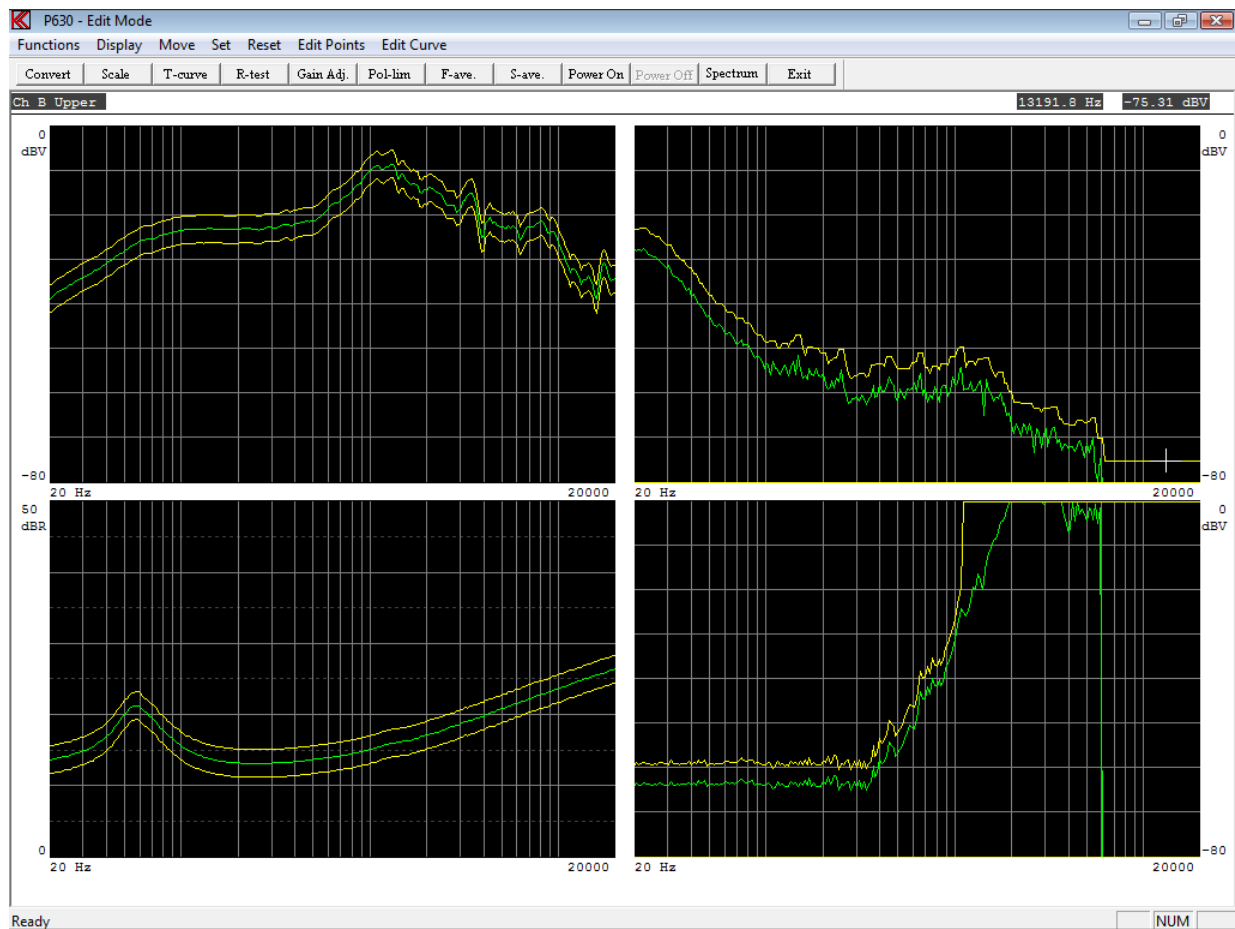
When a FIX-HP filter is used the filter frequency do not change due to the sweep. When the generator frequency reach the filter frequency and higher you see the same shape as in channel A , the frequency response. To not mix the filter and frequency test it is recommended to open the upper limit little higher than the half of the filter frequency.

- Step 27:** Move the cursor to 1116 Hz. Hit right arrow 2 times.
- Step 28:** Write upper limit up to the top of screen. Hit “8” until the curve point is on the top of the screen.
- Step 29:** Write the rest of the upper limit from the 1116 Hz and upward to the top. Hit “6” and make use of fast cursor on /off “0” to write to the end frequency.
- Step 30:** Adjust the reference limits in channel D a jitter correction. Select Move menu and click only one time on “Freq. Jitter”.



**Step 31:** Select channel B. Hit “+” two times.

**Step 32:** Adjust the reference limits in channel B a jitter correction. Select Move menu and click only one time on “Freq. Jitter”.



**Step 33:** Exit Edit mode.

**Step 34:** Exit Reference mode.

**Step 35:** Save & Exit as Reference Curve.



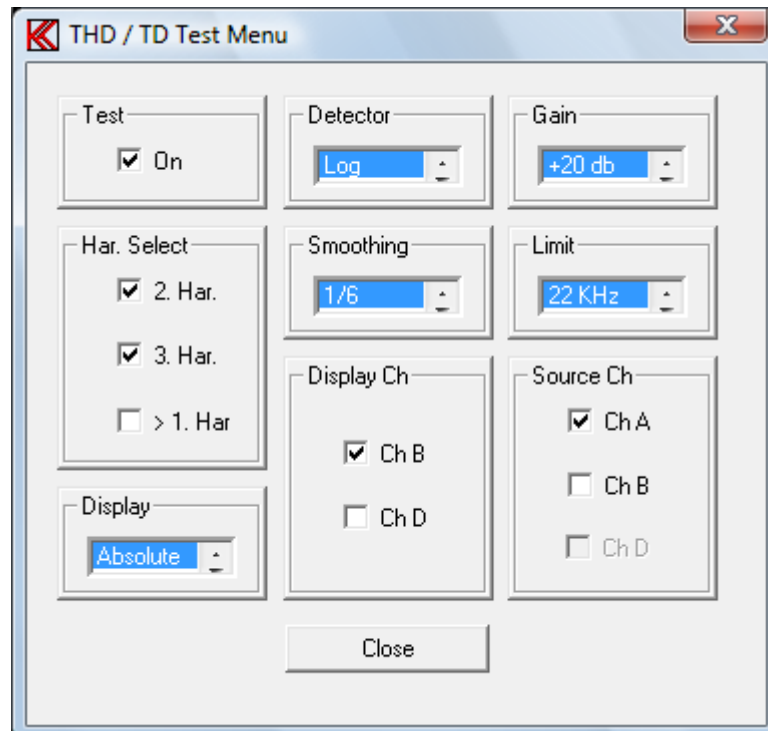
## Lesson 16

This lesson shows how to setup a test for THD and Rub & Buzz measurement at same time without using a Rub & Buzz channel.

Note: The step for entering password is not listed.

- Step 1:** Go to “Setup / change parameters”. Click “Setup”.
- Step 2:** Select "rubbuzz".
- Step 3:** Rename the type name “rubbuzz” to “ThdRubBuzz”.

- Step 4:** Enter the Reference mode and make a measurement.
- Step 5:** Enter the THD setup menu.
- Step 6:** Enable THD/TD test.



**Step 7:** Select 2. & 3. Harmonic in “Har. Select” menu.

**Step 8:** Set gain to +20 db.

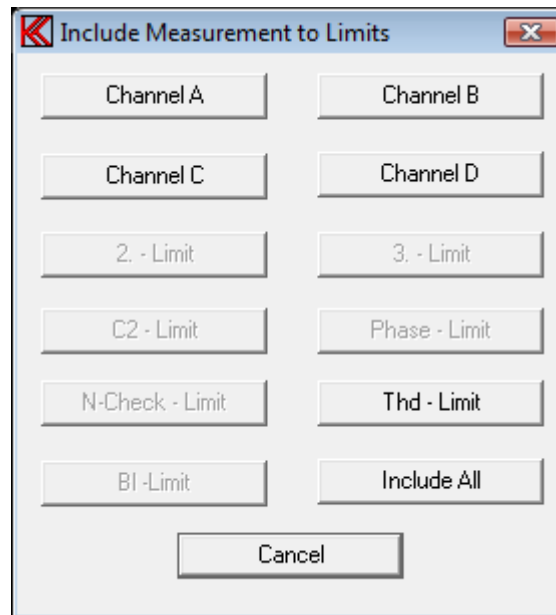
**Step 9:** Set Limit to 22 KHz.

**Step 10:** Set display channel to Ch B.

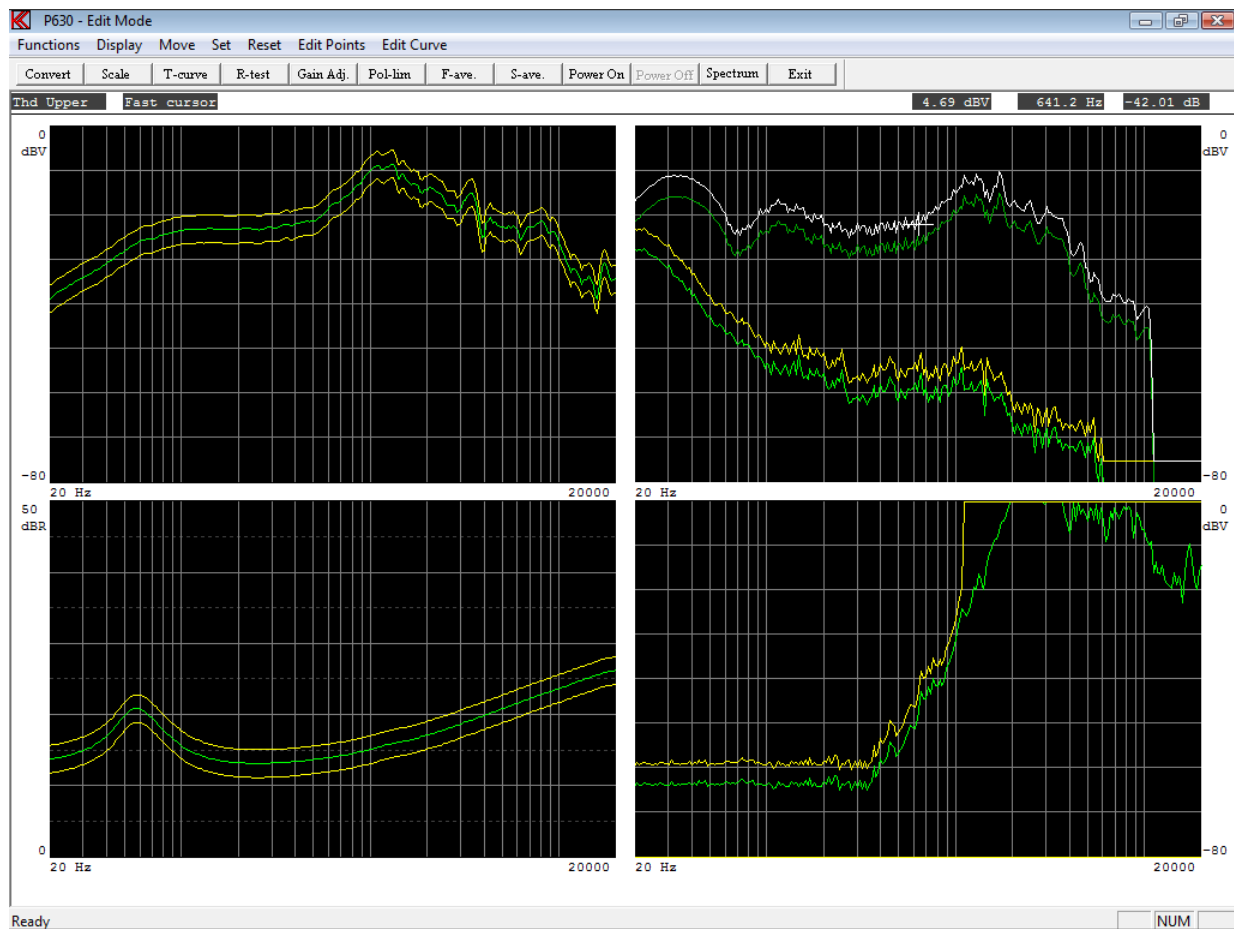
**Step 11:** Set source to channel A.

**Step 12:** Set smoothing to 1/6.

**Step 13:** Include “Thd-Limit”.



- Step 14:** Enter “Edit mode”.
- Step 15:** Select channel B. Hit “+” once.
- Step 16:** Set cursor Thd upper limit. Hit arrow down 3 time.
- Step 17:** Select fast cursor. Activate fast cursor on by “0”.
- Step 18:** Move upper limit 4.69 db up. Hit “9” tree times.
- Step 19:** Reset lower limit. Hit “Ctrl Page Down”.



In channel B there will be two curves with references. Both Rub & Buzz test and THD test are done at same time. THD as a secondary test.

**Step 21:** Exit Edit mode.

**Step 22:** Exit Reference mode.

**Step 23:** Save & Exit as Reference Curve.

## **Lesson 17**

This lesson shows how to setup a test for Phase, THD and Rub & Buzz measurement at same time.

Note: The step for entering password is not listed.

**Step 1:** Go to “Setup / change parameters”. Click “Setup”.

**Step 2:** Select "ThdRubBuzz".

**Step 3:** Rename the type name “ThdRubBuzz” to “PhaseThdRub”.

**Setup Of Parameters**

Type  
Name: PhaseThdRub Chain: Status:  
Description:  
Help File: -> ☐ 3-Limit

Sweep  
☐ Reverse  
Start: 20 Hz  
Stop: 20000 Hz  
Delay: 0 mSec  
Points: 250 No  
Time: 3.0 Sec.

Sensitivity Test  
☐ Move: 1000 Hz

I/O  
N.A.

Output  
A: 5.0245 Volt  
-9.50 dB  
0 dB = 15.0 Volt

Polarity Test  
☐ On ☐ Negative ☐ After  
Pulse Time: 50 mSec.

Compress  
Range: Off dB  
Ref. Ch: Off

Loudness (test off, enter: 0.0)  
Form: Off  
Test: 0.0

Input  
Status: ☒ Ch A ☒ Ch B ☒ Ch C ☒ Ch D  
Mux: 11 11 No Mux 11  
Detector: Log Log Log Log  
Gain: 0 db 0.1 ohm  
Smoothing: Off Off 1/3 Off

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
Data Path: c: ->  
Result Path: c: ->

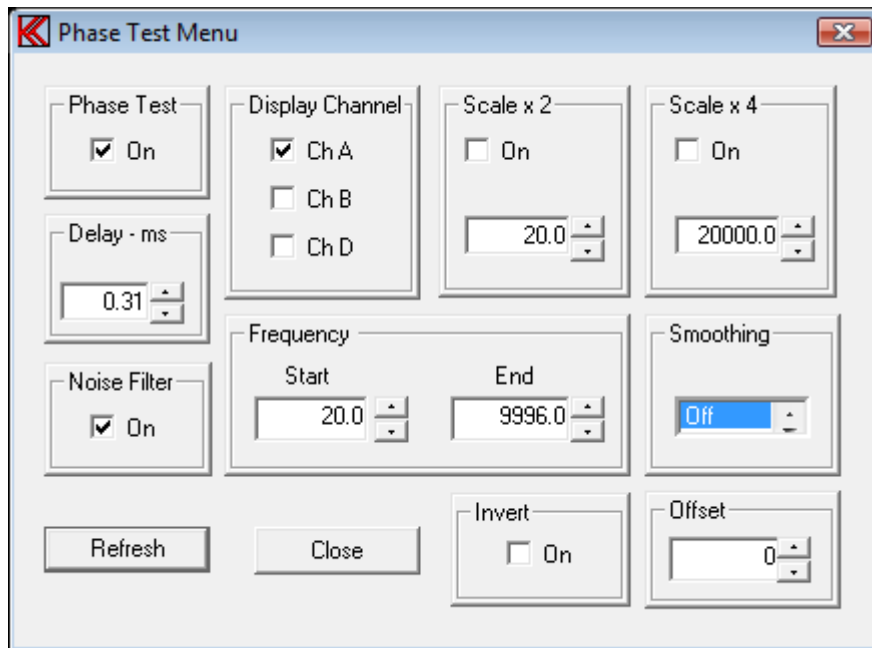
Filter  
Status: ☒ Ch B ☐ Ch C ☒ Ch D  
Type: TRK-HP FIX-HP  
Har.: 5  
Freq/Bw: oo 2000  
Gain: 0 db 0 db 0 db  
Display: Absolute Absolute Absolute  
Limit: 45 KHz 45 KHz 45 KHz

Buttons: Reference, Delete & exit, Save & exit, Exit

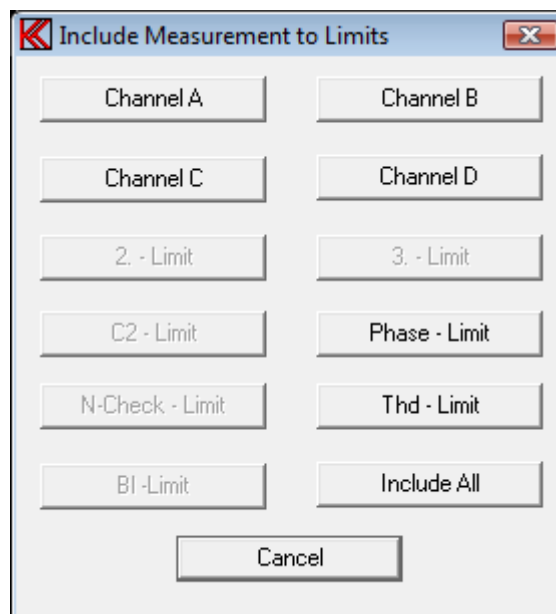
**Step 4:** Enter the Reference mode and make a measurement.

**Step 5:** Make a measurement.

**Step 6:** Enter Phase Test Menu.



- Step 7:** Enable Phase Test.
- Step 8:** Set End frequency to 9996.0 Hz.
- Step 9:** Refresh calculations.
- Step 10:** Include Phase - Limit.

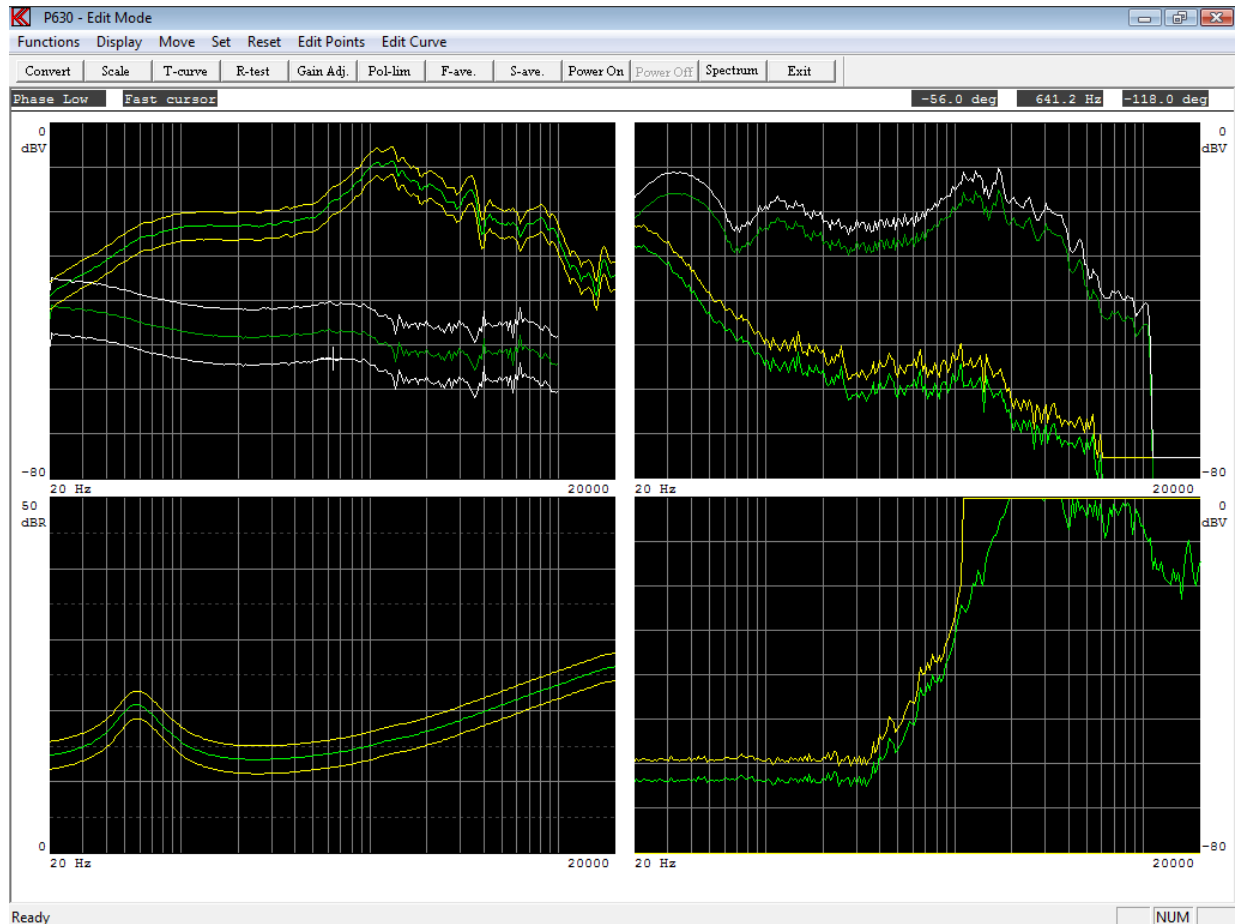


- Step 11:** Enter "Edit mode".
- Step 12:** Select Phase upper limit. Press arrow down 3 times.
- Step 13:** Select fast cursor. Activate fast cursor on by "0".

**Step 14:** Move upper limit 57.0 deg up. Hit “9” four times.

**Step 15:** Select Phase lover limit. Press arrow up one time.

**Step 16:** Move lower limit 55.0 deg down. Hit “3” four times.



In channel A there will be two curves with references. Both Frequency response and Phase test are done at same time. Phase as a secondary test.

