Products of the Week

API A2D Dual Mic Preamplifier/A-D

Legendary analog combines with state-of-the-art digital converter.

by Stephen Murphy, 10.31.2006 email the author

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API A2D Dual Mic Preamplifier/A-D Front

API A2D Dual Mic Preamplifier/A-D Rear

"The world is changing. I feel it in the water. I smell it in the air. I see it in my equipment rack..."

Okay., not a verbatim rendition of the opening monologue to the movie Fellowship of the Rings, but here's the point: a few months ago, the world of pro audio changed, though hopefully for the better. Hailed by API as a landmark moment in the "all-discrete analog" company's 38-year history, the new A2D dual preamp is the first product released by API that comes outfitted with digital outputs. Can this, the first product in a new age for API, live up to its, um, legacy?

Features

The API A2D ($1,995) is a rackmount dual-channel microphone preamplifier with integrated analog-to-digital converters capable of sample rates up to 192 kHz. The A2D's single rack-space chassis features a modern brushed aluminum faceplate adorned with the trademark API knobs and buttons (plus the API trademark, of course).

The A2D analog section consists of two 312 mic preamps, complete with the revered, all-discrete API 2520 op-amps and custom input and output transformers. On the front panel, each preamp features a gain knob plus a horizontal row of five blue-backlit buttons that control polarity, 48V phantom power, 20 dB pad engage, 2:1 transformer step-down and mic/line input selection. Each preamp also has an unbalanced, high-impedance (470 Kohms) 1/4-inch front-panel jack for direct instrument input.

The 312 microphone input gain range is +10 dB to +65 dB (including pad), and the unbalanced gain range is +14 dB to +50 dB. Above each preamp section is a 20-segment multicolored VU meter that ranges from -30 to +27, and is calibrated so that 0 VU equals +4 dBu. The analog section on the rear panel consists of an XLR microphone input jack, XLR line output jack and a 1/4-inch TRS A-to-D input jack per 312 preamp.

The output of each preamp is half-normalled to its respective A-to-D converter section. Front panel controls for each channel in the "Digital" section include a preconverter analog attenuation knob, which ranges from unity (unattenuated) down to infinity, and a 20-segment multicolored VU meter for monitoring input to the converter. The meter is a fast-attack, peak-reading type, with a scale ranging from -56 to 0 dBFS. Rear panel connections for the digital section consist of an RCA S/PDIF Out, XLR single-wire AES/EBU Out, a BNC Sync In Reference Clock spigot, and a pair of 9-pin D-sub master and slave connectors (for linking multiple A2D units).

Back on the front panel, global controls include a sample rate selector knob and a respective LED for each rate (44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz and 192 kHz), an external sync LED and power switch with LED.

FAST FACTS

Applications

Studio, post production

Key Features

Dual API 312 mic preamps; integrated 192 kHz-capable A-toD converters; mic and instrument inputs; balanced preamp outputs and converter inputs for inserting external processors; 20-segment analog and digital section VU metering.

Price

$1,995

Contact

API 301-776-7879
www.apiaudio.com

In Use

In answer to my earlier question ('Can API's first integrated digital product live up to its legacy?'), the answer is, Yes! Of course! I knew API wouldn't let us down. In all seriousness, the company obviously put some careful thought into the design of the A2D, and the result is an analog/digital hybrid worthy of the API name.

First off, the two API 312 mic preamps are worth the approximate $1,700 street price of the A2D. In fact, buying the A2D is currently the least expensive option if you want only two API preamps. The analog-to-digital converters could be considered a bonus, in that case. Of course, the 312s possess all the sonic characteristics expected of an API preamp: fantastic full-range response with a slight airy rise in the top, and plenty of attitude when desired.

While they may be a bonus price-wise, the converters were certainly not an afterthought in the A2D planning. The API-designed A-to-D section utilizes the same high-resolution converter circuitry found in many of the most popular high-end converters on the market. As the accompanying bench test confirms, the converters are sonically on par with some of the finest (and far more expensive) converters I have used.

So, the A2D has signature API preamps and a top-notch converter section. But it's the signal flow, ins and outs, and thoughtful features that hold it all together and make the A2D a real winner. The inclusion of balanced line outputs and converter inputs, for instance, provides the flexibility for separate preamp and converter section use, dual analog/digital out recording paths, and of course, preconverter inserting of favorite analog processors. Seems like a natural, but many preamp/converter combos I've reviewed fail in this department. It should be a crime.

The inclusion of the preconverter passive attenuation stage provides great sonic flexibility in that the preamp section can be driven as hard as desired without worry of digital overs, and it also adds the same flexibility to inserted outboard gear. Likewise, the 2:1 tap reduces the transformer output gain by 10 dB, allowing the 2520 amp to be operated at even higher levels, introducing creamy-smooth to over-the-top saturation.

I would be remiss if I didn't mention that the analog and digital-section LED meters, while quite a departure from usual API gear, are fantastic and most welcome. Speaking of departures, I do wish API kept its standard black faceplate and usual color scheme. The addition of digital outs to API preamps and the change to a Cylon-inspired silver faceplate is just too much to take all at once.

