Measure on microphones

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To measure on of microphone and test the frequency response requires a perfect sound source. You can look for sound sources there have a perfect frequency response as a straight line, or as a constant sound pressure. It is most likely you find no such loudspeaker there can do this.

To generate a constant sound pressure we have to make use of a device there can regulate the sound pressure to be constant or almost constant. We need a compress function to regulate the sound.

a) A way to do this is to use a mouth simulator together a microphone there is used for an in line compressor loop to give a constant sound pressure.
b) Another way is to use a good quality speaker and a reference microphone used together a compressor function to give a constant sound pressure at the position at the reference microphone.
c) Again another way is to place a reference close to the DUT microphone and compare the two microphone measurements.
d) And again another way is to place a reference close to the DUT microphone and use a compressor to generate a constant sound for the DUT microphone and correct the measurement on DUT with the reference microphone data.

Output Compress

Instead to make a compress loop our systems make use of an output compress curve. An output compress curve is the frequency response for a speaker there is used to regulate the output signal.
The sound when compressed is the output to the speaker minus the regulated level. If the compress curve dynamic range is 20 dB then the sound pressure is output level minus 20 dB.

When an output compress curve is used it is not possible to use Channel C for impedance measurement or distortion measurement.

Example

In this example solution d) is used. A standard low price speaker is used for this example. The reference and DUT microphones are placed approximate 50 cm from speaker and the two microphones are placed at same position close together.

Step 1

Figure 1 show the setup used to generate ab output compress curve. Input channel A and B is used.
The reference microphone is connected to input 5. Note both channel A and B is connected to the reference microphone.

Step 2

Figure 2 show the measurement done with the setup as shown in figure 1. Note the frequency response of the low price speaker have almost a change in the output signal of approximate of 30 db in the frequency range from 20 Hz to 20 kHz.

