

The
Authoritative
Magazine
About
High Fidelity

Audio

MAY 1982 • \$1.50 • Ⓢ06030

**35TH AUDIO'S
BIRTHDAY**

HEADPHONES

- HOW THEY WORK
- HINTS ON USE

MTV MUSIC COMES TO CABLE

REVIEWED TECHNICS

**SU-A8 AND
SE-A7 COMBO**

NAKAMICHI ZX-7 CASSETTE DECK

HITACHI FT-5500 TUNER



LINEAR TRACKING THE TURNTABLE

The linear tracking tonearm is without question the ideal way to recover information from a disc. It can virtually reduce horizontal tracking error to zero, eliminate crossmodulation and significantly minimize stylus and record wear.

But until now there hasn't been a linear tracking turntable whose overall performance truly measured up to the technology of linear tracking itself.

Pioneer's new PL-L800 has changed all of that.

THE LINEAR INDUCTION MOTOR ELIMINATES MECHANICAL CONTACT.

Unlike other linear tracking tonearms that are driven by vibration-producing rollers, worm screws or pulleys, the PL-L800's tonearm is driven by Pioneer's exclusive linear induction motor. Through a process known as electromagnetic repulsion, a magnetic field is set up that gently propels the tonearm, allowing it to track perfectly with no mechanical linkages to degrade performance.

THE POLYMER GRAPHITE™ TONEARM DAMPENS VIBRATIONS.

To minimize any tonearm resonance caused by acoustic vibrations, the PL-L800's tonearm has been constructed with an exclusive dampening material called Polymer Graphite™. The only thing we want you to hear through our tonearm is music.

Our Coaxial Suspension System, on the other hand, will absorb vibrations that occur when someone walks or dances too hard in a room, or accidentally drops the dustcover. Because inside the cabinet is a free-floating suspension system which isolates the tonearm, platter



THE PIONEER LINEAR TRACKING

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and motor from the rest of the turntable; vibrations that reach the cabinet are absorbed by the spring-coupled insulators before they can harm the reproduction process.

THE STABLE HANGING ROTOR DESIGN REDUCES WOW AND FLUTTER.

The most advanced turntable platter motor wasn't advanced enough for the PL-L800. So we came up with a new direct drive system called the Stable Hanging Rotor. The problem with the design of conventional motors is that the fulcrum is at the base of the motor, making it impossible for the platter motor's center of gravity to coincide with the fulcrum. And that results in a wobbling of the platter, known as wow and flutter.

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And as if all this weren't enough, the PL-L800 also is equipped with Pioneer's exclusive moving-coil cartridge. It has such unusually high output that even a receiver or amp not equipped to handle most moving-coil cartridges can be used with the PL-L800.

If you find it hard to believe that a turntable could be as remarkable as the PL-L800, we suggest you visit your nearest Pioneer dealer and see and hear the PL-L800, along with our entire line of new turntables, for yourself.

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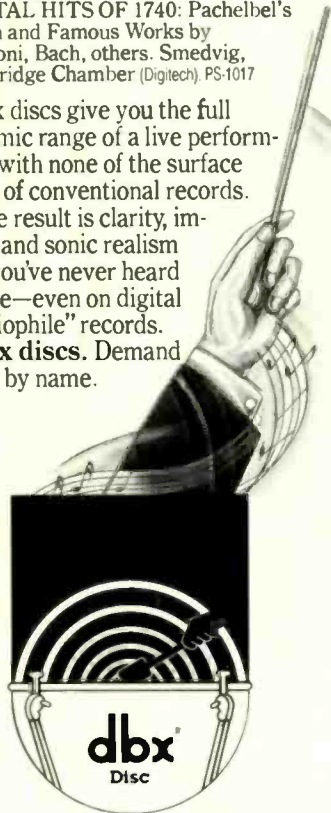
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MAY 1982

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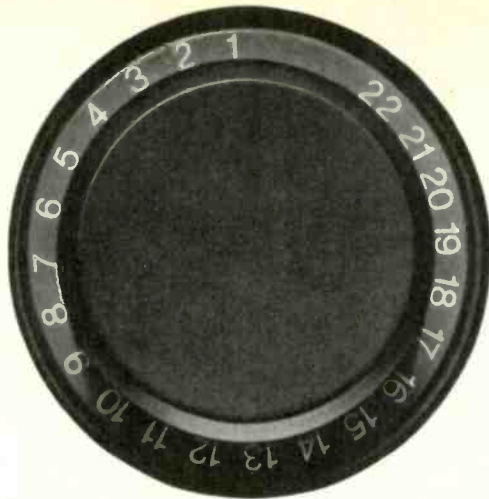
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Unfortunately this is not the case as any prospective high fidelity buyer—be he neophyte or hardened campaigner—quickly discovers.

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were . . . or he can buy a Quad 44.

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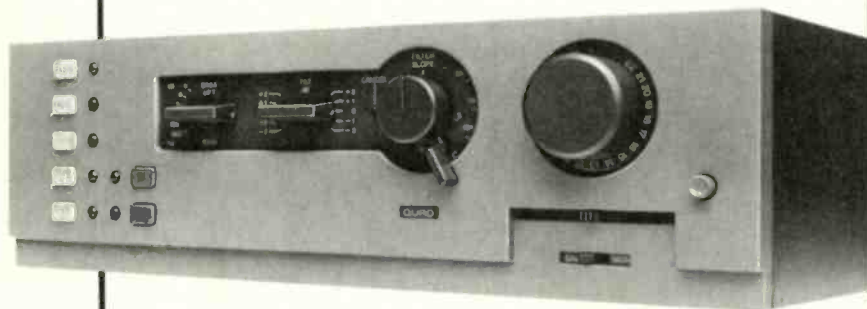
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Now Technics lets you hear nothing but the sound of the source. Introducing the SV-P100 Digital Cassette Recorder.

No tape hiss. No wow and flutter. Not even head contact distortion. With Technics new SV-P100, they no longer exist. The result—now you listen to the actual music... the source, not the tape or the tape player.

Utilizing the Pulse Code Modulation (PCM) digital process, the SV-P100 instantaneously translates musical notes into an exact numerical code, stores them on any standard VHS cassette, then "translates" them back into music on playback. Duplicate tapes are exactly the same as the original. Thus, every recording and every copy is a "master"

The revolutionary size of the new Technics SV-P100 recorder (17"x11"x10") is the result of state-of-the-art semiconductor technology. The built-in videotape transport mechanism brings the convenience normally associated with conventional front-loading cassette

decks to a digital application. Tape loading is now fully automatic. And, frequently used controls are grouped together on a slanted panel with LED's to confirm operating status.

Despite its compact size, the SV-P100 recorder offers performance beyond even professional open reel decks. Since the digital signal is recorded on the video track, the space usually available for audio can therefore be used for editing "jump" and "search" marks. The unit employs the EIAJ standard for PCM recording. And, in addition, editing and purely digital dubbing are easily accomplished with any videotape deck employing the NTSC format.

Technics new SV-P100 is available at selected audio dealers. To say that it must be heard to be appreciated is an incredible understatement.

