

What's New in APx v2.4 July 2009

APx500 Measurement Software version 2.4 will be released on July 31st, 2009. This document looks at the new and improved features of this release of the software.

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

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Digital Audio Protocol Analysis

APx 2.4 adds the capability to display, control, and analyze channel status and user data embedded in IEC60598 and AES3 digital audio streams and the HDMI audio infoframe.

When the APx is receiving a digital audio bitstream over HDMI, SPDIF, Toslink, or AES/EBU the instrument displays in real-time the channel status, user data, and HDMI infoframe. In addition when the input bitstream is not linear/PCM audio the instrument will decode the IEC61937 data type field. In addition for Dolby and DTS bitstreams the instrument will display ACMOD/Amode value, dialog normalization level, and bitrate.

For customers troubleshooting HDMI devices the instrument offers the ability to decode the entire HDMI audio infoframe. In addition the instrument can display the current N and CTS values, which is required by HDMI receivers to properly regenerate the audio sample clock. The instrument also displays the HDCP state, audio layout, AV mute condition and whether the high bit rate audio mode is being used.

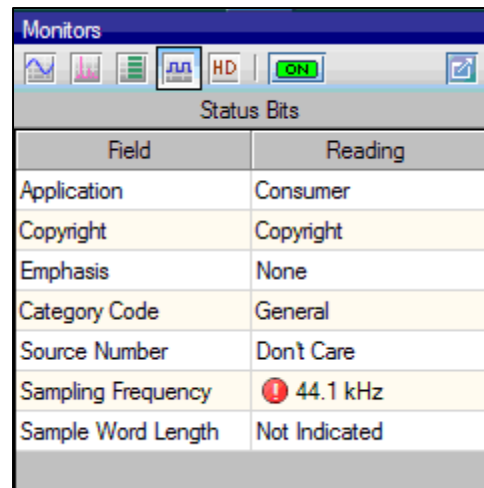
Users can monitor all digital audio metadata in real-time, but the new metadata recorder allows users to perform logic analyzer like debugging of digital interfaces by plotting the change in state of any of these parameters with time.

The results of this measurement are invaluable in situations such as an HDMI hot-plug, for verifying that the device behaves in compliance with relevant specifications:

In addition the instrument will automatically flag discrepancies between the indicated metadata and the actual data being received; for example, if the input sample rate is 48 kHz but the channel status indicates that it should be 44.1 kHz.

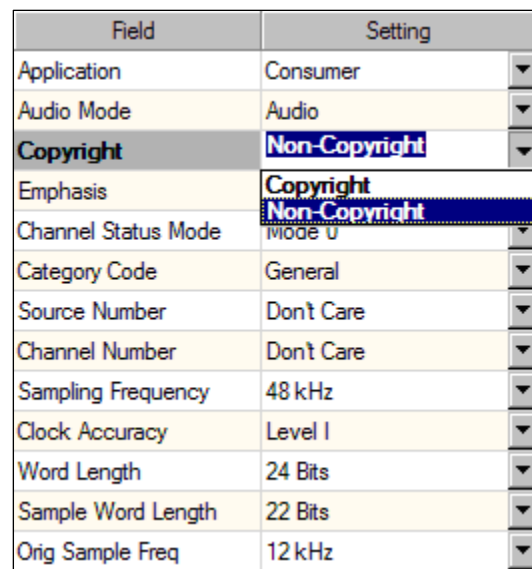
Finally, the instrument's digital transmitters can be used to verify the response of the device to various metadata parameters. All channel status, user data, and HDMI infoframe values can be set to any desired value.

APx 2.4 will allow complete debugging of the protocol layer in IEC60958, AES3, and HDMI digital audio systems.



The screenshot shows a software window titled 'Monitors' with a toolbar containing icons for a graph, a list, a document, and a refresh button. Below the toolbar is a 'Status Bits' table with two columns: 'Field' and 'Reading'. The table contains the following data:

