

3
Why Flat
Response?

4
How Can
You Tell?

8
Importance of
Time & Phase

9
Evaluating
Time & Phase

11
Minimizing
Stored Energy

13
Evaluating
Energy Storage

16
Importance
of Bass

17
Evaluating Bass
Performance

19
Thiel CS2.4
Review

25
Interview with
Jim Thiel

35
Interview with
Richard
Vandersteen

46
Engineering
Double Standard

Speaker Measurements

Objective Gauges of Fidelity

This Journal will explain how to interpret speaker measurements so you'll know what the test results mean and what they can tell you about a product's potential for accurate performance. These objective measurements can be very valuable to consumers because they show which products to avoid thereby narrowing the field of contenders and minimizing the number of components you'll have to audition.

Objective measurements don't tell the entire story of course, and they raise the age-old questions about objective versus subjective product evaluation.

The Debate

A debate we encounter frequently in audio involves the validity of "objective" versus "subjective" evaluations. You'll notice that I have enclosed both terms in parentheses. That's because neither word has an exact definition when it comes to audio, and it's easy to become involved in a semantic argument that simply diverts attention from the real issue. Objective usually means an evaluation based on repeatable "scientific" tests. Subjective usually means an evaluation based solely on the emotional reaction of the reviewer. Ah, if life were only that simple.

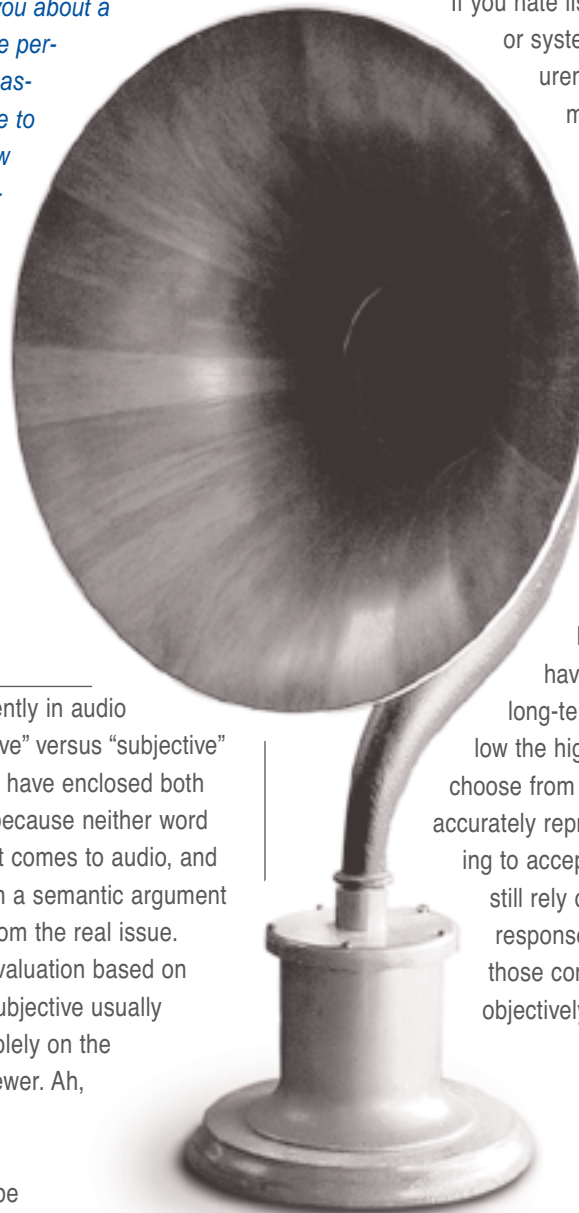
In reality neither method can be employed alone in order to come to sat-

isfactory conclusions about audio components. I'll offer examples in an attempt to explain why.

If you hate listening to a component or system, no group of measurements can magically make that experience enjoyable. On the other hand, if a component or system is demonstrably inaccurate you'll learn to hate it sooner or later (based on my experience) when you learn how to hear the flaw(s) that may initially have gone unnoticed.

I'm convinced that you have a far better chance for long-term satisfaction if you follow the high fidelity approach and choose from those components that accurately reproduce the signal according to accepted standards. You can still rely on your subjective responses as you choose from those components which are objectively accurate.

We live in a touchy-feely world and many will try to convince you that "if it sounds good, it is good." While there is



an element of truth here, there are objective measurements to gauge fidelity and many will try to ignore this fact or downplay its significance. Why do they do this? Because in a world where no objective standards exist, anybody can be a “designer” and everybody is an “expert” or qualified “reviewer.” Where would all these pundits be if they were forced to learn something about engineering?

Semantics

An argument about the meaning of the words can divert attention from the real issue. That issue is deciding which method of component evaluation produces the most satisfactory results.