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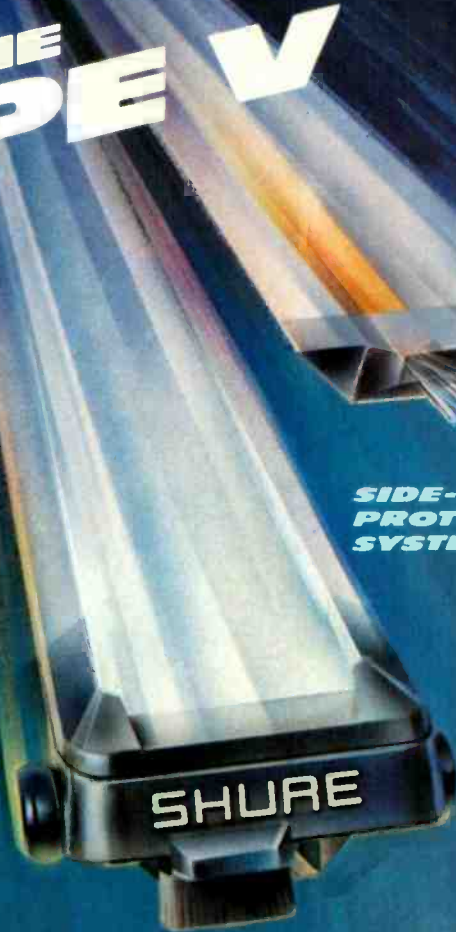
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- Exclusive DYNAMIC STABILIZER that functions like a miniature shock absorber to eliminate warp-related problems such as groove skipping, cartridge bottoming, and signal wow. Simultaneously discharges surface static electricity.
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My first letter from Prof. Dr. Hermann Scherchen, the eminent German orchestral conductor and founder of the world-famous research center for acoustics at Gravesano, Switzerland, came to me at *Audio* under the date of December 23, 1959. Dr. Scherchen (whose superb Westminster records older readers may recall) was a subscriber and obviously read us thoroughly, including my own column. His letter was no secretarial product—it was personally typed, in a species of English, on an extremely decrepit typewriter with added scrawls in handwriting. The stationery was that of his newest symphony orchestra, the Nordwestdeutsche Philharmonie, but he wrote to me direct from Gravesano. At the top of the first page was a large handwritten

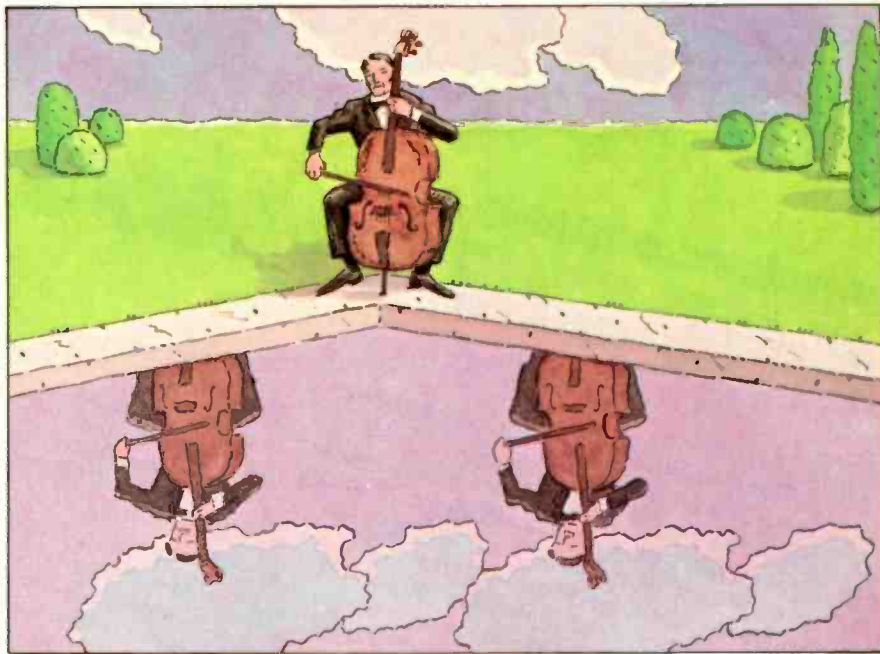
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"Dear Sir, It is with the greatest interest that I have been reading your monthly observations in *Audio* and I am delighted each issue to find so much that is not only clever but at the same time fine and realistic Surely you know nothing of me [*not true!*] but I shall say that if ever I have wished to see any personality here at the Gravesano Studios, it most certainly would be you"

Well, I never made it to Gravesano but you may be sure that my heart leapt up at those words. But like most well-known personages, Dr. S. wasted no more time and went straight to business. He wanted to tell me of a device he had developed in his lavish Swiss laboratories called the Stereophoner.

"This is the reason [the above kind remarks] why I allow myself to beg your interest in what follows, after you have read the material accompanying this letter. My wish and my researches have for long been to create a new kind of *monaural* disc that would yet have the effect of a *stereo* sound. My work in that direction has finally brought me to the Stereophoner, which is the result of a lifetime of ear-attention to all the directional timbres and sound-projection and reflecting qualities of the musical instruments.

"Now—at 68—I have once more taken on the responsibility for the sound-creating function of an orchestra, with which I work for radio in the city of Bremen, and with which I intend to



develop specifically all those best musical qualities in playing which lead to the finest sort of high fidelity reproduction. My [existing] stereo recordings are entirely compatible, for finest mono reproduction; now I am going back to the beginning of my work: I hope to create a new 'monaural room-sound disc.'"

What the Doctor is saying is that, in those early stereo days, he felt that a spatial or "room-sound" effect could be created more simply by the ingenious use of a split and "doctored" single signal, delivered as in stereo to a pair of loudspeakers but out of one amplifier. It was, of course, a circuit devised by him and his engineers that could do the trick, and the Stereophoner, already in production, was the preliminary answer. It could be hooked into any mono sound source; all that was required was the one extra speaker, suitably placed.

Nuts, I can hear you saying. Yes—in 1982. But in the late 1950s, when stereo was scarcely beginning and full of faults and clumsiness, not to mention expense, things did not look the same to serious listeners. There were already hundreds of stereo LPs available in late 1959, but stereo equipment was still mostly of the conversion sort and full of bugs, the recordings were often marginal, even out of

phase, as were mikes, amp circuits and, of course, speakers, not to mention stereo pickups. You bought a new speaker to supplement your old one and it usually was a grievous mismatch. All in all, stereo was no treat for most of us (though full of potential for a better future). The well remembered "hole in the middle" was rampant—not one but two point sources, thanks to lack of stereo coherence between the speakers. Inevitably, plenty of people still clung to mono as the more reliable sound source for music. Stereo releases were also available in mono, and many stereo tapes did not even appear as stereo discs.

But the basic problem with mono sound remained: 95% of listeners heard a single point source directly out of a loudspeaker pointed at them. This was unfortunate. Only a few lucky souls had listening rooms that somehow spread the apparent source by reflection, for better realism. What we desperately needed (and got in later stereo) was the obliteration of that ugly point, so that music could be spaced out, seemingly, within the entire listening area.

What if one could indeed liberate music in this fashion and yet maintain the simplicity of the mono system? That was Dr. Scherchen's preoccupation and a part of the more advanced

...and then came Super Feedforward.

Not many years ago a "high fidelity" amplifier delivered 5 watts with 5% harmonic distortion. Today, distortion levels of 0.05% — or even 0.005% — in amplifiers with hundreds of watts and a much wider frequency range are almost routine.