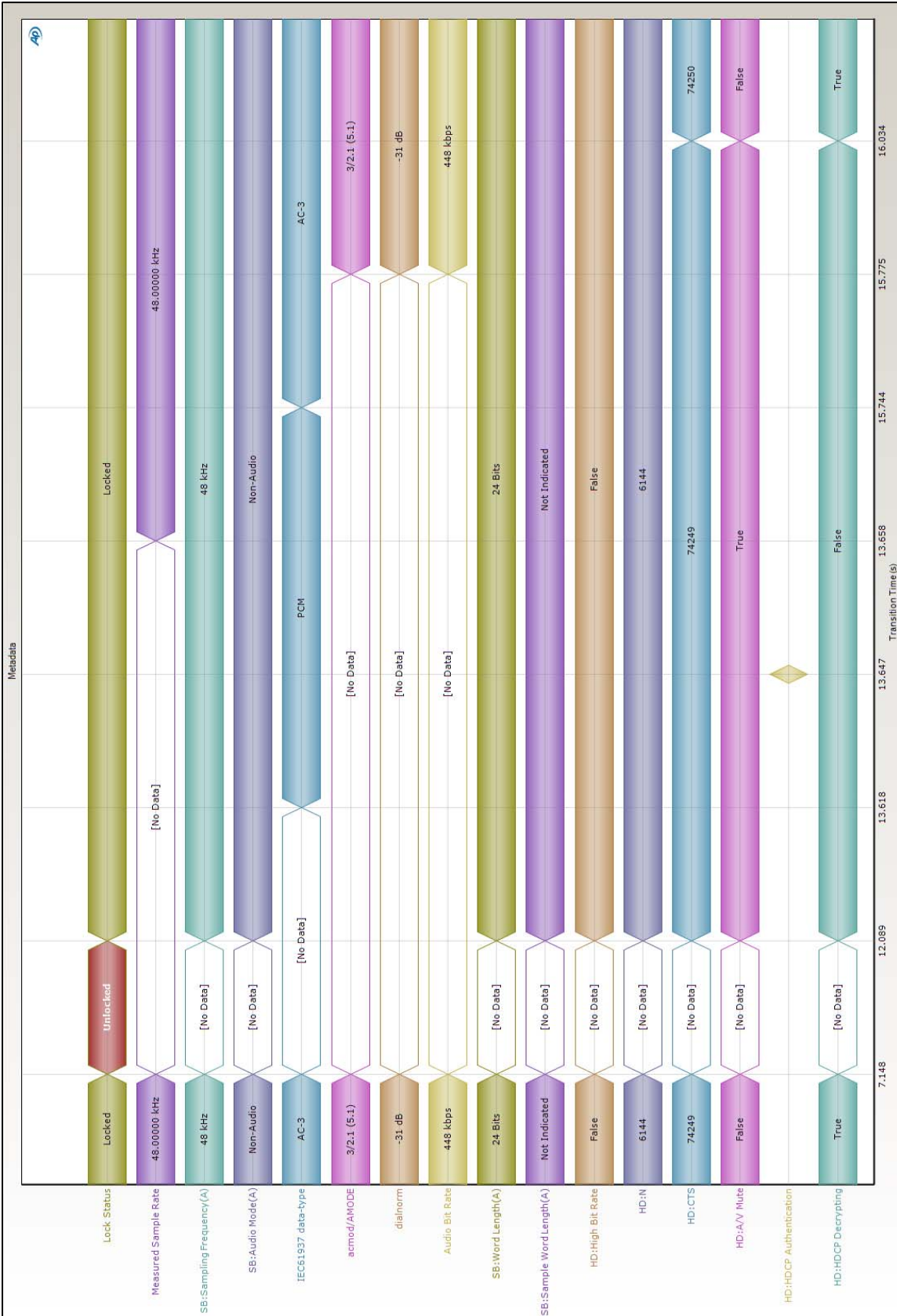
Field	Reading
Application	Consumer
Copyright	Copyright
Emphasis	None
Category Code	General
Source Number	Don't Care
Sampling Frequency	44.1 kHz
Sample Word Length	Not Indicated



The screenshot shows a settings table with two columns: 'Field' and 'Setting'. The table contains the following data:

Field	Setting
Application	Consumer
Audio Mode	Audio
Copyright	Non-Copyright
Emphasis	Copyright
Channel Status Mode	Mode U
Category Code	General
Source Number	Don't Care
Channel Number	Don't Care
Sampling Frequency	48 kHz
Clock Accuracy	Level I
Word Length	24 Bits
Sample Word Length	22 Bits
Orig Sample Freq	12 kHz

The APx Digital Protocol Analyzer view



Acoustic Response Measurement

The APx acoustic response measurement is based on the exponentially swept sine technique. The APx acoustic response measurement adds several important features useful for making acoustic measurements:

- Measurement of the linear response of speakers and microphones, including level and phase vs. frequency
- Measurement of the non-linear response of the device, including THD vs frequency and individual harmonics vs. frequency.
- The ability to time gate the impulse response
The system provides a graphical, interactive control for gating the impulse response of the device under test to remove acoustic reflections. This allows quasi-anechoic testing of loudspeakers and microphones in non-anechoic environments.
- Nth Octave smoothing: Smoothing of frequency response results in Nth octave increments, from 1/24th octave to 1 octave.
- Time domain synchronous averaging: The results of multiple sweeps can be synchronously averaged to reduce the effects of ambient noise on measurement results. This improves the repeatability of measurement in noisy environments such as factory floors.

