ART DUDLEY

Air Tight ATM-1S

POWER AMPLIFIER

It's no secret, especially to those who've been following *Stereophile* for more than a short time: In the first half of 2007, I took the plunge and bought a Shindo preamplifier and monoblock amplifiers—handmade products characterized by low output power, generous numbers of vintage parts, steel casework finished in a signature shade of green, and richly textured, impactful sound with lots of sheer musical *drive*. And while we tend not to alert the major newspapers whenever someone on staff buys new electronics, the change was notable for two reasons: The compatibility of Shindo's amplifiers is limited to loudspeakers of higher-than-average sensitivity and impedance; and, throughout the seven years that followed my switch to Shindo,[1] both my system and my point of view regarding domestic audio in general have evolved in the direction of the artisanal and the vintage.

Mild concern—among owners of low-efficiency loudspeakers, who might despair of finding in my reviews any relevance to their own systems; and among competing electronics manufacturers, who might wonder if an amp must be painted green for me to like it—is understandable. There isn't much I can do about the former except, I hope, write compellingly about things that people think they don't want. As for the latter, I can only assure you that my mind remains open—and that the world of hi-fi still contains many *other* musical-, organic-sounding, beautifully made preamplifiers and power amplifiers, the likes of which perform best when playing through horns, single-driver systems, and other high-efficiency loudspeakers. Of the proof I've heard most recently, there may be none better than the Air Tight ATM-1S ($9500), which first caught my eye at the High End 2014 show, in Munich.

Description

A&M Limited, the Japanese company that manufactures Air

1 From the similarly low-power Lamm Industries ML2.1, driven by an original Fi preamp.

SPECIFICATIONS

Description Tubed stereo power amplifier. Tube complement: four 6CA7/EL34, two 12AU7, one 12AX7. Inputs: 2 line-level. Output power: 36Wpc into 8 ohms (15.6dBW). Input sensitivity: 1V. Input impedance: 100k ohms. Output impedance: 4 and 8 ohms (see text). Frequency response: 20Hz–20kHz, 41.0dB. THD: <0.1% at 1kHz, 1W; <1.0% at 1kHz, 36W. Signal/noise: 100dB (IHF-A weighted, input shorted). **Dimensions** 14.4" (368mm) W by 9" (231mm) H by 11.4" (293mm) D. Weight: 48.4 lbs (22kg). **Serial number of unit reviewed** 19046. **Price** $9500. Approximate number of dealers: 12. **Manufacturer** A&M Limited, 4-35-1 Mishimae, Takatsuki City, Osaka 569-0835, Japan. Tel./Fax: (81) 726-78-0064. Web: www.airtight-anm.com. US distributor: Axiss Audio, 17800 S. Main Street, Suite 109, Gardena, CA 90248. Tel: (310) 329-0187. Fax: (310) 329-0189. Web: www.axissaudio.com.

Tight electronics and phono cartridges, was founded in 1985 by Atasushi Miura and Masami Ishiguro. Miura, who had worked for Luxman Corporation since the 1950s, was intent on retiring—but when he learned that Luxman intended to commemorate his departure by scaling back their line of tubed audio products, he decided to bring to market his own tubed designs. Thus, in 1987 or so, A&M introduced their first product: the Air Tight ATM-1 amplifier, a 36Wpc push-pull stereo power amp that used two EL34 power pentodes per channel.

Over the years, other designs were added to the Air Tight line, during which time the company's debut amplifier underwent various refinements. Eventually, in 2010, the ATM-1 was replaced by the ATM-1S—the *S* standing for *Special*. Among the more notable updates are the new model's user-adjustable biasing system (I'll come back to that in a moment) and its use of solid-state rectification in place of the original's pair of 5AR4 diode tubes.

As stereo tube amps go, the ATM-1S is rather compact: The consumer pays for no more than necessary of Air Tight's steel casework, finished in the company's trademark gray lacquer. A machined aluminum faceplate, anodized to match the rest of the case, is itself no thicker than it needs to be. Inside, the whole of the amplifier is hand-wired, with passive parts aligned, tagboard style, above a solid-copper ground plane. The latter appears to be coated with varnish or lacquer, presumably to discourage corrosion.

