

DT 1990 PRO Owner's Report

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Summary: this is a premium grade headphone. It is extremely well-built, comfortable, and has excellent sound quality except for a few frequency response departures from neutrality that will require EQ for a minority of owners.

Physical considerations

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

- Over-ear means the ear cups surround the ears rather than resting upon them or in them.
- Open-back means sound is vented to deliberately leak sound to the world surrounding the wearer. But in this case the venting seems to be minimal, so what the wearer hears as a roar when listening to the DT 1990's, others hear as more like a whisper. Conversely however, sounds from the outside world leak into the headphones and do so much more clearly. These headphones are designed for quiet-environment listening, not recording sessions or commutes.
- 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 cone is a titanium-



DT 1990 PRO Owner's Report

coated fabric and the voice coils use beyerdynamic's high-strength (Tesla) magnet technology.

- The DT 1990s have a sensitivity of 102 dB per milliwatt and an impedance of 250 Ohms.

Translation: most, but not necessarily all, smartphones, laptops and desktop computers from the past five to ten years will have enough power to drive the DT 1990 to a (literally) deafening loudness. My iPhone 6S certainly does. Nevertheless, 1990's are designed to sound best given the extra power provided by a dedicated headphone amplifier. Unlike some headphones, they are not particularly amp picky.

No balanced connection option: The single-ended connection cabling will disappoint many headphone enthusiasts, but apparently this is preferred in the recording studio environment they were designed for.

Fit and comfort

As a physical object, this headphone oozes a sense of design and engineering excellence. All load-bearing parts are metal. Yet its 370 grams or 13 ounces of weight, while enough to give a sense of solidity, is not enough to cause most people discomfort or fatigue during extended listening sessions. It has just the right amount of clamp to stay in place on most heads, but not so much as to create any discomfort. The ear cups have enough swivel to automatically adjust to most any head shape.

Adjusting the fit: You didn't read this here. I would never advise you to do anything that might void your warranty. The following just happen to be facts. They may be of interest if you can't achieve a perfect fit. The headband is metal inside the padding. It can be reshaped with an ever-so-slight and gentle pressure to fix the problem. If you feel a hot spot right at the crown of your head, for example, counterintuitively pushing the sides of the headband near the crown a smidgeon closer together, then spreading them apart at a point closer to the ear cups, would be the correct action. A single millimetre of change is typically all that would be needed.

Provided accessories



The DT 1990 comes with a 21 x 18 x 12 cm or 8 x 7 x 5 inch hard but non-rugged, zippered storage case that holds the headphones, both cables and both ear pads.

DT 1990 PRO Owner's Report



It comes with two cables. Both are supple and soft rubber coated. One is 3 meters or 9.8 feet long and straight. The other is 5 meters or 16.4 feet long but coiled so it only extends 4 feet when loose. Both cables terminate in 1/8 inch phone jacks (typically needed for smartphones and portable music players) but come with 1/4 inch adapters (typically needed for external



amplifiers).

Unusually, the DT 1990 also come with two sets of plush, comfortable Coolmax velour ear pads filled with Visco foam. Mine showed no sign of wear or flattening after more than a year of extensive use and only minor wear after two years. Both sets have an opening that tapers from 70 to 60 mm in diameter and 15 mm in depth. That's fine for the majority of ears, but if you have large and/or protruding ears you may want to try before purchase. The ear pad set that's initially installed on the headphones are called balanced and provide a moderate bass boost. The alternate set is called analytical and has only a slight boost. (See Fig. 1, below.)

Ear pad swapping: swapping from one set of ear pads to the other is not a simple procedure. Maybe half of all owners pick it up fairly readily. The other half (including me) find it difficult and frustrating.

Reliability

I can attest that my own pair of 1990s have stood up to daily use with only moderate care for more than two years. But beyond that the build is so obviously solid, with no plastics used for moving or stress-bearing parts, that decades of problem-free use seems almost a given. German mechanical engineering from Leica to Mercedes, however clichéd, has an almost mythical status. These headphones have that same premium physicality.

Sound considerations

Originally the subject of many glowing reviews, lately more scathing ones have appeared. The headphone hasn't changed, so what's going on?

Beyerdynamic headphones have long been polarizing. Many models have excellent build quality and ergonomics. Many have a generally enjoyable sound signature. But many models additionally have a very pronounced emphasis in one or more regions of the treble. This is far from unique to beyerdynamic. AKG is also well-known for this, and many other brands have it

DT 1990 PRO Owner's Report

in at least some models, such as Sennheiser's HD 700 and original HD 800. Sensitivity to this varies widely from person to person.

