



Audio.TST March 2010

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NOTES FROM THE TEST BENCH

By Bruce Hofer, Chairman & Co-Founder, Audio Precision

Just a short note this month as I'm hard at work perfecting the last details of some new designs that we'll be introducing later in the spring.

We'll be at NAB from April 12 to April 15 (see below for complimentary passes), and of course at AES London in May. It's been too many years since the show was last in the UK, and I'm really looking forward to the conference.

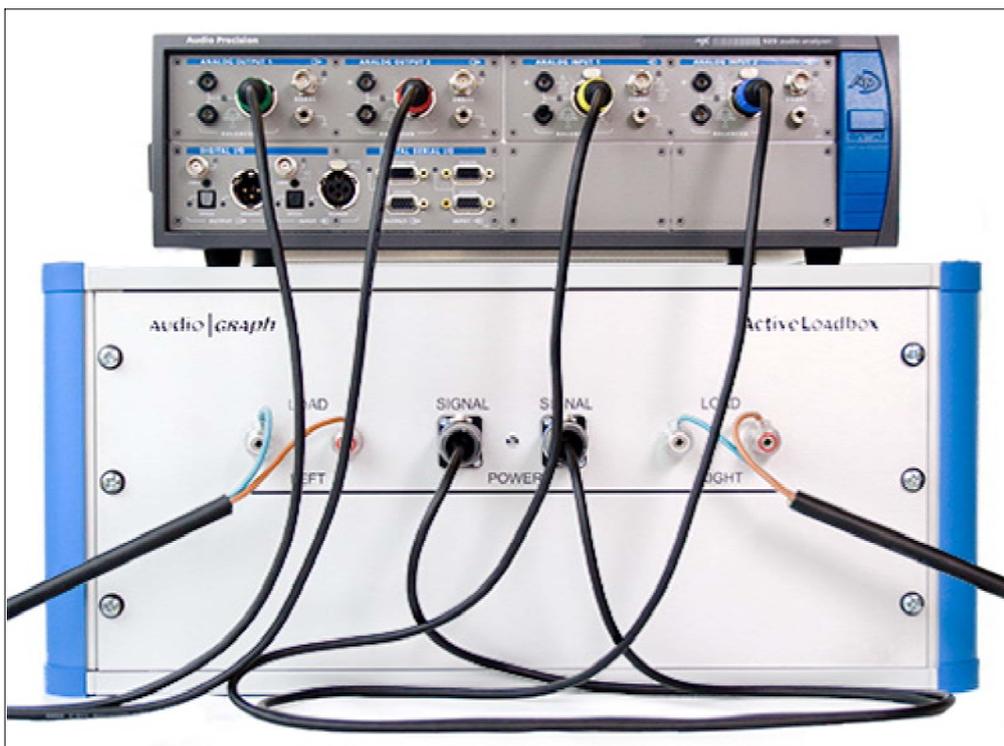
Meanwhile, below is a great example of APx's interactive capabilities being put to good use. Using the APx API and its ability to call third-party applications, we've written a utility that allows APx to control the Active LoadBox dynamic load tester. The Active LoadBox is sold by AudioGraph of Sweden. Founder Lars Ohlen first demonstrated the Active LoadBox with an APx526 at last year's AES Conference on "Class D Audio Amplification" in Hillerød, Denmark. Overall, it's a very useful instrument if you want a real-world view of your power amplifier designs.

OK. That's enough for now. Back to the bench.

