



# FORUM

Conducted by Neville Williams

## HIFI DYNAMIC RANGE — Sacred cow, or is it a bull?

It is commonly assumed that, for a devotee of hifi sound, happiness is a recording which preserves the full dynamic range of an especially dynamic performance. In fact, such a recording might prove more of an embarrassment than a delight in a home situation.

Let's begin with a word picture of some memorable orchestral concert — an appropriate conductor and orchestra, an appropriate work, an appropriate venue, an appropriate audience. The lights have dimmed, applause has faded into an expectant hush, and the performance has begun.

For much of the time, in what follows, the music proceeds at a median level, neither notably loud or notably soft; but there are moments of high drama, in the musical sense: the lonely sound of a single instrument, muted chords on the piano, the tiny tinkling of a distant cymbal. The audience strains to hear, for the most part expecting those exact phrases. For some in the auditorium, the expectation may well have more substance than the actual notes!

### MAGIC MOMENTS

But there are other times when the orchestra unleashes a veritable fury of sound. The conductor demands and the players give, with all the intensity of which they are capable. The adrenalin races and the entire audience shares in those magic moments of sonic — and visual — exhilaration.

There is no concern about how loud the sound may be — or how muted at other times. Outside, there are cars and trains; people going about their own affairs. That's another world.

Here in the auditorium, music is the only thing that matters.

Then, it's all over. The audience shuffles through the exits, exchanging remarks and pleasantries, still in the after-glow of an experience which they have just shared. If only that experience could be translated into the domestic living room per medium of a recording and

a hifi system . . .

But, somehow, it can't be!

This is where the hifi technocrats and techno-salesmen are likely to buy into the situation, with a masterpiece of oversimplification.

It's basically a matter of dynamic range, they say. Once that limitation has been corrected with the aid of Dolby, dbx, digital or ditto, rapturous radiant recitals will be recreated in routine rectangular rooms!

Then follows certain conventional wisdom:

- In an orchestral performance, the ratio between the loudest sound and the most subdued sound, expressed in decibels, is about 100. (A suspiciously "nice round figure".)

- This is a much greater ratio than can be accommodated on recordings normally accessible to the public. Peak level signals may saturate the master tape, or overmodulate the record groove, or both. Low level signals may disappear into the background noise of the overall system: tape, disc and amplifier.

- The dynamic range for ordinary commercial discs and cassette recordings is about 60dB. Poorer quality recordings may be nearer 50dB, while notably good recordings may achieve 65 or even 70dB. But any of these figures are short of the requisite 100dB, imposing on the musicians or the recording engineers the obligation to boost the softer passages or limit the louder passages to fit the constraints of the system.

- These constraints rob recorded music of much of its drama and spontaneity. When we can get from tape and disc what actually happens in a concert hall,



music in the home will really come alive! I wonder?

The first major flaw in this rather simplistic line of thinking is that original performances are themselves seldom above criticism in respect to dynamic range. Certain aspects of many performances may need correction, not preservation!

### EXPERT OPINION

In saying this, I am supported by the experience of our resident reviewer/critic, Julian Russell, who has attended more classical concerts, for more years, in more venues around the world than a whole lot of us put together. My question:

"In concert performances, do conductors and musicians always get things right in terms of dynamic range?"

"Certainly not. Some of them play too loudly and make the work sound coarse and brash as a result. I was only talking about this recently, over dinner, with . . ." (a conductor of international repute).

"Do they ever play too softly?"

"Again, yes. They can over-estimate the carrying power of softly played notes. For example, the celeste can be a problem instrument in some venues."

"We are talking about errors of judgement?"

"Yes!"

"How would they come about?"

"Well, conductors are involved with different works, different orchestras and different venues, with an enormous variation in building acoustics. All the time the conductor has to translate what he hears on the podium into what he thinks the audience will be hearing in various parts of the auditorium."



"I guess so."

"And think of the conductor who spends part of his time with opera. The sound projection from an orchestra in a pit is quite different from one on an elevated stage."

"It would have to be."

"And there's another point: if a conductor wants to listen to the sound from the auditorium, he can only do so during rehearsals, when the place is empty. He has to guess what it would be like with the seats occupied."

What emerges from all this is the dubious wisdom of basing system requirements on the most way-out readings obtained or deduced from live orchestral concerts.

Let's at least make sure that the performances we are talking about – and seeking to preserve – are musically valid in the first place: not misjudged or vulgar in the fortissimo passages; not below audibility, at the other extreme, for a significant proportion of the audience.

## THE ENVIRONMENT

A further point was referred to earlier: the significance, in a concert situation, of the environment and the visual contact between the performer(s) and the audience. The sound which is natural to that situation may not be optimum when the environment, the audience and the visual clues are stripped away – even allowing for the listener's imagination.

Audio-only is a quite different stimulus, with different implications, and these may well include careful re-thinking of dynamic range.

Particularly would this be the case when, as normal, recordings are played in a home situation. Listening rooms have an ambient noise level of between 30dB SPL (very quiet) to 40dB or more SPL (typical).