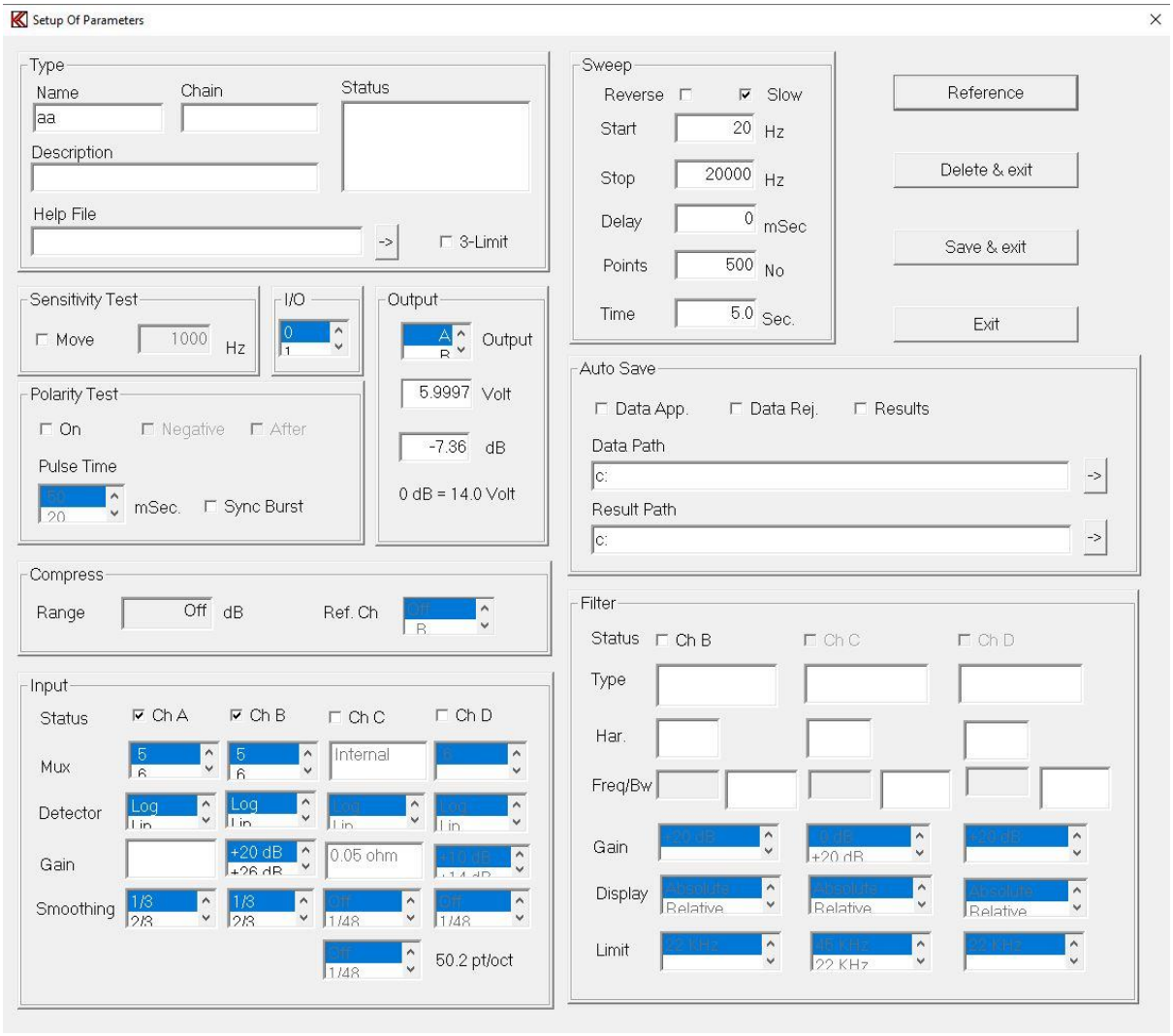

Figure 1: Setup used to measuring on microphones. Channel A and B is used. Reference microphone is placed on input 5.

Step 3

Make an out compress. The function you can find under commands. The output compress curve is brown and is the opposite of the frequency response. The output curve is shown in figure 3.

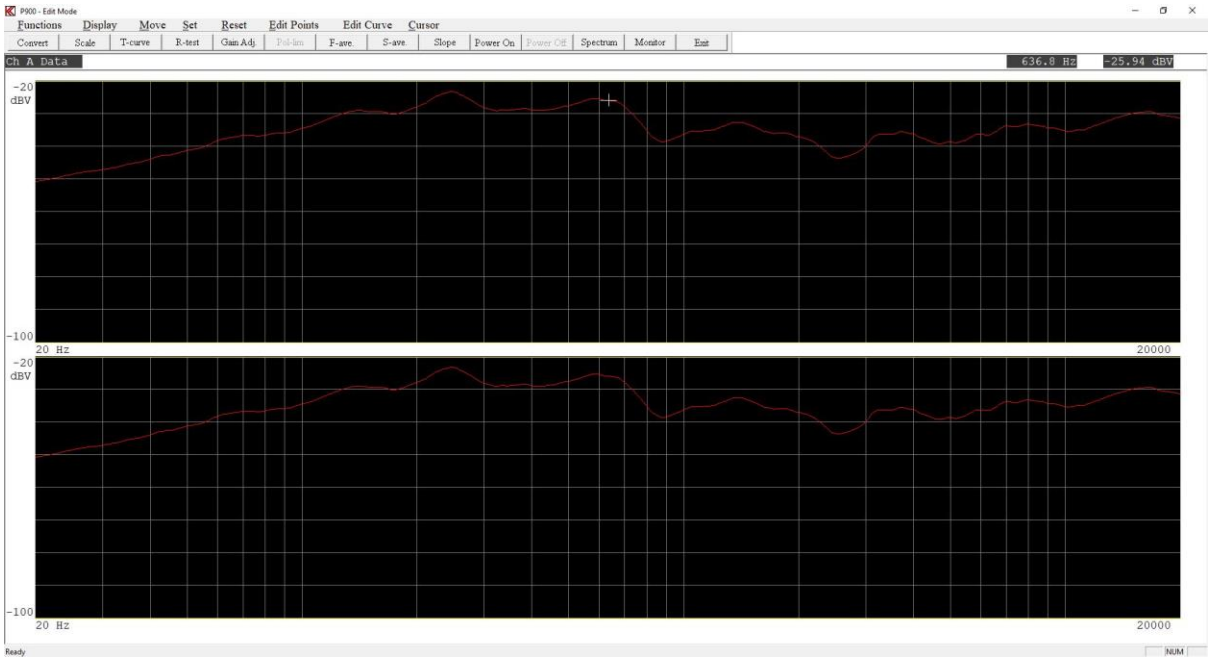

Figure 2: The frequency response of a measurement done with the setup as shown in figure 1.

