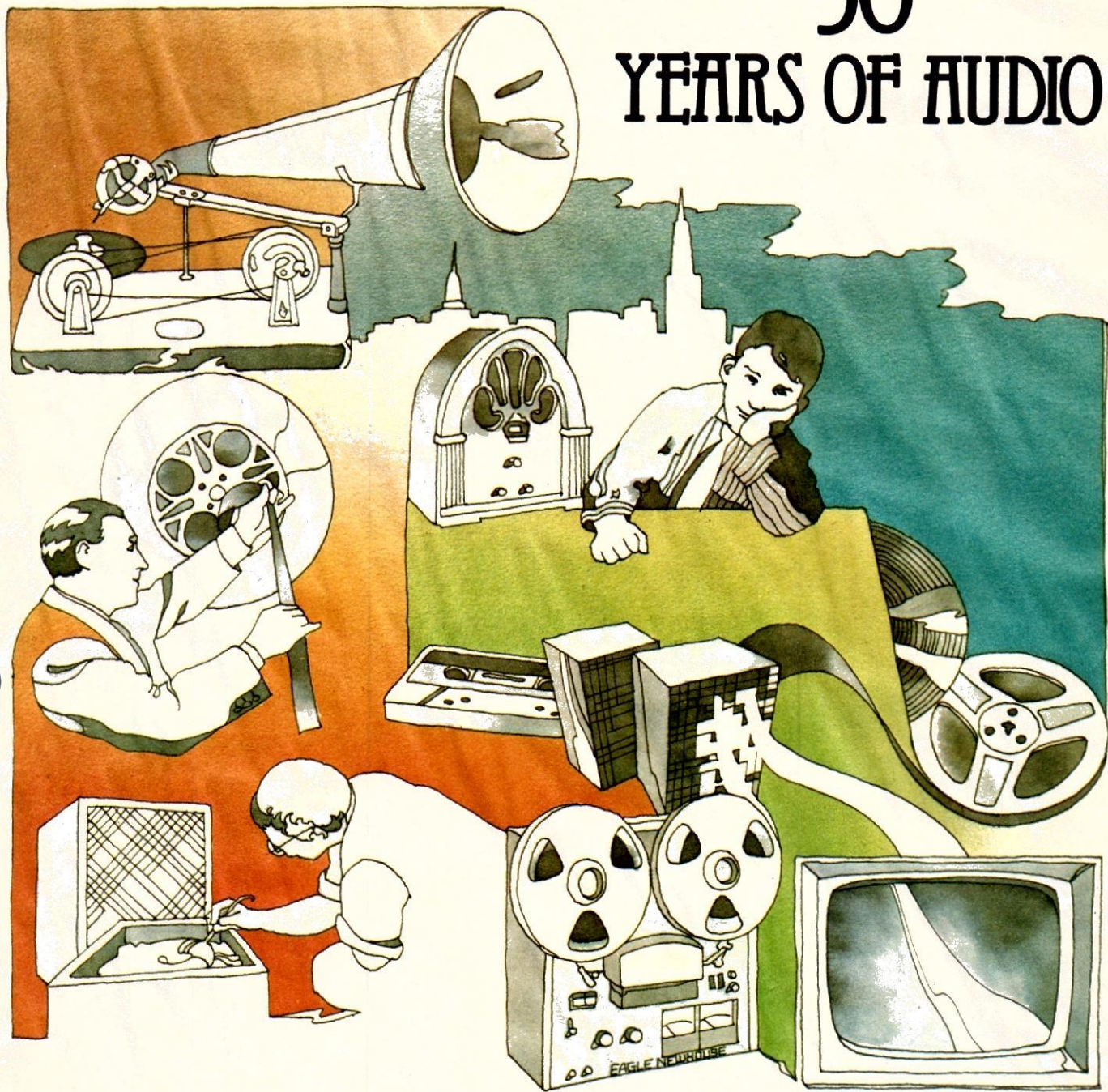


# 30 YEARS OF AUDIO



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## Norman Eisenberg

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My first exposure to the term "high fidelity" came in a phrase used in a broadcast station break picked up on an old AM radio I owned as a kid in pre-World War II days. It went, I think: "This is WNYC, the high fidelity voice of New York City." In that time of pre-FM, pre-tape, pre-LP, pre-pushpull amplifiers, pre-everything

innocence, the word "fidelity" had vague connotations relating to insurance companies or marital commitment. As for *high fidelity*, I fantasized some arcane goings-on high up amid the towers of lower Manhattan, perhaps having to do with poking futuristic structures into the clouds and heavens in pursuit of ethereal vir-