Let's say that, having acquired a fabulous new recording with a fully exploited 100dB of dynamic range, we preset the volume control of the amplifier so that the softest passage is barely audible.

This done, we settle back, determined not to negate the eagerly awaited experience by twiddling knobs.

By definition, during the next 10 or 15 minutes, the sound level in the room is going to hit 130 or more dB SPL, which is nudging the pain area.

(I am assuming that the amplifier and loudspeakers are equal to the task – and that's quite an assumption in itself.)

That kind of sound may be fine for hermit members of the Dynamic Range Intact Preservation Society (DRIPS). But most of us are ordinary citizens with ordinary families and ordinary neighbours, who may not generate instant enthusiasm for the full range of the "1812 Overture" or the "Rite of Spring". These unfortunate, deprived folk may even get quite upset by anything more than about 110dB SPL in our listening lair!

To be practical, the most suitable recordings for home listening, even serious home listening, are those which are compatible with home listening conditions, irrespective of how they relate to concert situations, real or imagined.

In fact, I can't escape the conviction that, in terms of dynamic range in domestic sound reproduction, the hifi industry has already arrived. There may well be room for refinement and greater consistency but we are already experiencing as much dynamic range as we would want to cope with. More will simply be an embarrassment, both sonically and electrically.

Digital mastering can now cope with a dynamic range of 90dB as a matter of course. The normal procedure is to set up the microphones, adjust the levels during rehearsal and record the ultimate performance without touching the panel controls. This would suggest that the dynamic range of a fully rehearsed orchestral performance is comfortably below 90dB, as distinct from that "nice round figure" (including errors of judgement) of 100dB.

I note also that the promoters of the dbx system of noise reduction quote a figure of 90dB.





## FORUM — continued

(Don't be tempted to dismiss that 10dB as a quibble. Apart from anything else, it would diminish by a factor of 10 the demands made on the amplifier and loudspeakers.)

What of the best analog discs?

It is now commonly accepted that the top grade analog discs — digital mastering, half-speed cutting European pressings, etc — are way ahead of that other "good round figure" of 60dB. One recent research program puts the figure at 88dB, assuming full groove geometry and a high trackability cartridge. dbx processing of the disc could extend this even further.

And, having reviewed many recent audiophile records I, for one, am prepared to cry: "enough, enough!"

As it is, I have to silence the ticking of the antique clock on the mantelshelf, and avoid Thursday evenings, when late shoppers are on the move outside. I also have to avoid those other occasions when members of the family want to study or sleep or use the telephone.

Either that, or I have to keep nudging the volume control thereby negating what the recording engineers have already achieved.

### THAT MAN AGAIN!

Elsewhere in this issue, in the record review columns, Julian Russell registers his reaction to a couple of recent CBS digital releases and the same message comes through. As a long-time concert-goer, he has no sympathy whatever with the cult talk about ever more dynamic range. Whatever is on the CBS discs is adequate, to say the least. More than that would be a positive liability, according to Julian.

In saying all this, I am not criticising noise reduction or digital techniques or the PCM (pulse code modulated) video-style discs that are around the corner. If, by such methods, we can acquire the capacity to accommodate 100dB or more of dynamic range, that is all to the good.

It will give recording engineers the latitude they need to keep the music consistently above the noise floor of the system, and consistently below the overload level on transient peaks. NR systems and digital mastering have already made very useful contributions towards that objective.

But the ability to eliminate noise and accommodate the sudden transient is a



(From "About Your Hearing" — G. A. Briggs.)

quite different thing from stretching the pianissimos and the fortissimos all the way from the inaudible to the unbearable!

### EFFECT OF AGE

Let me add one more thought that is particularly relevant to those who have left youth behind. The following figures are taken from the book "About Your Hearing" (G. A. Briggs) and are based on a test of 326 males and 319 females from a rural area in Scotland, conducted by the British Medical Research Council.

At the comparatively low frequency of 250Hz, average hearing loss was shown to be 3dB at 40 years, 5dB at 50 years, 7.5dB at 60, and 10dB at 70.

At 2kHz, the losses were respectively 5, 7, 10 and 15dB. At 6kHz, the figures were -8, -14, -20 and -33dB. The response at 8kHz was, of course, further down again. It was pointed out that hearing loss would have been significantly greater among people who had been exposed to industrial noise or medical trauma.

In terms of the musically significant threshold of hearing, this probably means that the average Australian adult has to think in terms of a loss of acuity ranging from about 5dB at age 40 to 7dB at 50, 10dB at 60 and 13dB at age 70.

What this adds up to is a diminishing ability, with increasing age, to cope with wide dynamic range, particularly in the home.

A younger person may set the minimum level at about 40dB SPL and, with a dynamic range of 80dB, end up with maximum SPL of 120dB.

An older person may have to advance the volume control to gain an extra 5, 10 or 15dB to hear the soft passages. That would push the loudest passages to 125, 130 or 135dB SPL — probably sufficient to distress the listener, the family, the neighbours — and the amplifier!

To expand a phrase used earlier:

In respect to dynamic range, enough is enough, even for the young but especially for the not-so-young!