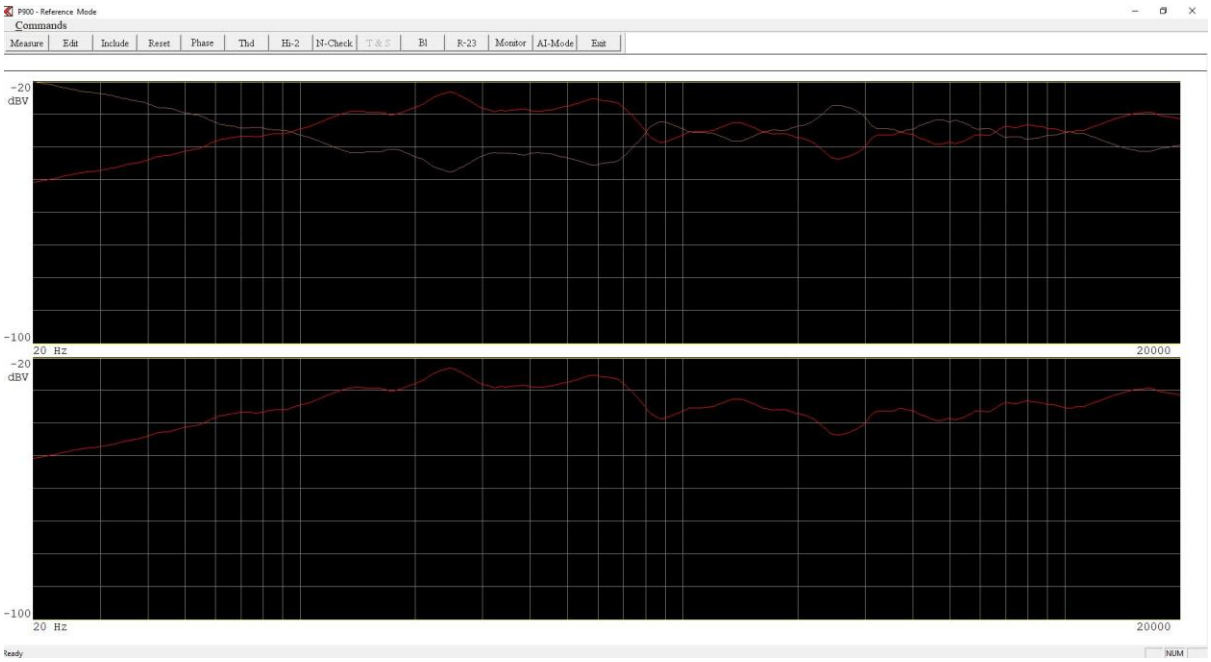

Figure 3: An Out Compress done- The curve is brown.
The command can be found under Commands menu.

Step 4

Make a new measurement. The sound is now regulated with the compress output curve. The result is shown in figure 4.