tues into which I had not the least technical insight but which I assumed had something to do with a devotion to good music and good sound. Later I learned, at G.I. radio school, that "fidelity"—together with selectivity and sensitivity—was one of the general hallmarks by which radio performance was judged. But high fidelity, as



related to audio reproduction of music, was a term not widely heard in the 1940s. It had not yet become anything like the major sweep that rolled over us in the 1950s, although interestingly enough Harold A. Hartley, the British audio designer and author, claims to have used the term "high fidelity" in 1927 to describe a speaker he (and the late P. K. Turner) had developed. In any event, the term remained relatively unknown until its first surfacing in advertising copy in 1934 when the best-made recording had perhaps a top frequency of 8,000 Hz and most phonographs of that day had a high-end response that went no better than perhaps half-an-octave below that.

Actually, the durability of the concept and its being firmly rooted in musical values is perhaps best suggested by the story of Giuseppe Verdi's encounter in 1889 with an early gramophone being delivered for demonstration before the *Academie Française*. Verdi was persuaded to play the piano and sing his *Ave Maria* into the device. When the results were played back, Verdi exclaimed: "My God! What fidelity."

If we analogize software and hardware as egg and chicken respectively, the debate can go on ad infinitum as to which came first, which was responsible for the other. Without a doubt, both have interacted endlessly but my reading of the major trends in hi-fi (to use the abridged phrase that Hartley once termed "pure, unadulterated Americanese") gives a slight edge to software, or at least to the promptings and thrusts from program-oriented sources, as the prime motivator. Be that as it may (and I allow that many audio-minded will feel it may not), a good deal was going on during the 1930s and 40s that came to bear on hi-fi sound. To detail all that here would be impossible, but some of the highlights included the growing sophistication of sound for the film industry, the invention by Edwin Howard Armstrong of FM radio, the experiments in stereo—from Dr. Harvey Fletcher's 1933 demonstration of Bell Laboratories' new telephone lines which he used to pipe a three-channel transmission of the Philadelphia Orchestra into Constitution Hall in Washington, D.C., to the multi-channel setup used in 1940 for the film "Fantasia" which finally evolved in 1947 to Altec's seven-channel sound setup that was the forerunner of

sound for Cinerama, not to mention stereo and surround-sound generally.

The 1940s also saw a lot of experimenting and getting acquainted with electronics and audio gear, much of it under GI auspices as unprecedented numbers of young Americans were exposed for the first time to high-class communications gear. This ferment, continuing in the post-war years, was given more specific direction and a strong consumer interest base by the ascendancy of FM in broadcasting, the development of the long-playing microgroove disc, and the introduction onto the audio scene of magnetic tape recording. It remained only for a feasible and viable marketing pattern to evolve—and it did, based on the gradual conversion of "radio parts outlet shops" to "audio salons" or "high fidelity dealers"—to change a quasi-professional, hobbyist, near-elitist activity into a broader-based consumer-oriented industry that somehow sensed the time had come to revise its equipment-design concepts from "sound-system parts" to "home music-system products." And so it was that in the late 1940s and early 50s hi-fi sound made a quantum leap from its various origins and sources into the American living room.

In terms of the three program sources—FM, disc, and tape—it is obvious now, with the benefit of hindsight, that the sources themselves were, in the earliest days, far more "hi fi" than most of the equipment used for playing them. Thus, one of the major trends that permeated the entire hi-fi field in those days was an effort to upgrade, refine, and improve consumer audio products so that their playback capabilities would do justice to the newly developed software sources, and—in addition to that tremendous engineering task—to convince the buying public beyond the hard-core audiophile in-group that such equipment was worth buying, learning about, and living with. The present state of the hi-fi field is a direct measure of that dual efforts' success which took many forms: publications; audio shows (interestingly enough the first of these, developed by Harry N. Reizes, was called an "Audio Fair" rather than a high-fidelity show); new concepts in product styling and in control labeling (e.g., "brilliance" for high frequencies; "presence" for midrange); and of course

new product distribution patterns that involved sales reps and retail shops in a way perhaps more intensely and uniquely than in any previous industry. Encouraging traditional music critics to pay more attention to the sonic aspects of the recordings they wrote about, and involving some of the "brown goods" brains around the country to design and produce suitable cabinetry for the new-fangled audio machinery—and the game was under way full tilt. The age of hi-fi had arrived.

