



Bench Mode

What's New: APx500 versions 4.0 and 4.1 January 2015

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.

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INTRODUCTION TO APx500 v. 4.0

(new features in APx500 v. 4.1 begin on page 8.)

APx 4.0 is a major release that brings both software innovations and support for the impressive hardware improvements to the APx platform available at the 4.0 release.

New Look

APx 4.0 has a new skin, with solid colors and bold icons. The pastel gradients are gone, and we think you'll enjoy the new look and find it easier to navigate.

Sequence Mode / Bench Mode

Until 4.0, the APx operating paradigm involved adding defined measurements to a navigation tree, and the ability to run this series of measurements in an automated procedure called a Sequence. This paradigm is continued in APx4.0, and is called Sequence Mode.

A new operating paradigm called Bench Mode has been developed and added. Bench Mode does not have defined measurements like Sequence Mode, but instead provides a configurable generator and analyzer, a broad family of meters, a comprehensive sweep engine, a time recorder and implementations of the APx Signal Analyzer, Continuous Sweep and Acoustic Response. System Two and 2700 Series users will feel right at home in Bench Mode.

Support for New Hardware

Concurrent with the APx 4.0 release are several major hardware initiatives:

- The APx555 analyzer, with unprecedented analog performance.
- An improved digital input/output option (standard on the APx555) called the Advanced Digital I/O (or ADIO).
- The Advanced Master Clock option (standard on the APx555). The Advanced Master Clock provides jitter generation and measurement capability, and rear-panel sync, trigger and DARS reference connectivity.

These are all supported by APx500 version 4.0. Details follow.

APx555 SUPPORT

APx555 is a new model in the APx family. The 555 brings high performance analog generator and analyzer circuitry, with performance that surpasses any audio measurement system on the planet. APx 4.0 provides complete support for the APx555 hardware.

To accomplish this, the APx555 provides an additional, entirely analog RC sine generator (the High Performance Sine Generator), that generates a very pure sine waveform over a much wider range of frequencies than has been available in the APx series. Sine burst, DIM and fast rise-time square waves are also available.

When the Generator Output is set to a non-analog choice, the RC sine generator is available as a second signal source.

The 555's High Performance Sine Analyzer uses analog notch filters and additional notch-dedicated ADCs, providing the lowest system THD+N residuals available.

The APx555 also features, as standard equipment, the Advanced Master Clock and the Advanced Digital I/O, discussed below.

ADVANCED MASTER CLOCK SUPPORT

The Advanced Master Clock is a completely revised system clock generation module, with jitter generation and measurement, and sync, trigger and DARS reference features. The Advanced Master Clock is standard on the APx555, and optional for the APx52x and 58x analyzers.

ADVANCED DIGITAL I/O SUPPORT

The Advanced Digital I/O brings jitter capability (in conjunction with the Advanced Master Clock), interface signal measurements, and a number of interface signal impairments to test downstream receivers.

BENCH MODE

Bench Mode provides a generator, analyzer, meters and batch measurements that operate, for the most part, independently from each other. You can use these tools as building blocks in constructing your own tests, free from the constraints of pre-designed measurements.

Signal Path Setup in Bench Mode

Since Signal Path Setup and instrument configuration are necessary for both Bench Mode and Sequence Mode, Signal Path Setup has been redesigned to serve both modes with a consistent interface, described in the following major topic.

Bench Mode Generator

The generator panel offers full waveform, level and frequency control, and will run independently of analyzer settings. A sweep will temporarily interrupt the generator, which will return to its previous state when the sweep concludes.

Bench Mode Analyzer

The analyzer panel offers settling controls, THD+N notch settings, bandpass filtering and a full set of IMD analysis tools. For Bench Mode tools that benefit from regulation, a regulation feature is available.

Bench Mode Monitors and Meters

Bench Mode has floating Scope and Spectrum monitors, and a wide array of available meters. Meters can have limits applied, and meter data can be saved to a file. The meters are real-time, running at measurement rates up to 250/sec.

Sweep

The Bench Mode stepped sweep engine can plot a wide range of result parameters against a wide range of source parameters.

Recorder

Bench Mode Recorder is a more flexible version of the Measurement Recorder in Sequence Mode. Recorder can make either settled or unsettled measurements.

NEW MEASUREMENTS IN SEQUENCE MODE

Level Ratio

This measurement returns the ratio between levels in two channels.

Input Sample Rate

This measurement provides the measured sample rate at the current digital input.

Jitter Frequency Sweep

For instruments fitted with the Advanced Master Clock, a Jitter Frequency Sweep measurement is available.

Jitter Level Sweep

For instruments fitted with the Advanced Master Clock, a Jitter Level Sweep measurement is available.

DCX DC Level Measurement

When connected to a DCX-127, a DCX DC Level Measurement is available.

DCX Resistance Measurement

When connected to a DCX-127, a DCX Resistance Measurement is available.

Sequence Steps

Where appropriate, new Sequence steps have been added.

