April Tech's Files

DO YOU HEAR WHAT I HEAR?

I wake up to strange alien sci-fi sounds from my wife's iPod Touch. I ask her to turn on the radio before she leaves for the gym. Yes, I listen to conventional, terrestrial FM radio - in the bedroom, bathroom, kitchen and car - on average about three hours a day. Making radio sound as good as possible on such a wide variety of 'systems' is both a technical and a political challenge, requiring a range of expertise and diplomacy second only to tax code reform (and mastering).

The broadcast engineer's priorities begin with the minute-to-minute deadlines of live programming, sound sources from around the world and management that wants their station to have a unique sonic personality AND be as loud as the competition. Like our own Mastering Level 'wars,' radio sound has been pushed beyond the 'limit of nice.' A 'good' sound system reveals commercial radio's brute-force solutions that - with the exception of compensating for automotive background noise and considering worst-case junk radios - shouldn't be as necessary on modern sound systems.

While the sound of commercial radio is offensively consistent, the bottom line is that I can listen to Public Radio for longer time periods without fatigue. That said, PR's more neutral, less aggressive approach reveals inconsistencies - especially with 'news' programming - where the voice-to-voice disparity can be frustrating at times. The difference between broadcast and music mixing is that a recording engineer would try to reconcile the disparities between host and guests or between local and network inserts. Radio operators have their hands full - the priority of being live and not missing a cue (and having dead air) is all too great.

WAKE, WASH AND DRIVE

While at home, I listen mostly to news / talk on bass-challenged clock radios that 'accidentally' provide the low-frequency filtering that should be part of the host mic's signal chain. My car has respectable bass response that can make music a pleasurable experience, until the DJ / host comes on stronger and muddier than two boys playing in the spring thaw. I'd rather not sacrifice bass notes for host clarity – that should be done at the station - and I'd also rather not be grabbing the tone controls while driving. For music, I generally listen with the Loudness ON and the tone controls set to 'flat.' (For commercial music programming, I'll reduce the treble by as much as 4dB adding a similar amount of bass.)

My three-hour daily airwave diet has generated a punch list of potential sonic improvements for all broadcasters, the 'research' for which is detailed in the **Sidebar** – **Blinding You With Science**. The issue in a nutshell is the spectral disparity between talk and music. **Hosts should not have more low frequency energy than a bass guitar or kick drum.**

UNNECESSARILY UP CLOSE AND PERSONAL

Everyone loves to work a mic's proximity effect for warmth, but this also generates excessive low-frequency energy that confuses dynamics processors into pushing the level down - and reducing intelligibility in the process. These FIVE bass-ic challenges explain why compressors 'see' bass better than we hear it. 1.) Human hearing is bass deficient. 2.)

Extended low-frequency reproduction requires large woofers. 3.) An acoustic space that supports low frequency response is the exception. 4.) Monitor position is optimized for convenience first and rarely for best response. 5.) Powered Monitors should have the ability to compensate for the previous four challenges, not just to achieve 'flat' but to include a feature that consumer / HiFi systems have had since the fifties – a Loudness button, or better yet, Loudness compensation integrated into a monitor level controller. (Blasphemous and well outside the box, I know.)

Based on the data compiled below, I would like to suggest that broadcast engineers encourage hosts to increase their distance from the mic to at least twelve inches (about four inches or a fist more than pinky-to-thumb). A high-pass filter should be applied to remove sub-sonics below 80Hz, followed by a shelving equalizer to reduce low frequency energy below 160Hz. The host mic should be gently compressed so it can be competitive with heavily processed music (our industry's most egregious faux pas, followed by auto-tuning). If possible, try inserting EQ into the vocal compressor side-chain (a broad, mid-range boost centered between 2.5 kHz and 3 kHz).

SIDEBAR: BLINDING YOU WITH SCIENCE

In order to back my subjective experience with a modicum of science, I enlisted the services of a local experimental Pirate Station – Radio R. With it came a luxury that few broadcasters have - the ability to interrupt programming to transmit and measure test signals. The 'data' collected from these 'measurements' should provide some insights.

