

# Innovating Sounds for a New Class of Guitar Pedals with Audio Precision

Keeley Electronics has shipped over 2000 of their new 4-in-1 pedals, with zero reported field-failures after implementing Audio Precision analyzers into their production processes.



## OPPORTUNITY:

At Audio Precision, our customers touch every corner of the audio electronics landscape. Sometimes, we get to work with a customer with an especially unique application which impacts the audio world around us in ways that we don't expect. Such is the case with Keeley Electronics, the industry-leading guitar pedal manufacturer based in Oklahoma City. Keeley Electronics started with a single pedal sold on eBay and then took off exponentially. They've sold 140K of the original Keeley Compressor and over 500K pedals over the past 20+ years. If you've listened to the radio over the past couple of decades, you've certainly heard Keeley's pedals in action – artists ranging from Jaime Wyatt to John Mayer swear by Keeley's pedals which give performers the power to define unique sounds for many, many of the hit songs you know and love.

Driven by the obsession for empowering musicians with new sounds, Keeley Electronics recently released their latest line of pedals, the 4-in-1 Series. This lineup takes the eight most popular pedals on the market and consolidates them into four, including multiplexing between circuits to give users a range of sounds to choose from. With the new offerings like the Noble Screamer and Super Rodent, the 4-in-1 line of pedals is designed to offer users both a smaller footprint for their favorite pedals as well as a mix of sounds that have never been heard before – something every musician can get excited about.

## ✓ CUSTOMER

Keeley Electronics



## ✓ PRODUCT

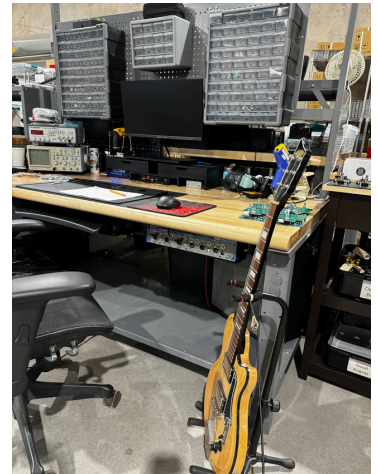
APx515B

## ✓ PERSONS

Robert Keeley  
Owner, Founder, Electrical  
Engineer, Keeley Electronics



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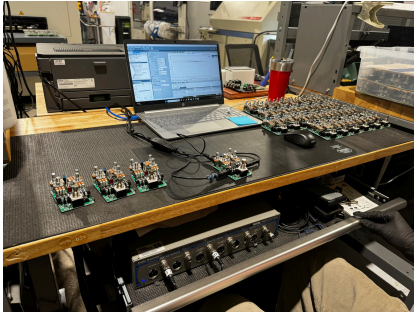
Above: Engineering test benches at Keeley Electronics set up with APx515 Audio Analyzers. Note the analyzer mounted under bench surface (right image) to save space on the working surface.

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*The APx analyzers are absolute game changers! I tell everyone about them! The results speak for themselves and we're definitely ordering a few more.*

**Robert Keeley**

Owner, Founder, Electrical Engineer, Keeley Electronics



Above: Manufacturing test bench with APx515 testing board assemblies, one of two key test points in the manufacturing process.

**Ease-of-Use**

The AP Analyzers are quick to set up and quick to deliver results.

**Reliability**

The APx515 gives consistent results, great in production test scenarios.


**CHALLENGE:**

The design and production of the 4-in-1 guitar pedals presented a set of unique challenges for Keeley. First, instead of trying to characterize anomalies to remove them as most audio professionals strive for, guitar pedals are designed to embrace the anomalies that make the output tones unique, interesting, and exciting. This includes distortion, harmonics, the undefinable “crunch”, and unique filter profiles. Contrary to the goals of most audio professionals, the objective for the electrical engineers working on the Keeley lineup is to characterize these effects and work with these anomalies. In short, the engineers working on Keeley’s newest pedals need a way to turn “this sounds good / this sounds cool” into measurable data.

Second, the 4-in-1 pedals combine the 8 most popular existing pedals, meaning that engineers need to replicate sounds which are already well-known to their customers. The replication of existing sounds is incredibly challenging to do by ear and would take a tremendous amount of trial, error, and uncertainty, wasting precious production time and leading to uncertain outcomes.

Finally, these new pedals need to support Keeley’s known reputation for quality and reliability in the real world. This means that Keeley’s manufacturing process needs to be designed around delivering consistent performance from pedal to pedal and real-world reliability on the stage or in the studio.


**THE SOLUTION:**

When it came to stepping up to the task of designing these new pedals, Robert Keeley and his engineering and production team looked no further than the APx515 as a game-changing asset for the task at hand. The APx’s unmatched analog performance and comprehensive measurement suite made it possible to solve problems in characterizing sound profiles which would be impossible by ear or with rudimentary tools like distortion analyzers and general-purpose oscilloscopes.

In production, the APx helps identify the variability of critical components like Germanium transistors, making it possible for Keeley to achieve consistently great results. It also made functional and performance testing possible with APx500’s production-specific sequence mode, allowing for easy setup of a wide range of production tests.



Above: Analyzers being put to work for taking measurements at engineering stations.



[APx515B](#)



## THE RESULT:

Production at Keeley underwent a transformative shift, abandoning subjective, labor-intensive testing in exchange for data-driven APx-based evaluations at the critical stages. Products previously were subjected to listening tests at two separate steps – once after the PCBs roll off the SMT line, and once at final assembly. This introduced subjectivity into the production process. Now, Keeley tests the subassembly and the finished product using the APx 515B, providing certainty in the performance of each product that rolls off the assembly line. The result is that they have shipped over 2000 of the new 4-in-1 pedals, with zero reported field failures.

The customer response to the new line of 4-in-1 pedals has been overwhelmingly positive, proof that Keeley engineers with the help of Audio Precision were able to deliver products that customers love. The success of the launch speaks for itself: with such strong demand and rave reviews abounding, Keeley's biggest distributor has quintupled their order volumes in the months since the product was launched and is expected to keep cranking up the volume as customer demand swells.

The APx515, APx500 software, and expertise from the folks at Audio Precision have been instrumental to Keeley's journey in making pedals that rock incredible new sounds and last for years. The proof is in Robert Keeley's own enthusiasm for Audio Precision. "The APx analyzers are absolute game changers! I tell everyone about them!", says Robert. "The results speak for themselves and we're definitely ordering a few more."

## BACKGROUND: APx515B

The APx515B Series is a performance audio analyzer optimized for production test. Despite its low cost, APx515 still has excellent performance, with a typical THD+N of  $-106$  dB, 1.2M point FFTs and up to 216k digital I/O, as well as the one-click automation and ease-of-use of all APx B Series audio analyzers. The APx515 operates either as a stand-alone test unit with its own user interface, or it can be controlled by a master .NET or LabVIEW application. In either case, an operator can control the APx515 with a keyboard, foot switch or barcode scanner, or the system can be totally automated. Switchers and external devices such as pass/fail lights are also supported.

## ABOUT AUDIO PRECISION

Since our founding in 1984, Audio Precision® (AP) has evolved into the worldwide leader for audio analyzers and audio testing. We maintain a singular focus: to help engineers worldwide design, validate, characterize, and manufacture audio components, products and systems. Fast forward forty years and AP is the recognized global standard in audio tests. We provide elite audio analysis, audio measurement software, and a wide range of modules, options and accessories to support analog and digital audio measurement, as well as electro-acoustic testing, and much more.

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