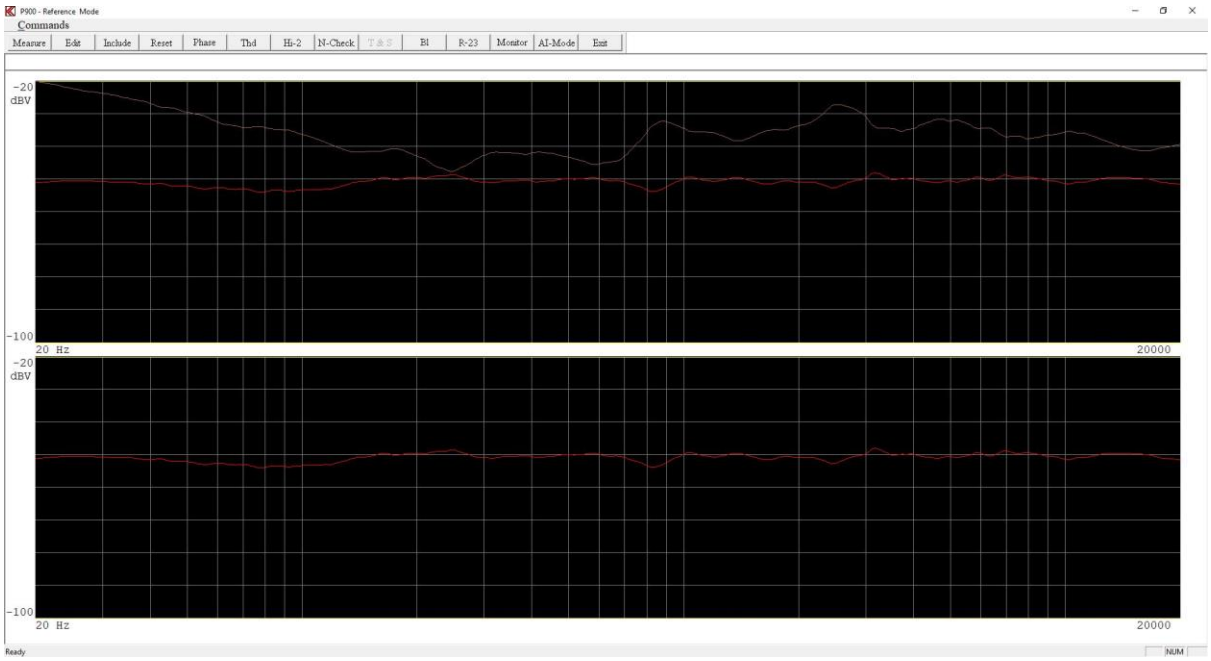

Figure 4: Measurement with compress output curve. The red curves are the regulated output.

Step 5

It is possible to make a second Out Compress and make a new measurement. This gives a better regulation. The speaker and the compress function is in this case not compete linear. Figure 5 show the result.

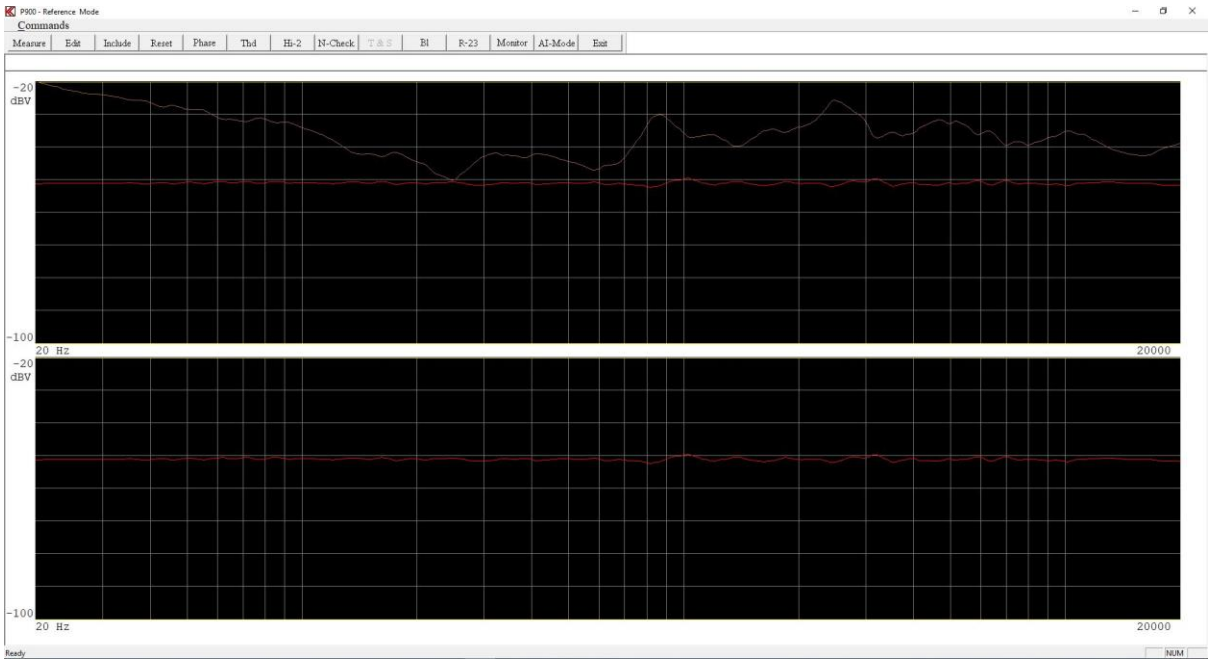

Figure 5: The compressed data after a second out compress function.