**Step 17:** Exit Edit mode.

**Step 18:** Exit Reference mode.

**Step 19:** Save & Exit as Reference Curve.

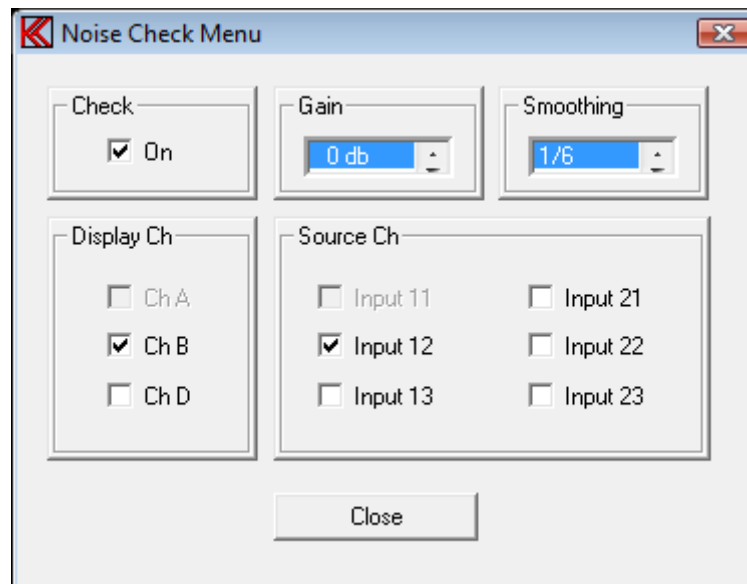


## **Lesson 18**

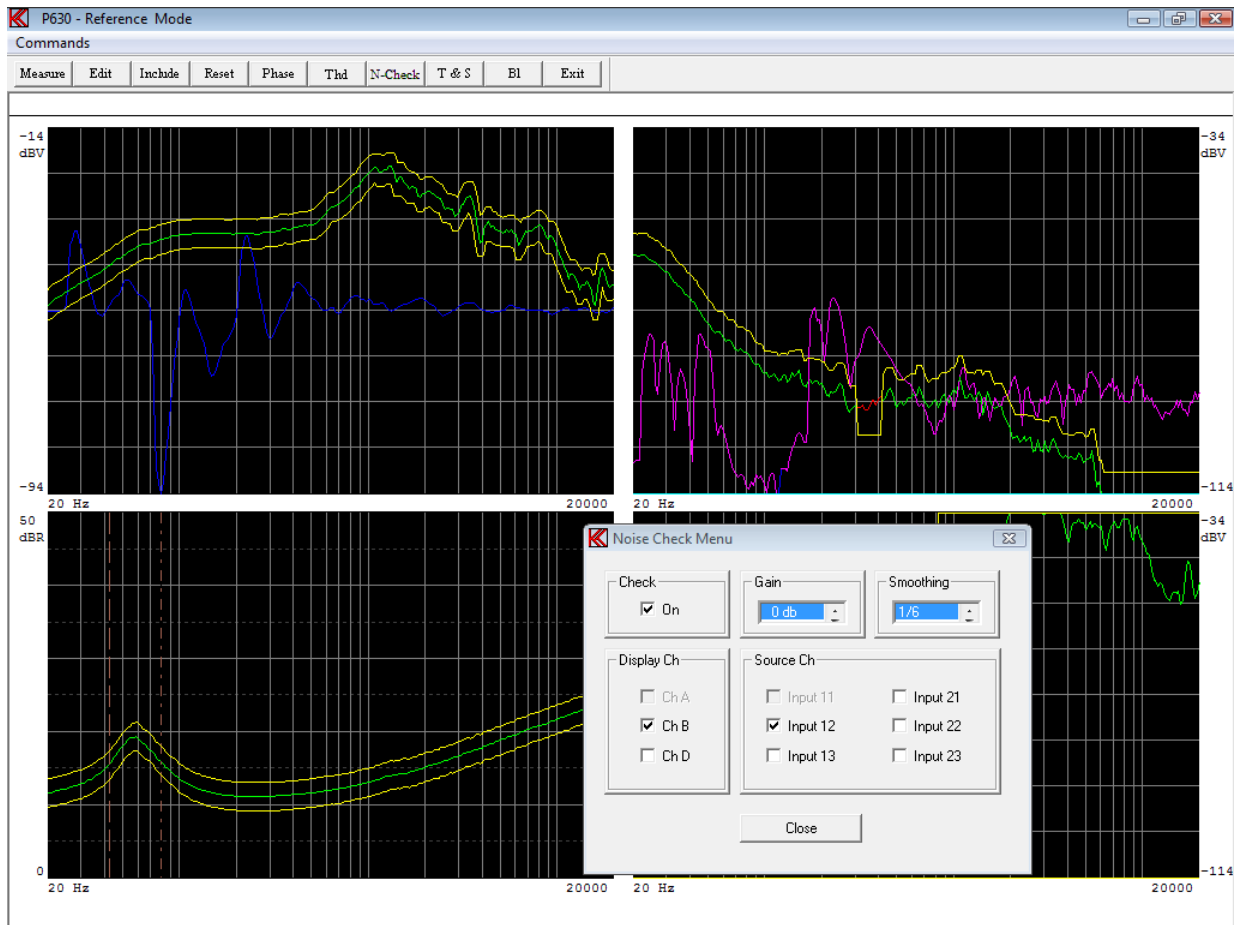
This lesson shows how to setup a check of ambient noise.

Note: The step for entering password is not listed.

- Step 1:** Go to “Setup / change parameters”. Click “Setup”.
- Step 2:** Select "demo".
- Step 3:** Rename the type name “demo” to “NoiseCheck”.
- Step 4:** Enter the Reference mode and make a measurement.
- Step 5:** Make a measurement.
- Step 6:** Enter N-Check the Noise Check Menu.



- Step 7:** Enable noise check. Set Check on.
- Step 8:** Set Display channel to Ch B.
- Step 9:** Select source channel to input 12.
- Step 10:** Set input gain to 0 db.
- Step 11:** Set smoothing to 1/6.
- Step 12:** Make a measurement.



In channel B a violet curve is displayed. This is a simulated noise curve picked up by an external noise microphone. Normally the limit is created by including the data and modifying the limit. In this case the limit will be created as a straight line.

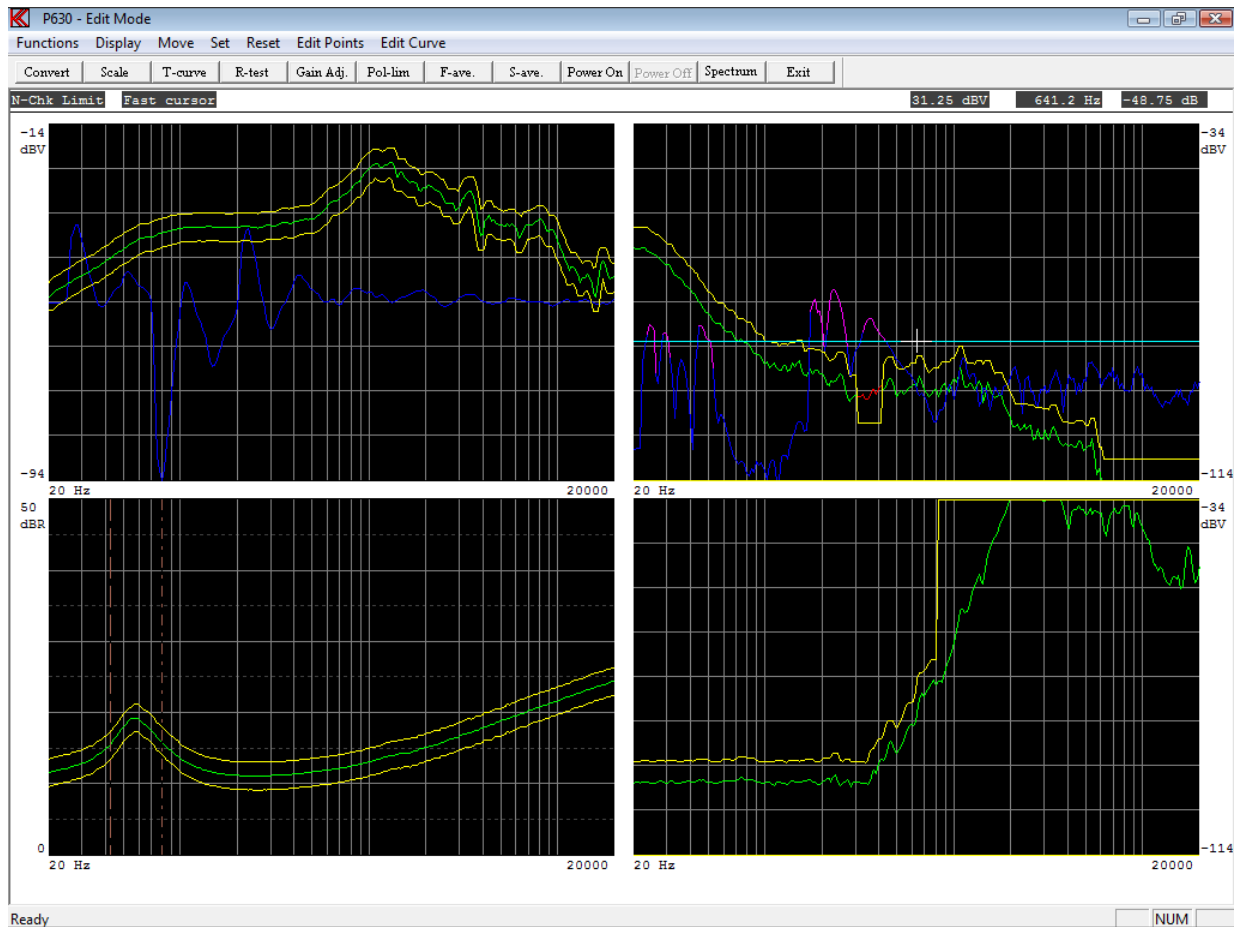
**Step 13:** Enter "Edit-mode".

**Step 14:** Select fast cursor. Activate fast cursor on by "0".

**Step 15:** Select channel B. Hit "+" once.

**Step 16:** Set cursor noise limit. Hit arrow down 1 time.

**Step 17:** Move the noise 31.25 dB up. Hit "9" or "Move, 9 Move Up" 20 times.



In run mode a yellow warning will pup up if noise data exceed noise limit. If the noise limit is exceed & the 'test some ware in channel A, B or D exceed the curve limit the test will be repeated one time if set so.

**Step 18:** Exit Edit mode.

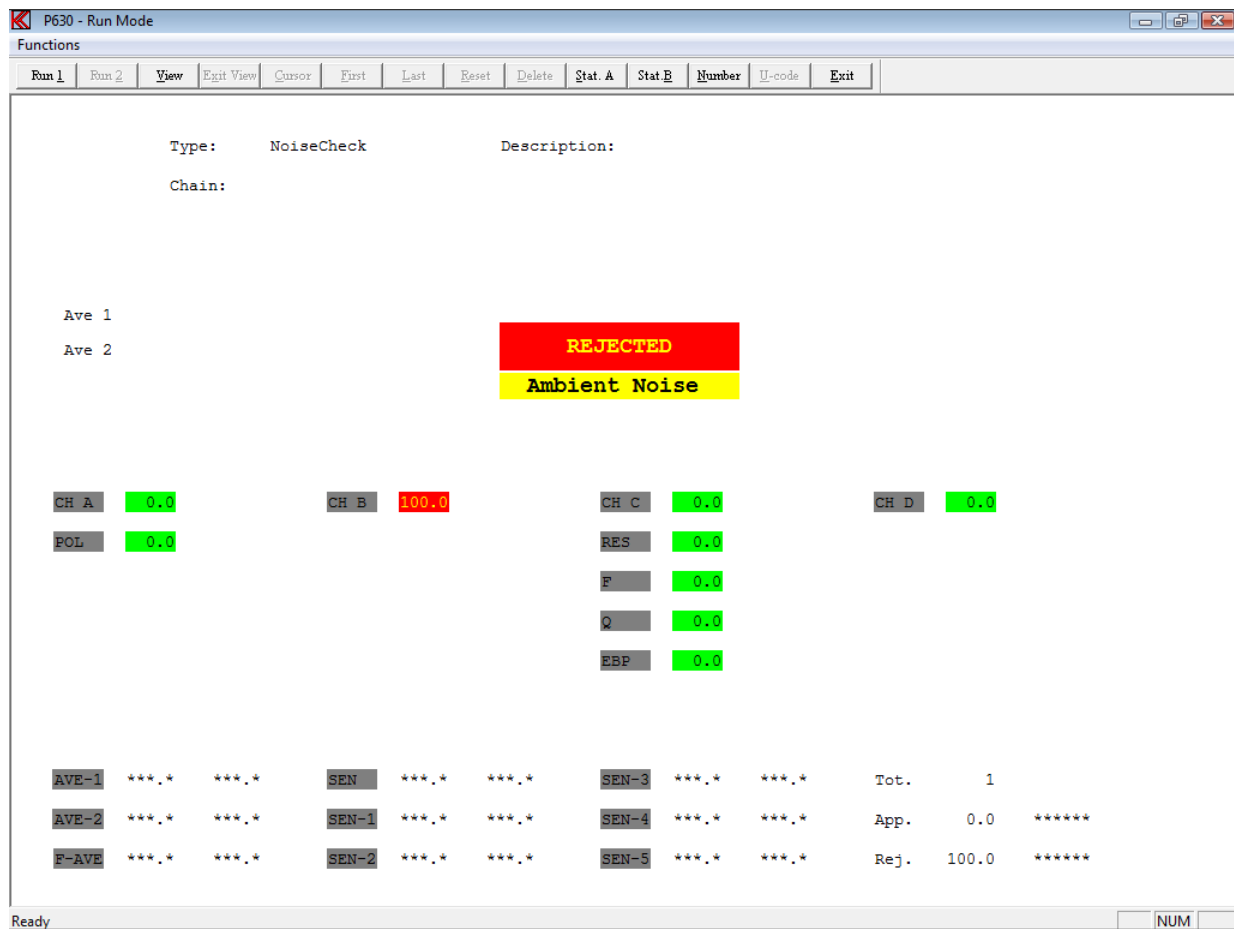
**Step 19:** Exit Reference mode.

**Step 20:** Save & Exit as Reference Curve.

**Step 21:** Select "Run speaker tests", activate "Run".

**Step 22:** Select type "NoiseCheck".

**Step 23:** Start test, activate "Run 1" or press key "1".



The noise exceed the limit first time. Then the test was repeated with same result. The flag tell that the test was a reject and there was ambient noise during the test.

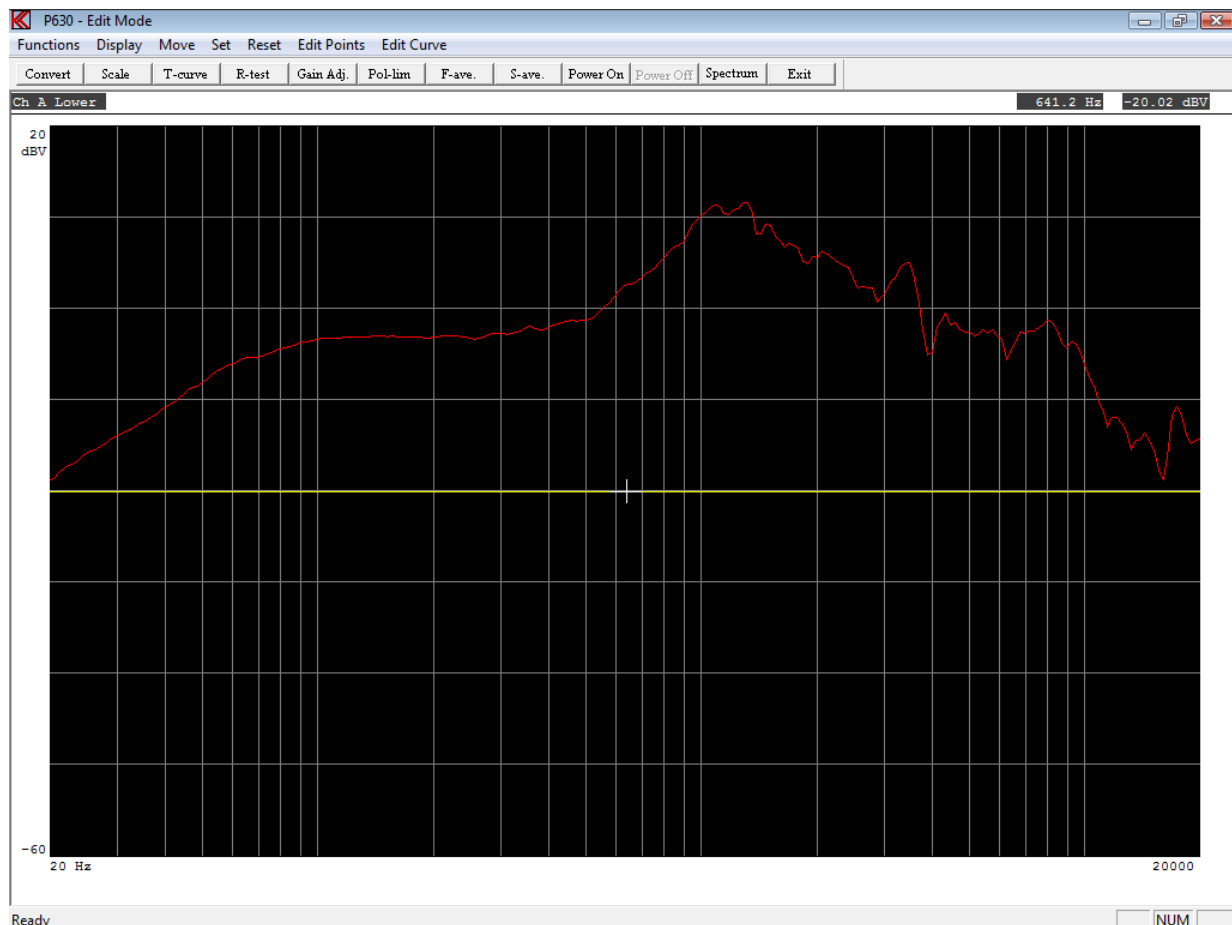
## **Lesson 19**

This lesson shows how to work with tolerance files.

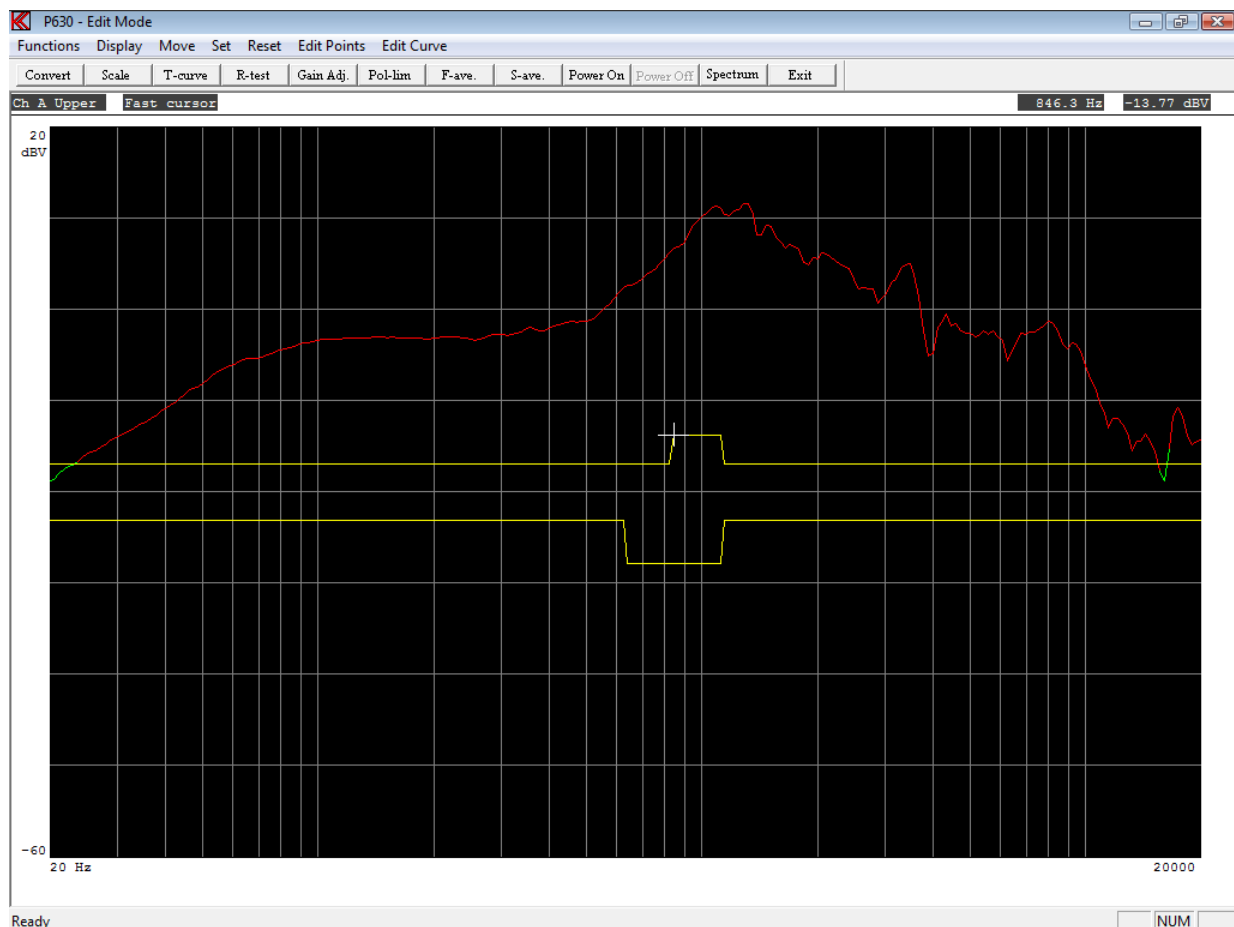
With the tolerance curve facility you can create and store several standards you often use.

Note: The step for entering password is not listed.

- Step 1:** Go to “Setup / change parameters”. Click “Setup”.
- Step 2:** Select "mytest".
- Step 3:** Go to Reference Mode, click “Reference”.
- Step 4:** Make a measurement, click “Measure”.
- Step 5:** Enter Edit menu, click “Edit”.
- Step 6:** Reset the reference curve in Ch A to centre level. Click on “Set, Centre Limits” or press on key “CTL Home”.
- Step 7:** Enlarge the display, press "Page Up".
- Step 8:** Select fast cursor, press "0" once.



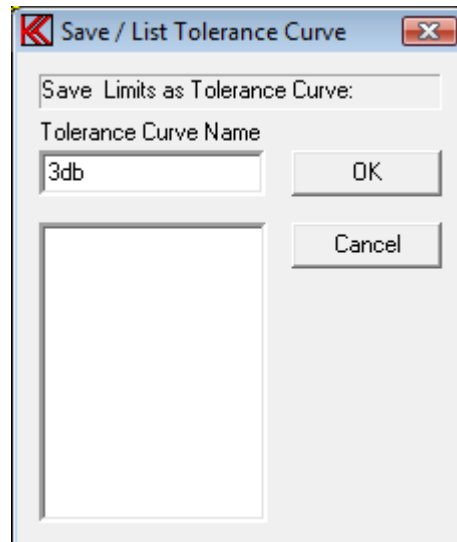
- Step 9:** Move upper limit 3.1 dB up, click “Move, 9 Move Up” two times or press “9” two times.
- Step 10:** Select lower limit, press “arrow up” once.
- Step 11:** Move lower limit -3.1 dB down, Click “Move, 3 Move Down” twice or press key “3” twice.
- Step 12:** Move cursor 4.7 dB down, click “Edit Points, 2 Down” three times or press key “2” three times.
- Step 13:** Move cursor to 1116 Hz, click “Edit Points, 6 Right” two times or press key “6” two times.
- Step 14:** Select upper limit, press “arrow down” once.
- Step 15:** Move cursor 3.1 dB up, click “Edit Points, 8 Up” twice or press key “8” twice.
- Step 16:** Move cursor to 1474 Hz, click “Edit Points, 6 Right” or press key “6” once.



- Step 17:** Select the Edit Tolerance mode, click “T-curve” or press key “T”.

**Step 18:** Save the reference band as a standard tolerance curve. Click “Save”.

**Step 19:** Save the curve as name “3db”, enter “3db” and click “OK”.



Normal use of available tolerance files:

- a) Make a measurement.
- b) Include the data to reference curve.
- c) Load a tolerance curve.
- d) Add the tolerance to reference curve.

**Step 20:** Exit Edit - Tolerance Mode.

**Step 21:** Reset the reference curve in Ch A. Click on “Reset, Channel Limit” or press on key “CTL End”.

**Step 22:** Exit Edit Mode.

**Step 23:** Go to include menu. Click “Include” or press key “I”.

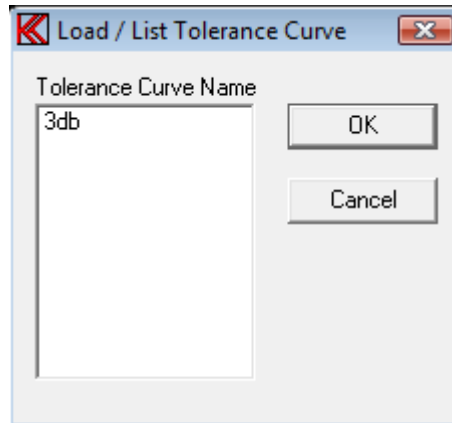
**Step 24:** Include channel A to reference.