Frequency response / tonality

Beyond that, the DT 1990 PRO, like many beyerdynamics, has PRO in its model name, reflecting beyerdynamic's wide acceptance in the recording studio world. Beyerdynamic concurrently produced a home-use headphone called the Amiron Home. The DT 1990 PRO has two sound reproduction characteristics that it could be argued were included to make it an analytical tool to highlight potential audio issues, although recording engineers will typically use other tools for that purpose.

Below is a (raw) frequency response measurement graph for the DT 1990 PRO. The measurements were made using professional-grade equipment. I can vouch for its accuracy in matching my own DT 1990.

Don't be put off if Fig. 1 makes you want to run for cover. I'll explain everything you need to know:

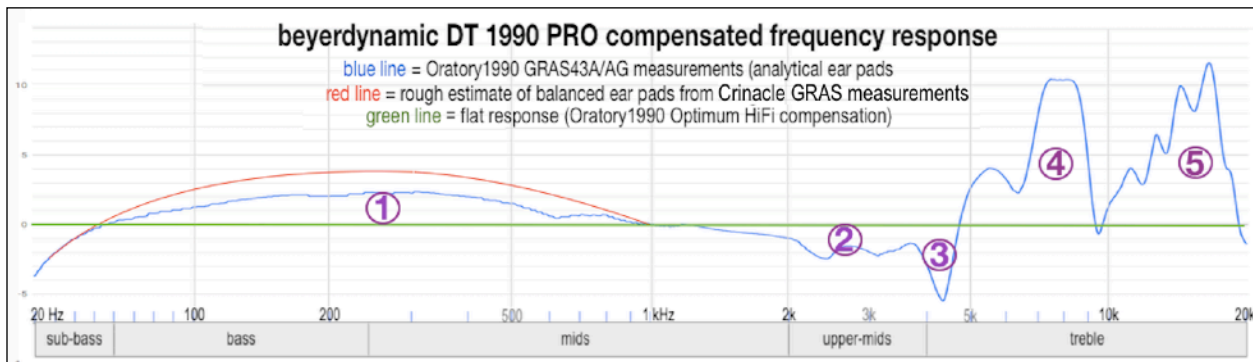


Fig. 1: DT 1990 measurements with analytical ear pads plus a balanced ear pads estimate
(sources: [Oratory Grapher](#), [Crinacle.com](#))

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 blue line is how the DT 1990 actually does measure with its analytical ear pads on. The red line is approximately how the balanced ear pads might measure on the same equipment, which I've estimated from measurements made using other and similar equipment (GRAS). Differences between the two sets of ear pads are minor after 1000 Hz. Just focusing on the blue line, as you can see it departs from the green line in four places I've labeled with circled numbers. Let's examine each of them in turn:

Above the green line. The elevation of the blue and red lines above the green line between 20 and 1000 Hz (1) and again between 7000 and 9000 Hz (4) could be argued to be useful to audio professionals to highlight common issues in these regions (the combined male and female human vocal range). The two decibel elevation of the analytical ear pads peaking at roughly 300 Hz highlights any issues in what sound engineers call the mud region. Similarly, the peak centred around 8 kHz highlights any vocal sibilance. The jagged elevation of the blue line on the far right (5) is less often commented on. But it may well also be intentional to highlight high frequency shrillness. The balanced pads (red line) approximate the even further boosted bass of many mass market headphones that almost always bleeds into the midrange. A sound engineer could theoretically swap pads to check how the current track would sound on such a playback device.

Below the green line. The dip of the blue line below the green line from 1000 to 4000 Hz (2) may be noticeable to some listeners at relatively low listening levels but will be welcome to those who crank up the volume. This is where those piercing electric guitar high notes live, for

DT 1990 PRO Owner's Report

example. The sharp extended dip between 4000 and 5000 kHz (3) is presumably an unintended artifact. Dips are rarely directly noticeable but tend to have a subliminally adverse effect.

Despite the PRO warning in the model name, the DT 1990 continues to sell briskly to non-professionals — who presumably just want to enjoy listening to music. And, indeed, for many genres of music, and given tracks that have had their mud and sibilance content toned down sufficiently, the DT 1990's other auditory goodnesses can carry the day. But to eliminate the recording studio focus on highlighting elevations, the DT 1990 would need to be EQ'd to something like the green line in Fig. 1. However, the elevation of the red and blue lines in the bass region (to the left of 250 Hz) could be left as is, depending on personal taste for bass quantity.