Interestingly, the ATM-1S has two pairs of input jacks (RCA): one on the rear panel, another on the front. Adjacent to the latter is a rotary selector switch, for choosing between the input pairs, plus left- and right-channel level controls, the latter fronting a nice pair of Alps potentiometers. In the original ATM-1, the front-mounted input jacks were provided for owners who wished to connect their CD players direct to the amp, without a preamplifier; I believe there may also have been a difference in circuitry between the front and rear input pairs. In the ATM-1S, all four input jacks are connected straight to the selector switch, all are affected by the level controls, and all address the same three stages: a single 12AX7 dual-triode tube for voltage gain, one 12AU7 dual-triode per channel for phase inversion, and a differential pair of EL34 or 6CA7 pentodes operating in class-AB. The rail voltage—a steady, unwavering 460V, which is on the high side for the EL34—appears on both the plates and the screen grids of the output tubes.

The quality of parts used in the ATM-1S is generally excellent, as is the internal build quality. My only criticism is that the center of the top panel of my well-traveled review sample appeared to be sagging a bit under the weight of the transformers. While that speaks well of the quality of the latter—the output transformers are by Hashimoto, while the mains transformer is built in-house—it does, I think, indicate the need for an internal brace of some sort.

Installation and setup

Installation of the Air Tight ATM-1S was as straightforward as it gets for a tubed amplifier, thanks in no small part to good-quality packing that allows the amp to be shipped with its tubes already in place. The making of loudspeaker connections was only slightly puzzling: Air Tight's specifications indicate output impedances of 4 and 8 ohms, and the spare but decent instruction manual advises the user to "select the red terminal between 4 ohms and 8 ohms in accordance with the impedance of your loudspeakers"—yet only a single pair of terminals is supplied for each channel, and I

MEASUREMENTS

I performed a full set of measurements on the Air Tight ATM-1S, using my Audio Precision SYS2722 system (see www.ap.com and the January 2008 "As We See It," www.stereophile.com/content/measurements-maps-precision). Before I did any testing, I let the amplifier run for an hour with a 1kHz tone at 1Wpc into 8 ohms, then turned off the input and checked that the bias current for each of its four output tubes had been correctly set. I used the rear-panel inputs for the testing, and repeated some tests using the front-panel input jacks to see if there were any differences. There weren't.

As Art Dudley surmised, the ATM-1S preserved absolute polarity (*ie*, was non-inverting). The input impedance was high, varying from 65k ohms at 20Hz to 58k ohms at 20kHz. The two channels differed in their voltage gain at 1kHz into 8 ohms, the left measuring 27.3dB, the right 29.6dB; the difference of 2.3dB was equivalent to two dots on the level controls' peripheral scales. For all subsequent testing, I reduced the gain of the right channel with its level control to match the left. When I asked AD if he'd noticed any channel imbalance in his auditioning, he said that he did indeed have to keep the left-channel gain higher than the right—but elaborated that, in his room, he finds he must *always* do this so that mono

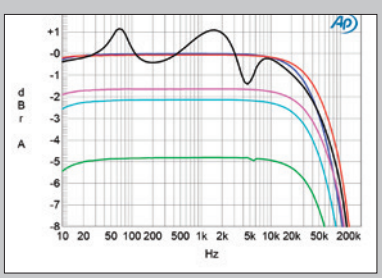


Fig.1 Air Tight ATM-1S, frequency response at 2.83V into: simulated loudspeaker load (gray), 8 ohms (left channel blue, right red), 4 ohms (left cyan, right magenta), 2 ohms (green) (1dB/vertical div.).

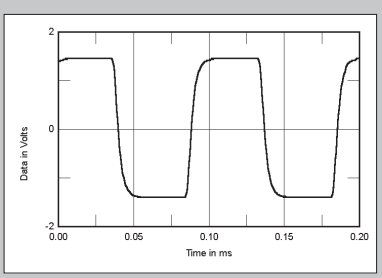


Fig.2 Air Tight ATM-1S, small-signal 10kHz squarewave into 8 ohms.

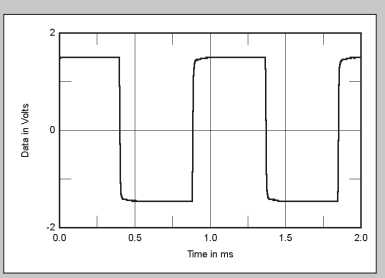
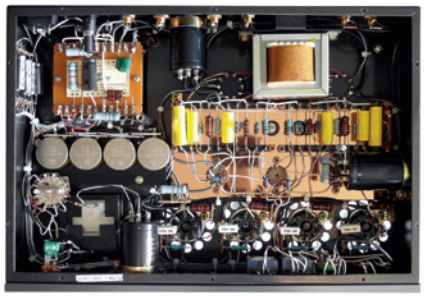


Fig.3 Air Tight ATM-1S, small-signal 1kHz squarewave into 8 ohms.

found no provisions, inside or out, for switching. In any event, I heard no indications of a mismatch with either my 16-ohm Altec Valencia or my 10-ohm DeVore Fidelity Orangutan O/96 speakers.