**Step 25:** Go to Edit menu, click “Edit”.

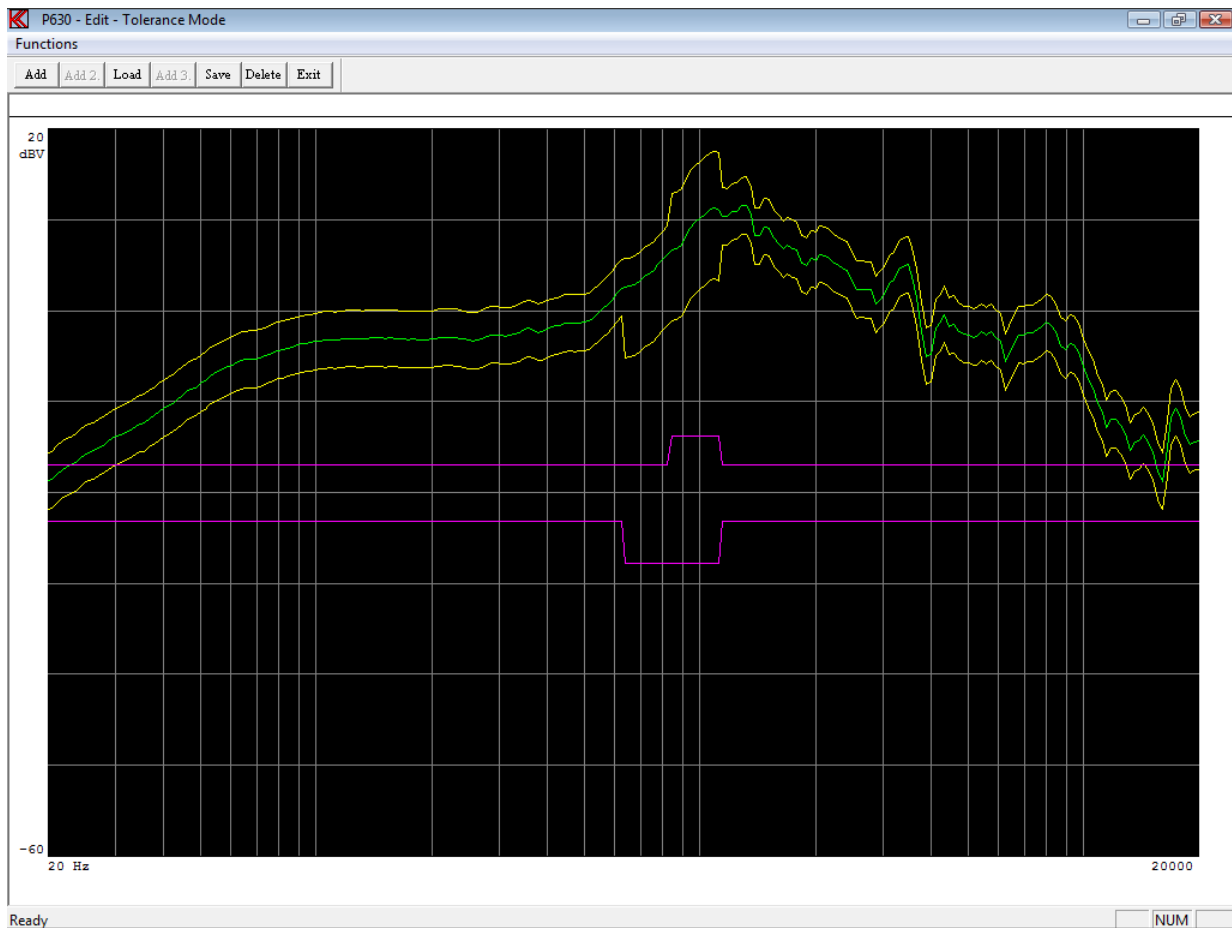
**Step 26:** Select the Edit Tolerance mode, click “T-curve” or press key “T”.

**Step 27:** Load a tolerance curve, Click “Load”.

**Step 28:** Select the file 3db, highlight “3db” by clicking text and click “OK”.



**Step 29:** Add tolerance curve to the reference curve, click “Add”.



**Step 30:** Exit Tolerance Mode.

**Step 31:** Exit Edit Mode.

**Step 32:** Exit Reference Mode.

**Step 33:** Exit Setup Of Parameters.

## **Lesson 20**

This lesson shows how to work with the compressor function.  
The compressor, change output as function of an output curve.  
Note: The step for entering password is not listed.

- Step 1:** Go to “Setup / change parameters”. Click “Setup”.
- Step 2:** Select type to be selected. Choose the name “compress”.
- Step 3:** Confirm to create a new type, click “Yes”.
- Step 4:** Go to change description. Enter “compress output, ref. Ch A” in “Type Description” field.
- Step 5:** Set polarity test off. Unmark “Polarity Test, On” if not already done.

When the compressor function is active you cannot use the filters for rub & buzz or THD measurements as well the impedance function.

- Step 6:** Set Ch C off, unmark “Input Status, Ch C”.
- Step 7:** Set Ch A, B and D on, mark “Input Status, Ch A, Ch B and Ch D” if not already marked.
- Step 8:** Go to Reference mode, Click “Reference”.
- Step 9:** Make a measurement, click “Measure”.
- Step 10:** Make a compress output curve, click “Commands, Out Compress” or press key “O” once.

When next measurement is made, the output is corrected as output curve shows. The sound pressure will then be equal to the lowest point on the output curve.

Normal procedure will be:

- a) Make a measurement.
- b) Make an output curve.
- c) Continue with a) and b) to best result.

In this demo you can only make an output curve once.

- Step 11:** Exit Reference Mode.

**Setup Of Parameters**

Type  
Name: compress Chain: Status: Output Curve  
Description: compress output, ref. Ch A  
Help File: -> ☐ 3-Limit

Sensitivity Test  
☐ Move 1000 Hz

Polarity Test  
☐ On ☐ Negative ☐ After  
Pulse Time: 50 mSec.

Compress  
Range: 30.4 dB  
Ref. Ch: Off

Loudness (test off, enter: 0.0)  
Form: Off  
Test: 0.0

Input  
Status: ☒ Ch A ☒ Ch B ☐ Ch C ☒ Ch D  
Mux: 11 12 No Mux 13  
Detector: Log Log No Log  
Gain: -20 db -20 db 17.5 db -20 db  
Smoothing: Off Off On Off

Sweep  
☐ Reverse  
Start: 20 Hz  
Stop: 20000 Hz  
Delay: 0 mSec  
Points: 250 No  
Time: 3.0 Sec.

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
Data Path: c:  
Result Path: c:

Filter  
Status: ☐ Ch B ☐ Ch C ☐ Ch D  
Type: Har.: Freq/Bw: Gain: 0 db 0 db 0 db  
Display: 0.0000 0.0000 0.0000  
Limit: 0.0000 0.0000 0.0000

Buttons: Reference, Delete & exit, Save & exit, Exit

When the output curve is present, the information “Compress Range” is displayed. In this case 30.4 dB. The sound pressure will then be 30.4 dB less if compress is function not used. If sound pressure is too poor, change output level.

**Step 12:** Change the compress reference channel to ch B. Select “B” in field “Compress, Reference Channel” and click in field to highlight.

When testing a microphone you normally want a constant sound pressure. The compressor function almost obtains this function. Next you have to use a reference microphone. This microphone is placed in the compress reference channel. In this case Ch B. The compress reference function takes the reference channel and subtracts the deviations from channel A. If the reference microphone is placed together with the microphone under test, outside noises will be more or less suppressed. To void to big noise under test it is a good idea to make a noise reference limit (upper limit) on the compress reference channel. This makes a reject if noise is too high.

**Step 13**      Save & Exit.

**Step 14:**      Save as Reference Curve.

Now the type "compress" is ready to make tolerance curves as described in earlier lessons.



## **Lesson 21**

This lesson shows how to handle telephone testing as loudness, make reference curve and adjust sensitivity.

Note: The step for entering password is not listed.

- Step 1:** Go to “Setup / change parameters”. Click “Setup”.
- Step 2:** Select type to be selected. Enter “loudness”.
- Step 3:** Confirm to create a new type, click “Yes”.
- Step 4:** Write in “Type Description” field “telephone send test”.
- Step 5:** Change start frequency, write “200” in “Sweep Start Hz” field and click on field “Sweep End”. When entering on Start and clicking End make the program to check valid start / end frequency.
- Step 6:** Change end frequency, write “4000” in “Sweep End Hz” field and click on field “Sweep Start”. When entering on End and clicking Start make the program to check valid start / end frequency.
- Step 7:** Change sweep time, write “1.0” in field “Sweep Time Sec.”. Click on “Sweep Start”. When entering on Time and clicking Start or End make the program to check valid sweep time.
- Step 8:** Set polarity test off, unmark “Polarity Test On” if not already done.
- Step 9:** Select loudness test for send loudness for 200 - 4000 Hz, select “Loudness Form” to SLR .2-4 KHz” and click on field to highlight field for selected.
- Step 10:** Set test range to +- 5%. Write “5” in field “Loudness Test”.
- Step 12:** Set Ch B off, unmark “Input Status Ch B”.
- Step 13:** Set Ch C off, unmark “Input Status Ch C”.
- Step 14:** Set Ch D off, unmark “Input Status Ch D”.

**Setup Of Parameters**

Type	Chain	Status
Name	loudness	
Description	telephone send test	
Help File		

☐ 3-Limit

---

Sensitivity Test  
☐ Move 1000 Hz

I/O  
 N.A

Output  
 A  
 5.0245 Volt  
 -9.50 dB  
 0 dB = 15.0 Volt

---

Polarity Test  
☐ On ☐ Negative ☐ After  
 Pulse Time 100 mSec.

Compress  
 Range Off dB  
 Ref. Ch 100

Loudness (test off, enter: 0.0)  
 Form SLR 2.4 kHz  
 Test 5.0

---

Input  
 Status ☒ Ch A ☐ Ch B ☐ Ch C ☐ Ch D  
 Mux 11 10 No Mux 10  
 Detector Log 10 10 10 10  
 Gain -20 db 20 db 10 db 20 db  
 Smoothing Off 10 10 10 10

57.8 pt/oct

---

Sweep  
☐ Reverse  
 Start 200 Hz  
 Stop 4000 Hz  
 Delay 0 mSec  
 Points 250 No  
 Time 1.0 Sec.

Reference  
 Delete & exit  
 Save & exit  
 Exit

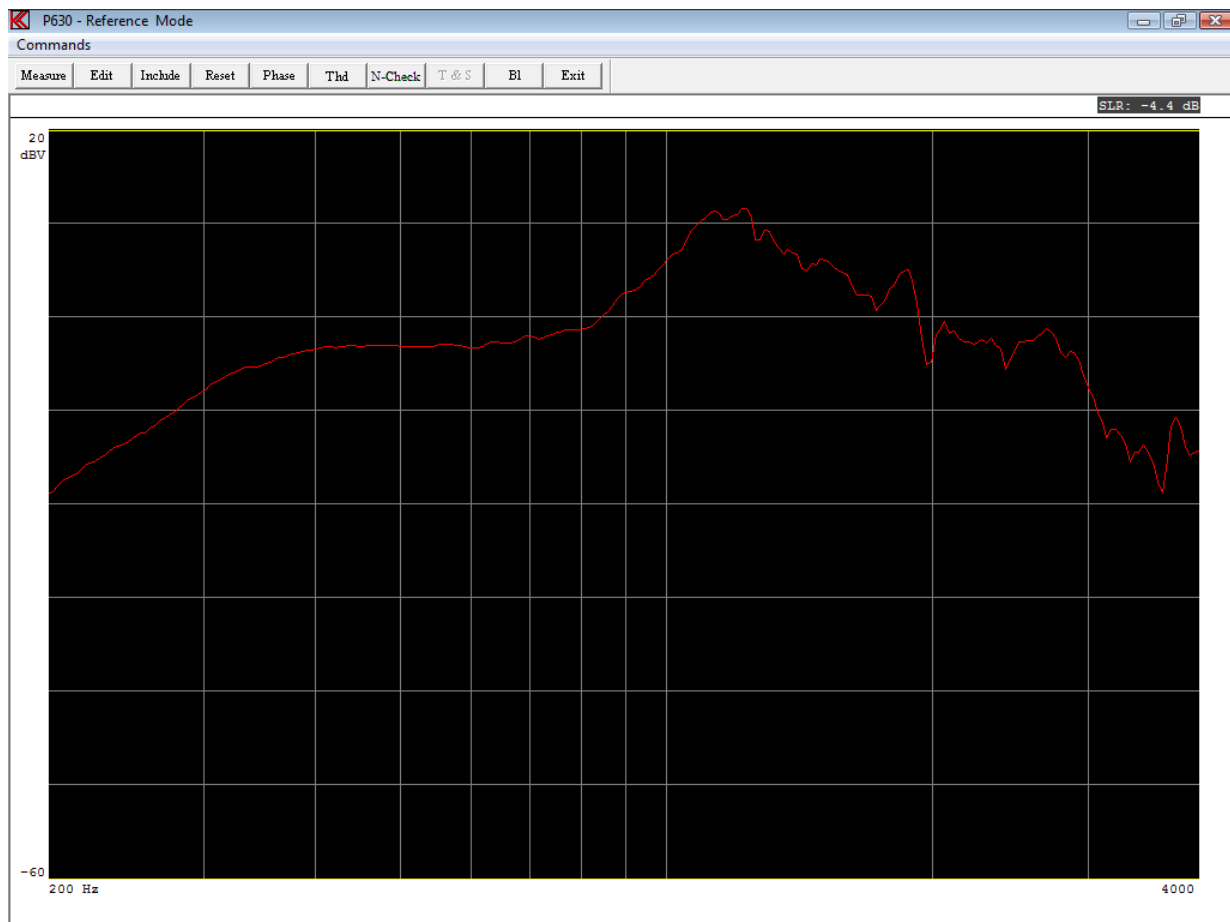
---

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
 Data Path c:  
 Result Path c:

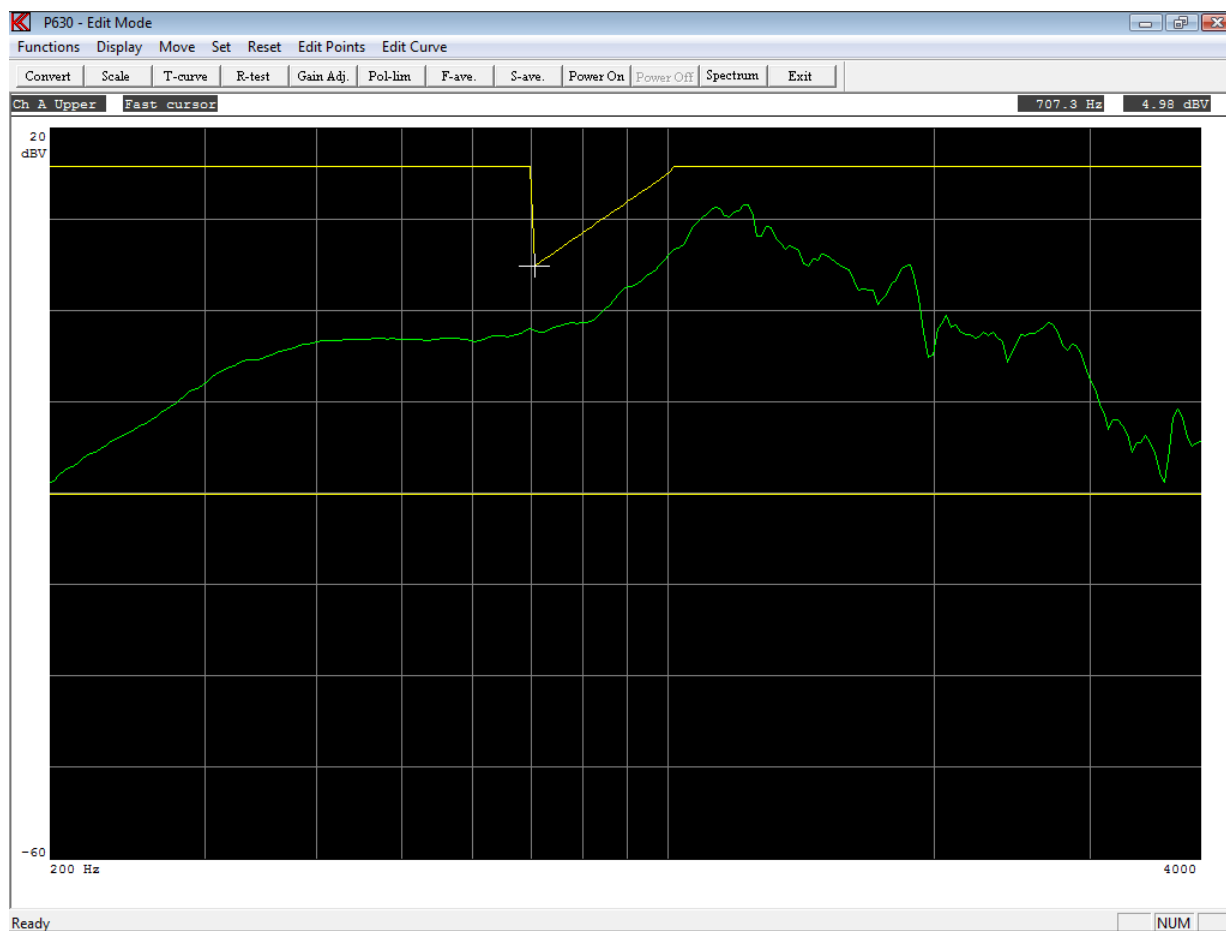
Filter  
 Status ☐ Ch B ☐ Ch C ☐ Ch D  
 Type  
 Har.  
 Freq/Bw  
 Gain 10 db 10 db 10 db  
 Display 10 db 10 db 10 db  
 Limit 10 db 10 db 10 db

**Step 15:** Go to Reference mode, click “Reference”.

**Step 16:** Make a measurement, click “Measure”.  
At upper right corner the loudness value is displayed.

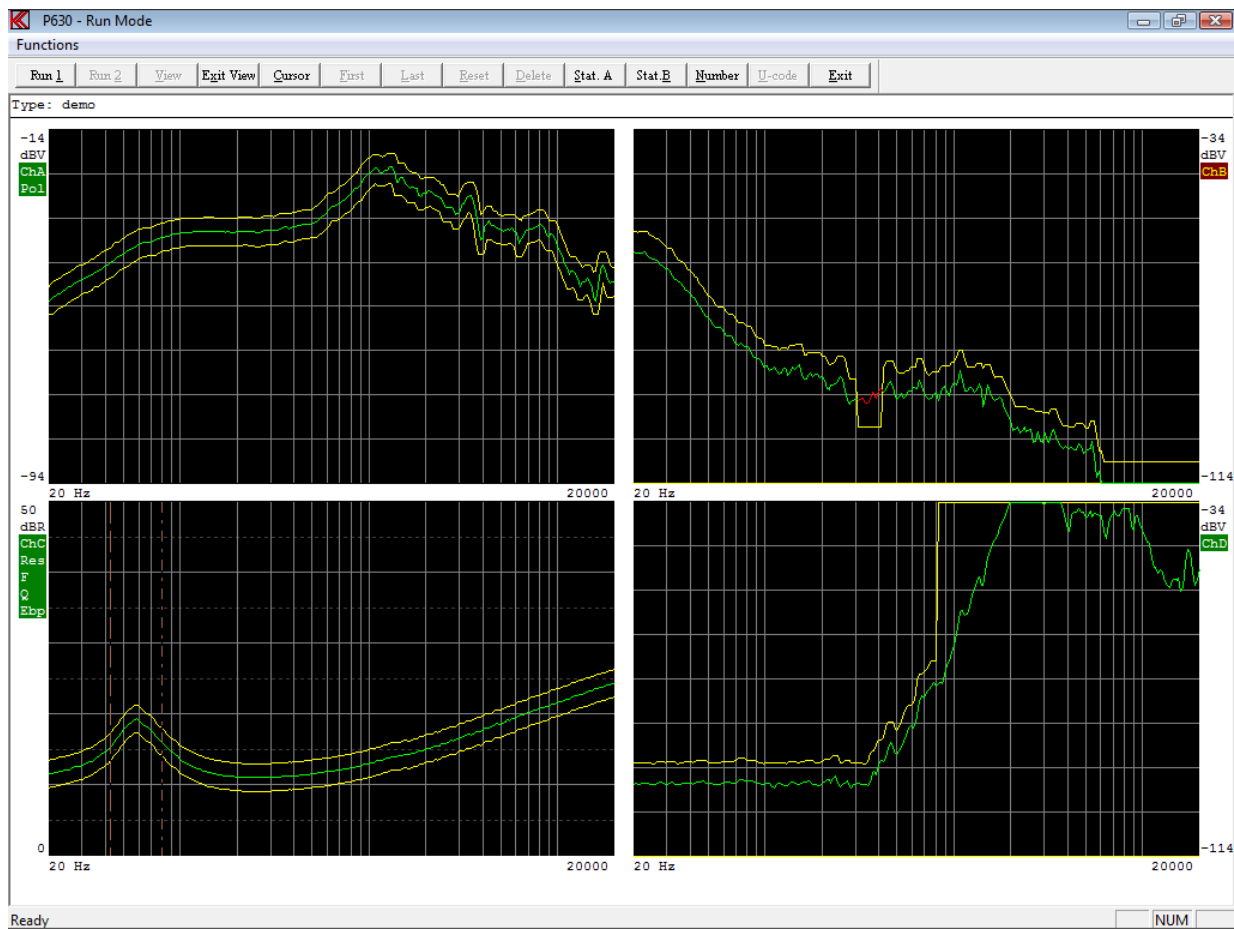


- Step 17:** Enter Edit mode, click “Edit”.
- Step 18:** Reset reference to center; click “Set Center Limits” or press key “Ctrl Home”.
- Step 19:** Select fast cursor, press “0” once.
- Step 20:** Move upper limit to 15.92 dB, press key “9” 23 times.
- Step 21:** Move cursor to 1014.8 Hz, press arrow right one times.
- Step 22:** Activate point-to-point drawing, click “Set, 5 Line Start” or press key “5” once.
- Step 23:** Move cursor to 707.3 Hz, press arrow left tree times.
- Step 24:** Write cursor down to 4.98 dB, click “Edit Points, 2 Down” seven times or press key “2” seven times.
- Step 25:** Deactivate point to point drawing, click “Set, 5 Line End” or press key “5” once



- Step 26:** Write straight line to 437.1 Hz, click “Edit Points, 4 Left” four times or press key “4” four times.
- Step 27:** Activate point-to-point drawing, press key “5” once.
- Step 28:** Move cursor to 200 Hz, press arrow left 7 times and 1 time right.
- Step 29:** Write down to -12.21 dB, press key “2” 18 times.
- Step 30:** Set point-to-point, press key “5” once.
- Step 31:** Select lower limit, press arrow up once.
- Step 32:** Move lower limit up to -7.52 dB, press key “9” 8 times.
- Step 33:** Move cursor to 411.6 Hz, press right arrow 6 times.
- Step 34:** Activate point-to-point drawing, press key “5” once.
- Step 36:** Write down to -35.64 dB, press key “2” 18 times.
- Step 37:** Set point-to-point, press key “5” once.

Now a reference is generated, for test the reference is after the standard but show how to do it.



**Step 37:** Move cursor to 4000 Hz, press left arrow 1 times.

**Step 38:** Write down to -24.71 dB, press key “2” 11 times.

**Step 39:** Set point-to-point, press key “5” once.

**Step 40:** Move cursor to 2191.8 Hz, press left arrow 5 times.

**Step 41:** Set point-to-point, press key “5” once.

**Step 42:** Set point-to-point, press key “5” once.



**Step 43:** Exit Edit Mode.

**Step 44:** Make a measurement, click “Measure”.

Now a measurement is performed and the SLR is calculated, but even the gain in input module is proper selected, the sensitivity is wrong. To change this, go to edit mode and use the gain function.

The loudness test is performed while a measurement is done. The result of the test is displayed as green or read background at loudness value.

To reset the loudness test value, you must make an Include command.

**Step 45:** Go to Edit mode, click “Edit”.

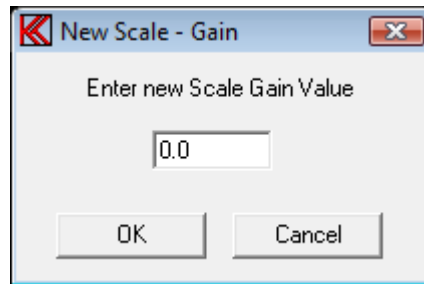
**Step 46:** Enter Gain mode, click “Gain Adj.” Or press key “G”.

**Step 47:** Select fast cursor, press “0” once.

**Step 48:** Move cursor to 493 Hz, press left arrow five times.

**Step 49:** The cursor value is now 3.05 dB. In this case the value must be 0.0 dB. Select new value, click “New” or press key “1”.

