This is the impedance curve of a driver in the Impedance/Thiele-Small measurement.
The larger curve is the free-air measurement; the smaller curve shows the lowered
resonance frequency when the driver is measured with added mass.

What's New in APx500 v3.4
November 2013

*This document looks at the new and improved features in the latest release of the
APx500 software for all models of APx Series audio analyzers.*

*For more information, please contact your local Audio Precision Sales Partner,
or visit the AP website at ap.com for datasheets, knowledge base articles,
and software downloads.*

Contents

INTRODUCTION

The team at Audio Precision is focused upon making sure that engineers working with audio have the best and most capable tools possible. We've been listening to what our customers have to say, and are proud to introduce the new APx500 v3.4 software. Sporting a host of requested features and improvements, APx500 v3.4 is designed to improve productivity, increase flexibility and streamline workflows both in the lab and on the factory floor.

LOUDSPEAKER TESTING

Impedance/Thiele-Small

The Impedance/Thiele-Small measurement measures the complex impedance of a loudspeaker driver, providing impedance response curves and Thiele-Small (T-S) parameters. An Impedance curve is measured and plotted against one of three mathematical models, and T-S parameters are derived. Using known moving mass (M_{MD}), added mass or known volume techniques, the full set of T-S parameters are derived. Support is provided for several test configurations, using the either the Audio Precision IMP1 (see below) or a custom jig incorporating a sense resistor. Amplifier correction is included for 1-channel impedance measurements. Impedance/Thiele-Small requires the SW-SPK-RD software option.

Loudspeaker Production Test

Loudspeaker Production Test is a comprehensive loudspeaker test that provides acoustic results, Impedance/Thiele-Small results and a polarity check in one brief sweep, perfect for the production floor. Amplifier correction is included for 1-channel impedance measurements. Loudspeaker Production Test requires either the SW-SPK-PT or SW-SPK-RD software option.

IMPROVEMENTS FOR ACOUSTIC TESTING

Acoustic Output mode

Acoustic Input mode was added in version 3.3 to force all analog input magnitude units to dBSPL or pascal units. In version 3.4, Acoustic Output mode does the same for analog output magnitude units.

When entering Acoustic Output mode, you are required to perform an Auto Gen Level calibration. If you have previously calibrated the input with a measurement microphone and calibrator, completing the Auto Gen Level step provides generator settings in dBSPL or pascals.

When Acoustic Output mode is set, the Y-axis units for the Regulated Frequency Sweep: Generator Level result are forced to dBSPL or pascals.

Output EQ

A 30-pole arbitrary digital filter is now available for up to two channels of analog output. This filter affects every analog signal from the APx generator, including sine, swept sine, continuous sweep, noise, multitone and files from any linear generator waveforms, including POLQA and PESQ.

The filter dialog includes an Import and an Invert function, so that system response curves can be imported and inverted to provide Leveled Acoustic Output. For devices that use preemphasis or deemphasis, a complementary curve can be applied to provide a flat result.

AG52 specialty waveforms, such as analog square wave and DIM waveforms, cannot be filtered.

Leveled Acoustic Output

Leveled Acoustic Output (LAO) is a setup configuration of the analyzer that compensates for response variations in an acoustic system under test, such as an amplifier/loudspeaker/chamber chain. There is not a "button" to engage Leveled Acoustic Output, but rather a procedure to accomplish LAO using new features in 3.4.

A sweep of the system is made, and the sweep curve is imported into the Output EQ filter and inverted. This, plus some level matching, provides LAO. Complete instructions are in the user documents.

GRAPH DISPLAY ENHANCEMENTS

Dual Y-Axis Graphs

A dual Y-axis graph was introduced in version 3.3 to display the Rub and Buzz result. This feature has been added to all XY graphs in version 3.4. Hover the mouse point near the right axis of the graph and click on the chevron icon that appears. You can then arbitrarily define the content and properties of a second Y-axis, displayed on the right of the graph.