During the ATM-1S's time in my system, I relied solely on my usual combination of Auditorium 23 copper speaker cables and Shindo silver interconnects; the former are relatively affordable, the latter moderately less so. (Apart from a really nice pair of Audio Note interconnects bought used in the 1990s for pennies on the dollar, I own no four-figure cables.) While poking around inside the ATM-1S, I noticed that the ground terminal of its IEC socket was unconnected to either circuitry or chassis. That doesn't necessarily mean the owner won't hear an improvement when using an aftermarket AC cord—yet because the qualities of many such cables pertain to their provisions for grounding, the Air Tight may be a dubious candidate for experimentation. In any event, I maintained my usual practice of ignoring aftermarket AC cords.



Apart from being unpacked, carried to its resting place, and plugged in, the only thing the ATM-1S asks is that its user check and occasionally adjust the bias current for its four EL34 tubes. For this, the amp has a nicely styled ammeter and four individual potentiometers, plus a rotary switch to select among the latter—all mounted on the top panel. This system proved easy to use, the entire procedure taking less than two minutes.

A final setup note: It didn't sound to me as if the ATM-1S inverted absolute signal polarity, but I've been wrong about that sort of thing before. Let's see what John Atkinson's measurements uncover.

Listening

Although it's difficult to say for sure without a blindfold and some 15-second snippets of unfamiliar music, it seemed to me that the Air Tight ATM-1S and my Shindo Corton-Charlemagne monoblocks, both of which use push-pull EL34 pentodes as output tubes, shared some common sonic and musical characteristics. Both were colorful, well textured, and slightly warm and lush, timbrally. And both allowed recorded music to have an appropriate sense of momentum and drive. Overall, if I were asked to sketch a quick-and-dirty thumbnail review, I'd say the Air Tight amp sounded like a musically tighter Shindo with a smaller sense of scale. Of course, one could turn that observation on its head and say that the Shindo is a bigger-, more fulsome-sounding Air Tight.

Another distinction: The Air Tight ATM-1S was almost uniquely capable of sounding forceful and present when listened to at lower volumes—which is to say, it was good at sounding loud without *being* loud. (Remarkably, the Air Tight required very little warm-up time before exhibiting that quality—something I noted while bearing in mind that my review sample was unusually well broken-in.) But when pushed to dynamic extremes—say, with well-recorded piano music—the Air Tight remained poised and free from gross colorations. With Vladimir Ashkenazy's recording of Chopin's Préludes (LP, London CS 7101), the Air Tight made musical hay of the pianist's forceful chording near the

measurements, continued

signals will sound centered. "Perhaps I had to do that to a greater degree with the Air Tight than with other amps," he added; but if so, "I failed to notice that difference."

As is usual with a transformer-coupled amplifier using a push-pull pair of EL34 or 6CA7 tubes, the Air Tight's output impedance was high, ranging from 3.6 ohms at 20Hz to 3.3 ohms at 20kHz. This suggests that the single output-transformer tap is optimized for a 4 ohm load, but it results in response variations of 41.1dB with the magazine's standard simulated loudspeaker (fig.1, gray trace). This graph also shows that, comparing their respective levels into 4 and 8 ohms, the left channel (cyan trace) drops more than the right (magenta), which suggests that the right channel's output impedance is not as high as the left channel's. The ATM-1S's ultrasonic output drops by 3dB at 60kHz (left) and 70kHz (right)—respectable performance for a tubed design. As a result, its 10kHz squarewave response was excellent, with short risetimes (fig.2), and the flat tops in the amplifier's reproduction of a 10kHz squarewave suggest extended low-frequency response (fig.3). Both squarewaves are free from overshoot and ringing, which means the ATM-1S is both stable and features well-designed output transformers.