**Step 50:** Enter new value "0.0" and click “OK”.



- Step 51:** Exit Gain Adjust Mode.
- Step 52:** Exit Edit Mode.
- Step 53:** Make a new measurement, press key “M” once.  
Note that loudness value is changed.
- Step 54:** Exit Reference Mode.
- Step 55:** Save setup, click “Save & Exit”.
- Step 56:** Save as Reference Curve.



## Lesson 22

This lesson shows how to setup a test for Average test as well as Sensitivity test.

Note: The step for entering password is not listed.

**Step 1:** Enter Setup and create a new test “senave”.

**Step 2:** Disable channel B, C and D.

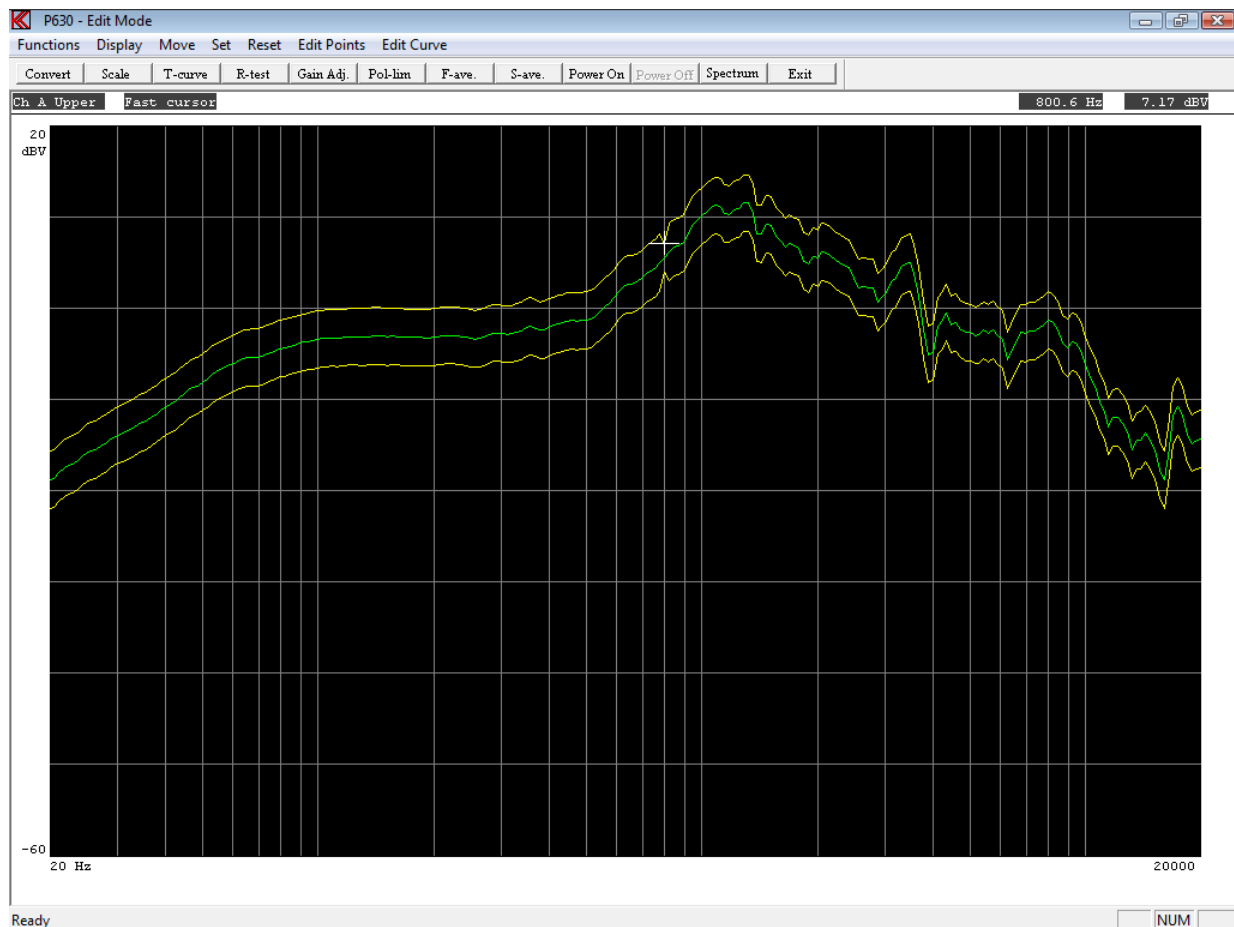
**Step 3:** Enable “Sensitivity test” and change sensitivity frequency to 800 Hz.

When a frequency response is tested against the upper and lower limit a approve is present id all parts of the curve are within the limits. If the sensitivity test move function is active following sequence is performed. First is the sensitivity test done at the sensitivity frequency. The test is done as before any moment of the curve. In this case at 800 Hz. After the sensitivity test the whole frequency cure is moved up and down to test it is possible to fit the curve within the upper and lower limit. If possible the test in channel A is Approved else it is Rejected. If the curve is moved the move value is displayed in graph mode.

**Step 4:** Enter reference mode and make a measurement.

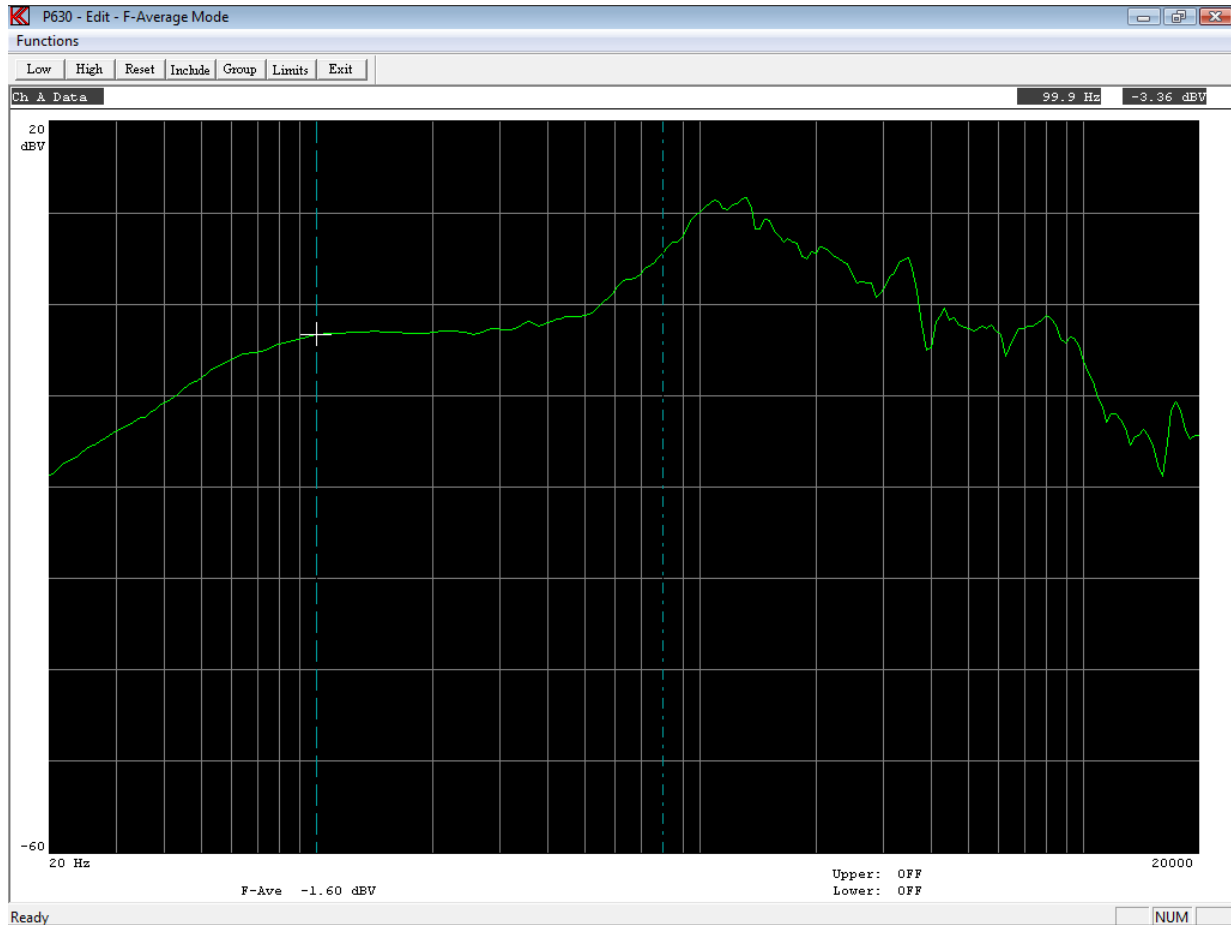
**Step 5:** Include channel A.

- Step 6:** Enter Edit mode and move upper limit 3.13 db up. Use fast cursor “0” and hit “9” twice.
- Step 7:** Move lower limit –3.13 db down. Hit upper arrow once and hit “3” twice.
- Step 8:** Move the cursor on lower limit to 800.6 Hz.
- Step 9:** Write 800.6 Hz point up to 4.04 db. Use fast cursor and hit “8” once.
- Step 10:** Move cursor to upper limit and write 800.6 Hz limit to 7.17 db. Hit arrow down once and with fast cursor hit “2” once.



The sensitivity test will now be tested at 800.6 Hz with a limit on 3.13 db while the frequency response tolerance is 6.26 db.

- Step 11:** Enter “F-ave” the Frequency average test setup.
- Step 12:** Activate the “High” marker. Hit “2” once.
- Step 13:** Move cursor to “99.9” Hz.
- Step 14:** Activate the “low” maker. Hit “1” once.



The Frequency average is now calculated between the markers and displayed. Here -1.60 dBV. To activate the F-ave test a reference must be selected together with a upper and lower limit.

**Step 15:** Include F-ave value to reference. Click “Include”.

**Step 16:** Enter “limits” and set upper limit to 3.4 db and lower limit to -6.6 db.

**Step 17:** Say “Ok” to limits.

The “F-ave” test is now done and a green flag at the value is displayed. Furthermore it is possible to enable a selection of a group. The group is a information for the user at the test – not a test against limits. However on this way the average value can be selected in some quality groups.



- Step 18:** Enter group menu. Click “Group”.
- Step 19:** Set group 0: High to 1.00 and Low to -1.05 dB.
- Step 20:** Set group M1: High to -1.07 and Low to -2.01 dB.
- Step 21:** Set group P1: High to 1.99 and Low to 1.02 dB.

**Frequency Average Select Group**

The average groups have High & Low tolerance in dB relative to the selected reference value.  
Step in +/- 0.02 dB. A Group must not overlap other Groups.

P7 High	...	P7 Low	...	0 High	1.00	0 Low	-1.05
P6 High	...	P6 Low	...	M1 High	-1.07	M1 Low	-2.01
P5 High	...	P5 Low	...	M2 High	...	M2 Low	...
P4 High	...	P4 Low	...	M3 High	...	M3 Low	...
P3 High	...	P3 Low	...	M4 High	...	M4 Low	...
P2 High	...	P2 Low	...	M5 High	...	M5 Low	...
P1 High	1.99	P1 Low	1.02	M6 High	...	M6 Low	...
				M7 High	...	M7 Low	...

Reset Ok Cancel

**Step 22:** Exit the group menu by clicking the “Ok”.

Those values is with reference to the F-ave reference value. If the average is below +1.00 / - 1.02 db from the reference the group “0” is displayed and etc.

**Step 23:** Exit F-ave menu.

**Step 24:** Enter “S-ave” menu.

**Channel A - Sensivity Average Test Setup**

Test	Select	Include		Frequency	Value	Test Limits	
		Ave 1	Ave 2			Upper	Lower
# 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
# 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
# 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
# 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
# 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				Average 1			
				Average 2			

Reset Ok Cancel

It is possible to select up to 5 separate sensitivity test. These sensitivity test are done against a upper and lower limit different from the curve limits.

On the same way it is possible to activate two new average test – Ave 1 and Ave 2.

**Step 25:** Select Sensitivity test # 1, 2 and 3.

**Step 26:** Select Ave 1 test # 1, 2 and 3.

**Step 27:** Select Ave 2 test # 3, 4 and 5.

**Step 28:** Frequency:  
           # 1 to 1000 Hz  
           # 2 to 1020 Hz  
           # 3 to 1040 Hz  
           # 4 to 1060 Hz  
           # 5 to 2000 Hz

**Step 29:** Limits:  
               # 1 Upper to 12.0 db               Lower to 8.0 db  
               # 2 Upper to 12.0 db               Lower to 8.0 db  
               # 3 Upper to 12.0 db               Lower to 8.0 db

**Step 30:** Ave Limits:  
               # 1 Upper to 12.3 db               Lower to 8.3 db  
               # 2 Upper to 10.0 db               Lower to 8.0 db

Test	Select	Include		Frequency	Value	Test Limits	
		Ave 1	Ave 2			Upper	Lower
# 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1000	10.14 dB	12	8
# 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1020	10.14 dB	12	8
# 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1040	10.61 dB	12	8
# 4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1060	11.05 dB		
# 5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2000	5.55 dB		
Average 1					10.29 dB	12.3	8.3
Average 2					9.07 dB	10.0	8.0

Reset      Ok      Cancel

**Step 31:** Exit setup. Click “Ok”.



**Step 32:** Exit Edit Mode.

**Step 33:** Exit Reference Mode.

**Step 34:** Save & Exit and save as Reference Curve.

Now go to Run mode and run the test with the graph and flag screen.



## **Lesson 23**

Set up of a Master curve and a Master compensation curve.

These features can be used for various applications of which some important are:

- 1) Substitution for a reference speaker in connection with a master compensation curve.  
This is used to emulate a reference speaker by the use of another speaker, thus protecting the reference speaker against wear and associated changing of characteristics.
- 2) Comparison/emulation of test booths. With a Master curve and a Master compensation curve a production line test booth can be emulated as a lab. Test booth or a production line no. 2 can be emulated as production line no. 1. This is done by generating a Master curve with the reference curve in the one test booth and then make a Master reference curve in the other. This way test booth no. 2 precisely emulates test booth no. 1.

Note: The step for entering password is not listed.

### **A)**

The first step is to generate a Master curve (this is done analogue to making a compensation curve).

- Step 1:** Go to "Setup / change parameters", click "Setup".
- Step 2:** Select type "demo".
- Step 3:** Enter new name in field "Type Name". Write "master".
- Step 4:** Write in field "Type Description", "demo with a master curve".

**Setup Of Parameters**

Type  
Name: master Chain: Status:  
Description: demo with a master  
Help File: -> ☐ 3-Limit

Sensitivity Test  
☐ Move 2000 Hz

I/O  
N.A.

Output  
A Output: 4.0003 Volt  
-11.48 dB  
0 dB = 15.0 Volt

Polarity Test  
☒ On ☐ Negative ☐ After  
Pulse Time: 5 mSec.

Compress  
Range: Off dB  
Ref. Ch: 10

Loudness (test off, enter: 0.0)  
Form: Off  
Test: 0.0

Input  
Status: ☒ Ch A ☒ Ch B ☒ Ch C ☒ Ch D  
Mux: 11 11 No Mux 11  
Detector: Log Log Log Log  
Gain: +14 db empty 0.1 ohm empty  
Smoothing: Off Off Off Off  
Off 25.1 pt/oct

Sweep  
☐ Reverse  
Start: 20 Hz  
Stop: 20000 Hz  
Delay: 0 mSec  
Points: 250 No  
Time: 3.0 Sec.

Reference  
Reference  
Delete & exit  
Save & exit  
Exit

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
Data Path: C:  
Result Path: C:

Filter  
Status: ☒ Ch B ☐ Ch C ☒ Ch D  
Type: TRK-HP empty FIX-HP  
Har.: 5 empty empty  
Freq/Bw: empty oo empty 2048  
Gain: +20 db empty +20 db  
Display: Absolute empty Absolute  
Limit: 45 KHz empty 45 KHz

**Step 5:** Save & Exit.

**Step 6:** Save as Reference Curve.

**Step 7:** Go to “Setup / change parameters”. Click “Setup”.

**Step 8:** Select type “master”.

**Step 9:** Go to Reference mode. Click “Reference”.

**Step 10:** Carry out a measurement. Click “Measure”.

**Step 11:** Go to edit mode. Click “Edit”.

**Step 12:** Reset reference on Ch A. Click “Reset Channel Limit” or press key “CTL End”.

**Step 13:** Exit Edit Menu.

**Step 14:** Go to include menu. Click “Include”.

**Step 15:** Include “channel A”.

**Step 16:** Exit “Reference Mode”.

**Step 17:** Save & Exit.

**Step 18:** Save as Master Curve.

The master curve is only for saving the original (the reference speaker).

## **B)**

In order to create a substitution reference or to out compensate differences between test booths a Master compensation curve must be generated.

**Step 19:** Go to "Setup / change parameters". Click “Setup”.

**Step 20:** Select type “master”.

**Setup Of Parameters**

Type  
Name: master Chain: Status: Master Present  
Description: demo with a master  
Help File: -> ☐ 3-Limit

Sensitivity Test  
☐ Move 2000 Hz

I/O  
N.A.

Output  
A Output: 4.0003 Volt  
-11.48 dB  
0 dB = 15.0 Volt

Polarity Test  
☒ On ☐ Negative ☐ After  
Pulse Time: 5 mSec.

Compress  
Range: Off dB  
Ref. Ch: 1

Loudness (test off, enter: 0.0)  
Form: Off  
Test: 0.0

Input  
Status: ☒ Ch A ☒ Ch B ☒ Ch C ☒ Ch D  
Mux: 11 11 No Mux 11  
Detector: Log Log Log Log  
Gain: +14 db 0.1 ohm  
Smoothing: Off Off Off Off

Sweep  
☐ Reverse  
Start: 20 Hz  
Stop: 20000 Hz  
Delay: 0 mSec  
Points: 250 No  
Time: 3.0 Sec.

Reference  
Delete & exit  
Save & exit  
Exit

Auto Save  
☐ Data App. ☐ Data Rej. ☐ Results  
Data Path: C:  
Result Path: C:

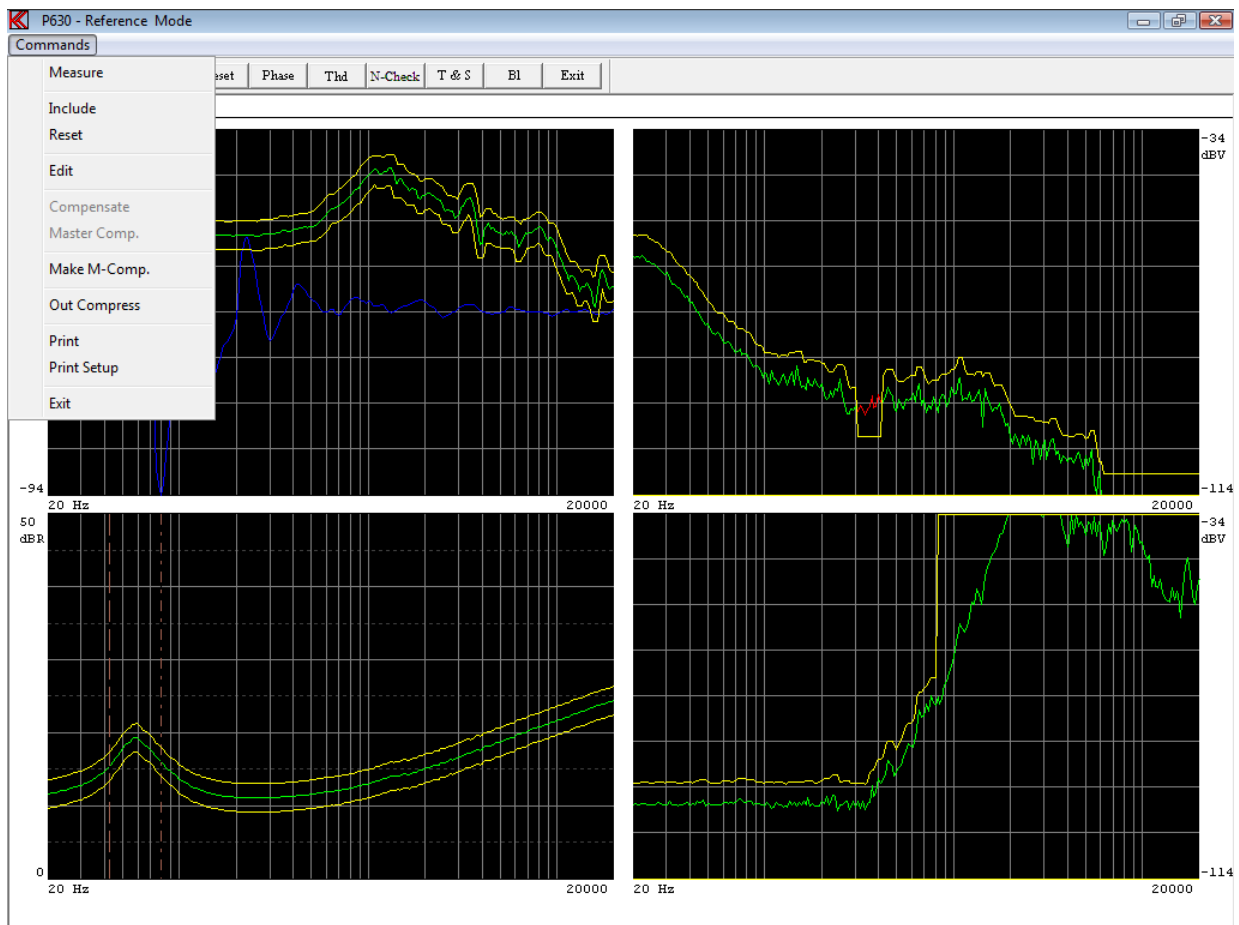
Filter  
Status: ☒ Ch B ☐ Ch C ☒ Ch D  
Type: TRK-HP FIX-HP  
Har.: 5  
Freq/Bw: 2048  
Gain: +20 db  
Display: Absolute  
Limit: 45 KHz

Please note that in the “Type Status” is written “Master Present”, to indicate that a Master curve is present.

- Step 1:** Enter “Setup / change parameters” activate “Setup”.
- Step 2:** Establish new type wit name “resonance”.
- Step 3:** “Create new type,” press “YES”.
- Step 4:** Write “Example of Rs, Q, F, & EBP” in field “Type Description”.
- Step 5:** Set output to 6Volt.  
Reset field “Output Volt” and enter “6”.
- Step 6:** Disable Polarity Test. Unmark “Sensitivity Test, On” of not already unmarked.  
(This test is not to be used in this example).
- Step 7:** Set “Ch A” OFF by unmark “Input Status Ch A”.
- Step 8:** Set “Ch B” OFF by unmark “Input Status Ch B”.
- Step 9:** Set “Ch D” OFF by unmark “Input Status Ch D”.

The channel C is always the impedance channel. If you want to carry out an impedance measurement, fres, Q and F, this channel must be "ON". Make sure Rs = 0.1. Select Rs with Gain field in Ch C.





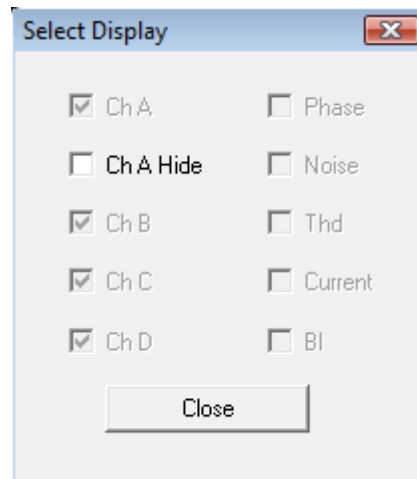
Please note that there is a new issue in the menu: Make M-Comp.

This is used to generate the master compensation curve. It generates the difference between the measured curve and the master curve (here there is no difference since the demo program only are using a simulated curve).