Data Set panel

The Data Set drop-down menu has been removed from the XY graphs, and a new Data Set panel has been added below the filmstrip. Each Data Set is listed, with a time stamp and an entry field for notes. Checkboxes select which Data Sets are viewed, providing a more flexible interface.

HDMI CEC PING AND MESSAGING

The ARC interface of HDMI provided some limited, ARC-specific CEC messaging in previous versions. The HDMI Source and Sink connections optionally "passed through" existing messages. With version 3.4, Source, Sink and ARC In and Out can send Ping or arbitrary CEC messages to any of the standard CEC logical address, and can display receipt of acknowledgement. The CEC physical address is displayed in the Status Bar.

HDMI+ARC hardware shipped after October 4, 2013 will support CEC messaging.

DSIO REFERENCE CLOCK MADE AVAILABLE

For analyzers equipped with Digital Serial I/O (DSIO), a DSIO pin can be used to output a reference clock, when the analyzer input configuration is not DSIO. The clock range is 4 kHz to 216 kHz, and the clock signal appears on DSIO receiver pin 5 (frame clock).

SEQUENCER ENHANCEMENTS

Import Output EQ curve

In support of the Output EQ feature, a sequence step has been added to Signal Path Setup to import and optionally invert an EQ curve.

Import References from another Signal Path

When calibrations and references are set in a sequence signal path, it is useful to employ the same references in another signal path in the sequence. This checkbox and menu in the References sequence step dialog enables importing references from any other signal path in a sequence.

Send CEC Command Step

When an input or output is HDMI, a step is available in the Signal Path Setup sequence step to send a CEC command.

Verify DDC checkbox

DDC (Display Data Channel) is part of the normal HDMI protocol and proper DDC connection is required for EDID communication. DDC is verified in normal APx HDMI operation. A Verify DDC checkbox appears on the Signal Path Setup sequence step dialog when Output Configuration is set to HDMI Source. If Verify DDC is set and the connection cannot be verified, an error message appears and the sequence is aborted.

OTHER IMPROVEMENTS

PDM interpolation ratios added

Additional lower PDM interpolation ratios have been added to accommodate customer use cases. The additional rates are 16x,16.67x, 21.33x, 24x, 25x.

New FFT windows

Three new FFT windows have been added: Dolph-Chebyshev 150, 200 and 250. The Dolph-Chebyshev windows are true equiripple windows. For a given minimum sidelobe attenuation, they provide the minimum possible mainlobe width. The Dolph-Chebyshev 250 window is capable of revealing details in very low noise floors that other windows obscure.

Analog inputs configuration on a channel by channel basis

Introduced in APx500 3.3, independent analog input configuration has been improved in version 3.4, with all-unbalanced, all-balanced, and custom settings.

POLQA Auto Level Alignment

POLQA functionality has been improved. An Auto Level Alignment checkbox has been added to the main POLQA panel, checked ON as the default. This realigns the level of the acquired sample to closely match the level of the signal in the reference file, making MOS results more stable. In rare cases, a user may want the POLQA algorithm to be sensitive to level misalignment, and Auto Level Alignment can be unchecked.

DSIO 1-channel

In TDM, Digital Serial Input/Output (DSIO) previously provided 2, 4, 8 and 16 audio channels. In multiple data line configurations, 2, 4, and 8 channels were available. Both configurations now support 1-channel operation to accommodate mono DUTs.

ALSO NEW

APx Polar Plot utility

The APx Polar Plot utility will control industry-standard acoustic turntables and create flexible polar plots from the data. The utility works in conjunction with APx500 and an APx analyzer. The APx Polar Plot utility is an additional download, and requires software option SW-SPK-RD to operate.

APx Waterfall Graph utility

The APx Waterfall Graph utility will run nested sweeps and create flexible waterfall graphs from the data. The utility works in conjunction with APx500 and an APx analyzer. The APx Waterfall Graph utility is an additional download, and requires software option SW-SPK-RD to operate.

IMP1 Impedance Fixture

The IMP1 Impedance Fixture provides precision sense resistors, connectors and switching in a convenient package, ready to connect to your amplifier, loudspeaker driver and analyzer.