Channel separation (not shown) was

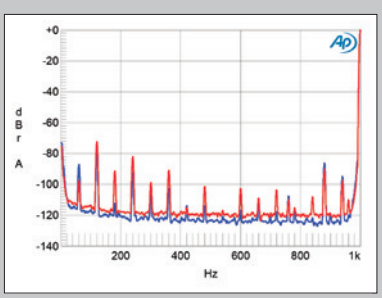


Fig.4 Air Tight ATM-1S, spectrum of 1kHz sinewave, DC–1kHz, at 1W into 8 ohms (left channel blue, right red; linear frequency scale).

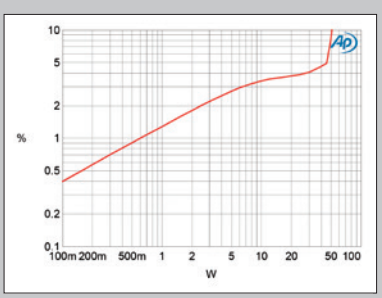


Fig.5 Air Tight ATM-1S, left channel, distortion (%) *vs* 1kHz continuous output power into 8 ohms.

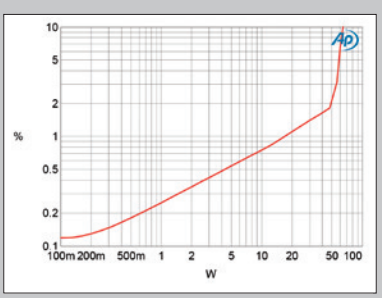


Fig.6 Air Tight ATM-1S, right channel, distortion (%) *vs* 1kHz continuous output power into 8 ohms.

end of the middle section of the Prélude 15 in D-flat, while remaining clear of pitch and maintaining the recording's characteristically dry and pleasantly stringy piano sound.

The ATM-1S's ability to resolve subtle musical information was superb. Through it, the softest kettledrum taps and plucked strings in the opening of Walton's Violin Concerto, played by Ida Haendel and the Bournemouth Symphony Orchestra under Paavo Berglund (LP, EMI ASD 3483), were electric with impact—and the soloist's pizzicato notes early in the second movement sounded similarly, subtly forceful and engaging. The Air Tight also uncovered a wealth of subtleties from throughout the simply arranged and recorded *John Wesley Harding*, by Bob Dylan (mono LP, Columbia/Sundazed LP 5123). Especially through the DeVore O/96 speakers, the melodic and rhythmic intricacies of Charlie McCoy's electric-bass lines—as in the measures just before the final verse of "All Along the Watchtower"—gained exceptional clarity and musical import with the Air Tight in the system, and the curious gain-riding on Dylan's voice and guitar during many of the songs was easier than ever to hear.

Selections from Procol Harum's *A Salty Dog* (LP, Regal Zonophone SLRZ 1009), their most stylistically varied album, were very well served by the Air Tight. In "Too Much Between Us," Robin Trower's gently fingerpicked acoustic guitar had fine tone and very good pitch definition—and, even more easily than through the Shindo Corton-Charlemagnes, I could hear that the background voice in the final two lines of the chorus was that of none other than organist Matthew Fisher, singing "Mmmm." And in the punchy "The Devil Came from Kansas," Trower's electric guitar was . . . well, *punchy*, a quality shared by David Knights's full-sounding electric bass. During that afternoon's Brit-rock fest, I also heard no shortage of impact and touch in the sounds of the electric guitar and bass[2] in "Mr. Churchill Says," from the Kinks' *Arthur* (LP, Reprise 6366), the former instrument apparently strung with heavier-than-average strings and played with generous force.

The elegiacally beautiful "Warm Canto," from Mal Waldron's *The Quest* (LP, New Jazz NJLP 8269), presented both the Air Tight and Shindos with any number of sonic and musical challenges; ultimately, both amps allowed the music to sound emotionally and intellectually convincing, and both put across the sounds of the instruments—especially Ron Carter's plucked cello and Eric Dolphy's clarinet—with lots of rich, colorful, altogether beautiful tone. Beyond that, subtle differences emerged, especially in terms of pitch and timing: The Air Tight sounded more *precise*, with pianist Waldron's accent chords comprising notes struck at the exact same time, while, through the Shindos, the same chords sounded very slightly more arpeggiated, the result being a more complex, more textured sound. I can't begin to guess which is more "correct," but I'll risk the ire of more doctrinaire hobbyists by suggesting that I enjoyed both.