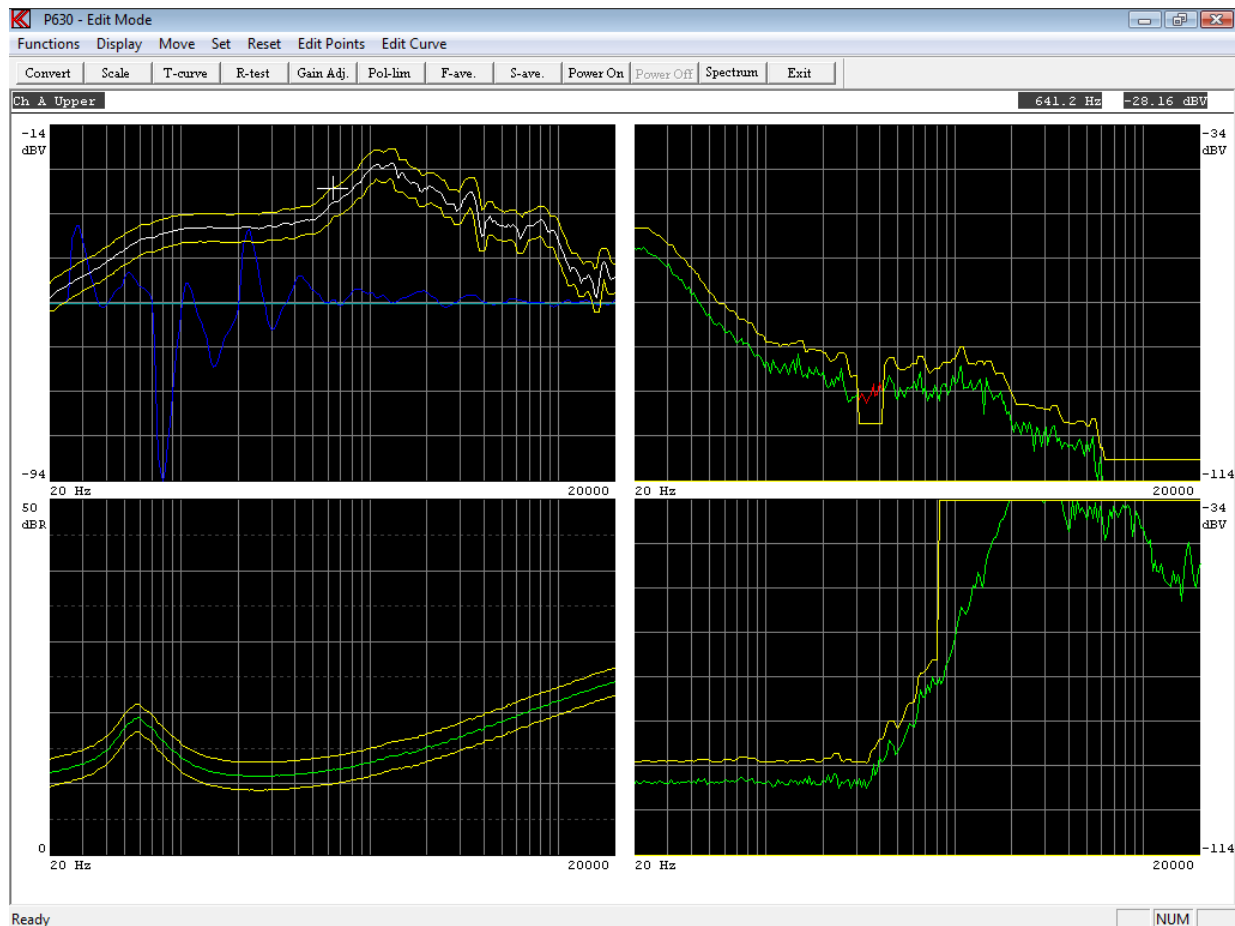
**Step 23:** Generate a Master Compensation Curve. Click “Make M-Comp.”.

**Step 24** Go to edit mode. Click “Edit”.

**Step 25:** Show the master curve. Click at “Display”, “Select Display”.



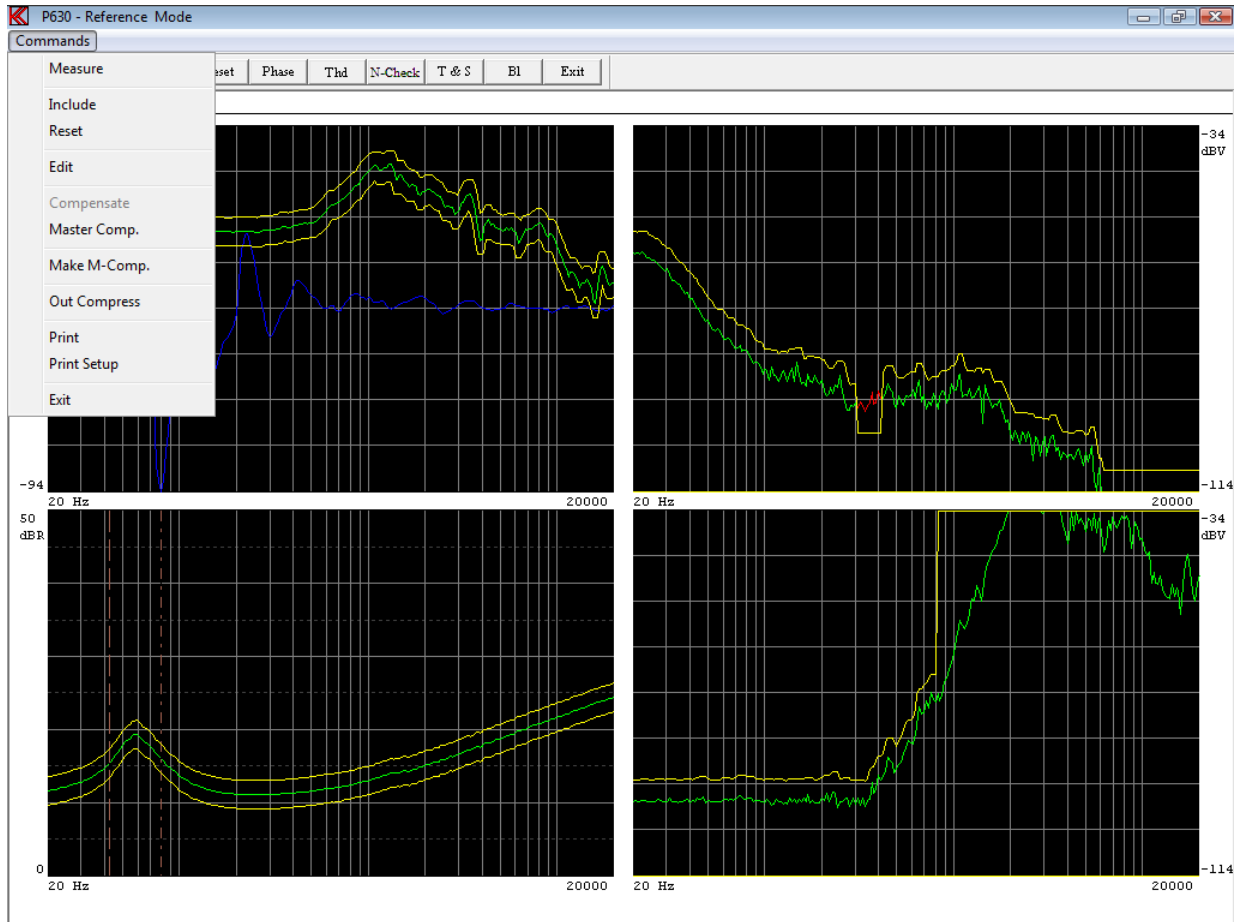
**Step 26:** Set flag at “Ch A Hide” off.



Upper left window: The Master curve is shown in white and the blue curve minus 40 dB from the top of the window is the difference (the Master Compensation curve).

**Step 27:** Exit Edit Mode.

**Step 28:** Carry out a measurement. Press key “M”.



Please note a new issue in the menu: Master Comp.

In the production environment this is used when the Master compensation curve has been generated. The Master compensation curve is automatic subtracted from the measured curve before test.

**Step 29:** See the compensated test result, click “Master Comp.”.

**Step 30:** Exit Reference Mode.

**Step 31:** Save & Exit.

**Step 32:** Save as Reference Curve.

## **Lesson 24**

The next four lessons show some of the use of the utility functions.

The first part shows how to process stored data and use the mean value of some “good” speakers to provide the basis for a new reference curve.

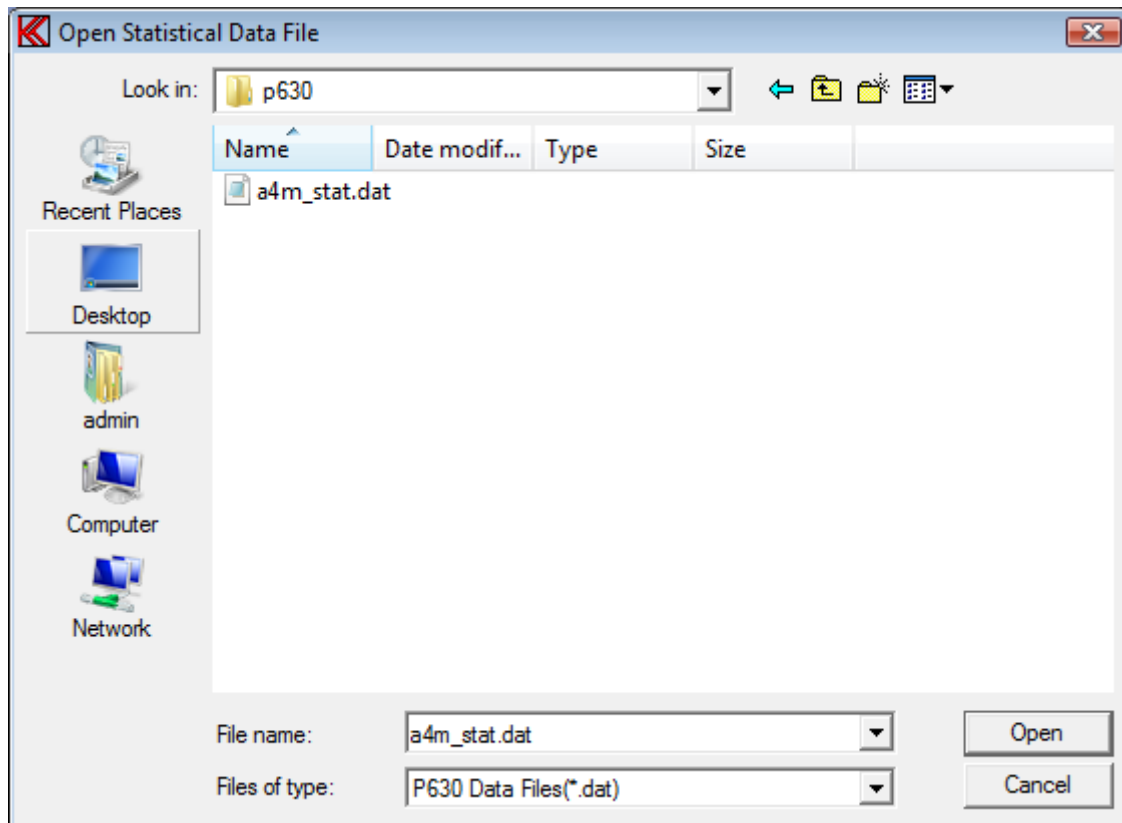
Note: The step for entering password is not listed.

**Step 1:** Go to “Utilities”. Click “Utility”.

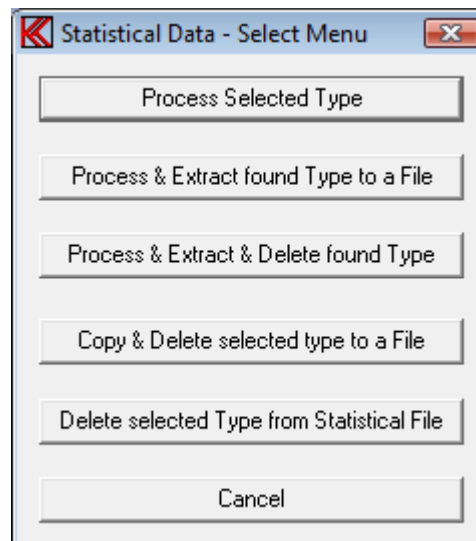


**Step 2:** Click “Process Statistical Data” to process a Statistical Data file.  
If “Store Data Approve” or “Store Data Reject” in “Global Menu” previously have been set to “ON” or “AUT” & “Auto Save” was activated in “Setup”, the file in “A4m\_stat.dat”, the Statistical Data file, is automatically generated in Run Mode.  
(Note: Match Store Data is optional)

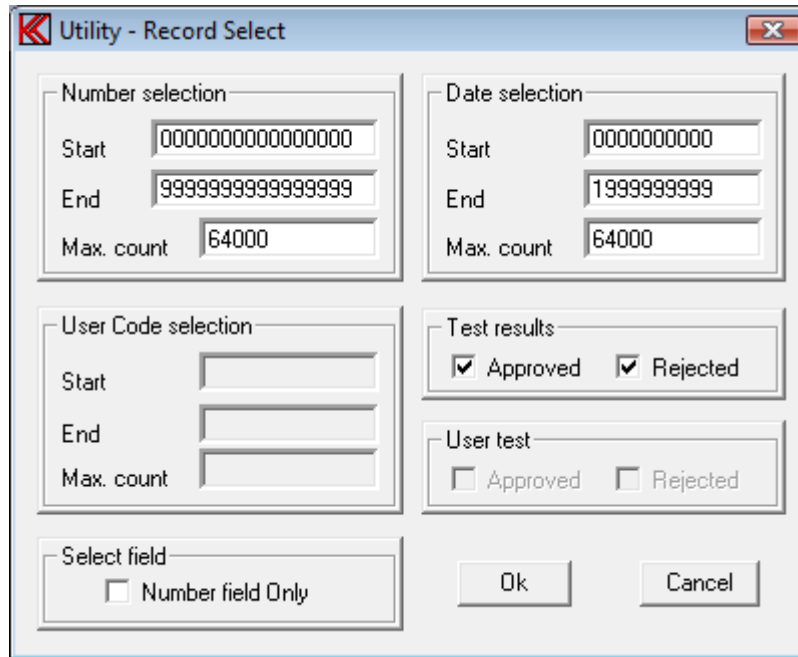
**Step 3:** Select the default data file: A4m\_stat.dat



**Step 4:** Select type “dat” and click “OK”.



**Step 5:** To process the type “dat” click “Process Selected Type”.




**Utility - Record Select**

<b>Number selection</b> Start: 0000000000000000 End: 9999999999999999 Max. count: 64000	<b>Date selection</b> Start: 0000000000 End: 1999999999 Max. count: 64000
<b>User Code selection</b> Start: End: Max. count:	<b>Test results</b> <input checked="" type="checkbox"/> Approved <input checked="" type="checkbox"/> Rejected
<b>Select field</b> <input type="checkbox"/> Number field Only	<b>User test</b> <input type="checkbox"/> Approved <input type="checkbox"/> Rejected

Ok Cancel

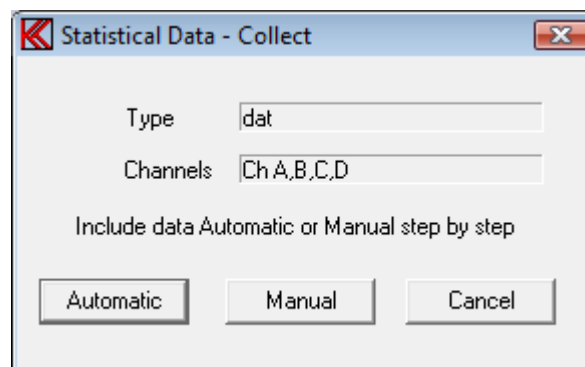
**Step 6:** Select to process all data with selected criteria, click “Ok”.



**Select Processing Ch**

Channel A	Channel B
Channel C	Channel D
Channel C2	Phase
Thd	BI
All Channels	

**Step 7:** Select to process all channels, click “All Channels”.



**Statistical Data - Collect**

Type: dat

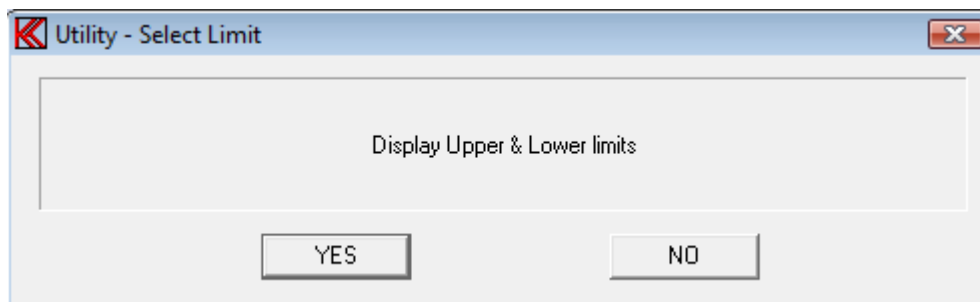
Channels: Ch A,B,C,D

Include data Automatic or Manual step by step

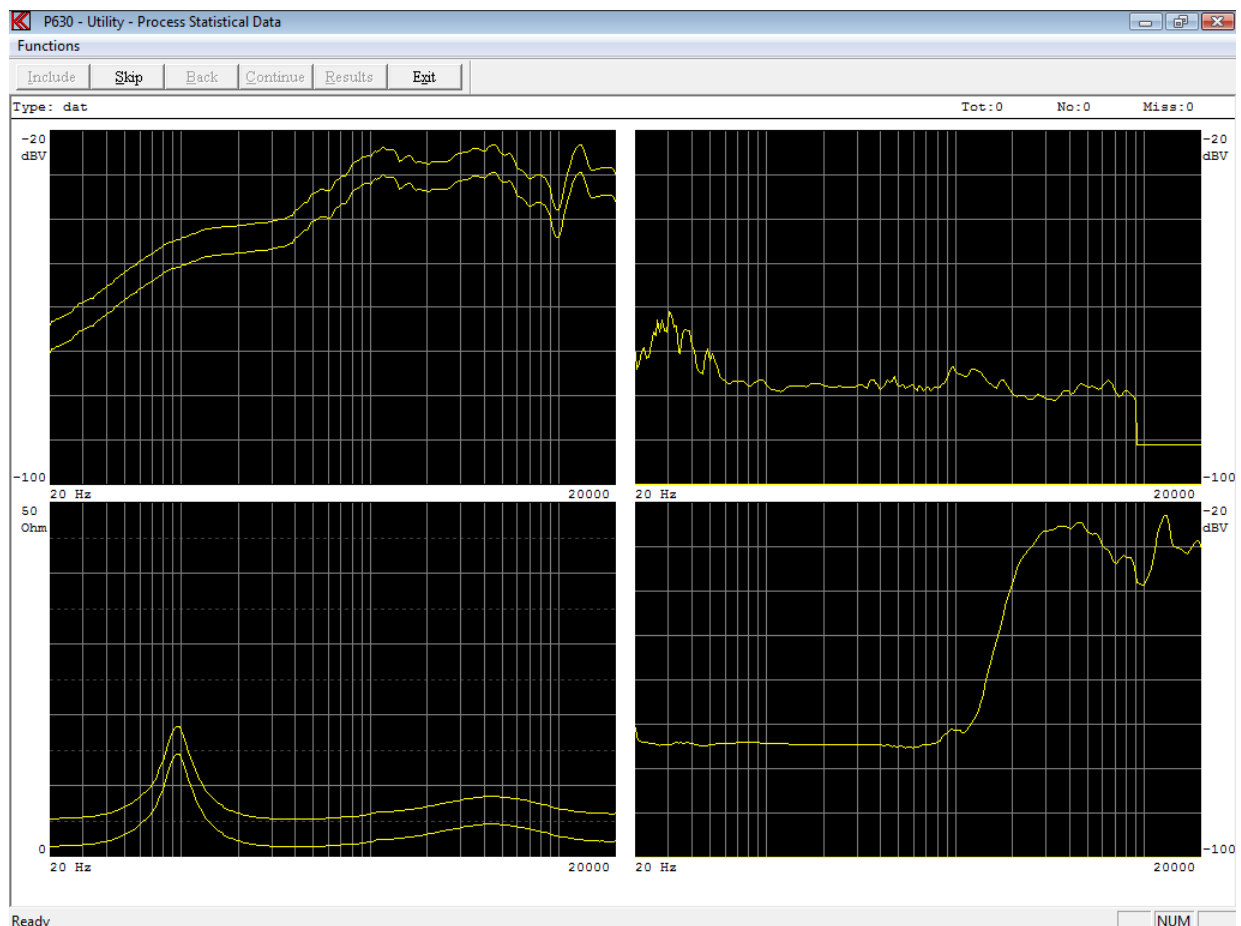
Automatic Manual Cancel

Data of the selected Type can be processed either automatic or manually. The Automatic process has a Suppress function, which can exclude measurements that exceeds limits setup in the Suppress menu. In the Manual process every measurement is displayed graphically on screen and can be included or excluded by pressing.  
The Manual process is shown first. Step 30 and onwards shows the Automatic process.

**Step 8:** Click “Manual” to select manual processing.

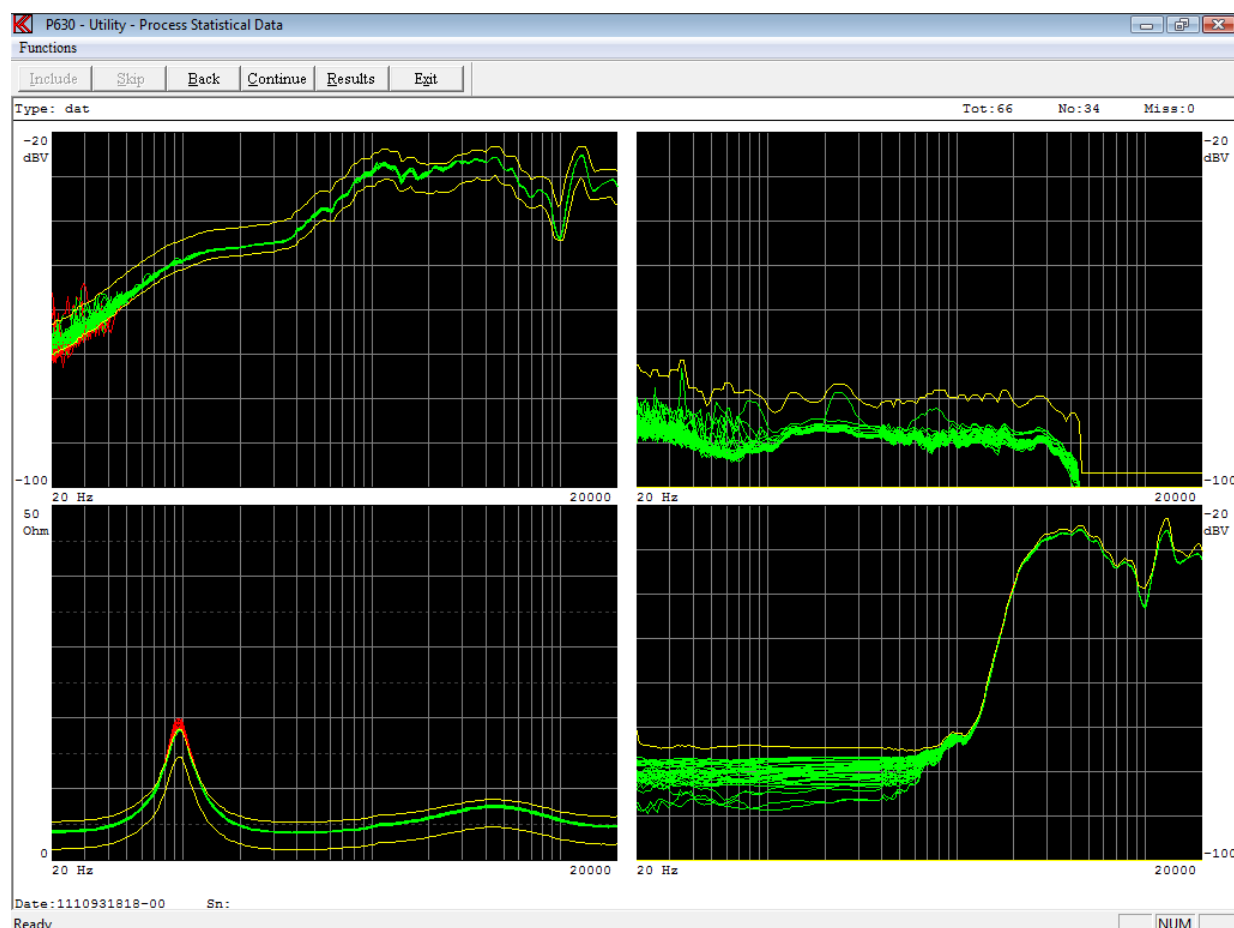


**Step 9:** Select no limits while processing, click “YES”.



A Date code and a serial number are displayed in the right bottom corner. The Date number is the actual date + time code for the record. The two last numbers is a sequential number if more than one record have the same date + time code. In this way no two records have the identical date number. The serial number is displayed after the date code. In this example the data is not saved with a serial number and therefore not displayed. The serial number is an 8-digit number saved together the measurement in Run Mode and entered by operator (or by a barcode). If the selected type name has a stored reference setup, the displayed data is colour coded “green” for approved and “red” for rejected.