Step 6

Go back to the setup menu. Now we have to select the DUT microphone to channel A. The DUT microphone is connected to in our case the input 4. To correct the data on the DUT microphone with dada from the reference microphone we select the reference channel to channel B. The function can be found the Compress selection. Here the compress range is 30.1 dB is displayed as information. See figure 6.

Figure 6: On setup menu input on Ch A is selected and Ref. Ch is selected to B.

Step 7

Go to reference mode and make a measurement. Now the channel A is the result from the DUT microphone and channel B from the reference microphone there regulate the sound pressure. See figure 7.

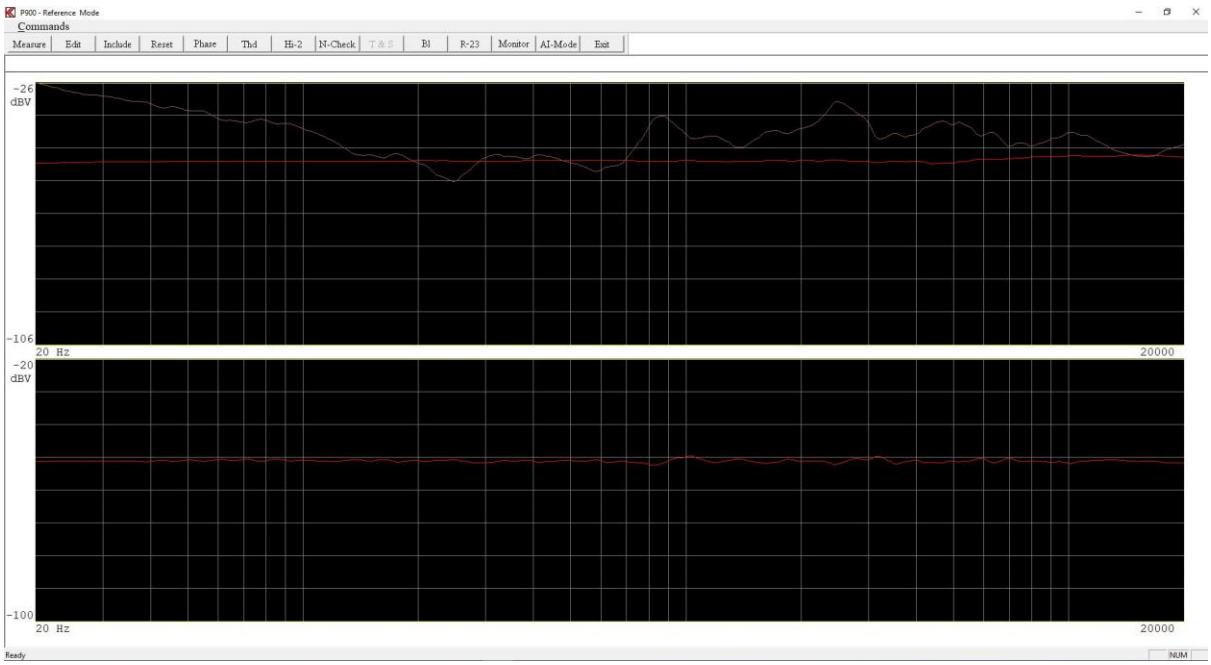

Figure 7: A measurement on DUT microphone. The top display the DUT microphone.
The bottom show regulated sound pressure from the reference microphone.

Step 8

The upper and lower tolerance curves can now be created. In our case the upper and lower limits are +/- 0.3 dB for the DUT microphone and for channel B the upper and lower limits are selected to +/- 3 dB for a check for the compress range. See figure 8.