The acoustic response measurement option is built on innovative technology which represents a leap beyond traditional continuous linear sweeps or maximum length sequence (MLS) techniques. It provides true separation of the linear and non-linear response of the device under test and much better correlation with conventional discrete stepped sine measurements.

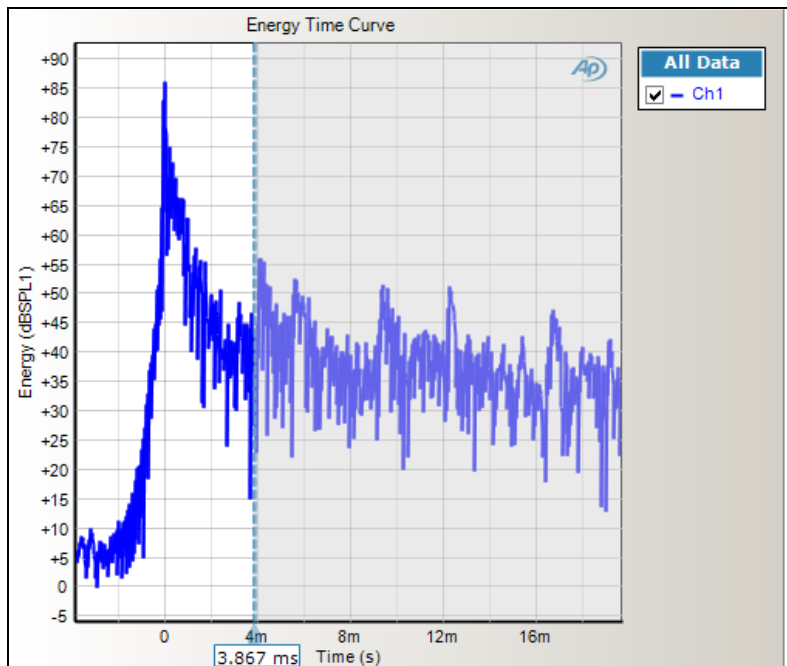


Fig 1. Energy Time Curve graph: The system's energy dispersal in time. Useful for viewing the signal alignment, and for inspecting the arrival of the direct signal, early reflections, and spurious outputs caused by leaks or resonances in the speaker enclosure.

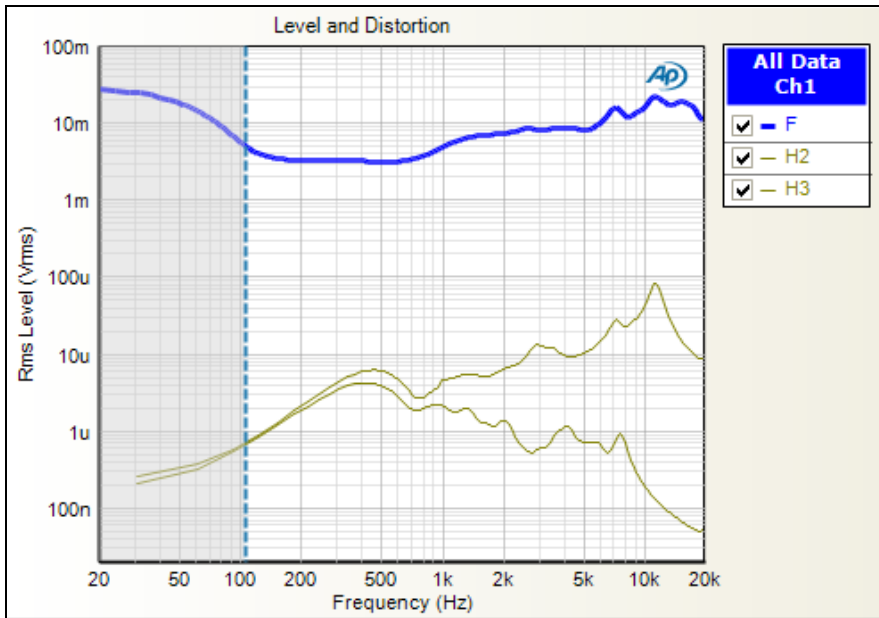


Fig 2. Level and Distortion graph: Both the level vs. frequency and the distortion vs. frequency of the speaker. It's especially useful to have separate traces for the second and third harmonics.