Bruce

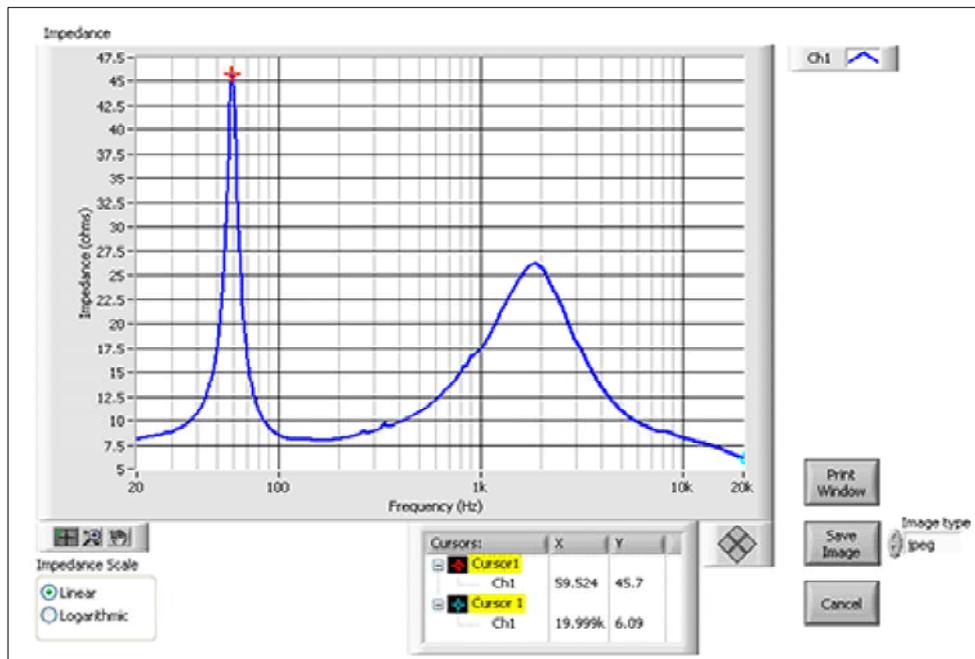
OUTPUT: MEASURING POWER AMPLIFIERS WITH REACTIVE LOADS

Audio Precision's APx Active LoadBox Utility integrates APx with Audio Graph's Active LoadBox for automated and comprehensive power amplifier load measurements. This month we explore the importance of making reactive load measurements, and show off some of the capabilities of the new utility.



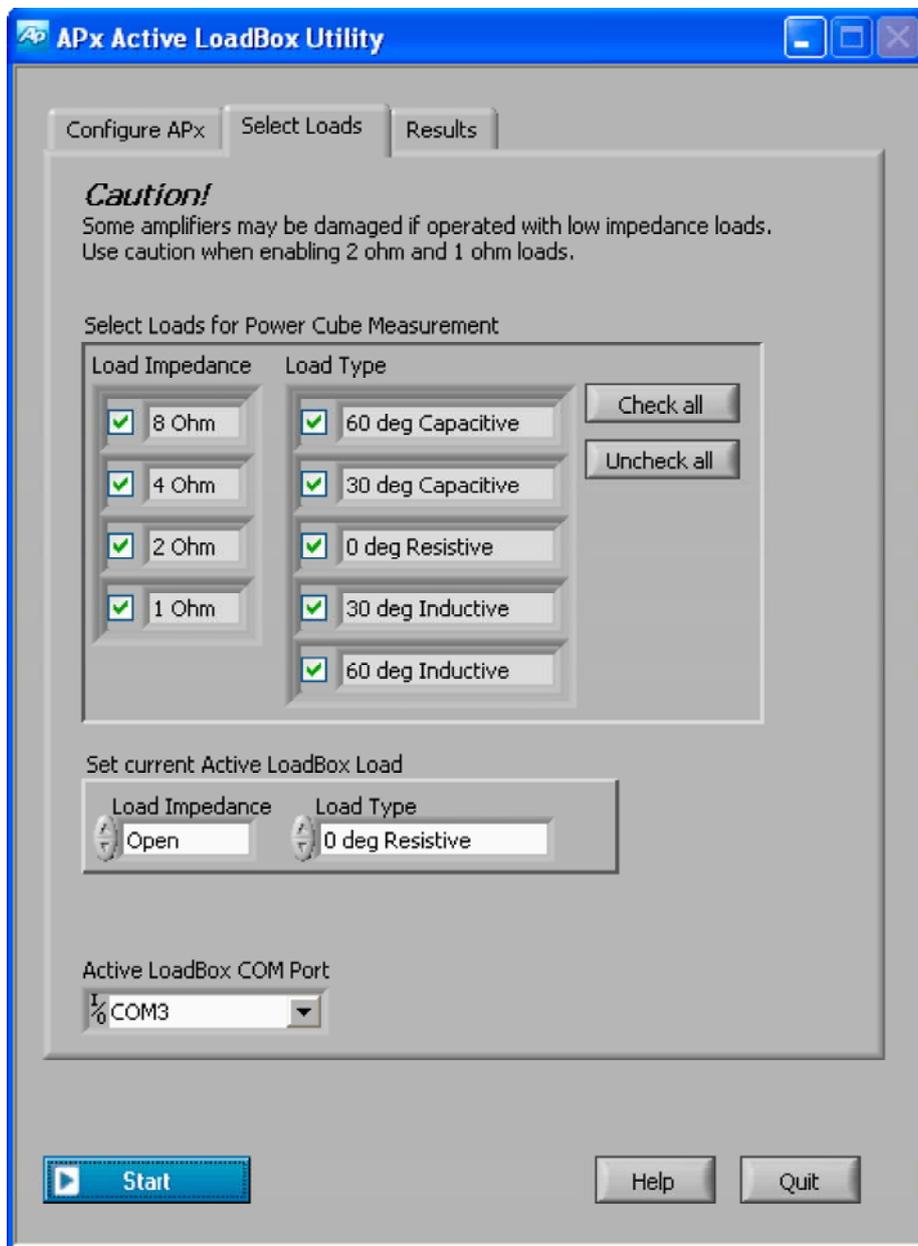
APx525 analyzer with the Active LoadBox (AudioGraph, Sweden).