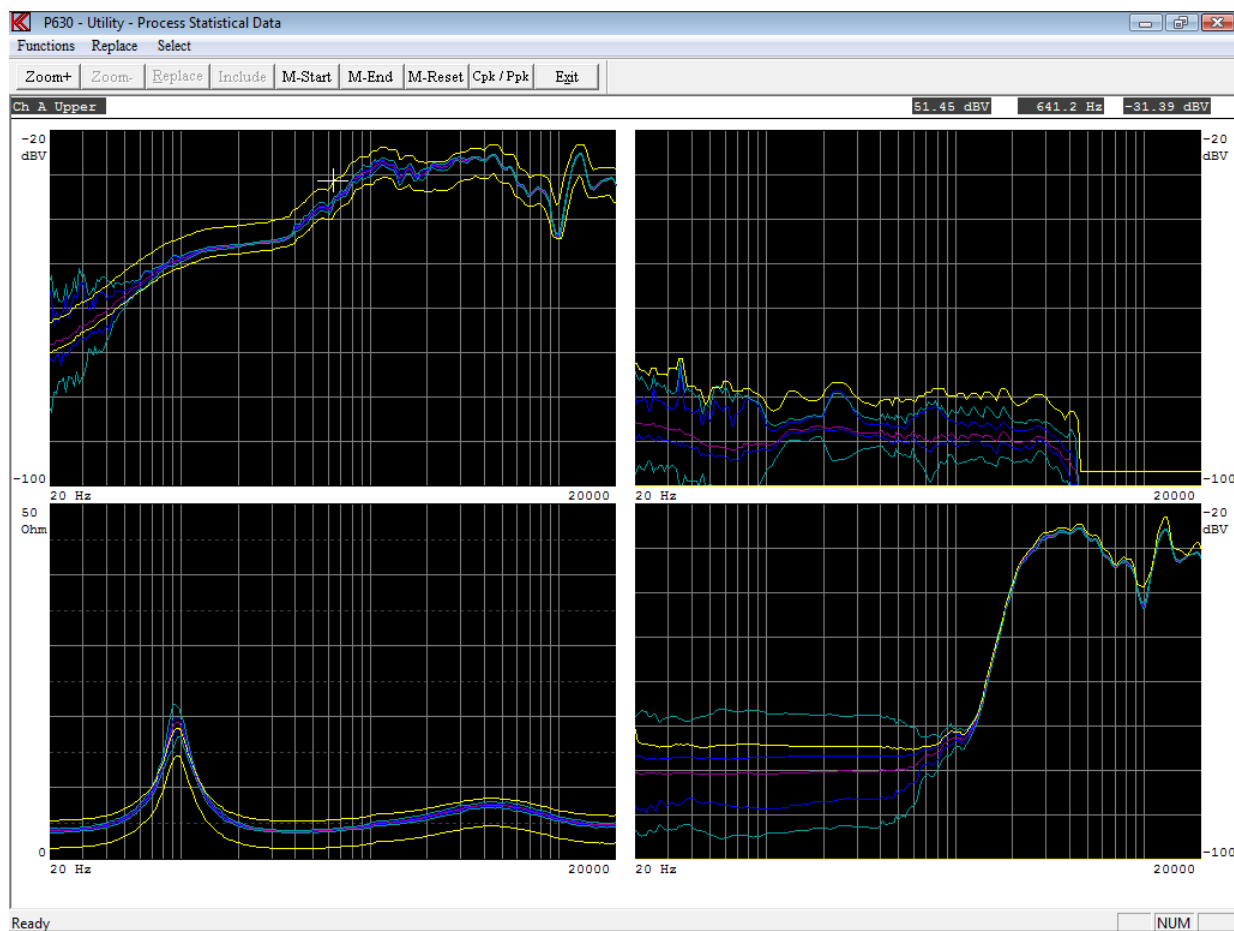
**Step 10:** Select some “good” data records by using : Click “Skip” or “S” and “Include” or “I”:  
 “Skip”, 2 times “Include”, “Skip”, “Include”, “Skip”, “I”, 2 x “S”, 3 x “I”, “S”, 4 x “I”, “S”, 4 x “I”, “S”, 2 x “I”, “S”, 15 x “I”, “S”, 2 x “I”, and the rest “S”.



**Step 11:** Click “Continue”.

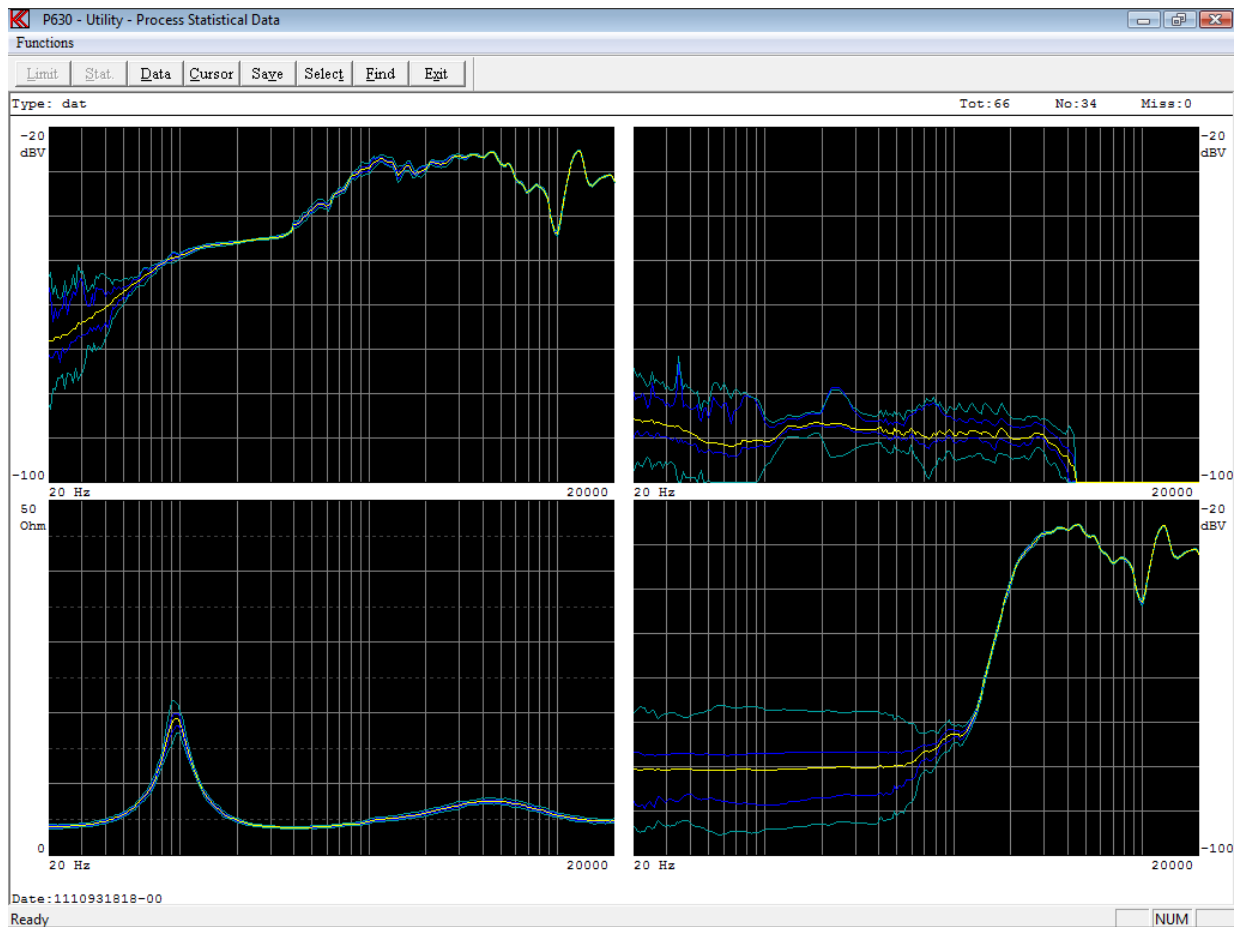
**Step 12:** Click “Stat.” or press “S” to go to statistics.

**Step 13:** Click “Cursor” to go to the Utility Process Statistical mode 2 where you can replace upper and lower limit with processed statistical data.

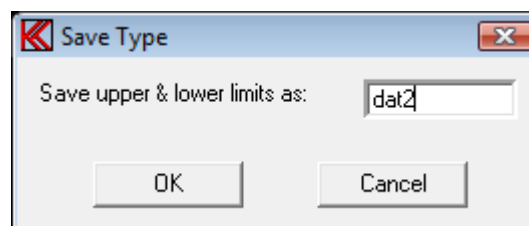


- Step 14:** The crossbar is in channel A focusing on the frequency curve upper limit values. Press “arrow up” until the crossbar is selected on the mean value of frequency curve data, Ch A Ave.
- Step 15:** Press key “R” or click “Replace” to replace upper and lower reference with average data.
- Step 16:** Press “+” to go to channel B.
- Step 17:** Press “arrow up” until the crossbar is selected on the mean value of frequency curve data, Ch B Ave.
- Step 18:** Press key “R” or click ”Replace” to replace upper and lower reference with average data.
- Step 19:** Press “+” to go to channel C.
- Step 20:** Press “arrow up” until focus on the mean value of frequency curve data, Ch C Ave.
- Step 21:** Press key “R” to replace upper and lower reference with average data.

- Step 22:** Press “+” to go to channel D.
- Step 23:** Press “arrow up” until focus on the mean value of frequency curve data, Ch D Ave.
- Step 24:** Press key “R” to replace upper and lower reference with average data.
- Step 25:** Exit menu.



- Step 26:** Click “Save” or press key “V” to save upper and lower limits.



- Step 27:** Change type name to “dat” and Press “OK” to save.

**Step 28:** Exit Process Statistical Data.

**Step 29:** Exit Utility.

Now the type “dat2” is ready for further elaboration, see lesson 5 step 22 onwards.

One of many other alternatives to the above practical example could be to:

A)

Test a number of speakers (say 100). Make use of serial number to detect actual measurement to physical device.

B)

Use 2 / 3 / 4 / 5 times the STD as upper and lower reference limits (for Rub and Buzz channels the lower limit shall of cause be Zero).

Following steps shows how to process measured data of a Type automatic:

**Step 30:** Go through Step 1 to Step 7.

**Step 31:** Select “Automatic” to enter automatic processing.

**Statistical Data - Collect**

Type:

Channels:

To suppress garbage data a suppress limit can be added to present references for active channel.

Enter a suppress value in db (0 - 40).  
0 = approved only.  
40 = almost no suppress function.

Ch A Suppress value:

Ch B Suppress value:

Ch C Suppress value:

Ch C2 Suppress value:

Ch D Suppress value:

Phase Suppress:

Thd Suppress value:

BI Suppress value:

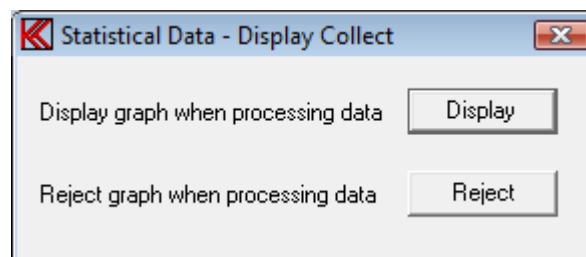
Accept Values

Disable Suppress

Only if the selected Type is setup with proper reference limits the Suppress menu will appear. The Suppress function excludes measurements from the statistics, which exceeds a limit in dB above upper reference limit and/or below lower reference limit. Each channel can be setup with separate limits between 0 and 40 dB. Disable means no suppressing.

**Step 32:** Write “10” in field “Ch C Suppress value.”

**Step 33:** Continue, click “Accept Values”.



Before the data is processed you must choose to have the measurements displayed graphically or not. “Display” graph enables you to see the measurements during processing but slows the process down, useful with a smaller number of measurements. “Reject” graph processes all data without displaying, thus speeding up the process, useful with a large number of measurements.

**Step 34:** Select “Display” to display graph during processing.

**Step 35:** Go through Step 11 to Step 29.



## **Lesson 25**

This utility lesson shows how to copy a reference setup to a disk and back again.

This is particularly useful for factories, which have more than one production line and therefore from time to time have the need for transferring reference setups from one PC to another.

Because of the database structure, copying cannot be performed using conventional functions.

Note: The step for entering password is not listed.

**Step 1:** Go to Utilities. Click “Utility”.

**Step 2:** Enter the copy reference utility menu. Click “Copy Reference to Data”.

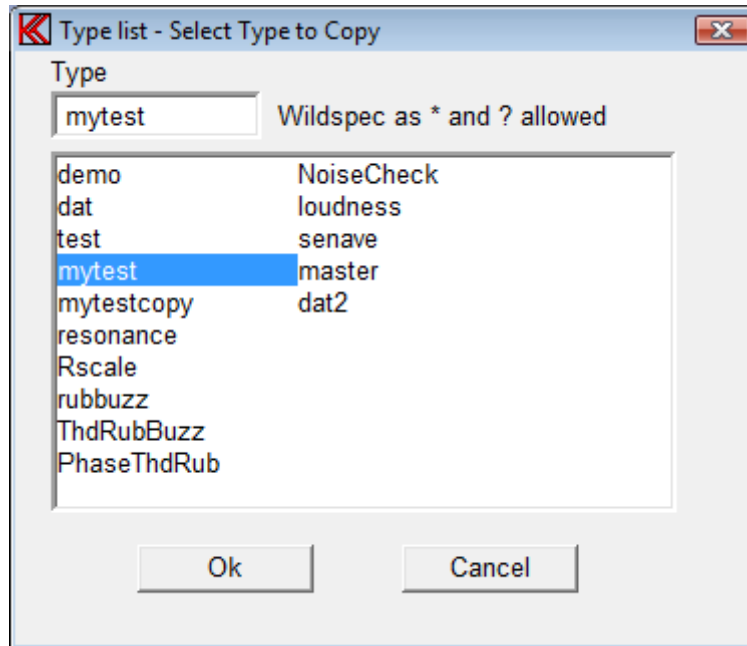


**Step 3:** List the existing reference types. Click “List Reference Types”.

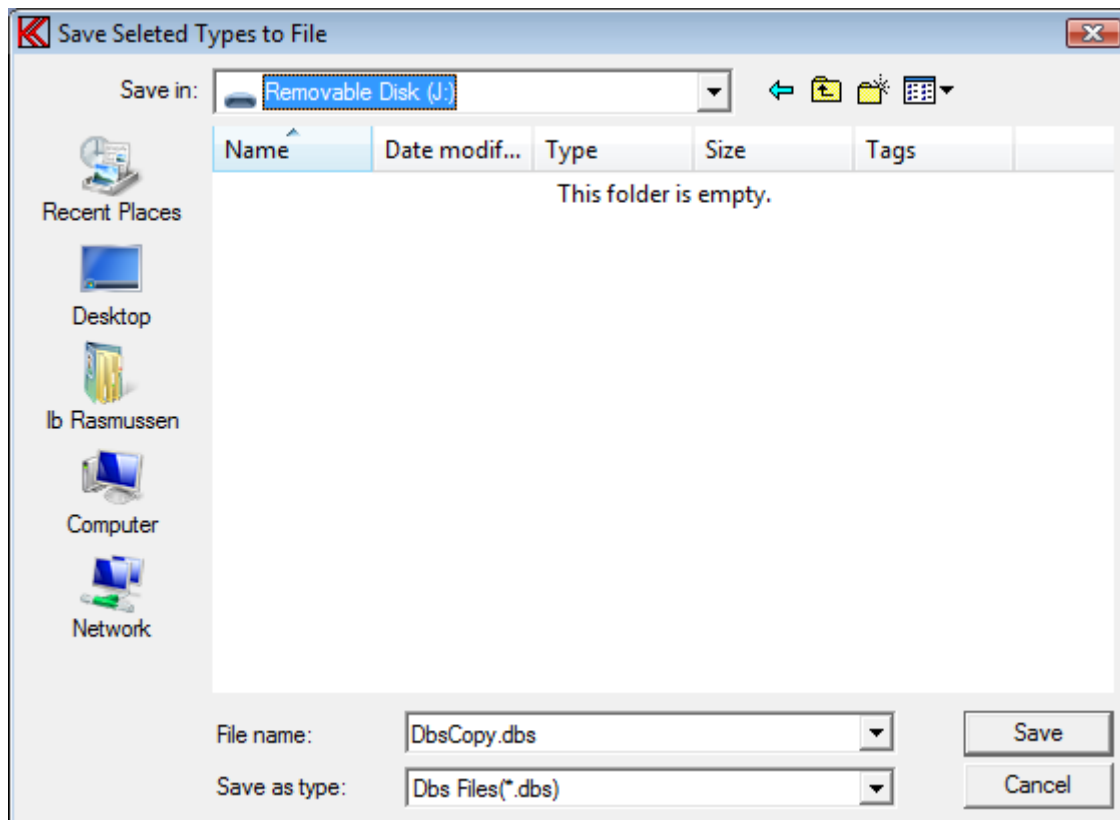
**Step 4:** Click “Exit” to return to the menu.

**Step 5:** Select “Copy Reference to Floppy or Disk” to copy to a disk.

**Step 6:** Select “mytest” and click “OK”.

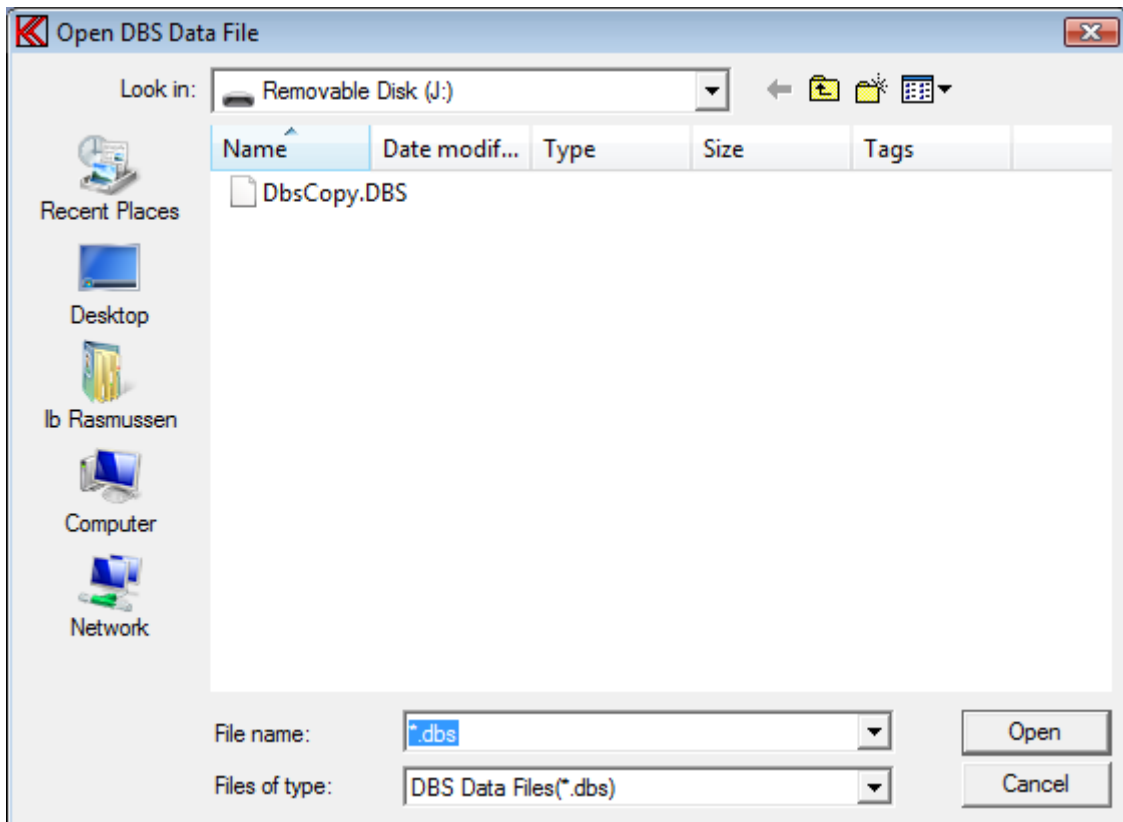


**Step 7:** Rename default filename to “DbsCopy.dbs” and click “Save”.



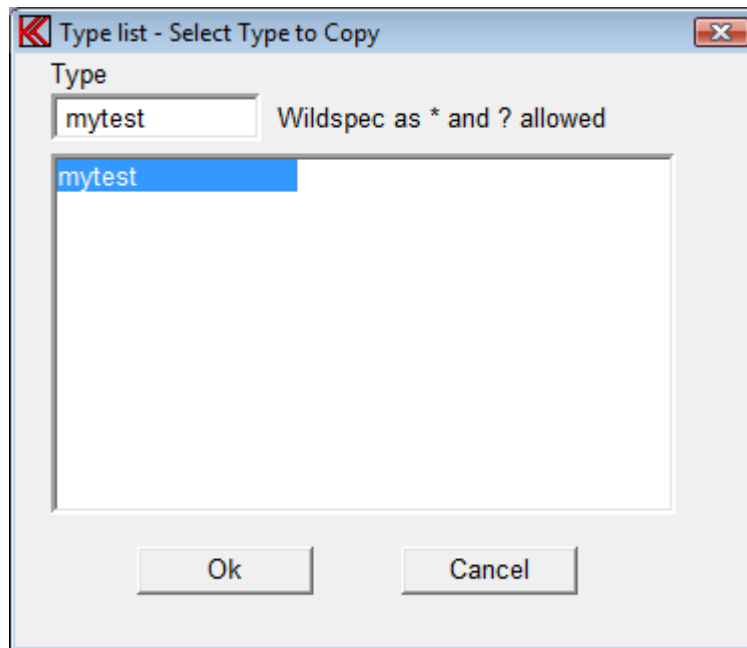
Imagine that you now physically move your floppy to another PC to add the reference type to the database there.

**Step 8:** Click “Copy from Floppy or Disk to Reference” to copy from the floppy.

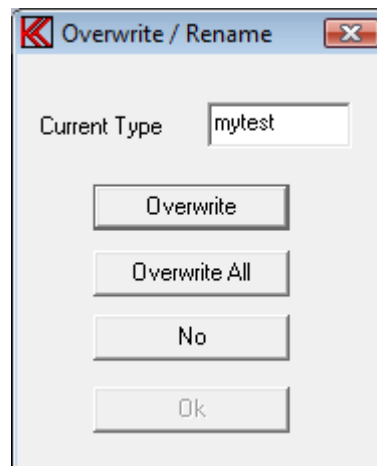


**Step 9:** Select filename: “DbxCopy” and “Open”.

**Step 10:** Double click on “mytest” to select type.



**Step 11:** Click “Ok” to continue.



**Step 12:** Instead to overwrite present setup a new type name can be entered. Enter in field “Current Type” the name “mytest1”.



**Step 13:** Accept, click “Ok”.

The type ”mytest” has now been copied via the floppy and has been renamed to “mytest1”.

**Step 14:** Exit copy menu.

**Step 15:** Exit utility menu.



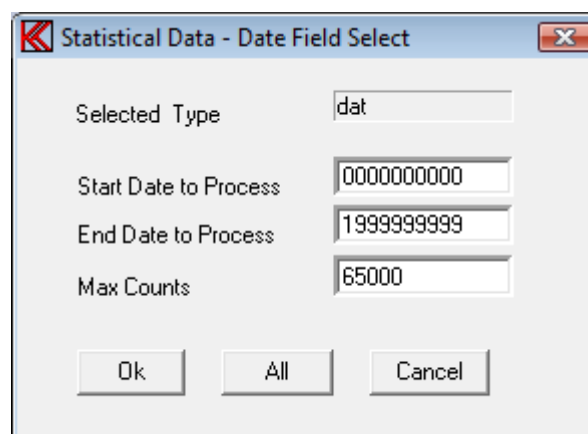
## **Lesson 26**

This utility lesson shows how to convert stored data in a “\*.dat” file to a plain ASCII test files.