Improved Production test support

Aux Control I/O

The auxiliary control input and output ports found on the back of the APx instrument provide 8 bits of TTL/CMOS compatible logic. With APx 2.4 they can be used to integrate the instrument with external controls and equipment such as foot pedal switches and indicator lights. The aux control I/O can be set to:

- Start a sequence
- Control measurement sub-steps according to an external signal
- Provide external indication as to the status of a measurement result or sequence

In addition the aux control I/O can be fully controlled via the APx API.



Fig 1. Push button: Example of the hardware controller with which APx can interface via Aux Control.

UI enhancements

Version 2.4 adds several enhancements to the APx user interface, making it easier to get the views you want of your data.

Graphs

- After appending multiple sweeps to a single graph, you can now clear individual acquisitions or all at once.
- All line graphs are now anti-aliased to remove display jaggedness
- You can now draw limits for a meter, similar to how you would for an X/Y graph.
- It is often useful to compare newly acquired data against reference data from a previous measurement. In previous releases of the software you could do this by importing a previous result as a limit. In this release of the result you can append data in X-Y graphs, such as frequency response, from a file of a previously saved result.

Signal Monitors

- In prior versions of the software, the signal monitors were not active during sweeps and other multistep measurements. You can now monitor the input of the instrument at all times.
- Normally time domain graphs including the scope monitor and signal analyzer time domain result are sinc interpolated. Particularly when analyzing a digital signal, it is useful to disable this in order to be able to see the uninterpolated value of each sample.
- When using the FFT monitor with a large number of averages, it is helpful to be able to reset the averaging. A control to do so is now available when the FFT monitor is undocked.

Sequences & projects

- Browse, delete or replace any files (such as wave forms or user prompt images) attached to a project with a new Project File Manager.
- By right-clicking on the project name in the measurement navigator, you can now access sequence properties including aux control selections for the sequence, pass/fail indication, and sample rate and HDMI sync delay.
- Sometimes you want a report of the results of a single signal path in a project file. You can now right-click on a signal path and run the sequence for just that signal path.

Reports & exporting data

- An additional report option is an executive summary which lists all the measurements in a sequence and whether they passed or failed.
- You can now select the prefix used on filenames created by the report auto-save functionality.
- When exporting data from a measurement you can now select which results to export, control how many points are exported, and select which of multiple appended acquisitions are exported.

HDMI and Dolby / dts enhancements

Support for DTS type 1-5 streaming at 48 or 192 kHz

Certain DTS streams can be transmitted over HDMI at single rate or quad rate. Users can now select which mode to use.

Saving E-EDID's to text file

This release allows the E-EDID of an HDMI device to be saved in a convenient, human readable text format.

Revised Dolby and DTS project files

The Dolby and DTS confidence testing project files have been enhanced to take advantage of various new features in this release.

New generator waveform files

The 2.4 version of the resource disc now includes Dolby Digital Plus and DTS-HD High Resolution generator waveforms.

Other Measurement enhancements

Dynamic Range - AES17 Signal to Noise ratio measurement

When testing the signal to noise ratio of digital audio converters the recommended procedure involves the ratio of a full scale signal to the THD+N residual of a very low level signal. The low level signal insures that the DAC or ADC does not mute itself and suppress idle tones. This measurement is implemented as Dynamic Range – AES17 in APx 2.4.

FM Broadcast test signals

The APx instrument has sufficient bandwidth to generate MPX encoded waveforms with embedded RDS data directly. The resource disc includes a generator allowing users to create sine waveforms with user defined data and a complete collection of pre-encoded generator waveforms.

Improved track channel mode in external stepped sequences

Previously, you could only measure the channel being tracked when using the track channel control in an external stepped frequency sweep. You can now measure all channels.

Support for Support for WAVE_FORMAT_EXTENSIBLE .Wav files containing 24-bit audio samples. APx now saves and plays back files using the latest Microsoft wave format extensible specification.

AG52 Analog Generator Option support

The AG52 enhances the capabilities of the APx520 family of instruments by adding a squarewave function generator. It also enhances the sine generator by providing a higher maximum output level and lower noise floor.

With the AG52 installed an APx520, 521, 525, or 526 can generate square waves with a rise time better than 2 micro-seconds. The system can also generate DIM 100, 30, and B square + sine waveforms and adds a corresponding DIM distortion measurement. The square wave generator is a true analog function generator which does not suffer from the ringing and rise time issues present when using a typical bandwidth limited audio DAC.

In addition the AG52 analog generator option increases the maximum output level of the instrument to 26.66/13.33 Vrms (balanced/unbalanced) from 21.21/10.61 Vrms. This provides a 30 dBm output level, a reference clipping level for some professional audio equipment.

When using the sine waveform generator the typical residual THD+N of the instrument improved by 2 dB.