Audio-Technica ATH-M50x Owner's Report

Summary: this is a workhorse monitoring tool, appropriate to and often used in the recording studio. For quiet-listening home use, its long-session comfort issues and sound signature can both be problematic. But for portable use both its bass and high frequencies emphasis add a valuable clarity in noisy environments.

Released over a decade ago, the M50x has been a controversial headphone, both praised and reviled in equal measure. For several years it was the object of a meme that this was the go-to headphone in the budget space. After that, the counter-meme was equally intense. Many a

YouTube reviewer made a mark debunking the popular wisdom of the M50x's audio goodness. But while all that was playing out in the consumer space, in the recording studio the M50x is frequently used just as it was designed — as a tool for isolated monitoring of an audio signal during a recording session. The snapshot above shows a close-up of an ancient pair of M50S — a predecessor of the M50x with a 10 foot un-coiled non-detachable cable — that I bought off a friend after he had used it for something like a decade as his daily driver. The "**MONITOR HEADPHONES**" stencil shows how Audio-Technica was targeting their niche in the market place early on.

The M50x is built around a traditional dynamic cone driver of the type everyone is familiar with from their use in everything from laptops to ultra-expensive floor-stander loudspeakers. Most importantly, it has one of the most accurate/neutral/"flat"/natural frequency responses of any headphone model ever made.

Physical considerations

This is an over-ear, closed-back headphone with dynamic drivers.

- Over-ear means the ear cups surround the ears rather than resting upon them or in them. This is only partly true of the M50x. It's ear cups are small enough that larger than average ears will have fit issues.
- Closed-back means the ear pad and ear cups are designed to keep external sounds out and internal sounds in.
- Dynamic drivers means the sound producers inside each ear cup use the same cone plus voice coil technology that loudspeakers commonly use. In this case, the voice coil is copper-clad aluminum and the magnets, neodymium.
- The M50xs have a sensitivity (loudness) of 133 dB per 1 volt, an efficiency of 99 dB per mW and an impedance of 38 Ohms. Translation: this headphone produces plenty of sound straight out of smartphones, laptops and desktop computers. A separate amplifier is not needed.

Build, fit and comfort

As a physical object, this headphone seems well designed to meet a very utilitarian objective. The hard plastic is certainly less than premium, but years on the market have attested to its reliability. The one Achille's heel is the ultra-thin overwrap of the ear pads. The M50x's little user manual warns to wipe the ear pads with a damp cloth after every use to remove body oils. I wearied of this after a few months. So now after a mere 3 years of not-that-extensive use the ear pads have frayed to the point of self-destruction. The one other problem I have is that it is just too multi-function for non-travel use. I don't need the ability for it to fold into an ultra-compact size. So the full 90° vertical swivel of the ear cups mean they are forever flipping over, requiring extra fiddling. I've experimented with gopher tape as the next picture shows to limit this freedom motion, but with limited success:

(I also use black vinyl electrical tape to cover up the hideous huge white AUDIO-TECHNICA stencilling on the black head band.)

Its 285 grams (10 ounces) of weight makes it one of the lighter full-size headphones available, which eliminates one source of discomfort or fatigue during extended listening sessions. However, a new M50x has a strong clamp force, especially for those with larger heads.

When I got the M50x I stretched the headband across a set of books just wider than my head. This worked, but I found that, while just right in the winter, they proved to be too lose in the summer. So now I favour carefully and minimally bending the metal extenders by applying pressure with both thumbs. Use nowhere near enough force that kinking the metal is a possibility.

The ear cups have enough swivel to automatically adjust to most any head shape. But the tight fit of the ear pads to even normal sized ears remains a problem. One thing I suspect few people realize is that the ear cups swivel on yet another axis. Use this capability to swivel the ear cups to match the exact angle of your own ears.

Provided accessories

- Cloth pouch with draw string
- Interchangeable detachable cables: a 1.2 m - 3.0 m (3.9' - 9.8') coiled cable, a 3.0 m (9.8') straight cable and a 1.2 m (3.9') straight cable.
- Plus a screw-on 1/8th to 1/4 inch adapter (2.35 to 6.3m mm).

In review after review of premium headphones I see reviewers ranting about the quality of the provided cable or cables. All the headphones I own come with absolutely wonderful cables, and the M50x is no exception. Given what people pay for decent after-market cables, if the connectors are appropriate, I'd suggest they simply by an M50x for the provided cables, instead. These rubber-type black cables are soft, supple, totally without memory and unobtrusive.
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Reliability

Given the use of plastic in the 600's build we might expect a potential for breakage. But this model has been around for over twenty years and has a sterling reputation for reliability. This is not to say indestructible, but given a modicum of care in handling it's going to last a lifetime. I bought mine third-hand in near-perfect condition. I put a bit of black electrical tape on the places it would touch a hard surface if laid down on one. This is nearly invisible but gets the job done. The storage box, however shows a bit of scuffing that doesn't seem to be from abuse. So, if you're planning to keep everything related to your 600 in flawless condition, take extra care with the storage box.