### Microgroove Recording

Its most telling single event probably was the introduction in June 1948 of the Columbia microgroove disc which not only multiplied the playing time of a single side but improved its audio response, and spurred the development of high-quality magnetic pickups. These in turn required improved tone arms wedded to quieter-running and more sophisticated turntables. The output of the new pickups needed, of course, equalization and pre-amplification—enter the new breed of low-noise, high-gain pre-amp-control units.

FM, which had been around before the LP disc, began to come into its own as a logical adjunct to a typical home hi-fi system.

Tape, which also got started in the U.S. before the LP disc (the famous Ampex demonstration for Bing Crosby took place one year before the introduction of the LP), similarly caught the fancy of many hi-fi enthusiasts but remained for many years behind both discs and FM as a home-sound medium.

During the 1950s refinements in all these areas continued together with a lively hobbyist trend having to do with putting together one's own speaker system, an activity that extended in varying complexity on the part of many enthusiasts, from winding their own coils for crossover networks, to building their own enclosures.

### Enter Stereo Sound

Stereophonic sound, which actually was older than many of us realized at the time, remained largely a specialized pursuit. Its first availability outside the cinema as a consumer item came on tape in the mid-1950s and my first mind-blowing experience of that was a demonstration by Ampex in the



old Ziff-Davis offices on Madison Avenue of—guess what—Strauss' *Also sprach Zarathustra*. To me those opening bars with their bold brass and percussion symbolized the dawn of a new era no less effectively at that time than the same music did years later in the futuristic film "2001."

Between the time stereo left the movie houses and Strauss got into them, of course, the next major thing had happened to hi-fi—stereo on discs, to be followed in a few years by stereo via FM. The retooling, restyling, and re-education that ensued during the 1960s were all vastly broader and deeper than the original hi-fi thrust a decade earlier. Stereo not only broadened the sound perspective in the home, it broadened the audience and it shook up the industry at all levels.

In no small way a contributing factor to stereo's commercial success was the development of the acoustic-suspension speaker which enabled the installation of two reproducers for stereo's two channels without preempting inordinate amounts of living space and with providing good clean sound at the same time. The a-speaker in turn prompted the design, manufacture, and marketing of high-powered amplifiers, hitherto thought to be relevant only for studio or professional applications. Once this trend caught on, it spawned another "sub-trend"—the so-called wattage race among amplifier manufacturers which, despite its often ludicrous side-effects, is still with us. Another, more salutary, trend related to the rise of stereo was the discovery by vast numbers of the attractions of listening via headphones which, improved over earlier types, and vigorously promoted (notably by Koss), became a staple item in many home music systems.

### Tape Trends

As stereo discs gained wider public acceptance, home tape went into decline. It began to come back with the introduction of the four-track idea but it really took off in the late 1960s with the development of the high-quality cassette format, and in this area the single most telling influence probably has been the use of the Dolby-B noise-reduction system. Saying



this however runs the risk of oversimplifying and of not crediting several other contributions to the cassette that have combined (and indeed still are at work) to upgrade this prodigious format to the point where many insiders have begun to speculate that it may eventually rival or even displace discs as the dominant form of home audio. Among these contributions are the improvements in cassette motors and transports, and the improved tapes themselves with the attendant facility provided in cassette decks for optimizing performance for different tape formulations.

In a way, the rise of cassette tape as a home medium has combined with another cultural trend to influence what has happened in open-reel tape. Actually the whole tape field from the late 1960s to date has become a complex techno/cultural matrix and to understand it fully we must take cognizance of yet another trend (or perhaps "non trend") that right now seems more important for its spinoff effects than for its original avowed purpose. That trend, of course, is quadrasonic sound.

Again hindsight tells us that four-channel sound in essence is at least as old as the 1940 film "Fantasia." And all during the rise of stereo, many enthusiasts experimented with setups that used more than the two speaker systems nominally required for two-channel sound. The literature is full of material about center- or phantom-channel speakers, flanking speakers, rear speakers, out-of-phase speakers, and so on—all of which were intended to broaden, to make more convincing, to lend an added ambience, to the two-channel stereo presentation. Significantly, most of the source material considered better-than-fair game for such investigations during the 1960s was on tape, with its superior channel separation, its inherently "discrete" capability for separate sound-tracks. Readers may

recall, for instance, an early form of tape cartridge developed jointly by CBS and Wollensak in 1959. Explaining it to a press group, Peter Goldmark—then head of CBS Laboratories—pointed out that although the tape was two-channel stereo it had room for a third track. "Why a third track?" came the inevitable question. "To record the hall and its ambience," was the answer, "which could be reproduced over a third loudspeaker placed conveniently in the listening room." Almost simultaneously, Philips in Europe was developing an electroacoustic technique for enhancing sound which they chose to call "ambiophony."