What’s objective? A conclusion based solely on “facts” perhaps? Whose facts? Which facts? Can we come to a truly objective conclusion based on only a few selected measurements (facts)? If so, which ones count? Among those that count, which are most important? Do measurements reflect all the facts we need to examine in order to come to a satisfactory conclusion?

And what’s subjective? A position based purely on emotion? Is the emotional response of the examiner a faulty basis for conclusions? Isn’t an audio system designed solely to produce an emotional response in the listener?

I can always identify my wife’s voice and usually identify the

brand of piano playing. Doesn’t that make me a skilled listener who doesn’t need measurements as a guide? On the other hand, couldn’t I be fooled by products with colorations complementary to my wife’s voice and pianos?

If a certain coloration reminds me of a certain kind of music some of the time, isn’t that enough? However, if I like a certain coloration won’t my listening be limited to a genre that benefits from that coloration? If I listen exclusively to that musical genre does it matter that measurements may show that the sound I enjoy is not accurate? If I hate listening to an audio system will my opinion change if I’m presented with a set of impeccable measurements?

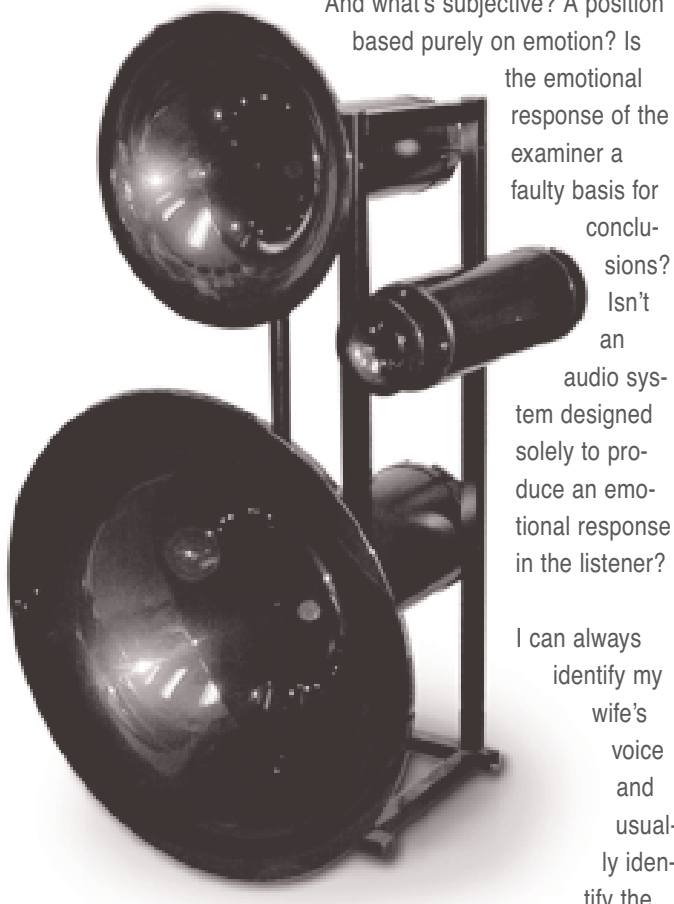
Extremes

Must we choose between these extremes or is it possible to combine the best elements of both objective and subjective evaluation and arrive at the most satisfactory conclusion?

I believe that it is not only possible but absolutely necessary in order to reach musical listening nirvana. I think we need to select those audio components and systems that provide emotional satisfaction from among those that are demonstrably accurate according to accepted standards. Accepted standards include, but are not limited to, reasonably accurate measured performance.

Yes, Virginia, Facts Exist

Facts are simplistic, but they can be very useful. They don’t necessarily demonstrate the value of something but they sure can help to expose a fraud. This **Journal** will explain speaker measurements and show their value. This knowledge won’t provide a substitute for personally auditioning components but it will narrow the field. Objective measurements can’t tell



you everything about how a component or system sounds but they absolutely can tell you when the search for accurate reproduction is hopeless.

Why Are Certain Facts Important



In this issue I'll explain why certain performance characteristics are important for the accurate reproduction of recorded music. These articles will offer my opinions and illustrate

the logic that led me to these conclusions. Then I'll explain how to tell which transducers provide these characteristics and which ones can't possibly present an accurate reproduction of the recorded information.

How Do You Tell Which Products Work?

After each of the articles that describes desirable performance attributes there will be an article that explains how these attributes can be measured and how you can interpret the measurements. Yes, objective facts exist and they can be of value to you.

Also In This Issue

Shane Buettner reviews the Thiel CS2.4, an outstanding, high-value speaker system. And we'll present my interviews with Jim Thiel and Richard Vandersteen. [APJ](#)