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To reduce TIM and other forms of residual distortion, Sansui developed its DD/DC (Diamond Differential

Direct Current) drive circuit. Then, to eliminate the remaining vestiges of high-level, high-frequency distortion in the amplifier's output stage, Sansui engineers perfected a unique circuit which, though proposed years ago, has now been realized in a practical amplifier design. Super Feedforward, the new Sansui technique, takes the leftover distortion products present in even an optimally-designed amplifier, feeds them to a separate, error correcting circuit that reverses their polarity, then combines them so they cancel themselves out against the regular audio signal. What's left is only the music, with not a trace of distortion.

While Super Feedforward circuitry puts Sansui's AU-D 11 and AU-D 9 amplifiers in a class by themselves, all our amplifiers are renowned for their musicality, versatility, and respect for human engineering. Add a matching TU tuner to any of Sansui's AU amplifiers and you'll appreciate the difference 35 years of Sansui dedication to sound purity can produce.

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Liberating music and yet maintaining the simplicity of the mono system was Dr. Scherchen's preoccupation.



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350 watts minimum continuous power per channel into 8 ohms, 20 Hz to 20 kHz, with no more than 0.1% THD.

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thinking of the day, which had given rise to commercial stereo itself. He intended, it seems, to go onward from the Stereophoner to a mono "coded" disc—but this evidently never got off the ground. The Stereophoner, the halfway stage, definitely did, if briefly.

Hermann Scherchen, then, belongs among the pioneers in our present and continuing interest in room sound-spaces and the "sound field." His mistake was to back the wrong horse in future terms. Mono. It was no wrong horse then.

I had a number of further letters on the Stereophoner from the great man, who genially saluted me in his quaint and misspelled English as "Dear Col-lege"—Colleague. Amusing, but since his intent was entirely serious I have "translated" his words to some extent in these quotes, though the sense of the original is there. Let me continue. He had worked on the Stereophoner for a number of years; it was demonstrated in Geneva before many notables as early as 1958 and thus must have been in final prototype form. Here is his account to me of the first impact:

"The first results were astonishing," wrote Dr. S. "The sound no longer came direct from the [mono] loud-speaker but was freely located in the whole room. This effect was impressive—the clarity of every timbre seemed perfect, the entire room seemed filled, though the sound was over-all the same [i.e. *equally good at any listening point*]. And this even though this sound analyzed itself stereophonically into a spatial separation of different sources. Nor was it divided sharply into right and left sound emissions [*the "hole in the middle"*]. And there was no 'best seat'!" Bob Carver and holographic sound, 1982, take note.

I wish I could quote you the dozens of enthusiastic reports that were passed on to me, from England, France, Germany, Switzerland, in Dr. Scherchen's accompanying literature. Even allowing for pardonable exaggeration of claims, they are impressive. He was, of course, particularly interested in radio, where stereo was still remote and reception in the home was necessarily mono. He was indefatigable—he had demonstrated the Stereophoner before many of the top radio

men in Europe and their response was overwhelming.

The chief of research at the French national radio system wrote, "The success of this system lies in its ability to recreate the differing character of the sound spectra on the left- and right-hand sides of the orchestra, represented by the two speakers, where all other attempts of the sort have contented themselves with simply separating the bass and treble frequencies, leaving the mid-frequencies spread over both channels . . ."

There speaks the engineer and you may begin to surmise at the actual electronics employed by Dr. Scherchen. Highs on the left, lows on the right was too simple a trick—that did a little but not much for sound separation. Many of us tried it and went on to better ideas. The Stereophoner, it seems, was more sophisticated.

A German engineer in Frankfurt/Main had this to say: "We have had the opportunity of demonstrating the Stereophoner before a gathering of prominent acoustic experts [and we report that] the Stereophoner effects an extraordinary improvement in the quality of reproduction of a sound manifestation . . . The source no longer appears to lie in a loudspeaker, as heretofore, but to emerge from there and take up a position in the air." Once more, the astonishment is in the creation of a graded sound space, in place of a point source.

And the composer Rolf Liebermann (Concerto for Jazz Band and Symphony Orch.) had this to say, typically: "It was a pleasant and powerful experience. I never thought that I should be prepared, capable and willing to listen to gramophone records for eight hours and still be enjoying it at the end of that time." Composers were generally not fond of "canned music."

Dr. Scherchen also collected a sheaf of testimonials from ordinary listeners in England, where he had licensed the Stereophoner for manufacture and sale. These people, without special engineering or musical knowledge, said much the same things. No question about it, this ingenious "black box" created a sensation, out of two loudspeakers, wherever it was set up, whether before experts or the layman. In its special way it clearly brought a



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125 WATTS



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Jensen believes that sound reproduction should be based on listener preference, not on the sound coloration built into many speakers. And that makes Jensen speakers unique. With uniform power response and ultra-precise crossovers, they deliver pure, virgin sound. Jensen System Series Speakers offer a broad range of adjustment to accommodate differences in program material or room acoustics. Listen to uncensored, virgin sound at finer audio shops. For more information and dealer locations, call 800-323-0707.



JENSEN

Scherchen's mistake was in backing the wrong horse, in future terms, but it was no wrong horse in 1959.

new kind of sonic experience to all kinds of listeners. Again and again, it was the remarkable "absence" of the loudspeakers that people noted, and the new presence of a sound field, an ambient source that was entirely removed from the speakers themselves as one listened.

I do not think there is the slightest doubt that the Stereophoner, as far as it went, was an important and briefly influential device in the history of sound reproduction, though apparently confined to the European continent. I could go on with a hundred more quotes—Dr. Scherchen himself described the reactions of a brace of famous musicians in his later letters to me. But all this is only part of the story. What was this Stereophoner? What sort of electronic circuit could it have employed, to create such apparently convincing spatial effects out of a single mono signal?

The thing was clearly no more than a

passive modifier; it had no power cord and there were no batteries of the sort then available. It was evidently intended as a kind of "Volksstereo," using the simplest means and requiring none of the clumsy and expensive stereo equipment then sold. Yet it did appear to have subtlety and it was sponsored by a very important man in the musical and acoustic worlds.

Dr. Scherchen did send me a Stereophoner. At this point I do not remember what, if anything, I said about it in this magazine; nor does it matter, since we have different ears today. That Stereophoner has been sitting on a nearby shelf for most of the last 22 years and now sits beside my typewriter as I write. Or rather, its remains.

Twice during the years curiosity overcame me and I asked a qualified audio man to make measurements, for, you see, the inner components were potted, buried and invisible inside a block of some tarry, plastic sub-

stance. That block filled only half of the small 3½-inch cube. If you are a tinkerer, or especially if you were around 1959, you will know, then, that there could not be much of anything inside that potting, other than a few standard and inexpensive elements for a passive circuit. No transistors, tubes, microchips, mini-batteries. Could this be nothing more than, say, "10¢ worth" of cheapie stuff, carefully hidden from the outer eye? My engineers could not be sure. One said a few resistors and capacitors, maybe. The other, only last year, told me somewhat lamely that the darned thing seemed just to have wires that went straight through and out the other side. Crazy, real crazy.