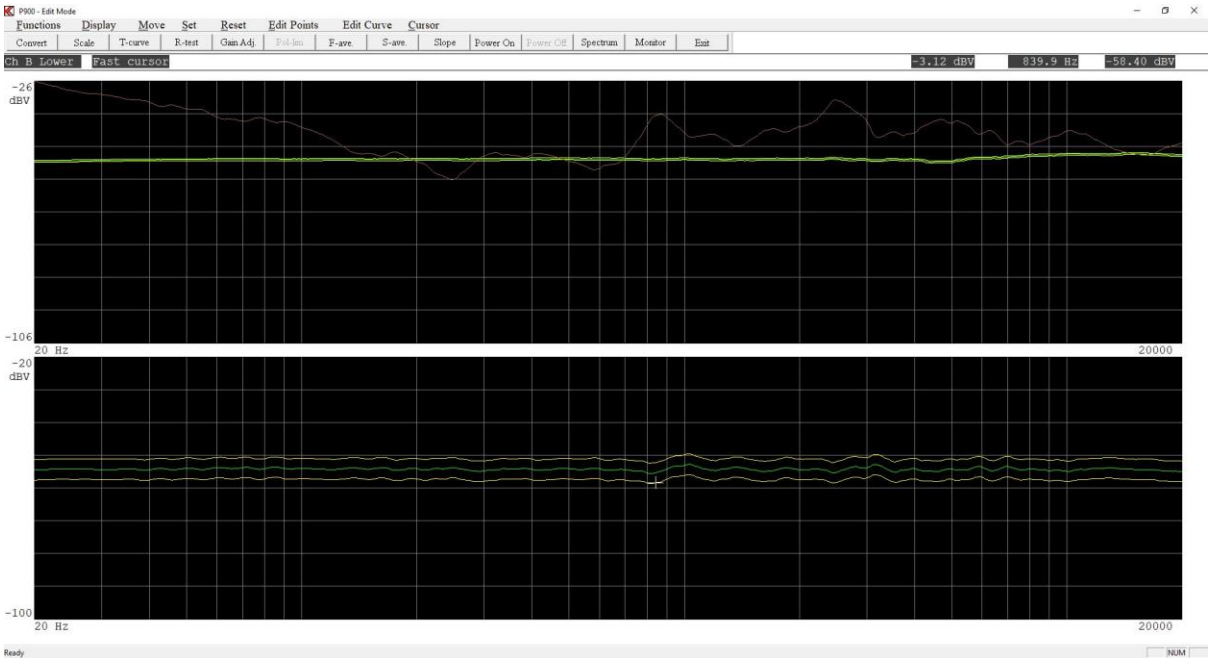

Figure 8: The top display a limits on +/- 0.3 dB made.
For the bottom display a limits on +/- 3 dB made for a check only.

Step 8

Save the setup as reference. If a mistake are made and a new out compress sequence is wanted save the setup then load the setup and delete the Compress Curve only. Then load the setup again to make a new Our Compress curve.

Step 9

The setup is ready to be used in run-mode. Figure 9 show a measurement in run-mode. If a compress output curve is used it is displayed above the test result “approve” or “reject”.
See figure 9. In graph display the display look like figure 10.