A final comparison centered around the *Mozart à Paris* box, issued in 1956 and reissued in 2012 (7 mono LPs, Pathé/Electric Recording Company DTX 191–197). As I listened to the aria "Popoli di Tessaglia," the Shindo

2 The latter including what sounds like a Fender six-string bass, a pleasantly twangy but rich instrument with a voice all its own.

measurements, continued

asymmetrical, with the L–R crosstalk at 1kHz being a high 93dB but the R–L crosstalk 72dB. The unweighted, wideband signal/noise ratio was also different in the two channels, measuring 75.7dB ref. 2.83V into 8 ohms, left, and 69.4dB, right, both measured with the inputs shorted to ground. Switching an A-weighting filter into circuit improved both ratios, to 82.7dB left and 80.7dB right. Spectral analysis of the Air Tight's noise floor while it drove a 1kHz tone at 1W into 8 ohms (fig.4) revealed that the right channel had more 120 and 240Hz components than the left, these frequencies related to the full-wave-rectified power supply. In both channels, however, were spuriae at 60 and 180Hz, which will be due to magnetic interference from the AC transformer.

When I measured how the left channel's percentage of distortion plus noise varied with output power into 8 ohms, the resultant graph (fig.5) suggested that there was something wrong. Not only was the distortion 0.6% at 100mW, it rose to 1% at 650mW and to 4% at 30W. Repeating the test with the right channel gave a very different picture (fig.6): The THD at 100mW was now 0.15%, and the slow rise in the distortion percentage with increasing power suggests that the ATM-1S's circuit uses only a small amount of negative feedback. We usually define clipping as when the THD+noise reaches 1%—which, in the ATM-1S's right channel, occurs

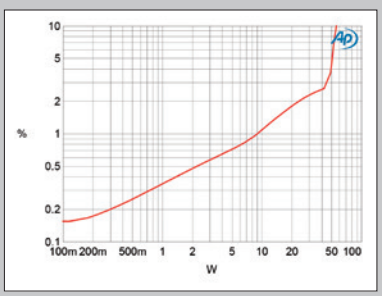


Fig.7 Air Tight ATM-1S, right channel, distortion (%) *vs* 1kHz continuous output power into 4 ohms.

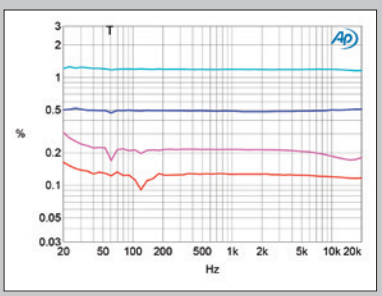


Fig.8 Air Tight ATM-1S, THD+N (%) *vs* frequency at 1V into: 8 ohms (left channel blue, right red), 4 ohms (left cyan, right magenta).

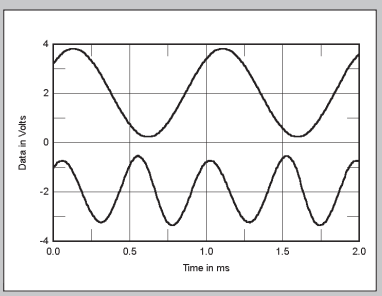


Fig.9 Air Tight ATM-1S, left channel, 1kHz waveform at 500mW into 8 ohms, 0.6% THD+N (top); distortion and noise waveform with fundamental notched out (bottom, not to scale).

monoblocks captured the clarity, directness, and surprising sweetness of this very dry recording, and allowed the high G sung by soprano Annik Simon—a fundamental of over 1500Hz!—to sound *naturally* piercing but not mechanical or harsh. Strings had gorgeous texture, especially in the final bars, and the performance as a whole was equal parts pretty and thrilling. The Air Tight ATM-1S told the same essential truths, while sounding slightly less rich than the Shindos and doing a more impressive job of thrusting Simon out in front of the orchestral ensemble in this mono recording. Both were a hell of a lot of fun.

Conclusions

My wife has a new shtick. These days, when I express my love for this or that inanimate object—my Hario conical-burr coffee grinder, someone else's two-weight fly rod, the yellow rain parka I thought I'd bought for myself but is now equally loved by the rest of the family—she replies: "Then I suppose you want to marry it?" I smile when I hear this, and carry on.

And so it was when I recently announced, "I'm really impressed with this new tube amp from Japan. It has EL34s and separate left- and right-channel level controls, just the way I like, and—"

I watched her face, waiting for it.

Nothing.