Well, this got too much for me. When I recently ran into Dr. Scherchen's original letter I resolved to act. There was only one thing to do: Melt the thing down. And so, by golly, I did. What a mess! But now I know. More about this later. A

1. Tapered *laser-hollowed* Ruby cantilever
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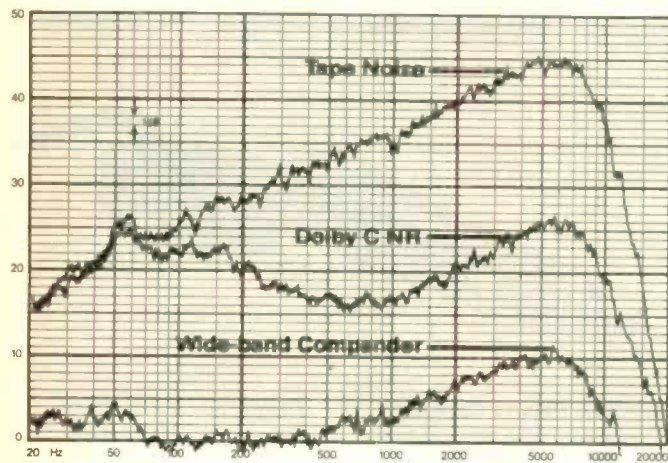


FIGURE 1: NOISE AND NOISE REDUCTION IN THE ABSENCE OF MUSIC. Noise from biased cassette tape without noise reduction, the effects of Dolby C-type noise reduction, and the effects of a wide-band compander are shown in the *absence* of any signal! Dolby C's noise reduction effect results in an overall perceived noise level below the ambient noise of many listening rooms, even at high playback levels. In the absence of signals, the conventional wide-band compander provides still more electrical noise reduction (but usually no more audible noise reduction).

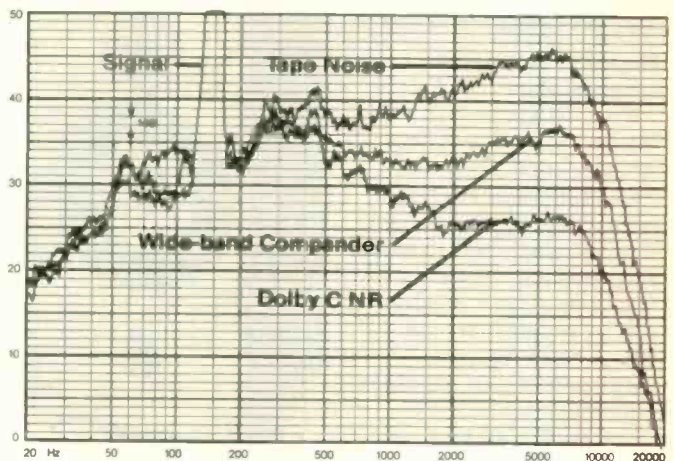


FIGURE 2: NOISE AND NOISE REDUCTION IN THE PRESENCE OF MUSIC. In the *presence* of a signal (148 Hz, D below middle C on the piano, recorded at Dolby level), in all cases noise in the region of the signal will be masked by it. However, at higher frequencies, especially between 2 kHz and 10 kHz where tape hiss is clearly audible, Dolby noise reduction provides almost as much noise reduction as if the signal weren't there, while the compander allows the noise to increase to a considerably higher level than with Dolby C.

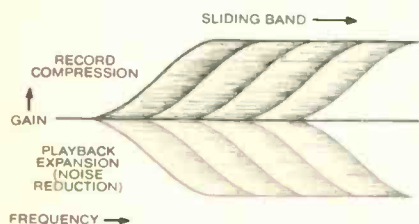


FIGURE 3: THE SLIDING BAND PRINCIPLE. Dolby noise reduction operates over a band of frequencies which slides up out of the way of the music, resulting in noise reduction just where there is no musical signal to hide the noise. Thus the perceived noise level is consistently low at all times.

Providing noise reduction on silence is not all that difficult. For years, conventional wide-band compressors have been available which dramatically reduce noise — between selections on a tape or record.

Yet it is just as important to have noise reduction when there is music playing. While music will mask noise part of the time, there are times when it won't. A bass drum note, for example, cannot hide tape hiss, no matter how loud the drum is: the ear can detect both simultaneously.

Conventional noise reduction systems effect noise reduction at the time of playback by turning down the volume when there is little or no music present. This turns down the noise as well. But they also turn the volume back up again on louder music, and so turn the noise back up at the same time. Thus the bass drum note is accompanied by a burst of tape hiss — hiss which is audible if there is no music at higher frequencies to hide it.

This problem is called noise modulation. It means that with a conventional NR system, the noise level is constantly shifting up and down with changes in the level of the music. But Dolby noise reduction, on the other hand, is free of noise modulation on virtually any type of music (Figures 1 and 2).

Unlike conventional compressors, Dolby noise reduction operates over a constantly changing, or sliding band of frequencies (Figure 3). The band extends low enough to provide very effective noise reduction on silence. But in the presence of music, the band slides up just out of the way of the music, so that noise at frequencies above the music is almost as effectively reduced as if the music weren't there.

Both Dolby B-type and Dolby C-type noise reduction are sliding-band systems. With the standard B-type system, noise reduction begins at 500 Hz and increases to 10 dB at 4 kHz and above, while with the new C-type system, noise reduction begins at 100 Hz and increases to 20 dB at 1 kHz and above. With either system, the presence of music does not prevent noise reduction from occurring where it is still needed.

*70µs equalization, measured with a constant-bandwidth wave analyzer, and weighted (CCIR/ARM) to reflect the ear's sensitivity to noise and noise reduction effects.

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WHAT'S NEW IN AUDIO

Mission Electronics Loudspeaker

The 770 Broadcast Monitor, a two-way bass reflex design, features a motor system in the bass unit employing "electrical dynamic damping" to allow extended low-frequency response without ringing, ensure linearity, enhance power handling, and minimize Doppler distortion. The frequency response extends from 40 Hz to 20 kHz, ± 2.5 dB, and sensitivity (one watt, one meter) is 85 dBA SPL. The 770 is available in either a black or walnut finish. Price: \$997.00 per pair. Enter No. 100 on Reader Service Card



Ortofon Phono Cartridge

The MC 200 moving-coil cartridge is an integrated headshell design utilizing a miniature ring magnet of samarium cobalt and a cantilever of boron, which is very light and stiff, for low moving mass. In turn, this low tip mass contributes to the cartridge's tracking ability, which is specified as 80 μ m with a 1.5-gram tracking force at 315 Hz. Other

specifications include a response of 20 Hz to 35 kHz, ± 2 dB, and channel separation of greater than 25 dB at 1 kHz and 18 dB at 15 kHz. The stylus has an asymmetric Fine Line profile which, together with the cartridge's Wide Range Damping system, is credited with improving high-frequency tracking. Price: \$420.00. Enter No. 102 on Reader Service Card



Denon Cassette Deck

The DR-F7 features Denon's FTS Flat Tape Tuning System of automatic bias adjustment with any tape type and a refined Mk II version of the firm's Tape Tension Servo Sensor, which automatically maintains proper tape tension across the heads during recording and playback. Also included is Dolby C noise-reduction circuitry for up to 76 dB signal-to-noise ratio, three heads for accurate monitoring, and a direct-drive capstan motor

system, which allows a wow and flutter specification of 0.027% wtd. rms. Other specs are frequency response of 20 Hz to 20 kHz with metal tape and 60 dB S/N without noise reduction. Price: \$500.00.