Measuring a power amplifier under both resistive and reactive load conditions is an essential part of the design process. Resistive load testing is commonly done by designers, and involves hooking a power amplifier up to non-inductive load resistors. It's used to derive the power output ratings seen on specification sheets.



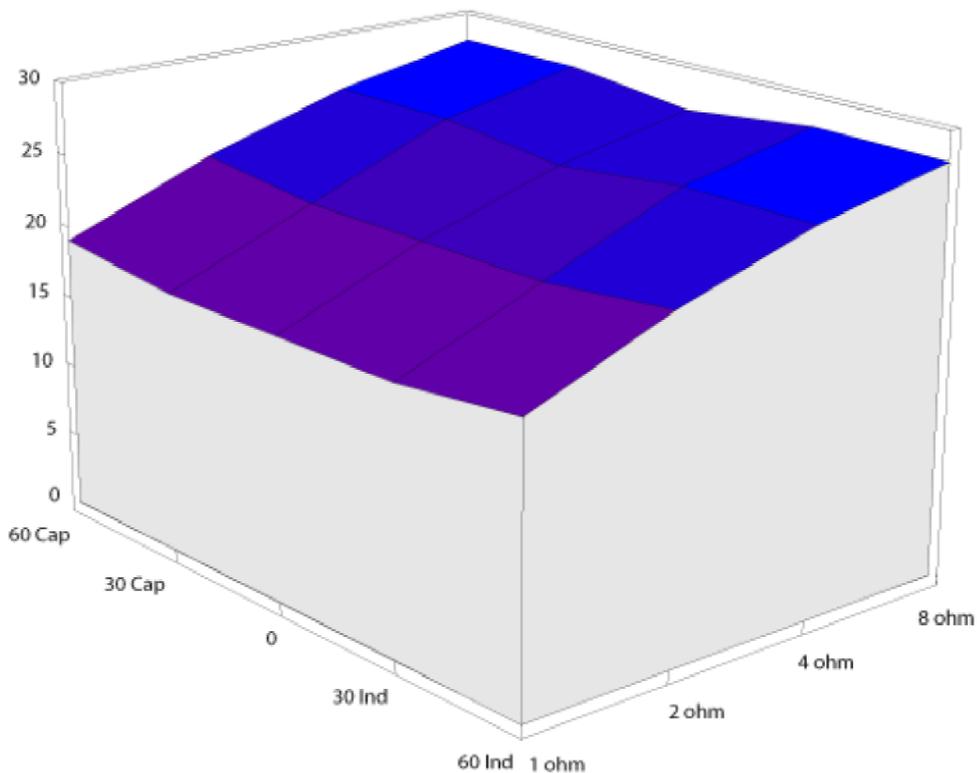
Actual speaker impedance can vary considerably.

Reactive testing, where the load includes inductive and capacitive components, is not as commonly performed. Real world speakers, however, often have significant inductance and capacitance. Neglecting to test an amplifier with reactive loads means we can only speculate about its performance in actual use. An amplifier that has good resistive power output ratings, but poor drive into low impedances or reactive loads, may produce distortion well before it reaches rated output.



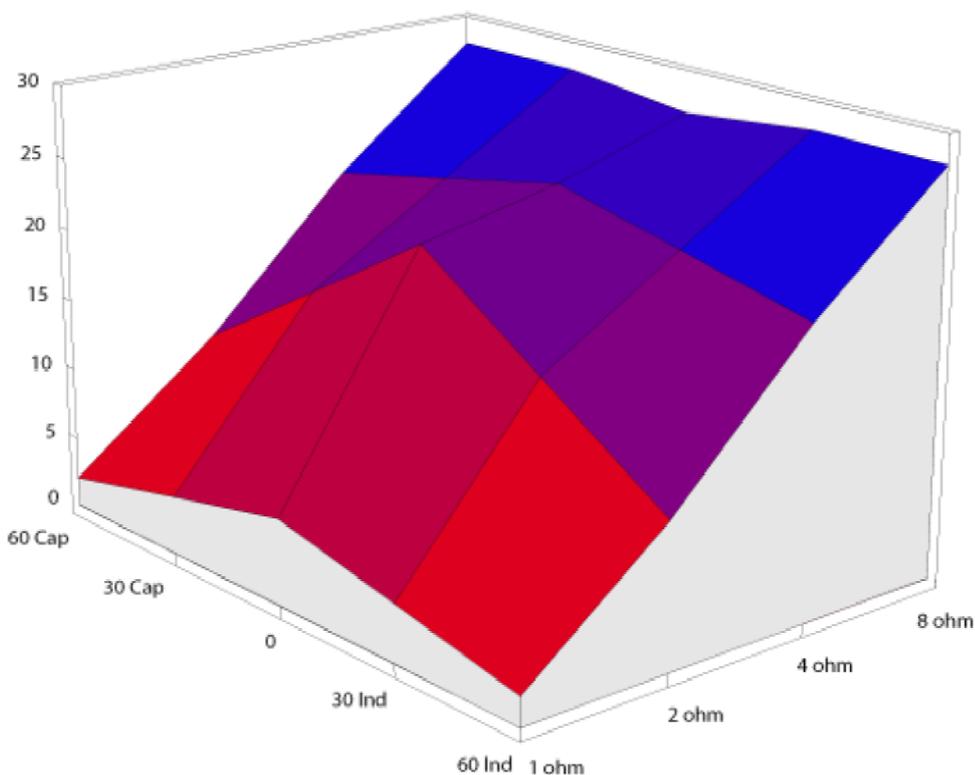
APx Active LoadBox Utility.