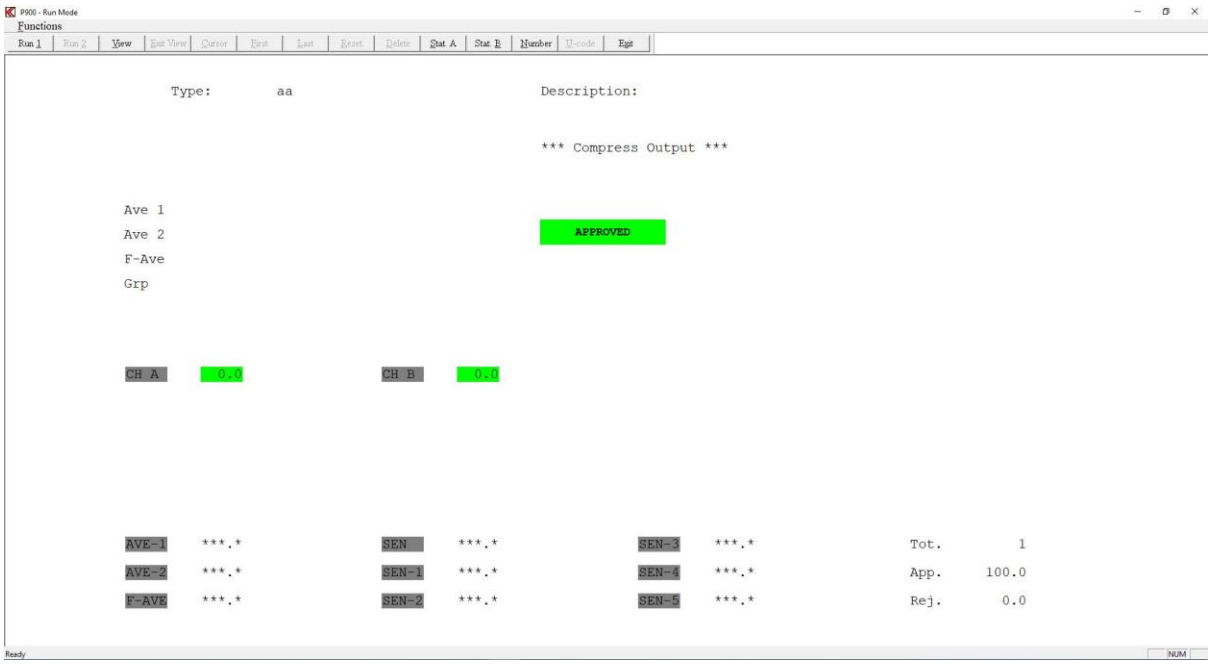

Figure 9: The test result when using a Compress Output curve.

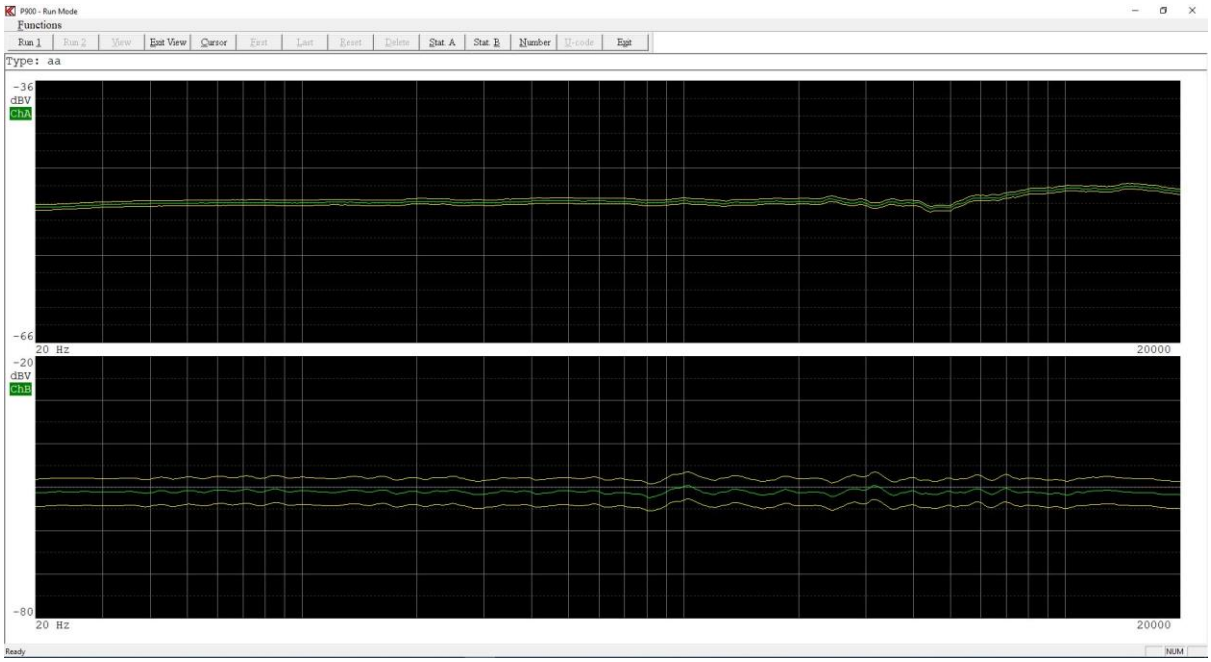

Figure 10: Test result in run-mode as graph display.