Maybe there was something in my tone. Something that said, *I'm not just kidding around: I love this amplifier.*

And I do. The Air Tight ATM-1S is right up there with the best I've heard: the artisanal, the small, the artistically sensitive, the colorful and characterful, the smart. At $9500, it isn't cheap. It isn't a toy or a half-hearted effort or an appliance to be used in the oozing of background music. The Air Tight is as serious an EL34 amplifier as I've heard, offering texture, color, poise, and musical drive and rightness, all in good proportion to one another. It also looks nice, and represents at least *decent* if not outrageously good value for the money.

In that most artificial yet most sincere of all review constructs, the Air Tight ATM-1S is among the few power amps I'd care to live with. Strongly recommended. ■

ASSOCIATED EQUIPMENT

Analog Sources Garrard 301, Thorens TD 124 turntables; EMT 997, Thomas Schick tonearms; Ortofon SPU-A, Miyajima Premium BE Mono II, EMT OFD 15 & OFD 25 & TSD 15 70th Anniversary pickup heads.
Digital Sources Halide Designs DAC HD USB D/A converter; Apple iMac G5 computer running Decibel 1.2.11, Audirvana Plus 1.5.12 playback softwares; Sony SCD-777ES SACD/CD player.
Preamplification Hommage T2 step-up transformer; Shindo Masseto & Allegro preamplifiers.
Power Amplifiers Shindo Corton-Charlemagne monoblocks & Shindo Cortese, Fi 421a.
Loudspeakers Altec Valencia, DeVore Fidelity Orangutan O/96.
Cables USB: WireWorld USB Revision 2.0. Interconnect: Audio Note AN-Vx, Shindo Silver. Speaker: Auditorium 23.
Accessories Box Furniture Company D3S rack (source & amplification components).—**Art Dudley**

measurements, continued

at 9W (6.5dBW). However, looking at the waveform on an oscilloscope reveals that the signal isn't clipped at this power; true waveform clipping actually occurs just above 40W, with the THD+N reaching 3% at 46W (16.6dBW), 1dB higher than the specified 36W (15.6dBW). Into 4 ohms (fig.7), the right channel reaches 1% THD+N at 17W (15.3dB) and 3% at 52W (14.2dBW).

The dramatically higher level of distortion in the left channel can be seen in fig.8, which plots the THD+N percentage at 1.1V into 8 ohms (blue and red traces) and 4 ohms (cyan, magenta). Fortunately, the distortion residual in both channels is heavily second-harmonic in nature (fig.9), which will be subjectively innocuous, provided it is not accompanied by significant intermodulation distortion. The spectral analysis in fig.10, taken at 5Wpc into 8 ohms, shows the drastically higher levels of second and higher harmonics in the left channel (blue trace). While the level of the difference product at 1kHz as the amplifier drives an equal mix of 19 and 20kHz tones into 8 ohms at a peak signal level of 5Wpc (fig.11) reaches –39dB (1.1%) in the left channel and –53dB (0.2%) in the right, the higher-order products all remain at or below –60dB (0.1%), even in the left channel.

I suspect that the much better behavior of its right channel is more likely to be representative of the Air Tight ATM-1S's intrinsic performance than is the left channel's. As AD mentioned, this was a much-traveled sample, and it's possible that a tube had been slowly going bad during the time we had the amplifier in for review. After writing this sidebar, I tried to repeat some of the measurements with the output tubes swapped from side to side. However, the ATM-1S buzzed loudly when it was turned on, suggesting that something inside was now broken.—**John Atkinson**

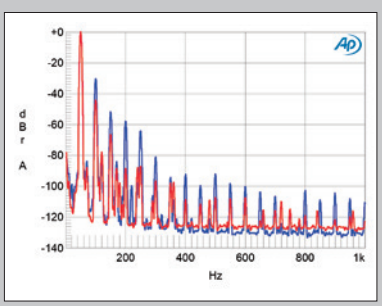


Fig.10 Air Tight ATM-1S, spectrum of 50Hz sinewave, DC–1kHz, at 5W into 8 ohms (linear frequency scale).

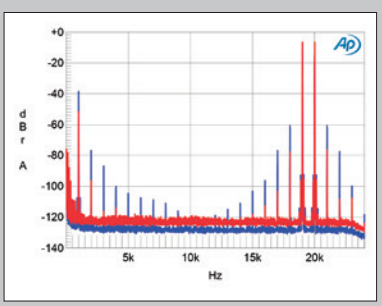


Fig.11 Air Tight ATM-1S, HF intermodulation spectrum, DC–30kHz, 19+20kHz at 5W peak into 8 ohms (linear frequency scale).