Sound considerations

That the M50x has what's called a v-shaped, or fun, sound signature, meaning both the bass and the high frequencies are louder than the mid range. People universally report that it has a very small/intimate sound stage (see below), as well. Bizarrely, when used with the appropriate EQ and a decent amplifier and DAC, the M50x sounds distressingly similar when compared to headphones costing multiple times their price — except for that small sound stage. And even then many expensive headphones, such as the Sennheiser HD 6 series and the Focal closed-backs also have small sound stages. But the M50x has a fine clarity, or sense of detail, plus good dynamics, wanting only a bit of EQ (see below) to release much of their potential.

Frequency response / tonality

Fig. 1 is a frequency response measurement graph for the M50x. The measurements were made using professional-grade equipment and are the average of several units. Don't be put off if Fig. 1 makes you want to run for cover. I'll explain everything you need to know:

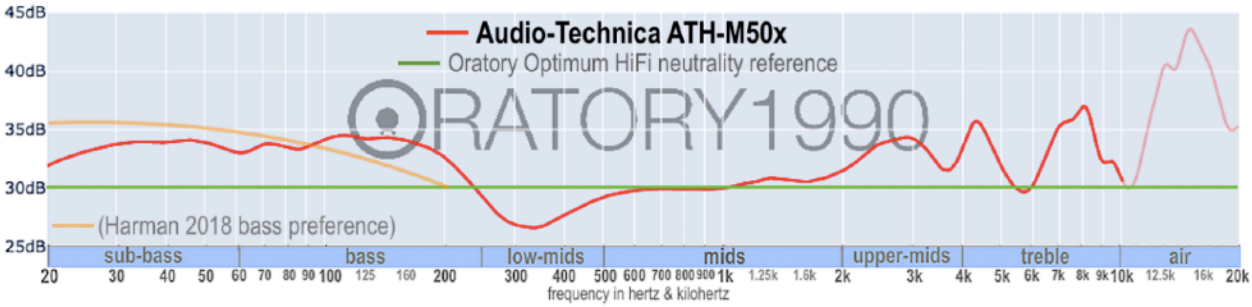

Fig. 1: M50x frequency response, deviation from neutral (source: Oratory Grapher)

The vertical axis in Fig. 1 is loudness, the horizontal axis is frequency (lower/deeper pitches on the left to higher pitches on the right. The green line is the hypothetically accurate response for an over-ear headphone. The red line is one way of displaying how the M50x measures using state-of-art equipment. Just focusing on the red line, as you can see it departs from the green line in several places that I've circled and numbered in Fig. 2. This is getting into true nit-pickery, but let's examine each of them in turn:

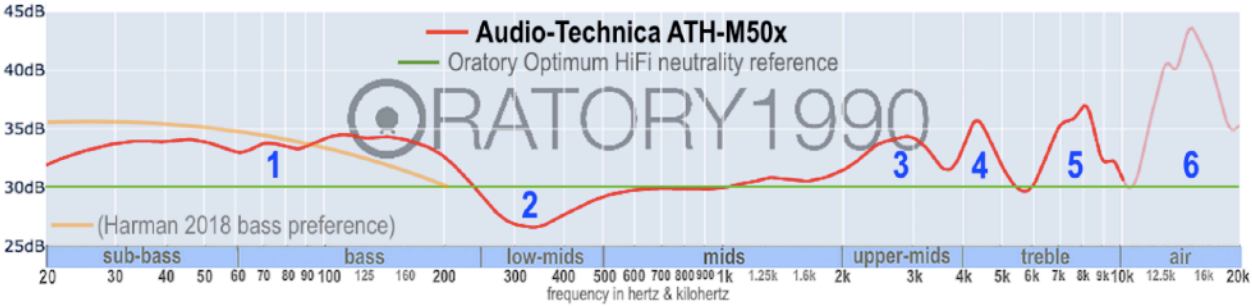

Fig. 2: M50x measurements with deviation areas numbered in blue

1. The red line is well above the green line through-out the sub-bass and bass region. Importantly. however, it plunges down to the green line just at the bass-to-mids transition of 250 Hz. I included the well-known Harman 2018 over-ear headphone target's bass elevation as the orange line on the left for comparison. Some 64% of the population reports a preference for this level of extra bass. So the M50x's boost is quite reasonable. I don't find the extra high-bass plus steeper roll-off to be problematic.
2. The dip just after the bass boost is very common in the better closed-back headphones. As concerning as it might look, in practice it seems to be a non-issue. It seems to be an artifact of dealing with their closed-chamber acoustics. But EQ'ing it out does not seem to make for an audible improvement.