Enter No. 101 on Reader Service Card



Stanton Record Cleaner

RC5^{plus} is an all-in-one record cleaner which dissolves oily films and helps remove dust and debris without leaving residue. In addition, the fluid has an anti-static property which is heightened by the supplied brush's conductive handle. The brush's working surface is directional so that the maximum amount of dust and debris is removed with a minimum of brush motion. The fluid also quiets even virgin records during play, and a sufficient amount is supplied to clean both sides of 150 discs. Price: \$16.95.

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TDK Cassette Tape

AD-X is a new high-quality normal-bias formulation featuring the firm's high-density, cobalt-adsorbed gamma ferric oxide Avilyn particles. The new cassette offers 1.5 dB wider dynamic range than any previous TDK normal-bias cassette, with up to 2.0 dB greater sensitivity in the high-frequency range, and up to 1.5 dB greater maximum output level.

Prices: C-60, \$3.99; C-90, \$5.49.

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Radio Shack Receiver

The Realistic STA-2290 AM/FM receiver is a 90-watt-per-channel unit featuring microprocessor-control circuitry for precise frequency-synthesized tuning and digital

frequency display. In addition, there is instant pushbutton recall of six FM and six AM stations, all of which are stored in a battery-protected memory. Banks of LEDs act as output power displays, tuning signal-strength

Infinity Loudspeaker

The RS jr is a two-way bookshelf-size speaker system, with a frequency response of 50 Hz to 32 kHz, ± 3 dB. It's for use with amplifiers or receivers delivering from 20 to 80 watts/channel rms power. The speaker is crossed over at 3.3 kHz and measures 18 x 12 x 9 $\frac{5}{8}$ inches. The RS jr has a 6 $\frac{1}{2}$ -inch polypropylene woofer, an Infinity EMIT tweeter, and is housed in a vinyl oak enclosure. Price: \$130.00 each.

Enter No. 106 on Reader Service Card

meters, and memory and function indicators. The tuner offers superb performance; specs include 70 dB selectivity, 0.2% THD, and 10.33 dBf sensitivity. Price: \$599.95.

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Black Acoustics Loudspeaker

The Night's three drivers are vertically aligned and have four thermoplastic coatings to aid the mechanical crossover and damp ringing. Sensitivity is rated at 87 dB (one watt, one meter), nominal impedance at 6 ohms, and frequency response from 41 Hz to 19.5 kHz, ± 3 dB. Each 40 inch high x 10 inch wide x 8 inch deep cabinet is cloth-wrapped in a choice of 15 colors with a choice of four top finishes. Price: \$720.00 per pair.

Enter No. 107 on Reader Service Card

Meter Meanderings

Q. I have a 200 nWb/m Dolby calibration tape. I have adjusted two cassette decks so that each shows the same output level on its meter when playing this tape and so that a recording of a steady tone on either deck produces the same output level on either deck. However, music recorded on one deck at a level as high as +7 dB shows a maximum of -10 dB on the other deck in playback. I'm baffled by the agreement between the two decks on test signals and the disagreement on music.—Larry Morgen, Belle Meade, N.J.

A. I believe the discrepancy is due to differences in the characteristics of the meters of the two decks. This would be true if one deck has a peak-reading meter while the other has an average-reading meter or possibly a VU meter. The deck with the VU-type meter would give lower readings on music because it does not follow sharp transients as faithfully as a peak-reading instrument. Keep in mind that for much program material, the average level may easily be 10 to 20 dB below peak level.

Switch Settings

Q. My cassette deck has separate bias and equalization switches. How should the various positions be used?—Russell Chang, Philadelphia, Pa.

A. Types I, II, III, and IV tapes are respectively ferric oxide, chromium dioxide and chrome equivalents (cobalt-modified), ferrichrome, and metal particle. These formulations require respectively larger and larger amounts of bias current in recording to minimize distortion and maximize the amount of signal recorded on the tape. Also, the amount of treble boost required in recording tends to vary among tape types. Finally, the standard playback equalization differs; Type I requires 120- μ S playback equalization (playback bass boost commencing at 1,326 Hz), while the other types require 70- μ S equalization (bass boost commencing at 2,274 Hz). The bias and equalization switches are intended to accommodate these requirements.

The best thing a user can do is to initially follow the tape deck's instruc-

tion manual regarding switch settings for a particular type of tape. If performance appears satisfactory—as judged by comparing tape playback with the source signal, which can be a phono disc or FM interstation noise—that is all there is to it. If performance appears less than satisfactory when using a particular brand and type of tape, the user should experiment with other switch settings to find if performance can be audibly improved and then note the preferred settings for future reference.

Magnecord—Where Are You?

Q. A friend of mine recently came upon a fine Magnecord 1024 tape recorder. I have been unable to find out what has happened to this company. I would like to obtain a schematic diagram and service manual for this tape recorder.—John Marrett, Montreal West, Quebec, Canada

A. I have also lost track of Magnecord, which was absorbed by one firm, which in turn was absorbed by another firm, which in turn... However, without vouching for the outcome of your search, I have been informed that the following firm caters to owners of "old high-quality audio components": Acoustatronic Laboratories Ltd., 140-11A Cherry Avenue, Flushing, N.Y. 11355. (*Editor's Note:* We will be pleased to publish the name and address of firms specializing in older equipment.—E.P.)

Speaking of Speeds

Q. Since open-reel tape is about twice as wide as cassette tape, and open reel decks record at least twice as fast (3 $\frac{3}{4}$ ips and up), why do good cassette decks sound as good or better at 1 $\frac{1}{8}$ ips than open-reel decks do at 3 $\frac{3}{4}$ ips? Using open-reel decks, it would be preferable if one never had to record above 3 $\frac{3}{4}$ ips in order to get great sound.—Charles Sampier, Jr., Rochester, Mich.

A. Manufacturers of cassette decks and of heads for these machines have diligently pushed forward the technology of these devices to realize the potential of the newer medium. The fumble-fingered outnumber the nimble-fingered, so that the market for good cassette decks is large. Similarly, manufacturers of cassette tape have

taken great pains to extend the high-frequency response of such tape as well as to improve it in terms of distortion, output level, stability, oxide shedding, etc. Further, they have sought and achieved improvements in the cassette shell to obtain good mechanical performance. These efforts have been very successful, and there is no indication as yet that the potential of cassette has been fully realized.

In the case of open-reel decks operating at 3 $\frac{3}{4}$ ips, there has not been a similar concentration of effort to obtain the best that is possible, perhaps because the rewards of the marketplace are not sufficiently large enough to induce such effort.

Taking a Dubbing

Q. I own both a cassette deck and an open-reel deck. I have been copying FM broadcasts and phono discs with my open-reel deck and then dubbing them on cassettes because I feel I have more control over the reel than over the cassette. Do you recommend this procedure?—C. L. Yearwood, Jr., Durham, N.C.