Audio Precision's Active LoadBox Utility integrates Audio Graph's Active LoadBox with APx, providing automated and comprehensive resistive and reactive load measurements. The Active LoadBox contains resistive loads of 1–8 Ω , as well as capacitive and inductive loads that are calculated for a current phase shift of 30° and 60° at 1 kHz. This combines for a total of 20 different possible loads.



PowerCube graph of a good amplifier (image courtesy of AudioGraph AB).

When the APx utility is started, it switches the LoadBox through each of the loads and instructs the APx analyzer to make a maximum output level measurement for each one. Either continuous or CEA-2006 burst signals may be selected. After the utility completes, it takes the measurement results and creates a 3-D surface graph, allowing the results to be easily interpreted. A perfect amplifier would produce a cube with a flat top, indicating that it can maintain constant voltage output over a wide range of resistive and reactive loads. Practical amplifiers will fall short of perfection, but it's possible for a good amplifier to come pretty close.



PowerCube graph of an amplifier with current limiting (image courtesy of AudioGraph AB).

To read the graph, note that the results in the center are purely resistive, with higher impedances in the

To read the graph, note that the results in the center are purely resistive, with higher impedances in the back and lower impedances in the front. Moving to the left of center adds inductance (current lags voltage by 30° and 60° @ 1 kHz), and moving to the right adds capacitance (current leads voltage by 30° and 60° @ 1 kHz). Because actual speaker impedance can vary greatly from the nominal rating, it's important to observe the results over the entire graph.

Downloads:

[APx Active LoadBox Utility](#) (expanded version of this article with installation instructions and the utility installer).

Resources:

[AudioGraph, Sweden](#)

SOUND ADVICE: AP KNOWLEDGE BASE

Using Barcodes to Select Test Routines with APx, AP2700, and ATS-2 Software

A barcode scanner may be useful in production testing, not only to expedite data entry, but to eliminate the possibility of initiating the wrong test routine.



A handheld barcode scanner.

In high speed manufacturing test environments, it is common to visually identify the product to be tested, and then manually select the appropriate tests. If an error is made in selection, it can cause significant delay or improper testing of the device. This problem is most commonly seen in production areas where the device being tested has many variations in its configuration or features.

APx:

AP has created the APx Barcode Scanner Interface application in VB.NET. It is designed to use common barcode scanners that enter data as if it were typed on a keyboard. When the application is run, the following dialog is displayed:



APx Barcode Scanner Interface.

The operator simply scans the product barcode, and an APx project with the same name as the barcode data is automatically loaded and run. The status box at the bottom shows what is happening during the process, and when it is ready to scan another device. The corresponding APx projects

should be placed in the same folder as the APx Barcode Scanner Interface application.

As an example, we have provided sample barcodes and projects that can be used to verify your scanner functionality. The "Barcodes.pdf" file contains four barcodes, one for each of the sample projects, that you can scan with your barcode reader.

A barcode reader can also be used to fill text data, such as a serial number, into an APx project report. In this case, a barcode scanner can be used instead of a keyboard to fill in a user input prompt. In this case, the VB.NET application is not necessary.

For more sophisticated functionality, the barcode scanner can be incorporated into a complete VB.NET application that uses the APx API to control the APx instrument.

AP2700 and ATS-2:

Users with 2700 Series and ATS-2 instruments can easily incorporate barcode input into macros, either to capture text input or to control conditional branching statements. No utility or extra code is needed – the bar code reader is simply used instead of a keyboard at the appropriate time.

Downloads:

[APx Barcode Scanner Interface](#)

TEST RESULTS: AP NEWS & EVENTS



Visit us at NAB in Las Vegas April 10–15, Booth C2023.
Get a complimentary exhibit pass, courtesy of AP.

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