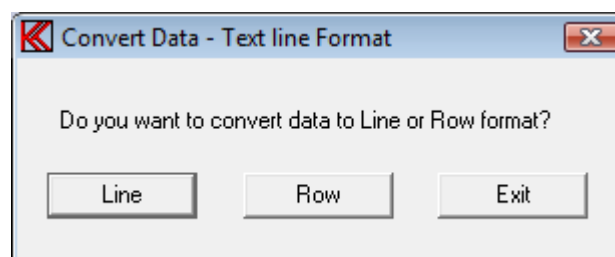
It can for example be used to export a reference type, edit the content with notepad editor, and then import the reference back as a new type.

The below example shows how to convert data from the A4m\_stat.dat file to a text file.

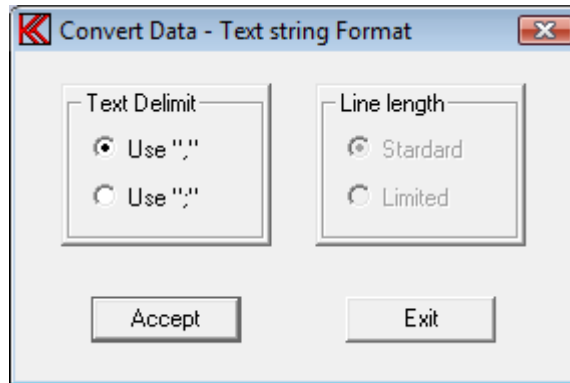
- Step 1:** Go to Utilities. Click “Utility”.
- Step 2:** Convert the DAT file. Click “Convert Statistical Data”.
- Step 3:** Enter the dat filename or use the default file name “a4m\_stat.dat” and click “Open”.
- Step 4:** Select type “dat” and click ”Use Selected” type.



- Step 5:** Click “All” to select all data from start date “0000000000” to end date “1999999999” (default). This disable Data Field Select function.
- Step 6:** Click “Ok” to continue.

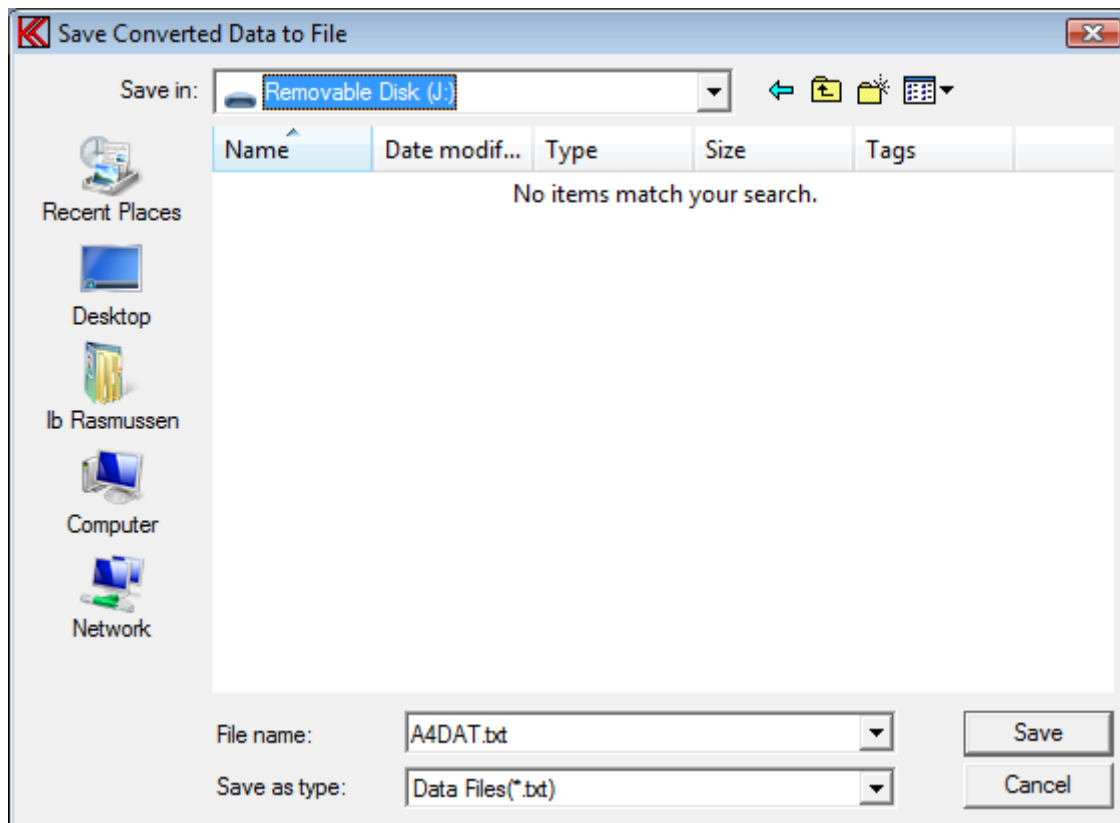


- Step 7:** Press “Row” to convert to row format.



**Step 8:** Mark “Text Delimit, Use ‘,’” to select comma delimiter file format.

**Step 9:** Click “Accept” to continue.



**Step 10:** Write the name of target text file. Default name is “a4dat.txt”. Continue, click “Save”.

**Step 11:** Exit Utility.

The data is stored in a file named A4DAT.TXT.

Now you can view or manipulate your data from “dat” in the file A4DAT.TXT with the windows notepad editor a spreadsheet.

```
"ALT-4 Convert Utility ver. 3.2"
```

```
"Type:", "dat"
"Start frequency:", 20
"End frequency:", 20000
"Points:", 250
"Active channels:", 4
```

```
"Channel A:", " 20 db"
```

```
"Point:", "Freq:"
 1,  20.0, -66.5, -68.0, -70.8, -68.4, -69.1, .....
 2,  20.6, -66.5, -71.8, -70.0, -67.8, -63.1, .....
...
...
...
```

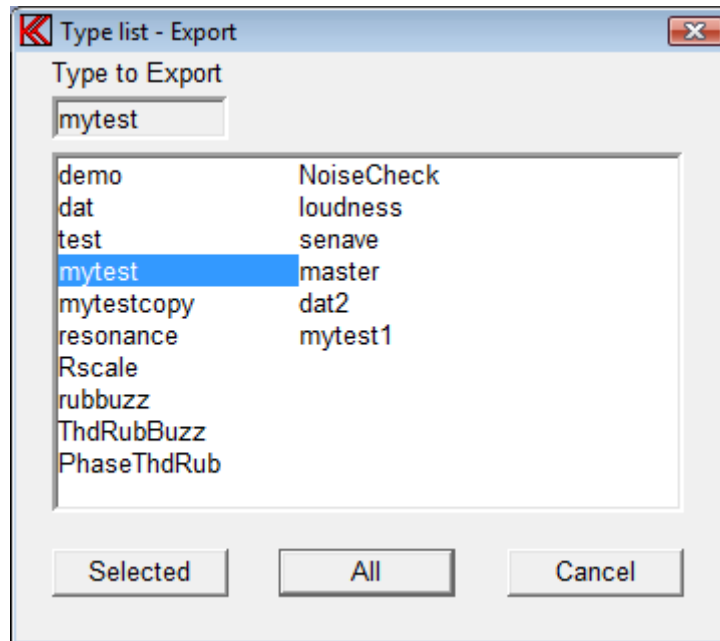


## **Lesson 27**

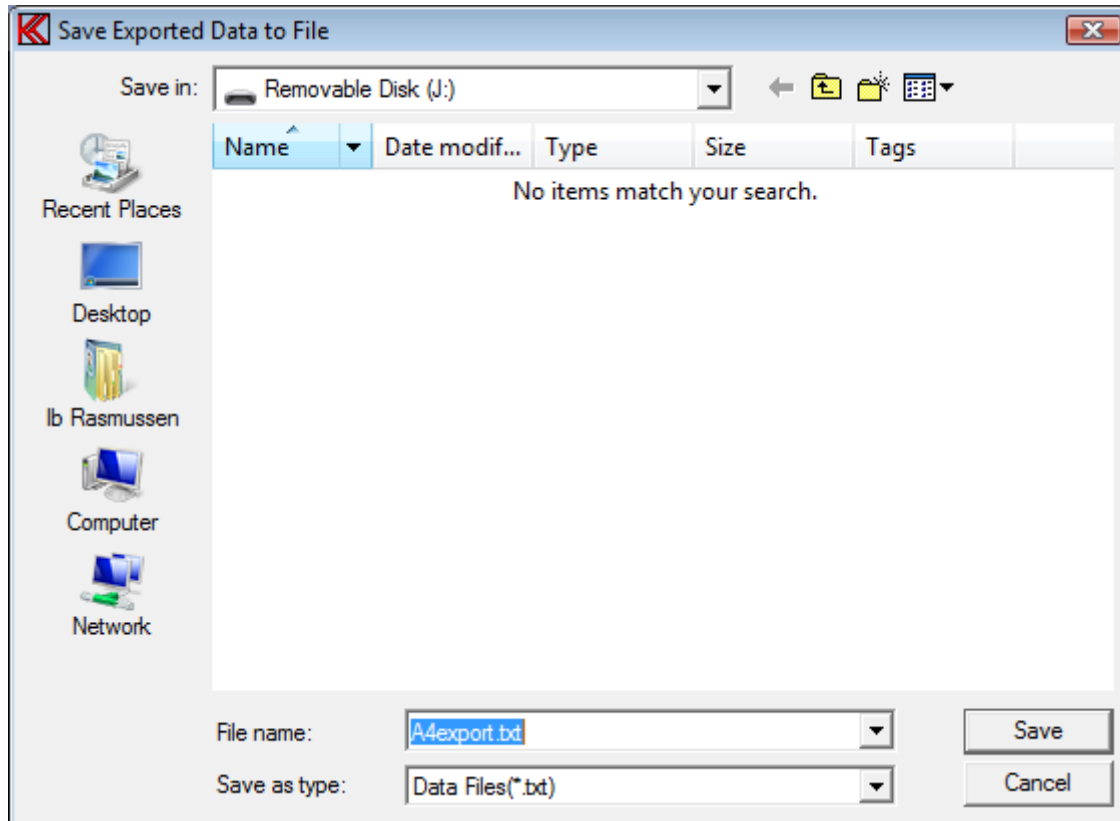
This lesson shows how to export a reference type to TXT file, edit the content with a TXT editor, and then import the reference back as a new type.

**Step 1:** Go to Utilities. Click “Utility”.

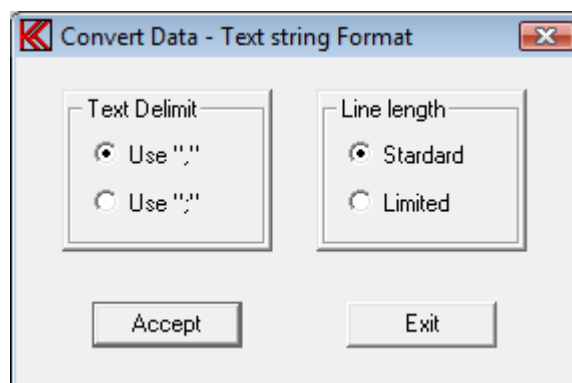
**Step 2:** Enter the export utility. Click “Export Reference Data”.



**Step 3:** Select “mytest” to export and click “Selected” to export “mytest” only.



**Step 4:** Write the name of the text file to be exported to. Default name is “A4export.txt”. Save the file, click “Save”.



**Step 5:** Mark “Text Delimit, Use ‘,’” to select comma delimiter format and mark “Line length, Standard” to select exported reference limits as one long text line.

**Step 6:** Accept selected option. Click “Accept”.

**Step 7:** Exit Utility.

**Step 8:** Open your exported file, the A4export.txt with windows notepad editor. Contents looks like:

```
Export Utility ver. 3.4

"Type:", "mytest      "
"Description:", "This is my first test      "
"Chain Type:", "      "
"Chain status:", "ON "
"Help file name:", ""
"Start frequency:", 20, "Hz"
"End frequency:", 20000, "Hz"
..
..
..
```

**Step 9:** Change the type name “mytest ” in line 3 to “importdemo “. NOTE: The content of the name field (“mytest ”) MUST contain 12 characters including the spaces.

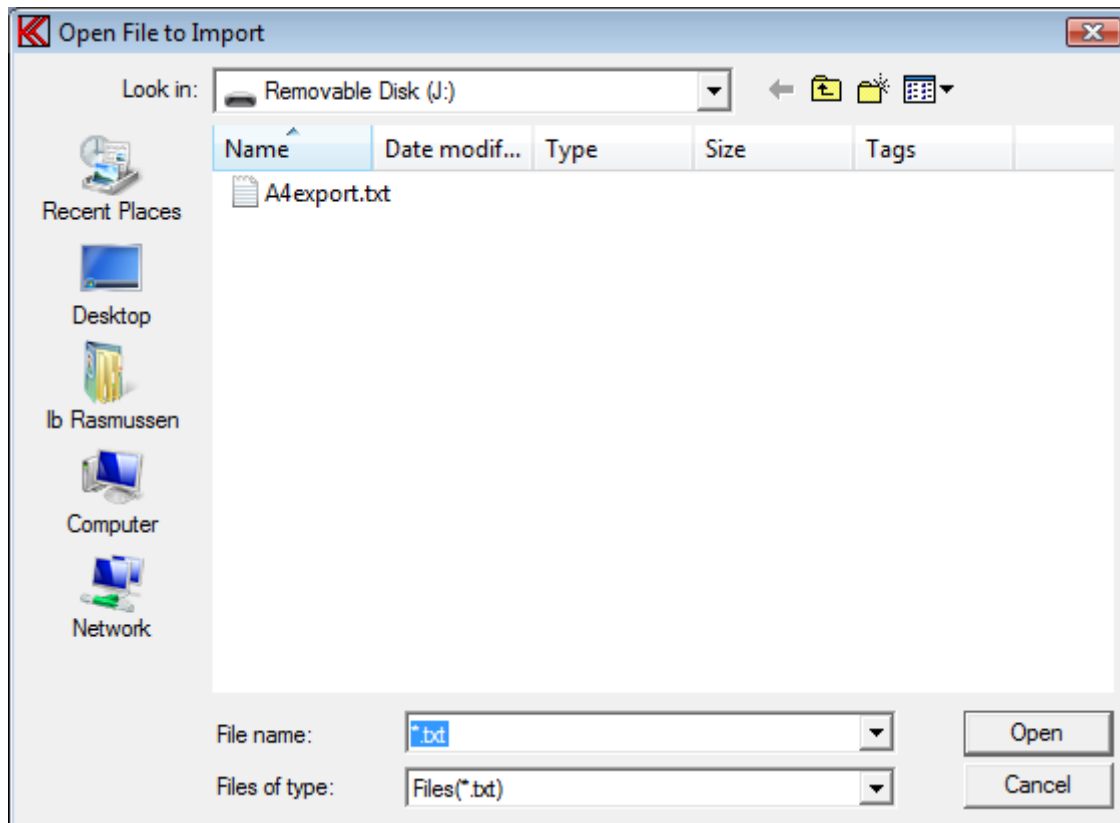
```
"Export Utility ver. 3.4

"Type:", "importdemo "
"Description:", "This is my first test      "
..
..
..
```

**Step 10:** Save the edited A4export.txt file under same name.

**Step 11:** Go to Utilities. Click “Utility”.

**Step 12:** Go to import to reference. Click “Import Reference Data”.



- Step 13:** Select the file you just changed. Click “Open”.
- Step 14:** Exit Utility.
- Step 15:** Go to Setup / change parameters. Click “Setup”.
- Step 16:** Check that type "importdemo" now exists.
- Step 17:** Exit to main menu. Click “Cancel”,

## **Lesson 28**

This lesson shows how to make a test for impedance and offset of coil in magnetic field – the BL test.

- Step 1:** Enter “Setup / change parameters” activate “Setup”.
- Step 2:** Establish new type wit name “BL”.
- Step 3:** “Create new type,” press “YES”.
- Step 4:** Write “BL coil offset “Type Description”.
- Step 5:** Set output to 4Volt.  
Reset field “Output Volt” and enter “4”.
- Step 6:** Disable Polarity Test. Unmark “Sensitivity Test, On” of not already unmarked.  
(This test is not to be used in this example).
- Step 7:** Set “Ch A” OFF by unmark “Input Status Ch A”.
- Step 8:** Set “Ch B” OFF by unmark “Input Status Ch B”.
- Step 9:** Set “Ch D” OFF by unmark “Input Status Ch D”.

The channel C is always the impedance channel. If you want to carry out an impedance measurement, this channel must be "ON". Make sure  $R_s = 0.1$ . Select  $R_s$  with Gain field in Ch C.

**Setup Of Parameters**

Type	Chain	Status
Name: BI		
Description: BL coil offset		
Help File:		

☐ 3-Limit

---

**Sensitivity Test**  
☐ Move 1000 Hz

**I/O**  
 N.A

**Output**  
 A 4.0003 Volt  
 -11.48 dB  
 0 dB = 15.0 Volt

---

**Polarity Test**  
☐ On ☐ Negative ☐ After  
 Pulse Time: 50 mSec.

---

**Compress**  
 Range: Off dB  
 Ref. Ch: Off

**Loudness (test off, enter: 0.0)**  
 Form: Off  
 Test: 0.0

---

**Input**  
 Status: ☐ Ch A ☐ Ch B ☒ Ch C ☐ Ch D  
 Mux: 11 12 No Mux 13  
 Detector: Log Log Log Log  
 Gain: -20 db -20 db 0.1 ohm -20 db  
 Smoothing: Off Off Off Off  
 Off 25.1 pt/oct

---

**Sweep**  
☐ Reverse  
 Start: 20 Hz  
 Stop: 20000 Hz  
 Delay: 0 mSec  
 Points: 250 No  
 Time: 3.0 Sec.

Reference  
 Delete & exit  
 Save & exit  
 Exit

---

**Auto Save**  
☐ Data App. ☐ Data Rej. ☐ Results  
 Data Path: c:  
 Result Path: c:

---

**Filter**  
 Status: ☐ Ch B ☐ Ch C ☐ Ch D  
 Type:   
 Har:   
 Freq/Bw:   
 Gain: 0 db 0 db 0 db  
 Display: Absolute Absolute Absolute  
 Limit: 45 KHz 45 KHz 45 KHz

**Step 10:** Enter “Reference mode”. Click “reference”.

**Step 11:** Carry out a measurement. Press key “M” or click “Measure”.

**Step 12:** Enter BI Test Menu.

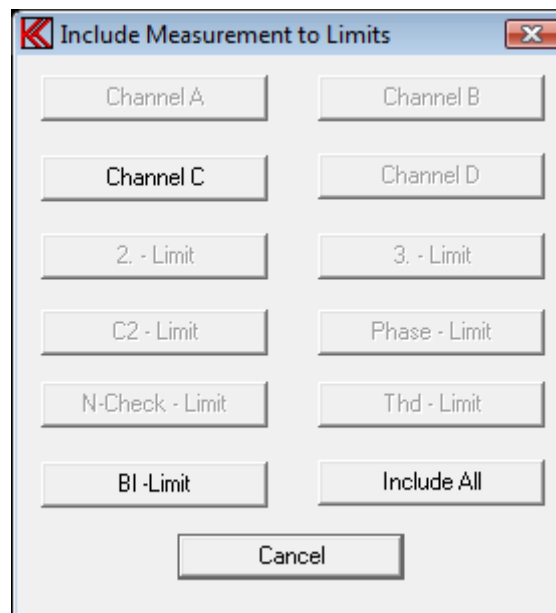
**BI Test Menu**

<b>Offset Test</b> <input checked="" type="checkbox"/> On	<b>Display Channel</b> <input type="checkbox"/> Ch A <input type="checkbox"/> Ch B <input checked="" type="checkbox"/> Ch C <input type="checkbox"/> Ch D	<b>Frequency</b> Start: 20.0 End: 500.0
<b>Smoothing</b> Off	Close	

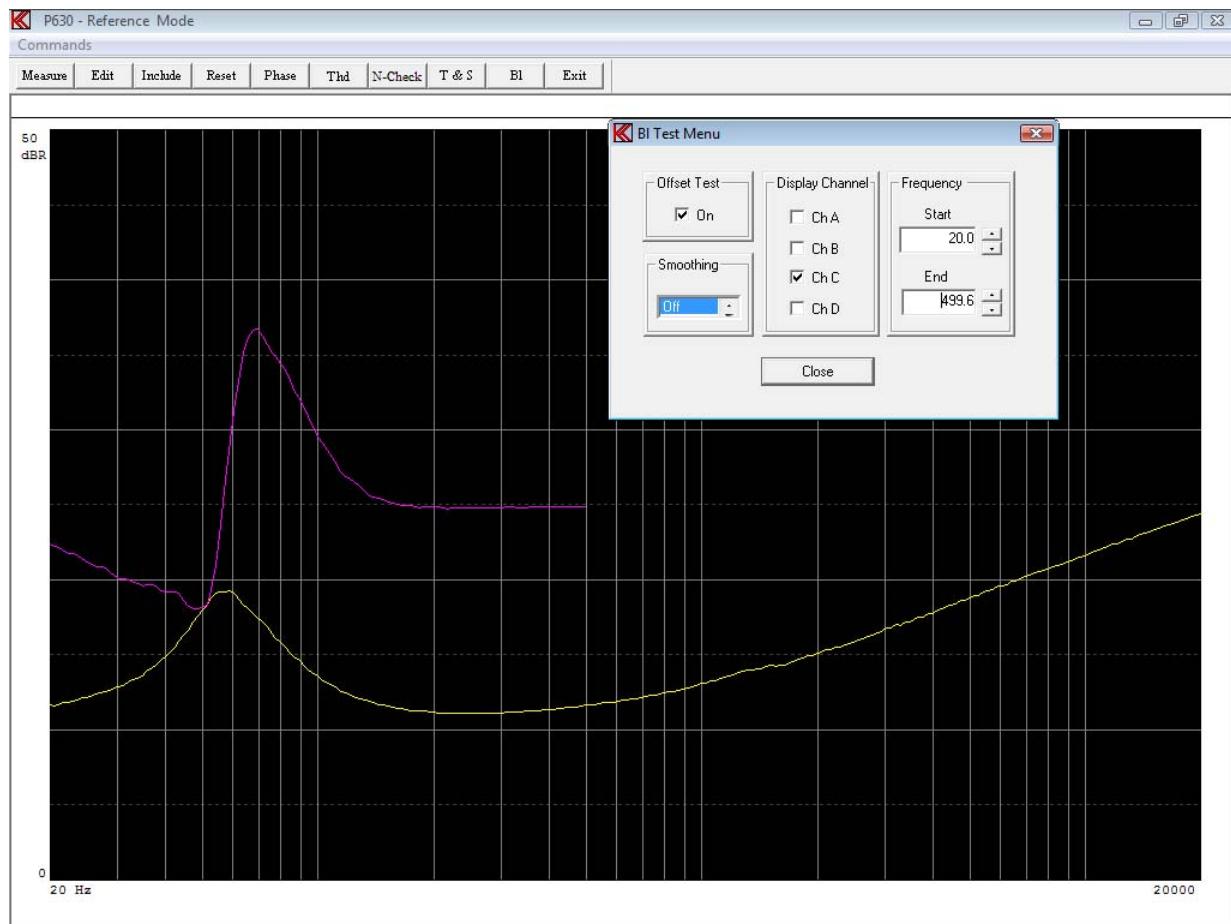
**Step 13:** Set Offset Test On.