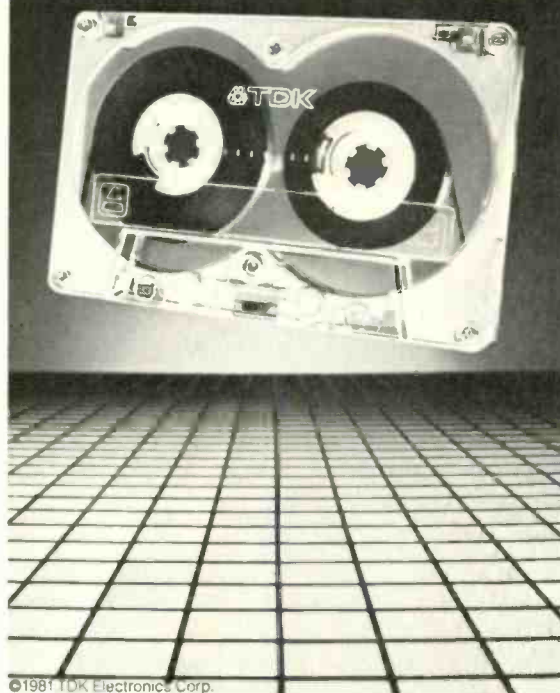
A. The idea of first putting an FM broadcast or phono disc on open-reel tape and then transferring it to cassette is a reasonable one. In addition to providing greater editing flexibility, it may give you better protection against the effects of record warp. It appears that the electronics of some cassette decks are more adversely affected by record warp than are the record electronics of open-reel decks. You should recognize, however, that you will add noise in the dub to cassette, and you may wish to investigate use of a noise reduction system such as Dolby C or dbx.

It's a Jungle Out There

Q. While hunting through the jungle of new cassette decks, I've found a lot of controversy about frequency response specifications. How wide a response is really necessary and how important is it in comparison to signal-to-noise ratio? The deck I'd like to buy

If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 1515 Broadway, New York, N.Y. 10036. All letters are answered. Please enclose a stamped, self-addressed envelope.

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While our one-of-a-kind, die-cast metal frame is amazing, it's our MA-R tape's sound that will really impress you. TDK MA-R created a new state-of-the-art in cassettes. It's metal tape with a higher energy and a wider dynamic range.

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Look for TDK MA-R and MA, the metal tapes that stand alone.



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has a response of 30 Hz to 16 kHz and S/N of 70 dB. Many people claim you can't hear the difference between a deck of 30 Hz to 16 kHz response and one of 20 Hz to 20 kHz. Is the difference dramatic or audible enough for the average ear to notice?—John Keyes, Tucson, Ariz.

A. The answers to your questions really depend on how far your own hearing extends and your personal reaction to a deck with a lower S/N. I don't believe anyone would say that anything less than response to 13 kHz is necessary, and many would claim that 15 kHz or higher is required. The response at the low end, that is, choosing between a deck with response to 20 Hz and one flat to 30 Hz, is relatively less important. Most seem to feel that a high S/N is just as important as broad, flat frequency response, and it is certainly easy these days to find a cassette deck with both.

System Upgrade

Q. I want to update my stereo system by adding a cassette deck and replacing my turntable. What features should I look for in purchasing these items? Which specifications are most important?—Clarence Beatty, Houston, Tex.

A. Your questions take in too large a territory to be quickly covered in this column. I can only comment briefly that the most vital aspects of tape decks and record players are flat, extended frequency response; high signal-to-noise ratio; low distortion, and accurate, steady motion. This last also applies to turntables, as does low rumble, i.e. high signal to noise. Generally speaking, price is a guide to quality, but there are exceptions.

Your best course is to do some research using *Audio* and other popular periodicals devoted to stereo components. Search for articles that discuss the various available features of the two components in which you are interested, and check the same periodicals for equipment reviews of cassette decks and turntables that have appeared in recent months. *Audio's* Annual Equipment Directory, published every year in October, should be particularly helpful in this regard, and you can write to us again or to the maker if you need specific data.

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STANTON
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Richard Strauss: Ein Heldenleben. Fritz Reiner, Chicago Symphony Orchestra.

RCA .5 Series ATL-4100, \$15.98.

Sound: A+ Performance: A+
Surfaces: A+

This glorious reissue rates an A+ in several areas, and the first of these is the performance. Reiner's 1954 *Ein Heldenleben* remains one of the very best in the catalog. It shows the Chicago Symphony in top form, performing in one of the best recording venues this country has ever known, old Orchestra Hall, before it was acoustically deadened back in the '60s.

The second A+ mark goes to the quality of the original recording. Made in the very early days of commercial

stereo in this country, this was a direct-to-two track at 30 ips. According to my 17-year-old notes, the microphone array consisted of a pair of Neumann U47s left and right, and a pair of RCA 44BXs in the center, each feeding one of the stereo channels. This amounts, of course, to a modified left-center-right spaced array. In many ways, RCA's mid-'50s 30-ips recording was far better than the quasi-noise-reduced 15-ips AME (Ampex Master Equalization) which RCA adopted for a time during the late '50s. The advantage of the 30-ips technique is its greater headroom on peaks as well as a relatively low noise level.

Some listeners may find this recording a bit unfocused, especially during quieter passages. Others will find its

rich ambience a welcome relief from present-day analytical trends in multiple microphone placement. They are all probably right.

The third A+ area is in care in reprocessing, which is evident at the remastering stage, where most reissues go wrong. Messrs. Pfeiffer and Begley deserve credit for exercising musical and technical restraint of the highest sort. Since the source was two-track, "remixing" is of necessity minimal; they have corrected some occasional left-right imbalances and done no gratuitous gain manipulation. In the equalization department, a subtle rise in the 2.5 to 5 kHz range has given the sound a little more sheen, at least by comparison with my old 7½-ips two-track reference.

Processing quality also rates an A+. RCA has seen fit to have all of their .5 Series reissues processed by Europadisk (New York) for plating and matrix work and by Teldec (Germany) for pressing. These extra measures pay off handsomely in the tick, pop, and warpage areas.

The .5 Series liner notes present something of a logical inconsistency. They point up the merits of half-speed (.5) disc mastering in cutting a more accurate signal on the disc. If this process is good for a 28-year-old master tape, should it not be an absolute requirement for more recent master tapes (especially digital masters), which contain even more demanding high-frequency program detail? There is no indication that half-speed cutting is being generally used by RCA for the bulk of their product.

Many early proponents of half-speed cutting have made the transition to real-time. For example, the Telarc's are now being cut real-time by IAM in Irvine, California, and JVC, once the chief proponent of half-speed, has developed a new cutter-amplifier package capable of better performance at real-time than their earlier systems yielded at half-speed. Only Mobile Fidelity remains committed to half-speed cutting; that commitment is consistent, and all their product is cut that way. In RCA's case, the question is not whether half-speed cutting is better or worse than real-time; it is purely a matter of technological consistency.

John Eargle



Trio Sonata: Music for Flute, Oboe and Guitar.

Boston International BI 1202, \$8.98.

Sound: A+ Performance: A+

Trio Sonata was formed in 1975 by guitarist Gary Kessler, flutist Anton Kuskin and oboist Donald Bender, and fortunate recital audiences have heard them in halls around the country as well as on the radio. This is musicianship of the highest caliber, arranged and performed by artists playing instruments that might at first seem an odd grouping. But you won't need much convincing once you hear the Telemann Trio Sonata in C minor which shows the natural balance and rich tonal variety possible for a transcription of these instruments. Perhaps what strikes most of all is the clarity, the rightness of the Baroque tempi. In two interludes by Jacques Ibert, the trio has transcribed and carried forward its uncanny sense of interwoven technique; the dark sonorities of Ibert shift and lighten from moment to moment, and the musicians handle them with great grace indeed.