NESTED SWEEPS

A few sweeps in Sequence Mode and all batch measurements and sweeps in Bench Mode allow Nested Sweeps, where the primary parameter sweeps are nested within an outer sweep of a second parameter.

DCX-127 SUPPORT

The DCX-127 Multifunction Module is now addressable from APx, using the USB APIB Adapter. The DCX has provided unique capabilities to Audio Precision systems over the years, and in APx 4.0 you can use the DCX digital multimeter features, the programmable DC outputs and the DCX Aux Output (GPIO) connectivity.

SIGNAL PATH SETUP

Signal Path Setup has been thoroughly revisited, largely to harmonize the user experience across Sequence Mode and Bench Mode.

In previous versions, Signal Path Setup was limited to Input/Output configuration, ADC bandwidth and coupling settings. The Verify Connections feature and a button to open Switcher settings completed the picture.

In 4.0, Signal Path Setup has a series of menus providing a central and convenient location to set and adjust all system configurations. Verify Connections remains in Sequence Mode only, but for the most part Signal Path Setup is the same in Bench Mode and Sequence Mode.

Input/Output

Here you'll find all the Input and Output connection and configuration settings: analog or digital, unbalanced or balanced, source impedance and termination settings, choice of HDMI or Bluetooth or File Input, and so on.

I/O Filters, Bandwidth and Coupling controls

This is a new feature for both Bench Mode and Sequence Mode, a set of filters and bandwidth controls (including AC-DC coupling) that affect the entire signal path, including spectrum displays.

References

In earlier releases, References were a Navigator node called Reference Levels. In 4.0, you'll find all the generator and analyzer level references, acoustic references, frequency references and features like Auto Gen Set and Microphone Calibration gathered in the Signal Path Setup > References menu.

Switchers

The Output and Input switcher controls are now Signal Path Setup menu items.

DCX

When a DCX-127 is attached, DCX configuration settings are available as a Signal Path Setup menu item.

Clocks

For instruments with the Advanced Master Clock fitted, a Clocks menu item provides access to controls for the rear panel Sync and DARS reference outputs and inputs.

Jitter Generator settings are also available on the Clocks menu.

Triggers

For instruments with the Advanced Master Clock fitted, a Triggers menu item provides access to controls for the rear panel Trigger Output and Trigger Input.

INTRODUCTION TO APx500 v. 4.1

APx500 v. 4.1 adds key improvements to version 4.0. APx analyzers can now use all available analog inputs at full bandwidth; filter capabilities, controls and bandwidth have been expanded. These and other changes are detailed below.

Full bandwidth for two (APx525 w/BW52) and sixteen (APx586) input channels

Previously, the bandwidth of an APx525 with BW52 was limited to 500 kHz with two channels operating. The APx586 was limited to 45 kHz with sixteen channels operating. With version 4.1, the APx525 (with BW52) can now operate with both channels operating at the full available bandwidth of 1 MHz. The APx586 can now operate with 16 channels at the full available bandwidth of 90 kHz.

Higher input bandwidth for the APx555 High Performance Sine Analyzer

The APx555 High Performance Sine Analyzer can now operate at input bandwidths up to 1 MHz with both channels operating.

Level and THD+N Filter improvements

Low-pass and high-pass filters, in both the signal path and in Sequence Mode measurements, have more options and greater range of corner frequencies.

- An elliptic filter has been added to the high-pass filter collection.
- For analog audio measurements, the high-pass and low-pass Butterworth and elliptic filters now have a range of 10 Hz to 1 MHz (APx555 and APx525 w/BW52). Other hardware supports a range of 10 Hz to 90 kHz.
- For digital audio measurements, the high-pass and low-pass Butterworth and elliptic filters now have a range of 10 Hz to 100 kHz.
- For jitter measurements (when supported by hardware), the high-pass and low-pass Butterworth and elliptic filters now have a range of 50 Hz to 150 kHz.
- Additionally, the weighting filter algorithms have been tuned to more closely match the defined standards.

Post-notch residuals available in FFT Spectrum monitor

The post-notch residuals previously available in the Scope Monitor and the Audible Monitor are now also available in the FFT Spectrum monitor.

Improved accuracy in Thiele-Small results

Algorithms that calculate Thiele-Small results have been adjusted for improved accuracy.

Acoustic Response measurements now accommodate dominant 1st reflection

Rarely (in circumstances where the loudspeaker is facing away from the measurement microphone), a reflection may have a higher amplitude at the microphone than the initial impulse. Since APx identifies time zero as the impulse with highest amplitude, measurements in this case would be in error. APx 4.1 allows you to disable the automatic start time feature and manually set time zero.

Increased efficiency in coded audio files

Previously, coded audio files were formatted with headers and zero-padding using the attached Windows computer. A more efficient method is implemented in 4.1, enabling larger maximum coded waveforms and reduced waveform download times.

ASIO dither selection

Previously, dither was always enabled for ASIO output. With APx v. 4.1, you can now disable dither for ASIO.