3. The succession of peaks and valleys labelled 3, 4, 5 and 6 are going to affect individuals very differently, due to each individual's particular ear anatomy. None of these peaks is a problem for me, but I have an old man's ears. Younger ears are more likely to have a sensitivity at one or more of these frequency ranges. Upshot is: be prepared to EQ when using the M50x for quiet environment listening.

In summary, only the areas in the 3 and 4 circles represent potential issues of any consequence — and that only for a minority of listeners.

While frequency is the single most important aspect of sound reproduction, other factors also make a big difference.

Noise and distortion

Another potential problem area having to do with frequency reproduction is measured as *total harmonic distortion plus noise* (roughly, any unwanted variation from the original signal):

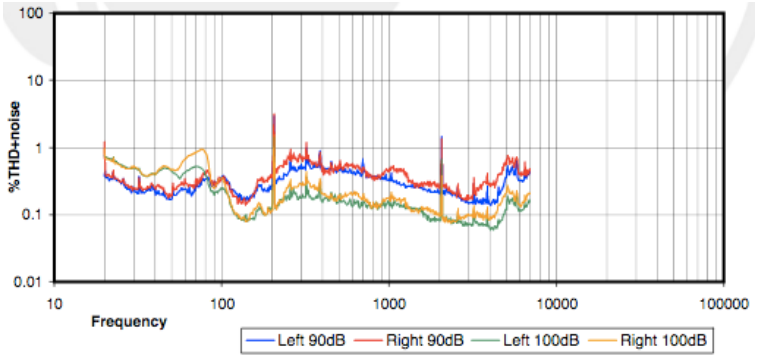

Fig. 3: M50x harmonic distortion (source: InnerFidelity.com)

The M50x measures well below the 5 to 10% threshold for humans to actually hear distortion during music playback. For the M50x to stay so consistently in the same 0.1 to 1.0 distortion range at 90 decibels is highly unusual. It's much more common to see higher distortion in the bass followed by something similar to the M50x following that. In all, this is a very good showing for the M50x. That's potentially important, given low distortion means a greater ability to respond to EQ.

Speed and detail

In this context speed refers to how quickly a headphone can start and stop producing a sound. This is technically referred to as *impulse response* or *ringing*. A faster headphone has greater

accuracy than a slower one in the time domain. A "fast" headphone is not still producing a sound beyond the sound's actual presence in the recording. That said, it's rare that any headphone fails to reproduce the whole auditory range out to at least 20,000 Hertz (20,000 vibrations each second). 1/20,000th seems plenty adequate for sound separation.

Again unlike other headphones, the particular frequency response we saw above in Figs. 1 and 2 has very little negative impact of the M50x's sense of detail. The M50x provides a very real clarity and level of detail across the entire audible range, well above what I expect in its price range.

Dynamics

Dynamics is, at least partially, another time domain property. It refers both to the range from quiet to loud a device is capable of reproducing, and to how well it can reproduce sudden changes in loudness. Time domain measurements are hard to come by, but reviewers are pretty consistent in reporting that the M50x has excellent dynamics as well as speed for its price point. This matches my own experience.

Soundstage and imaging

Soundstage is the ability of speakers or headphones to create the auditory illusion that the sound they produce comes from a larger three dimensional space instead of just from the devices themselves. Imaging is the precision in which sound sources can be located within this illusory space.

Due to some hearing loss in one ear I cannot properly evaluate this feature. Other reviewers are very consistent in reporting that M50x has a small sound stage with a tendency to place sounds left, front or centre with little gradation in between. Some people actually enjoy this presentation as creating a more intimate connection with the recording. But for most people, sound stage is a weakness of this headphone model.

Timbre

The word timbre usually refers to the characteristic sound of one musical instrument vs another. But sound reproduction devices can sometimes have a distinctive departure from naturalness of their own, such as a metallic or plasticky accent. The M50x basically has the natural timbre typical of a non-metallic dynamic driver. But I also detect just the slightest hint of brashness, like a slightly too enthusiastic trumpeter or trombonist in a marching band, grin.