But the range widens further. The first prelude of Villa-Lobos has a self-contained energy and demands a kind of relentless pursuit by guitarist. Kessler, who changes keys and rhythms unerringly here as he does in the Vivaldi concerto for two mandolins and strings—which he has transcribed for two woodwinds and guitar. Mr. Bender has turned his own considerable talent to the first and third *Gymnopédies* of Satie, and this is as airy and tranquil as the dignity he brings to the leitmotif of the haunting "Clear Out of Touch with Time."

Bach's G major "Trio Sonata" and the finale from the first "Trio" (the so-called "London") of Haydn have a wonderful delicacy and colors that shimmer. And just in case you think

there's no room for the up-to-date with this classy trio, there's a six-minute "Madrigal" by David Loeb, full of the quirky arhythmias and apparent disharmonies of the spunky avant-gardist. To suggest that this wonderful disc has something for everyone and deserves wide acceptance would be a critical cliché; it would also be the hard, glorious truth. *Donald Spoto*

Sibellus: Violin Concerto. Saint-Saens: Introduction & Rondo Capriccioso. Dylana Jenson; Philadelphia Orch., Ormandy.

RCA ATC1-3792, digital, stereo, \$15.98.

Sound: A Surfaces: A Recording: B+

Here's an RCA digital package with all the trimmings — in a typical traditional RCA release right out of the past. Lots of spendid corn or, if you wish, a couple of well-roasted chestnuts. A brand new virtuoso fiddler, female at that. And an old-line orchestra and conductor, top drawer. The young lady is all set to be a female Heifetz or, better, a Fritz Kreisler.

At 19 Dylana Jenson is indeed an extremely good violinist. Her ear and her technique are both flawless with never a slip in the pitch or a hesitation in spite of the familiar but horrendous difficulties of these often-played showpieces. Her styling and sound are right in the groove, if you see what I mean, just like the big old Romantic players of yore. She has studied to good purpose. Very few violinists could do as well at her age.

But the musical price is there. She is fiery, yet one feels imitation; she is still learning the tradition, note by note. Her performance is a mirror of other virtuosos, without much of her own self. Entirely correct, at her age! She is almost, but not quite, convincing — yet. Give her time (even if you buy this record). You have to start somewhere, after all, even if it is at the top.

Very good sound in the old RCA mold, big and rather distant in the orchestra (not multi-miked), but with the solo violin very much up front and loud. This I do not enjoy, even if it is normal for virtuoso recordings. Makes for hard listening. If you like it, rate the technique an A. I can't. *E.T.C.*

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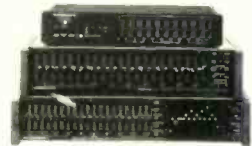
Get up to 20dB more dynamic headroom for louder louds and softer soft passages, AND kiss off hiss when you play any CX-encoded disc.

Instead of asking you to spring a C-note for yet another add-on gizmo we offer a feature-packed octave equalizer with 18dB/octave subsonic filter, great specs, low noise, over-the-counter warranty and real oak end panels... WITH CX BUILT IN for under \$180 suggested retail!

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All for less than you might pay for just a so-so equalizer.

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THE COLUMN

MICHAEL TEARSON
JON & SALLY TIVEN



I Love Rock 'n' Roll: Joan Jett & The Blackhearts

Boardwalk NB1-33243, stereo, \$8.98.

Sound: B

Performance: B+

Joan Jett has cleaned up her act. With a full-time backing band providing the support and consistency she so desperately needs, she has managed to produce one killer cut ("I Love Rock 'n' Roll," written a decade ago by Alan Merrill and Jake Hooker of The Arrows), several very pleasant rock tracks ("Run Away," "Nag," "You're Too Possessive"), and some filler tracks a cut above the usual throwaways. Her deadpan delivery finally has a context in which it is effective, and the production is far more restrained than on the last album. She sounds like *she's* carrying the music herself, not with help from some stellar sidemen and a zillion percussion tracks. Seven years after the debut of the all-girl would-be sensation The Runaways, Joan Jett has arrived.

Although she spends most of her time parading the tough girl persona we've come to expect, several of the cuts on this LP showcase the singer as more than merely macho. Notably, "(I'm Gonna) Run Away" and "Crimson and Clover" boast a gentler—and in the latter's case, nearly ethereal—delivery that proves that J.J. can convey emotions from a feminine point of view.

As a singer as well as a songwriter, J.J. seems to be improving by leaps and bounds with each recording. The selection of cover tunes (an all-important aspect, as she's yet to write her own hits) shows a lot of smarts and gives the direction of the album considerable integrity. Straight-ahead rock 'n' roll tailored to a '60s pop model is an apt context for Jett's blossoming talents. Watch out, world, this is no longer just a tomboy guitarist with a learner's permit. *Jon & Sally Tiven*

Dr. John Plays Mac Rebennack: Dr. John

Clean Cuts CC 705, stereo, \$8.98.

Sound: A

Performance: A-

The title may be a bit misleading, as Dr. John and M.R. are one and the same, but there's no mistaking his distinctive keyboard style. Most people

are familiar with his vocalizations, which are lacking on this primarily instrumental album, but the recording is intended to appeal to a slightly different crowd. Here Dr. John pays tribute to his roots, be they Hoagy Carmichael or Huey "Piano" Smith, and his blues-based piano interprets their compositions as well as ones Rebennack has written in their style. Longtime fans of Dr. John who associate him with New Orleans R&B, the wacked-out arrangement on Garland Jeffreys' "Wild in the Streets," or his own spaced-out albums from the late '60s might find this somewhat conventional—nay, almost traditional music—a shocking step backward. However, the playing is truly sensational, and although the genre may be somewhat of a throwback rather than a progression, the performance is an honest one. The liner notes were written by my colleague, Mr. Tearson, so if you have any respect at all for his opinions you should rush right out and score a copy of *Dr. John Plays Mac Rebennack*. Surely there's not an album in your collection recorded in the past 20 years or so that's anything like it.

Jon & Sally Tiven

Nick the Knife: Nick Lowe
Columbia FC 37932, stereo, \$8.98.

Sound: B Performance: B

With the dissolution of Rockpile as a recording and performing unit, one would expect that the albums of its leaders would reflect the differences in their preferences rather than the sameness that's pervaded their past few records. Rockers-to-the-core will have to save their money for the next Dave Edmunds album (due any day now), as Nick Lowe has reverted to the clever pop formula that distinguished his earlier work. Not that this is awful stuff, because as singer/songwriters go, Nick can nick a hook with the best of them, but there's relatively little bashing being done here—the main instruments are acoustic guitars and percussives. The supporting cast includes former Rockpiller Billy Bremner and Terry Williams, but this is more for appearances than re-enacting the Rockpile legacy; Carlene Carter has a stronger presence here than those boys.