Try as I might, the only real potential problems I could find with the A2D are that it only synchronizes externally to incoming Reference Clock (256X), and that it has no clock output (unless connected to other A2D units using the supplied cabling). Both of these could cause problems (or additional investment) when integrating the A2D into existing digital setups.

Summary

For some it may have come too soon, and for others it was a long time coming. Either way, based on successful implementation in the A2D, the pairing of API's discrete analog circuitry with digital converters is here to stay. The future just got brighter...

BENCH TEST

API A2D Dual Mic Preamp/A-D Bench Measurement Data

(Unless otherwise specified, all tests reflect signals applied to the balanced Input 1 to balanced Output (A/A), or to AES-EBU output (A/D). Measurement bandwidth of <10 Hz to 30 kHz (analog) or Fs/2 (digital), and the worst-case result. Reference levels: 0 dBFS equaled +18.1 dBu at the analog outputs)

Input Impedance (1 kHz) 1475 ohms
Output Impedance 80 ohms
Output Polarity Non-inverting
Input Overload Mic (1 kHz, Mic w/wout pad):
-2.4/17.2 dBu
Input sensitivity
(Mic, Gain at min.) -30.7 dBu for +4 dBu out
(Mic, Gain at min, D-out) -18.1 dBu for 0 dBFS
Maximum Output (1 kHz) 32.1 dBu
Frequency Response (10 Hz to -3 dB point):
A/A: 10 Hz - 94 kHz
A/D 44.1 kHz Fs: 20.05 kHz
A/D 48 kHz Fs: 23.7 kHz
A/D 96 kHz Fs: 48.2 kHz
THD+noise (at 1 kHz, re: 0dBFS):
A/A: 0.002%
A/D 44.1 kHz Fs: 0.001%
A/D 96 kHz Fs: 0.0009%
S/N (A-wtd., re: 0 dBFS)
A/A: -107.5 dB
A/D 44.1 kHz Fs: -106.6 dB
A/D 96 kHz Fs: -104.7 dB
Dynamic Range (per AES17 with signal)
A/A: -107.1 dB
A/D 44.1kFs: -105 dB
A/D 96kFs: -104.1 dB
Deviation from Linearity
< 0.9 dB to -120 dBFS
Channel Separation
>90 dB, 20 Hz to 20 kHz or Fs/2

Inter-channel Phase Error (A/D)
>0.85 deg. 20 Hz to Fs/2

Bench Measurement COMMENTARY

API's A2D mic preamp/D-A converter certainly seems a very capable box. I uncovered no anomalies, and measured generally very high performance throughout. This was my first bench session using the dual-domain Prism dScope Series III test-rig, a powerful, flexible machine, and though highly intuitive, there's still a learning curve, up which I did my best to crawl. I could not sync the dScope at sample-rates above 96 kHz, so we'll have to use our imaginations for the API's 176.4 kHz/192 kHz Fs performance; I would expect no surprises.

Figure 1 shows analog-domain ('A/A') frequency response of mic-input signals; very wide and flat (the very slight up-tilt is only about 0.25 dB per octave); the hump at around 80 kHz may be spuriae in the bench environment.

Figure 2 shows four similar sweeps of response for mic-in to digital-output, (note the linear horizontal scale to spread things out). From the top down these are the A2D's sampling frequencies of 96 kHz, 48 kHz, and 44.1 kHz (I've offset each curve by 2 dB for graphic clarity).

Figure 3 is THD+noise v. frequency for analog in and out, shown relative to 0 dB full-scale, which in the API's case is about 18 dBu at the outputs. The minima are about 0.001%, which is pretty close to the limit of measurement accuracy. The curve rises at low frequencies, but only as far as about 0.05% at 20 Hz, so no worries.

Figure 4 is the same test but for digital output, with plots for 96 kHz and 48 kHz Fs. (I omitted 44.1 kHz as it was virtually indistinguishable from the 48 kHz plot.) Pretty much same deal as above, but a couple dB better, probably thanks to eliminating the analog-output circuitry. I don't altogether believe the spikes at 25 kHz and 28 kHz (but cannot exactly explain them, either): very likely spurious.

Figure 5 plots THD+noise v. input-level, for both analog and digital outputs. From top to bottom at -70 dBFS input, these are analog, 96 kHz Fs digital, and 48 kHz Fs digital (again, I've skipped the 44.1 kHz plot for clarity). The higher sampling-rate mode appears to be a few dB noisier, but this is mostly a product of its wider bandwidth and consequently greater influence of noise-shaping products on its sum-of-noise. As expected, the digital plots go pretty much vertical as they approach 0 dBFS, so as always in the digital domain, a dB or 2 of headroom is always prudent!

Figure 6 shows two spectral-analysis plots for 1 kHz signals: I've offset them for clarity, so the absolute values are not meaningful, only the shapes. The upper plot is A/A; the lower A/D (96 kHz Fs). The main point here is that if you imaginarily overlay them you'll see they match very closely indeed: the analog plot has a bit more visible 4th and (maybe) 2nd harmonic-Hey, "analog sweetness" revealed!-but they're otherwise almost identical.

- D. Kumin