### Ambience & Quadraphonics

It took about another ten years for the message to get through as quadrasonic sound. I first heard it on tape recorded by Acoustic Research during a performance of a student orchestra. Later AR sponsored four-channel broadcasts of the Boston Symphony transmitted over two stereo FM stations in that area—WGBH and WCRB. But like stereo before it, quadrasonic sound did not make much headway until it appeared on discs, first as a matrix-encoded signal and then as the CD-4 type. At that, the headway has not been very auspicious and today quadrasonic sound languishes, its future uncertain. But its "natural affinity" for tape influenced a wave of four-channel open-reel designs which began coming onto the market a few years ago. What apparently has happened, however, to these machines is less a matter of their being used for quadrasonic sound than for their coincidental options of overdubbing synchronously, and otherwise creating special sonic effects for a relatively new segment of the audio population—created out of the rock-culture of the 1960s and bolstered by the technical advances in open-reel tape equipment—the so-called "semi pro" sound activists. Taken as a whole, these enthusiasts make up an alert, informed, dedicated group who have entered the hi-fi world by—so to speak—a side door, but they are in it and will influence it and be influenced by it in coming years.

A related spinoff of the environ-



mental-conditioning and acoustic implications of quadraphonic sound has been the recent wave of various kind of "sound processors"—ancillary devices offered for patching into sound systems to improve them, or the source material, or the listening room itself. These include noise-reduction units, dynamic range expanders, ambience enhancers, and graphic equalizers. Whether this development turns out to be a major trend or a passing fad, I cannot tell. I will stick my neck out though and say that of all these devices and systems the one that seems to be the most valid and most viable for the future would be the graphic equalizers. I think they are demonstrably the most convincing class of "extra" device for most home music systems.

### Future Phonics

As for future trends, the most obvious right now would seem to be home video recording and digital recording. But, again with my neck way out, it may be that the next major trend in hi-fi will be one that is not so obvious although in one way or another it has been discussed sporadically over the years. I am referring to psychoacoustics which can be

thought of ultimately as the personalization of the listening experience. Our prevailing audio concepts today—specific differences of detail notwithstanding—are based largely on generalities which are necessary in any science or discipline. But audio is also an art. Years ago the generations-old "rules" about recording were broken when bold souls at London Records and Columbia and some others decided that the way to make a successful recording was not simply to "eavesdrop with a microphone" but to deliberately treat the whole thing as a new art-form, as a creative "production" specifically designed for reproducing on home audio systems. A closer tailoring of the reproducing system itself to that end, based on listener reaction, may be the next logical move. This obviously would help in the long effort by conscientious sound people to relate instrument measurements to listening experiences. Equally obviously, it's going to take a major commitment to some serious and extended research, which of course means funding. But it may well be that the "bottom line" of such a project could become the starting line of a new chapter in home audio that will make all that has happened before seem like a prelude. A

## SORTING IT ALL OUT

Pondering the first 30 years of hi-fi, I've come up with four general categories for the many things that have happened and still are going on. **Lasting Contributions** denotes major contributions of lasting importance. **Major Trends** include wide-reaching developments of more than passing durability. Under **Fads** are listed what obviously are less important developments of shorter duration or limited appeal or both (the term "fad" is used here in its transient sense, not disparagingly). Finally there are the **Possibles** whose future remains, at this writing, still undetermined.

### LASTING CONTRIBUTIONS

FM  
Tape — open reel and cassette  
Microgroove discs  
Magnetic pickups  
Stereo  
Headphones  
Solid-state circuitry and related techniques  
Recording productions  
Noise-reduction techniques

### MAJOR TRENDS

High quality automatic turntables  
High-powered amplifiers  
A/S speaker systems  
Receivers (tuner/amp combinations)

Kits  
Multi-directional speaker systems  
Graphic equalizers

### FADS

Ping-pong records  
Compact modular systems  
Cartridge tape  
Reverb systems  
Volume expanders  
Color/light displays  
"Rock" sound speakers

### STILL TO BE DECIDED

Home video recording  
Digital recording  
Elcaset  
Multi-channel or surround sound  
Psychoacoustics