

# That pesky peak meter

Having sent Becky and Fred away on honeymoon bliss, **BOB KATZ** has got the place to himself and takes the time to ask if we should peak to full scale to fill up all those bits.

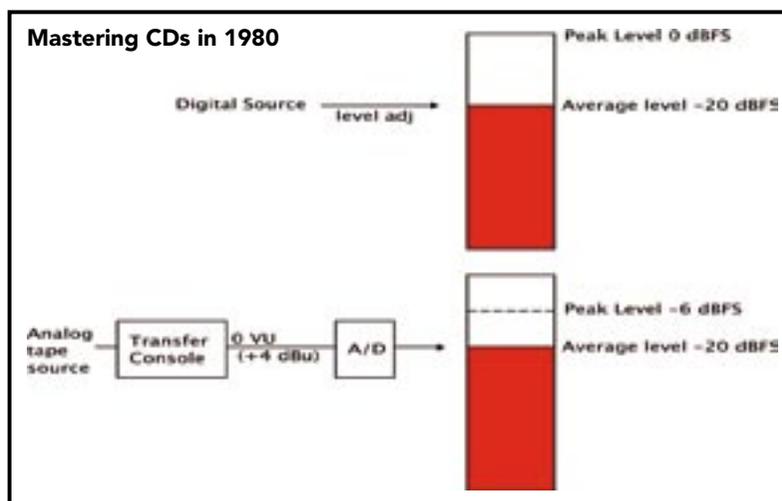
**R**EADERS TELL ME they've received advice to peak levels to full scale so they can 'take advantage of all those bits'. This is totally unnecessary with 24-bit recording; you would have to reduce the level of a 24-bit recording by 48dB to arrive at '16-bit resolution'. So there's plenty of room at the bottom. A 24-bit recording peaking to -10dBFS still has 20 to 30dB better signal-to-noise ratio than the analogue recordings of the past.

A good reason not to adjust gains for peak is that mic preamps and line amps that are maxed out tend to be noisier; total system gain structure will more likely be optimum if you adjust gains closer to unity. The next reason is that components with filters, such as equalisers, converters, codecs (e.g. MP3, AC3, DTS) and broadcast processors introduce intersample peaks that are above the level shown on a standard peak meter. I recommend that in all stages up to mastering, you should allow at least 3dB headroom for intersample peaks so the recording will not distort down the line. Because of the current state of level 'competition', in mastering I do peak to full scale but I use an oversampled peak limiter that prevents intersample peaks. Please reserve bus-peak limiters for the mastering stage; they almost always make the sound worse and distortion accumulates.

When mixing, use a VU meter calibrated to -20dBFS, leave yourself 20dB of headroom and don't worry about the peaks, which will never overload. Working to -20dBFS average, you will discover a new freedom in mixing. Liberated from the meters you can concentrate on the mix clarity and fullness. You can mix with your eyes closed with no fear of overloading. Many newcomers may think this a crazy idea — how can you mix rock 'n' roll if you can't compress? But I'm not suggesting that you turn off your compressors — by all means keep the compressors that help get your 'sound'. I simply suggest that you can remove all sound-degrading 'protection' devices.

If you must deliver this mix to clients who do not understand what a raw mix sounds like, first try to educate them that a mix is not a master, teach them how to listen to raw mixes. In the old days, clients knew what raw mixes sounded like but often today they have unrealistic expectations. If you are concerned that inexperienced clients will panic just because they have to turn up their volume control, then try to make a 'fake mastered' reference for them. Don't make the fake master any hotter than necessary or you will complicate the mastering engineer's life by adding false expectations. Then send the unprocessed mix for mastering.

Back in 1980 we did not have digital compressors, equalisers, or limiters. There was no competition for level; no one was pressuring us to get the loudest CD. We were lucky that we could reduce level in the DAE-1100 digital editor. If we needed to raise level we had to pass through an analogue gain stage, which we avoided if possible. Analogue tape sources went through a transfer console,



adjusted to 0 VU and then passed to the PCM-1610's 16-bit A-D convertor as seen in the diagram.

Audio level was referenced, or 'normalised' to 0 VU = -20dBFS (calibrated with a 1kHz sine wave). Note that in the good ol' days we often let the peak level of the analogue tape fall where it wanted, which in this picture is 'only' -6dBFS, due to the tape's lower crest factor. Despite that, our transfers from analogue tape sounded just as loud as digital sources peaking to full scale, because the VU meters read the same.

So, even though we all know that the VU meter lies and cheats and steals, there's one thing it does much better than the peak meter and that is regulate the average level. In the halcyon days of LPs, average levels were very standardised; I could put an audiophile LP on the turntable and then switch to Simon and Garfunkel, and probably not have to move the volume control. Try that with two arbitrary CDs made today and you'll probably jump for your volume control.

One of the earliest PCM adapters made by Sony, model 1610, had digital peak meters with a scale marked +20 at the top. 0dB was supposed to be aligned to 0 VU (+4dBu), that was the original design of the system. By this simple artifice, Sony made it clear to us digital pioneers that full scale (+20) was supposed to be the 'unattainable' level that you hit only on rare occasions.

As the first CD jukeboxes appeared, with no user volume control, the clients started asking 'can you make my master louder?' For better or worse we

obliged. The first thing we discovered was that there was some peak wiggle room for the analogue tapes so we boosted their level to reach full scale. As soon as we began to normalise all masters to the peak, this created an automatic loudness discrepancy of about 6dB depending on whether the source was analogue or digital tape. The VU fell by the wayside. Now the clients wouldn't tolerate having their digital sources lower in level than their analogue tapes and so we had to invent digital compressors and limiters, and then we were off to the downhill races.

Welcome to lawless Digital Dodge City, 2005. Between 1980 and 2005, average CD levels of pop works rose by more than 16dB! Reissues are frequently remastered with excess compression so they fit on the CD changer along with current releases, and thus they usually sound much worse than the original versions. We have absolutely no standard for level (recordings' average levels now vary by as much as 20dB!) and mastering engineers are resorting to using severe clipping to push the average level nearly to full scale! Say, why don't we record square waves instead of music — a square wave has RMS value above full scale! It's getting so bad that even classical clients are wanting their recordings to be louder. But loudness comes at a price; extra loud masters are distorted, irritating,

lack impact, clarity and depth.

Don't you wish those wise Sony/Philips inventors had standardised on an average level for the CD? Please, Sony — you got us into this mess, now help us get out of it. Every new release medium you invent will be ruined in the same way as the compact disc unless we find a way to enforce an average level standard.

Here's my simplest suggestion: the new dual-disc, a hybrid DVD-CD, could become our saviour. The patent-holders could make a rule that the average levels of comparable material on each half of the dual-disc must match within a couple of dB or the master would be rejected at the plant. The ostensible reason is for sonic consistency, so that listeners will not be jolted by level differences between the DVD and the CD halves, but my ulterior motive is that it will encourage CD producers to lower their own levels in deference to the superior sound quality of the (hopefully) less-compressed DVD half. Mastering engineers doing dual-layer SACDs tended to follow this practice. Pass this idea on to the corporate parties in charge! ■

## Information



Resolution recommends Bob Katz's book *Mastering Audio — The Art and the Science* as an essential source of information for every pro audio enthusiast who cares about sound. You can buy it on line at [www.digido.com](http://www.digido.com)