Two bathroom radios revealed a useful 'low' frequency response down to 240Hz and 320Hz, the resonance far each respective box was 440Hz and 535 Hz. Add in a bathroom's longer reverb time BEFORE the shower obliterates intelligibility and the sonic muck becomes considerable. Similarly, the noise level for a car at idle was 70dB SPL (C-weighted, slow response), the noise increases with additional RPM and MPH. The reference audio level was set at 85 dB SPL for local MPR talk / news programming. MPR's contemporary music channel (The Current) was 2 dB higher (87 dB SPL) than reference and Commercial radio was 4dB higher (89 dB SPL).

With the Loudness button ON, the car radio had useable response down to 42Hz - this is just above an open E on electric bass. The Loudness Control did its job for the first two bass octaves by adding 10dB @ 42Hz, but only 1dB @ 168Hz. This is completely different from, and independent of, the Bass Equalizer, which easily affects frequencies up to 500Hz. (Bass and Treble EQ is plus or minus five steps in each direction, about 2dB per step.) Loudness ON revealed the vehicle's mild low frequency 'resonance' bump at 120 Hz, where 'mud' lives.

LET'S TAKE A LOOK AT HOW RADIO DOES IT

I approached two Public Radio Broadcast engineers with questions - and my wish list - to see what life is like on their turf. Both engineers were ready and willing to provide perspective, receive listener feedback and even agreed to take my suggestions into consideration.

Peter Bombar, the Technical Production Supervisor at WUNC (North Carolina) explained that what technicians might view as obvious proximity effect, a host might hear as "warm," which projects to their listeners as "appealing," just like a recording artist's need to be comfortable with their sound. The microphone on Dick Gordon (host of "The Story") is a Neumann U87. Frank Stasio (host of "The State of Things") favors of an Electro-Voice RE-20

as do Joe and Terry Graedon (hosts of "The Peoples Pharmacy"). The signal path for the U87 is an analog Wheatstone console with no EQ or compression, directly to Adobe Audition, using Genelec 1030A reference studio monitors.

For a program like "The Story," the majority of the interviews are through an ISDN system from remote studios that vary from "very good" to "very not so good." Peter explained that his hard working staff must meet daily deadlines, placing the emphasis on achieving a meaningful and purposeful interview over allowing time for "mastering" or equalizing various source material.

Kyle Wesloh is manager of Production and Operations at Minnesota Public Radio (MPR) / American Public Media (APM), where their host mics are the Electro-Voice RE-20, the Shure KSM-32 (with “Popless VAC” windscreens), plus a vintage Neumann U-87 (for national shows). Regional host mic settings (with or w/o high pass filter) are flat (no EQ, no Compression). National programs use Great River Pres, Great River EQ and Cranesong Compression. Settings are unique to each host. All of their shows use the Axia Element modular console. Both engineers must maintain consistent operating levels as set by APM, NPR and PRSS (National Public Radio and Public Radio Satellite System), some of which can only be truly achieved in post-production.

Extended interviews will be available online upon engineer approval.

OUTRO

It can be argued that radio is not for golden-eared audiophiles - of which I am not - but I do believe it's possible to raise a station's low frequency energy awareness simply by having ONE full-range system in house. Studio monitors with 6-inch woofers are amazing for their size but are down 6dB (or worse) at 47Hz, when at minimum, they need to be up by that much.

NOTE: At AES, one monitoring system impressed me over ALL others - the Grimm Audio LS1 (that I would love to review).

These suggestions are intended as a starting point (salt and pepper to taste). For those concerned about maintaining warmth, the primary point is that target audiences listening on a minivan or clock radio may not - or should not - hear the EQ changes. By making corrections and / or presets to tackle the more egregious daily 'problems,' the other processors in the signal chain can do a better job - with less gain reduction - while improving intelligibility and level consistency ALL without sledgehammer signal processing. Once the host mic's excessive low frequency energy is tamed, the multi-band processor can be readjusted to restore warmth (but not rumble or mud) to the overall program. Who knows, it might even improve ratings...

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