Treble trauma?

I've yet to have anyone young or old try my DT 1990s and notice it, but if the 7 to 9 kHz sibilance elevation proves to be a problem for you and you want to avoid using EQ, you can insert a ply or two of toilet paper into the ear cups. Once you get the dampening you want, you can move the toilet paper to sandwich it between the felt backing of the ear pads and the ear cup interior. Optionally, you can spend a few dollars on the more elegant solution of foam inserts. Amazingly, I found Charmin Ultra Soft toilet paper reduced a fair chunk of the spike I hear, which peaks at 7300 Hz, while minimizing (but certainly not eliminating) reduction of detail in neighbouring frequencies. I have no experience with other products.

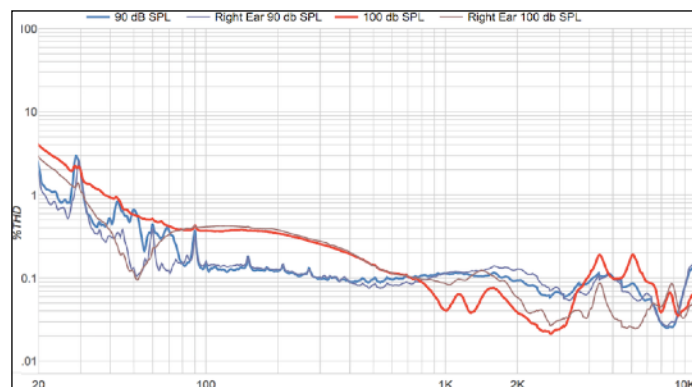
If you don't own this headphone but are considering buying it, you can get some indication whether you have a sibilance range or high frequency sensitivity using the site [Online Tone Generator](#). This allows you to listen to a sound that stays the same in loudness but changes continuously in pitch. Simply move the slider to the right starting at around 5000 Hz and at a moderate loudness. Make multiple passes increasing loudness each time. (Also use the Online Tone Generator to test toilet paper effectiveness — just another marvel of modern technology at your service.)

If high frequency loudness in general is particularly irritating compared to lower frequencies, you likely have treble sensitivity and will definitely want to avoid the DT 1990s for home use. If one or more very narrow ranges of frequencies jump out in loudness, that will either be something intrinsic to your hearing called an *ear canal resonance* or it will simply be an artifact of the headphone or speakers you're listening to. To eliminate the latter you'll need to see whether the same spike persists on more than other headphones or speakers.

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. 2: DT 1990 harmonic distortion (source: [rtings.com](#), but no longer available)



DT 1990 PRO Owner's Report

The DT 1990 measures well below the 12% threshold for humans to actually hear distortion. The higher distortion levels in the bass frequencies may seem concerning, but humans are actually even less sensitive to distortion in the bass than at higher frequencies. In all, this is actually a very good showing for the DT 1990. That's important, given low distortion means a greater ability to respond to EQ ... and how beneficial EQ will be for the typical listener.

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

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 *step response*. A faster headphone has greater accuracy than a slower one in the time domain. The headphone is not still producing a sound beyond the sound's actual presence in the recording. The DT 1990 is exceptionally well-behaved in this regard. The one measurement I've seen is nearly textbook perfect. All 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 is plenty adequate for sound separation.

A common theory is that the sibilance and treble boost of headphones like the DT 1990 give an illusion of greater detail than they actually possess. While this may well be a meme that applies to treble boosted headphones as a whole, the DT 1990's other frequency response issues serves to undo any such gain. The lower mids elevation combined with the upper mids recession serves to take the edge off mid-range sounds, which translates into a slight sense of detail fuzziness. One need only EQ out these issues, then listen to recordings with little or no content in the upper frequencies to determine that the 1990s has the potential to provide a very real clarity and level of detail across the entire audible 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 1990 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. What I do know is that both the young musicians who have tried my DT 1990 immediately commented how much wider and deeper its sound stage is than that of their own headphones. In any case, I have yet to read a review that ranks the 1990s as having a small soundstage or less than average precision of imaging.

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 DT 1990 has the natural timbre typical of a dynamic driver. What I notice instead compared to my other headphones is a particular sense of enhanced clarity and precision.

