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521 ZDT Preamp
An incredibly clear mic preamp in a handy new format

While best known for its line of ultra-accurate, miniature capsule omni microphones, Earthworks has also been making mic preamps since the beginning, first with the LAB series reviewed back in our April 1998 issue and then the Zero Distortion Technology (ZDT) line.

We introduced readers to the ZDT line in our January 2013 review of the of the 1022 2-channel rack preamp. Earthworks also makes the 4-channel 1024 and the half-rack single-channel 1021; the latest model is the 521 ZDT, a single-channel unit in the popular API 500 Series module format.

Zero Distortion Technology in a lunch box

As noted in my last review, this David Blackmer-designed preamp is a Class A bipolar input circuitry device that contains almost no nonlinear distortions of any kind, less than 1 part per million. It uses a balanced input and a symmetrical, balanced output with no transformers or electrolytic capacitors in the signal path.

Some sample specs: frequency response of 2 Hz to 100 kHz ±0.1 dB, 1 Hz to 200 kHz ±0.5 dB, an impulse response of 1.4us, equivalent input noise of –132 dBV at 20 dB gain and –143 dBV at 60 dB gain, a slew rate of 22V/µs, and of course distortion of less than 1ppm (0.0001%) at the /µ" out, 0.001% via the XLR out.

The ZDT preamps belong to the “straight wire with gain” family also inhabited by the likes of Millennia Media, John Hardy, Grace Design, and AEA. Put another way, you hear the sound of the source and the character of the microphones, not the preamp.

Like the previous ZDT models the 521 comes in a lightly powder-coated matte black finish with white lettering. Its 500 series chassis is fully enclosed and its internal circuit board is clean and well laid out with high quality pots and switches. It is possibly also the lightest 500 Series box I have ever felt weighing only 0.8 lb.

As a fun little extra, it comes in its own little black and white lunch box—no, not the API kind, but a real lunch box like most of us would have used in grade school!

Controls and features

The 521 starts with a large input knob, a 12-position stepped gain switch with a range of 5 dB to 60 dB in 5 dB steps. This controls signal flow from the 500 Series enclosure’s XLR input directly to its output. As with previous models, there is also a second balanced output via a front mounted /µ" jack, controlled by a small variable knob that can attenuate the signal –20 dB.

Other controls include 48V phantom power, polarity switching, and a Standby switch for muting the unit when switching mics or engaging phantom power.

In use

As with my 1022 review, I compared the 521 to my own 8-channel Millennia Media HV3D and overall my impressions were the same. If I listened really hard, I could discern a 5–10% difference in the two, with the 521 ZDT being just a touch more forward in the lower mids.

From drums to voice and instruments in between, this is a preamp that does as advertised and adds nothing to the sound. Where the 521 really excels is in how gosh darn quiet it is! Not only with the company’s own mics (one of which we will look at below), but with low-output ribbons and dynamics.

The only time noise starts to become apparent is when pushing the output up past 55 dB, but even at 50 dB you will be able to easily use a Shure SM7 for clean clear spoken word duties or a low-powered ribbon for quiet sources like nylon-string classical guitars.

On the flip side, if you have really high-output mics and a loud source, switching to the variable output allows you to bring the sound down further should you need it. I did try using this feature to induce some intentional clipping and breakup by turning the input to 60 dB and the variable output down to –15 dB. All I can say is, it took a lot of work and a loud source to accomplish, and the result was not “vibey” as on some other preamps, it was just clipped. In other words, the ZDT delivers on its sonic promises! It’s not a preamp you’d choose for harmonic distortion and vibe.

Conclusion

Earthworks’ ZDT preamps have always lived quietly in the shadows of their famous microphone siblings, but the line does have a respectable following among audiophile recording types, and with good reason.

With the growing popularity of the 500 Series and with clean uncolored preamps being in vogue again, I suspect that the 521 ZDT could be the breakout model of the series. If you are after clean, uncolored, and exceptionally quiet performance, and you own a 500 Series box, you should check it out.

Price: $999 street

Earthworks QTC50 HDM Microphone

When the folks at Earthworks inquired if I would like them to send me any of their mics to use with the 521 ZDT, I went right to the big gun—the company’s flagship model, the QTC50. It’s been a long while (over 15 years!) since a QTC mic was in our pages, so our readers deserve a refresher!

The prefix QTC stands for Quiet Time Coherent, and HDM stands for High Definition Microphone. Both sum up the Earthworks’ paradigm nicely. “Time Coherent” is how Earthworks explains its miniature omni capsules’ sound. Unlike traditional large and small diaphragm mics, the QTCs do not “smear the time domain”. Essentially, due to their size, they are fast enough that capsule’s resonance stops when the sound does.

As a drummer I totally get this. When you hit a small, tightly tuned drum head the sound is quick and short. As you move to bigger drums the sound rings longer with more overtones and harmonics. Microphones follow similar principles—smaller means faster damping.

“Quiet” refers to the microphone’s self noise of 22 dB, making it one of the company’s best choices for quiet sources. It can also handle 142 dB SPL, so it’s equally well suited to loud sources.

And “High Definition”? With a frequency response of 3 Hz to 50 kHz, it hears things you can’t. There is no point looking at a frequency plot unless you like straight lines—the only slight 2 dB dip is well beyond the range of human hearing.

The mic has a milled stainless steel enclosure with a purple ID band. It measures 9” x 7/8” and tapers down to 1/4” where its 6mm capsule lives. It’s available singly ($1399) or in pairs ($2999), with mic clip in a felt-lined wood box.

I used the pair of QTC50s on drum overheads, room duties, acoustic guitar, piano and backing vocals. I also compared them side-by-side with a pair of Neumann KM84s, another mic known for its flat frequency response. The KM84 is cardioid vs. the QTC50’s omni pattern, so the comparison is imperfect, but served to highlight the QTC50’s width and depth vs. the focused and weightier sounding KM84.

To my ears Earthworks mics are very much the “straight wire” of mics, very honest and non-source-specific. As an omni mic, the QTC50 has zero proximity effect and almost no off-axis rejection.

They excel at stereo work; I enjoyed playing with various techniques. Inches from a source in a tight pattern yields a very intimate dimensional recording, while a wider (17 cm apart) pattern or even a medium spaced pair a few feet back gives your source a nice open depth. (We can’t really call these “XY” or “ORTF” patterns, as these aren’t directional mics, but those terms will give you an idea of how I placed them.)

In all instances I like how they capture the sound of the instrument—not in a dry sterile way, but with a nice touch of space. While I don’t typically use a stereo XY setup for backing vocals, I tried it and was surprised at how effortlessly they naturally placed the voices back into the mix.

Interestingly I did not like them as much for traditional distant mic room duties, especially on quieter sources where they highlighted too much room noise that mics of this sort pick up. The QTC50 is very unforgiving in this role.

My favorite use was on drum overheads. On cymbals they capture the harmonic nuances of the splashing metal very honestly thanks to their 50 kHz range. This is in contrast to many mics that highlight high frequencies louder rather than more extended high end. As such a pair of QTC50s are the cornerstone of Earthworks DK50/R drum mic package.

I knew the QTC50 was going to be a critical and honest mic, but I was not prepared for how much fun the pair could be! Mics such as these inspire artistic mic placement and creativity, and capture it impeccably.

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