**Step 14:** Set End frequency to 500 Hz.

**Step 15:** Set End frequency to 500 Hz.

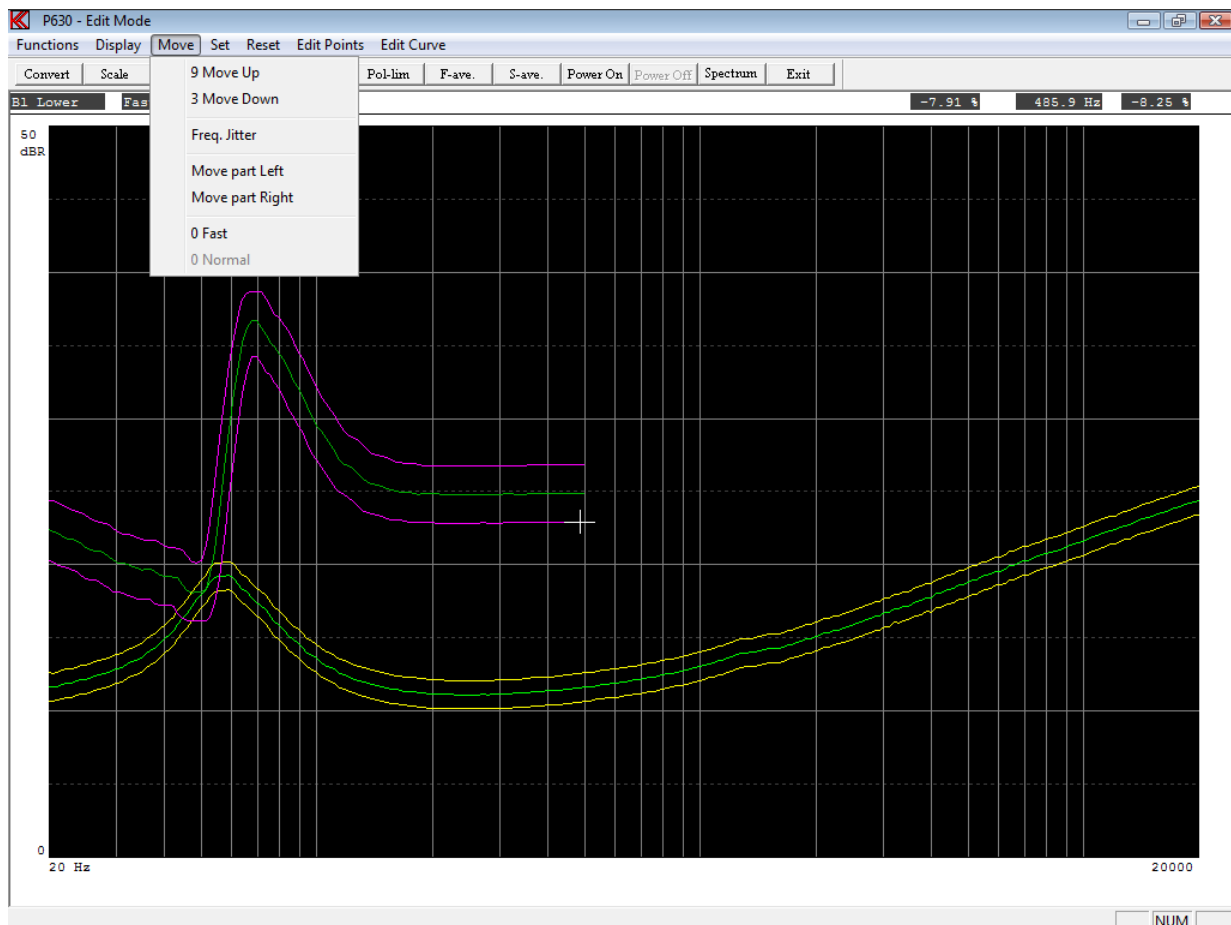


**Step 16:** Include All.

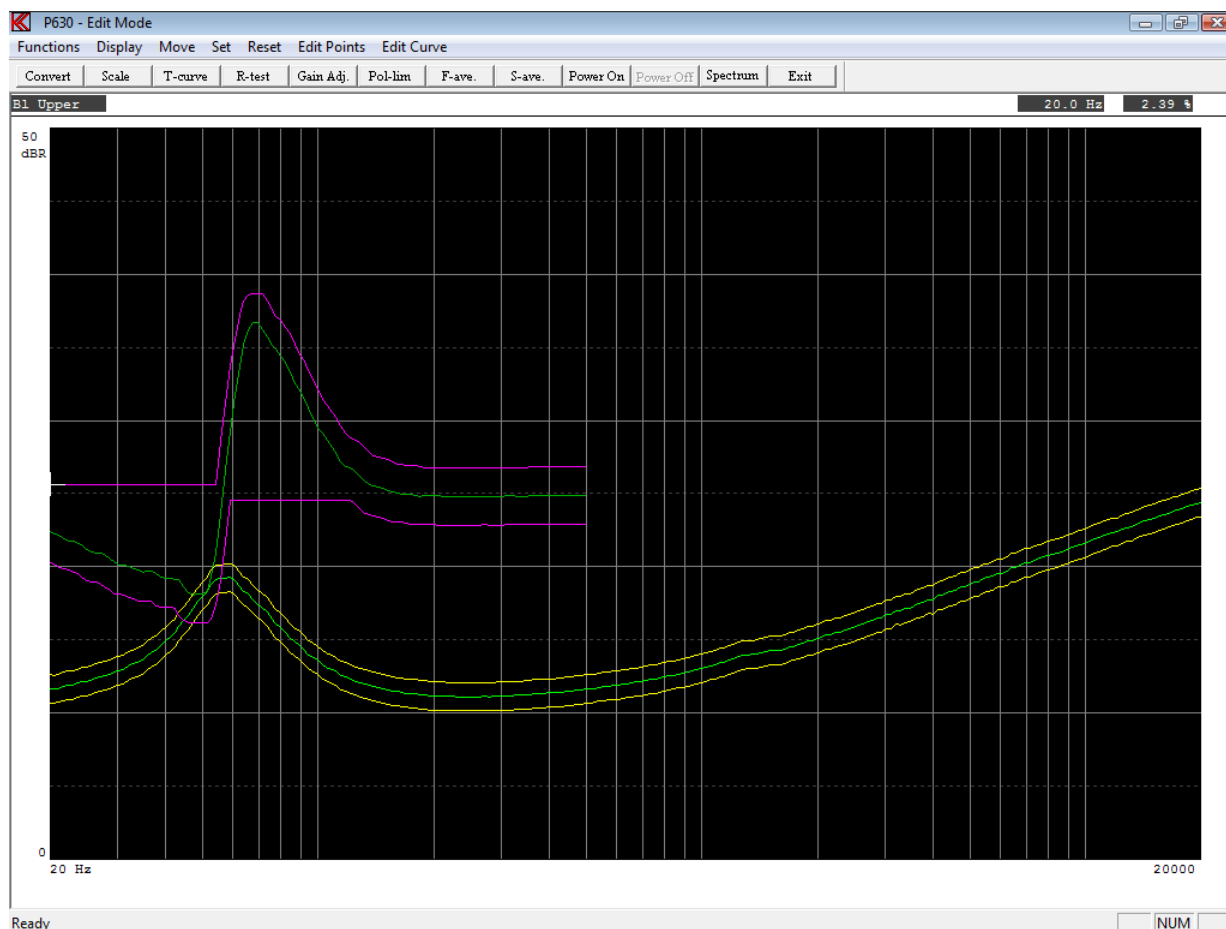


- Step 17:** Go to "Edit mode". Press key "E" or click "Edit".
- Step 18:** Activate "Fast cursor". Press key "0", once or use "Move, 0 Fast".
- Step 19:** Cursor is active on upper reference curve.  
Move upper reference curve + 1 dB up. Press "9" once or "Move, 9 Move Up".
- Step 20:** Move cursor to lower reference curve. Press "arrow up" once.
- Step 21:** Move lower reference curve -1 dB down. Press "3" once or "Move, 3 Move Down".
- Step 22:** Refresh display. Press "Page Down" once.
- If you anytime want to update the graphic display, press "Page up" or "Page Down".
- Step 23:** Move the cursor to 458.9 Hz. Hit left arrow one time. This to be sure the cursor can be moved to the BI curve.
- Step 24:** Move cursor to upper BI reference curve. Press "arrow up" twice.

- Step 25:** Move upper Bl reference curve + 7.8 % up. Press "9" two times or "Move, 9 Move Up" twice.
- Step 26:** Move cursor to lower Bl reference curve. Press "arrow up" once.
- Step 27:** Move lower reference Bl curve – 7.8 dB down. Press "3" two times or "Move, 3 Move Down" twice.
- Step 28:** Jitter Bl reference one time.



- Step 29:** Move the cursor to 121.3 Hz. Hit left arrow tree time.
- Step 30:** Write a line to 59.9 Hz by using the "4" or Edit Point "4 left". Shift between fast cursor "0" and normal cursor.
- Step 31:** Move cursor to upper Bl reference. Press "arrow down" once.
- Step 32:** Move the cursor to 54.2 Hz.
- Step 33:** Write a line from 54.2 Hz to 20.0 Hz by using the "4" or Edit Point "4 left".



The BI curve will be around the middle of the screen if no un-linearity are present in the impedance curve. When un-linearity are present and the coil are in the middle of magnetic field the un-linearity will be at same positive as negative values. The zero passing point are around the resonance frequency. If the un-linearity, the positive and negative parts are different, a offset are present as shown in this example. The un-linearity come from the offset of the coil in BI fields and the suspension together.

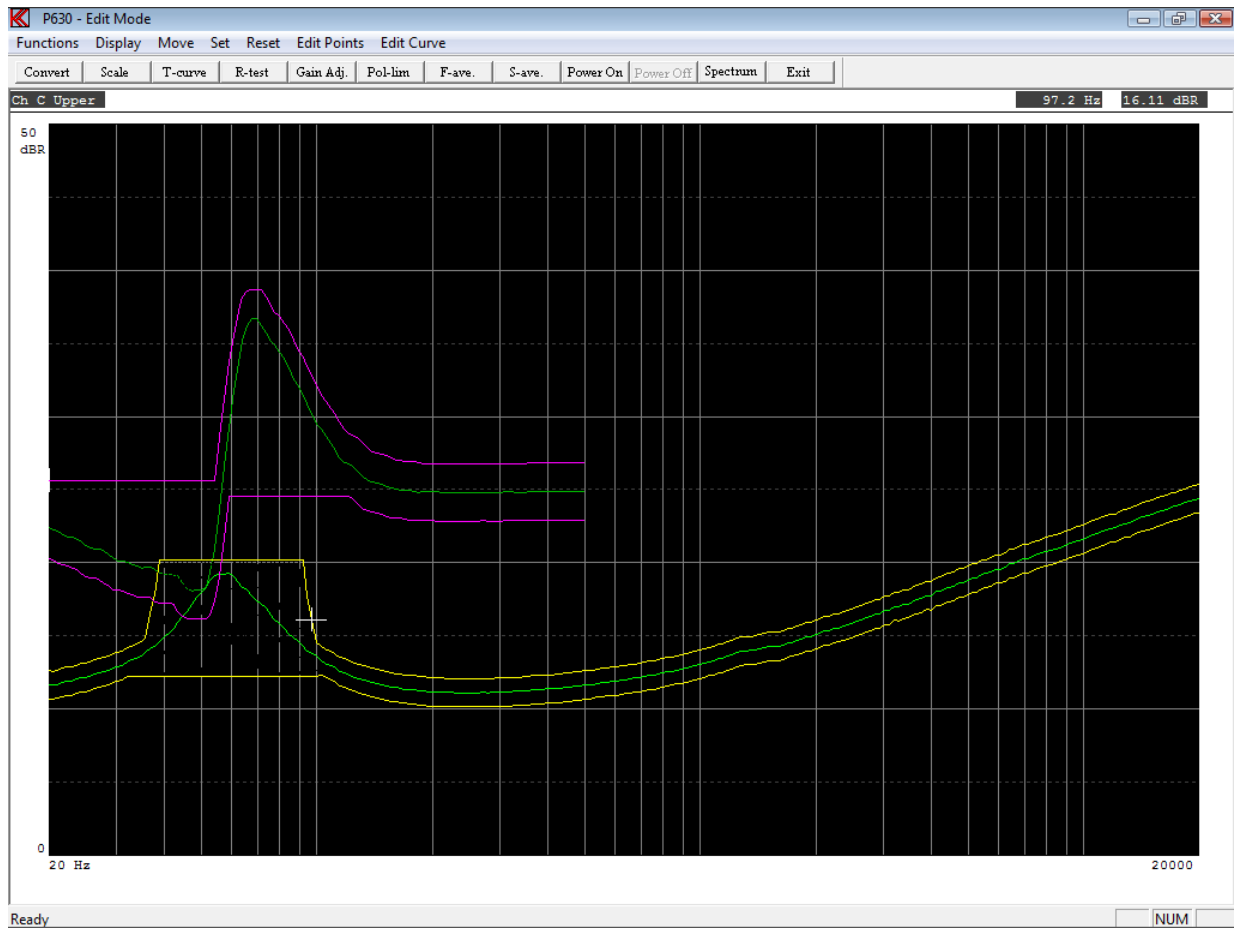
NOTE if the polarity of speaker are reversed the BI curve are reversed too. This enable a polarity test with the impedance measurement without a microphone.

**Step 34:** Open the impedance curve around the resonance as shown by using the “4” write left, “6” write right, “8” write up and “2” write down keys.

This to enable the resonance frequency to move up and down without exceeding the upper and lower limits.

Normally a separate resonance test are added to complete the impedance test.

To make a separate resonance test see Lesson 7.



**Step 34:** Exit from Edit mode.

**Step 36:** Exit from Reference mode.

**Step 37:** Save setup by “Save & exit”.



## **Lesson 29**

This lesson shows how to use the Curve Editor in edit.

- Step 1:** Enter “Setup / change parameters” activate “Setup”.
- Step 2:** Select type “loudness” (see lesson 21”).
- Step 3:** Go to “Reference settings” by clicking on “Reference”.
- Step 4:** Rename “loudness” to “loudnessX”.
- Step 5:** Carry out a measurement. Click on “Measure” or press key “M”.
- Step 6:** Go to “Edit mode” by “Edit” or press key “E”.

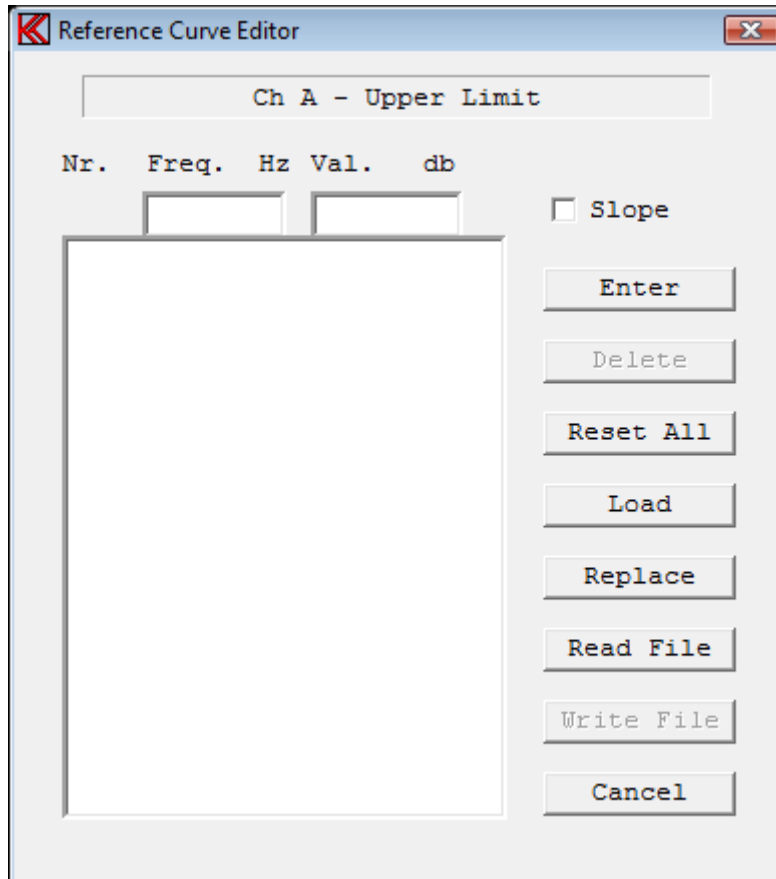


The upper and lower limits was in lesson 21 generated by mobbing curves up and down and by making a line from point to point. This by use of keys 2, 3, 4, 5, 6, 8 and 9. In this example the upper and lower limits are made by the Curve Editor.

- Step 7:** Reset limits. Press “CTL End” to reset limits.

**Step 8:** Place cursor on upper limit. Use arrow up or arrow down do place cursor on upper limit.

**Step 9:** Enter Curve Editor. Click on Curve Editor under menu Edit Curve.



**Step 10:** In Frequency edit field enter 200.

**Step 11:** In Value edit field enter -9.16. Use the mouse to get to the Value edit field or press the Tab once.

**Step 12:** Press the "S" key or flag the "Slope" with mouse. This make a point line from this frequency point to next entered frequency point.

**Step 13:** Press Tap once to get the Enter and press "CR" or use the mouse press the use the "Enter". This move the selected numbers to the list field. Use the Tap key to return to frequency field.

Reference Curve Editor

Ch A - Upper Limit

Nr.	Freq. Hz	Val. db	Slope
1	200.0	-9.16	<input type="checkbox"/>

Buttons: Enter, Delete, Reset All, Load, Replace, Read File, Write File, Cancel

**Step 14:** Do as same way following numbers:

Frequency	Value	Slope
442.5	8.03	no
707.4	8.03	yes
1014.9	18,97	no
4000	18.97	no

Note. The listed frequency is the actual value the p630 system can use. The system will correct the entered frequency value a valid frequency point.

Reference Curve Editor

Ch A - Upper Limit

Nr.	Freq. Hz	Val. db
	4000.0	18.97
1 S	200.0	-9.16
67	442.5	8.03
106 S	707.4	8.03
136	1014.9	18.96
250	4000.0	18.96

☐ Slope

Enter

Delete

Reset All

Load

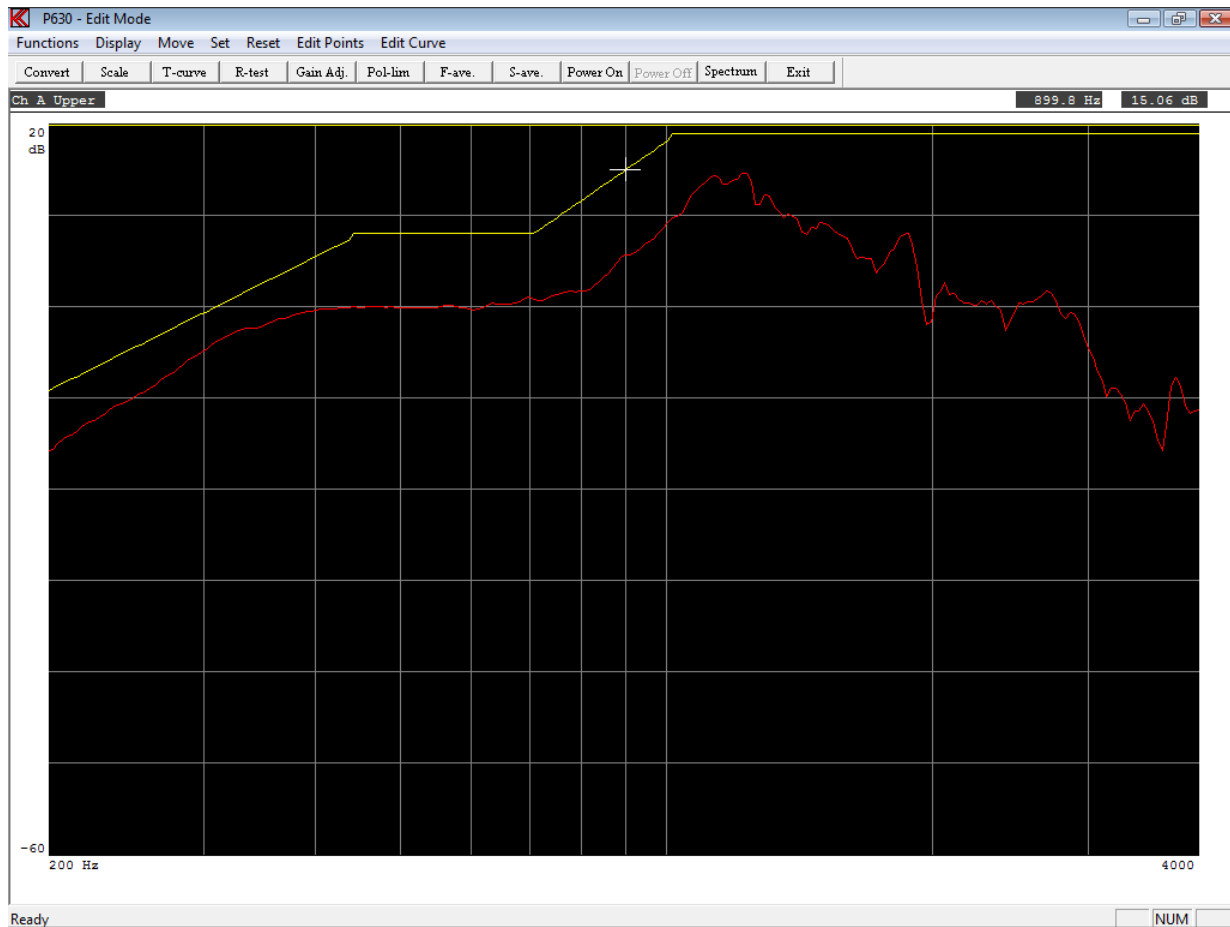
Replace

Read File

Write File

Cancel

**Step 15:** Press "Replace" to replace limits with selected values.

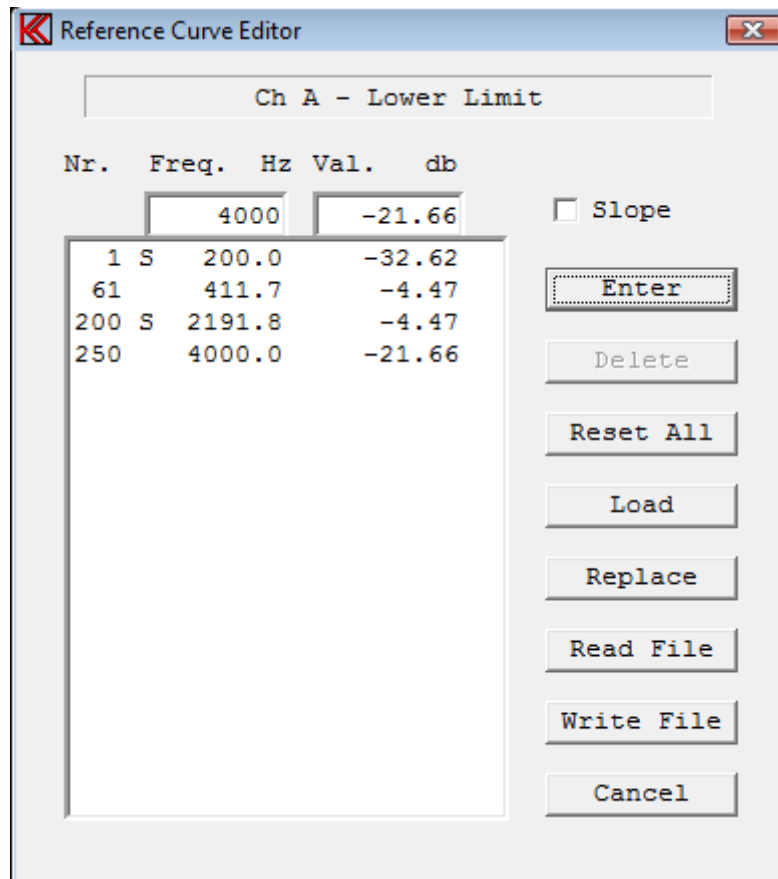


**Step 16:** Place cursor on lower limit. Use arrow up or arrow down to place cursor on upper limit.

**Step 17:** Enter Curve Editor. Click on Curve Editor under menu Edit Curve.

**Step 18:** Do the same as for the upper limit with following numbers:

Frequency	Value	Slope
200	-32.6	yes
411.7	-4.47	no
2191.9	-4.47	yes
4000	-21.66	no



**Step 19:** Press “Replace” to replace limits with selected values.



**Step 20:** Exit from Edit mode.

**Step 21:** Exit from Reference mode.

**Step 22:** Save setup by "Save & exit".