EQ-ability

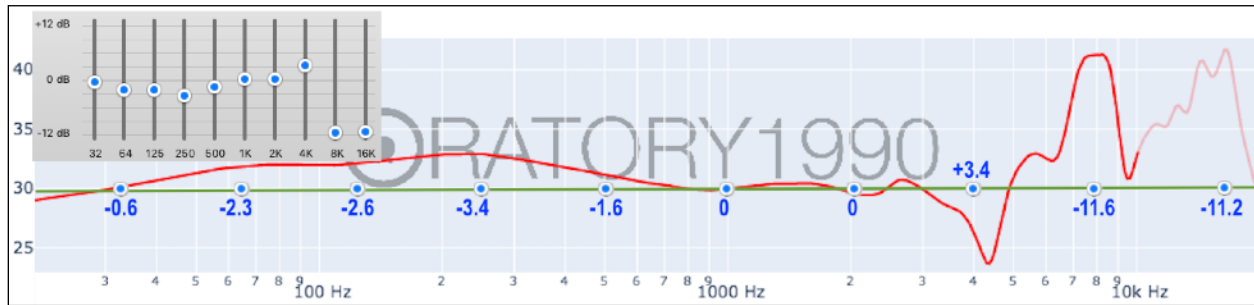


Fig. 3: possible 10-band EQ for DT 1990 with analytical ear pads

As noted, you may well be quite happy simply using the 1990 with either the provided balanced or analytical ear pads and without EQ. But to achieve a more accurate sound reproduction Fig. 3 shows that you can achieve excellent results using even one of the 10-band graphic EQ tools that tend to be readily available. An EQ, such as shown in Fig. 3, is based on a population-average ear anatomy. Your ears will differ from that, so you need to tweak the shown adjustment values as needed until an aggregate of many tracks of music sounds most correct. The corrections at 8 and 16 kilohertz in particular are probably the most extreme values. You can likely get away with much less in those two places.

Another consideration, is frequency response change over time as ear pads wear in. This can be quite significant. But my 1990 has received extensive use, the ear pads are holding the shape of my skull, yet their frequency response remains unaffected.

Value



Not being a sound engineering professional, I can't evaluate the DT 1990 PRO for its intended use case (but see the Grover Neville review linked to below). For home/non-professional use the DT 1990 has a few weaknesses but many strengths. They excel at build quality, durability, comfort, and many aspects of sound quality.

Their current retail price (US\$599) may be on the high side. But certainly at \$500 or less, on sale or used, they represent good value and compete well with competitors from other manufacturers for anyone who is not overly sensitive to treble peakiness but who does value the sheer goodness of physicality these headphones are generously endowed with.

Personally, I use a bit of EQ and love what I'm hearing, while listening with an extra smidgeon of peace of mind that comes from owning something constructed with lifetime usage in mind.

Other resources

Measurements

- Oratory1990: <https://www.reddit.com/r/oratory1990/wiki/index> (analytic ear pads)
- Crinacle: [https://crinacle.com/graphs/headphones/graphtool/?share=IEF_Neutral_Target,DT1990_Pro_S2_\(Balanced_pads\)](https://crinacle.com/graphs/headphones/graphtool/?share=IEF_Neutral_Target,DT1990_Pro_S2_(Balanced_pads))
- Rtings.com: <https://www.rtings.com/headphones/reviews/beyerdynamic/dt-1990-pro> (balanced ear pads)
- DIY-Audio: <https://diyaudioheaven.wordpress.com/headphones/measurements/brands-a-i/dt-1990-pro/> (both sets of ear pads)

Miscellaneous

- Changing DT 1990 ear pads: <https://www.youtube.com/watch?v=JXpuyCIJEPg>

Some reviewers who don't have a treble spike reaction to the DT 1990

- DMS TV: <https://www.youtube.com/watch?v=CSwGfncyq9k>
- Joshua Valour: <https://www.youtube.com/watch?v=Uy3gfOm8kRE>
- Grover Neville: <https://www.innerfidelity.com/content/beyerdynamic-dt1990-pro-headphone-review> (*InnerFidelity is now defunct: go to archive.org then copy InnerFidelity link into the search box to locate this page*)

Some reviewers who DO have a treble spike reaction to the DT 1990

- Chrono: https://www.youtube.com/watch?v=FPeF5_E2ZQw
- Resolve: <https://www.youtube.com/watch?v=nZs6MLjWBIk>
- Metal571 formerly posted a DT 1990 YouTube review but later withdrew it.