EQ-ability

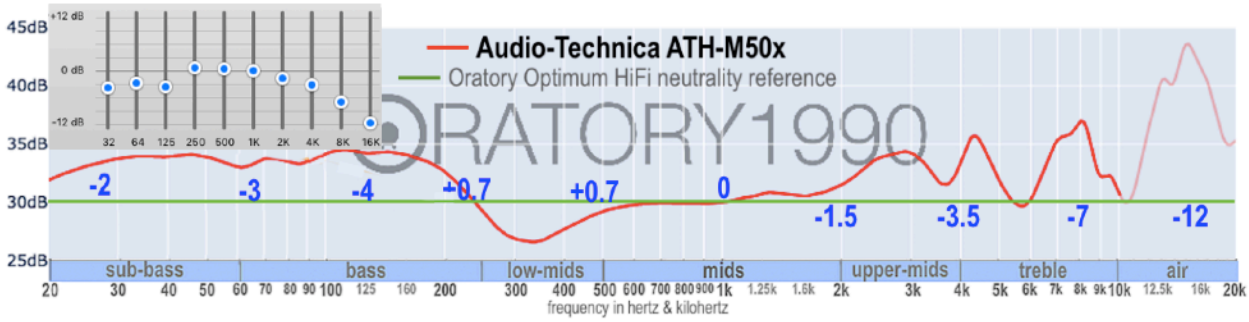

Fig. 4: possible 10-band EQ to neutral for M50x

To achieve a more accurate sound reproduction Figs. 4 and 5 show you can achieve good results using even one of the 10-band graphic EQ tools that tend to be readily available. The blue numbers will bring the M50x close to the neutral green line everywhere except for the dip at 330 hertz and the two humps centred at 3 kilohertz and 4.3 kilohertz. As mentioned, the dip

isn't problematic, and the corrections shown will reduce it to some extent. You may want to adjust either or both the numbers at 2k and 4k if the values shown aren't aggressive enough. But also note that a quality frequency response graph, such as shown in Figs. 4 and 5, is based on a population-average ear anatomy. Your ears will differ from that, so you need to tweak the shown adjustment values, especially at the last two at 8 kilohertz and 16 kilohertz, as needed until an aggregate of many tracks of music sounds most correct.

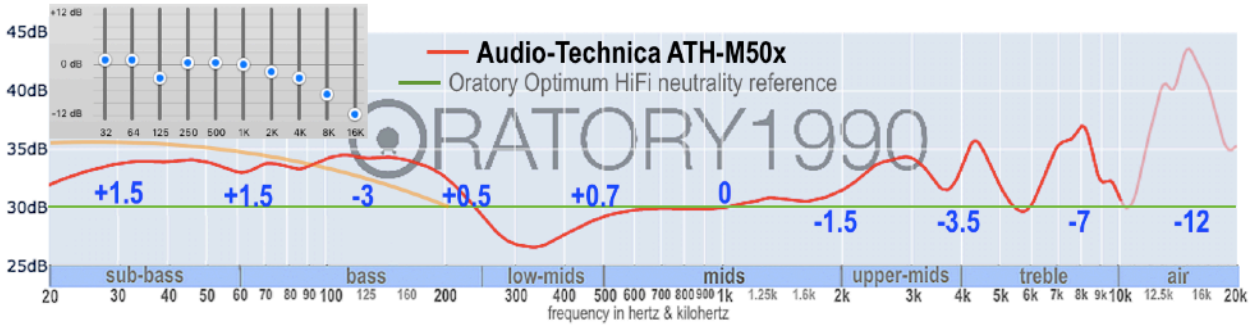

Fig. 5: possible 10-band EQ to Harman elevated bass for M50x

Another consideration, is frequency response change over time as ear pads wear in. For many headphones this can be quite significant after extensive use. However, I haven't noticed a meaningful change even after wearing the ear pads in to the point of shredding their covering as we see above.

Value

At their current retail price (US$150) they *still* represent an arguably reasonable value and continue to compete with competing models from other manufacturers for anyone looking for portability combined with the amount of sound isolation that passive-only noise reduction can provide.

Personally, I use the EQ shown above, along with an Earmen TR-amp and am very happy with what I'm hearing. But I'll never be *truly* happy until Sennheiser/Sonova releases an M50xNR — a headphone otherwise exactly like the M50x, except with the true-neutral frequency response of the HD 560S.

Other resources

Measurements

- Oratory1990: https://headphonedatabase.com/oratory/headphones?ids=146
- Rtings.com: https://www.rtings.com/headphones/reviews/audio-technica/ath-m50x
- Tyll Hersten: https://www.stereophile.com/content/legend-continues-audio-technica-ath-m50x

Miscellaneous

- Tyll Hersten's review of M50x: https://www.youtube.com/watch?v=usjF3XBR6M8
- Replacing M50x ear pads: https://www.youtube.com/watch?v=Hb35CJFTmnU
- Z Review's infamous M50x put-down: https://www.youtube.com/watch?v=ZnOlHAfHfQE&t=361s (may well have kick-started his career)