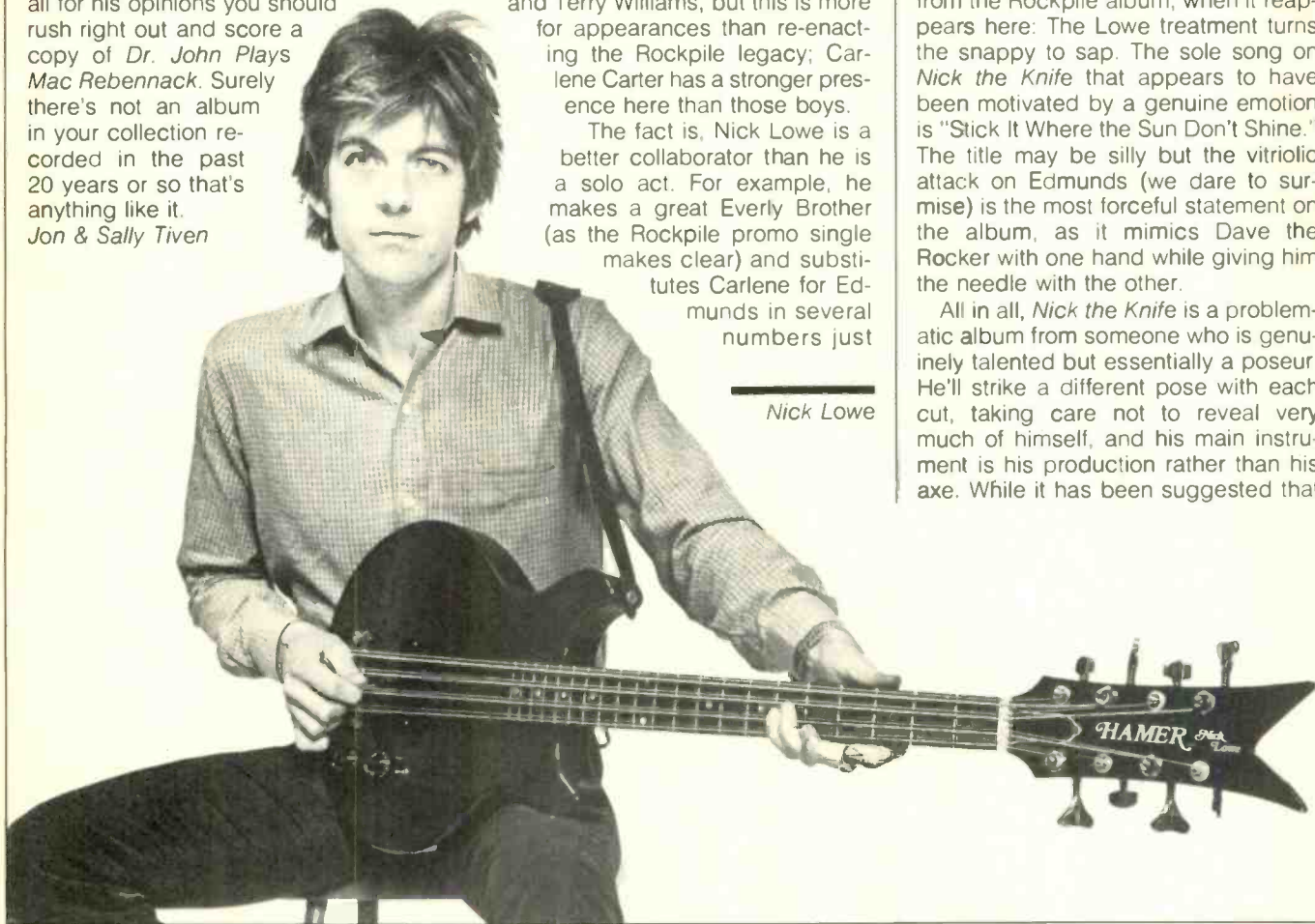
The fact is, Nick Lowe is a better collaborator than he is a solo act. For example, he makes a great Everly Brother (as the Rockpile promo single makes clear) and substitutes Carlene for Edmunds in several numbers just

so's he can do the country harmony schtick he's so fond of. Nick's drawback as a recording artist is that he's more skilled than inspired: In conjunction with an unfocused talent his craft has some purpose, but in and of themselves the stylistics fall flat. The production of this LP, with its reliance on sweetness and space rather than guts, could well be called the featured instrument.

The songwriting is extremely limited—or lazy—depending on your opinion of Lowe's potential to pen something you haven't already heard (he's one of the most reliable self-plagiarists in the biz). "One's Too Many (And a Hundred Ain't Enough)" almost gets off the ground, probably due to a lingering presence of its coauthor, one authentic blues crooner named Kim Wilson from The Fabulous Thunderbirds. It's interesting to hear what happens to "Heart," an upbeat '50s rocker from the Rockpile album, when it reappears here: The Lowe treatment turns the snappy to sap. The sole song on *Nick the Knife* that appears to have been motivated by a genuine emotion is "Stick It Where the Sun Don't Shine." The title may be silly but the vitriolic attack on Edmunds (we dare to surmise) is the most forceful statement on the album, as it mimics Dave the Rocker with one hand while giving him the needle with the other.

All in all, *Nick the Knife* is a problematic album from someone who is genuinely talented but essentially a poseur. He'll strike a different pose with each cut, taking care not to reveal very much of himself, and his main instrument is his production rather than his axe. While it has been suggested that

Nick Lowe



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Lowe is a great producer, it seems that he's done a poor job of directing himself in a way that brings out the best. Perhaps he *should* be produced by someone else who knows talent when he sees it rather than a producer who sees the task of making a record as an opportunity to sell records and be clever. Nick, you've outsmarted yourself.
Jon & Sally Tiven

Mesopotamia: The B-52's
Warner Bros. MINI 3641, stereo,
\$5.99.

Sound: D+ Performance: D

Rumors abound that Warner Bros. was not at all delighted when they heard the new B-52's material produced by chief Talking Head David Byrne. Word also is that the decision to release a mini-album of six songs, instead of the normal full album, was a corporate decision that did not thrill the group very much.

It is not too hard to see where Warners' people came up with the decision since *Mesopotamia* is quite a departure from the B-52's sound developed on their first album and made formulaic by the second. Obviously, the band must have felt cornered artistically and chose Byrne as producer to expand their vision. He is an activist producer and plays throughout. Whether or not their combined expansions and explorations succeed must remain an open question.

The element of the band's early work most thoroughly jettisoned is their humor, an odd move since that was perhaps their chief draw. *Mesopotamia* just is not the fun experience the first two B-52's albums were; indeed, they are alarmingly deadpan with a metronomic beat. Byrne's production never really jolts the band into the boldness you'd expect. Add a genuinely lousy mastering job, in which the sound keeps breaking up, and you've got *Mesopotamia*, a disappointing mess all around.
Michael Tearson

Dare: The Human League
A&M SP-6-4892, stereo, \$6.98.
Penthouse and Pavement: Heaven 17
B.E.F./Virgin (U.K.) V-2208, stereo, import.

Sound: A— Performance: A

During 1981 The Human League, pioneers in England's post New Wave synthesizer-art rock, splintered into two separate groups after their second album. The split has brought each band greater success than the parent band had up to that point.

By last year's end The Human League had several hits on the English charts, culminating with "Don't You Want Me" being No. 1. Their album *Dare* had also reached No. 1 and stayed there well into the new year, and its success goosed the first two Human League albums back into charted positions. Heaven 17 had three major hits, with "(We Don't Need This) Fascist Groove Thang" the biggest, and their album was well up in chartland too.

I expect both to impact seriously on America in 1982 for several reasons. To begin with material, which both bands deliver strongly, The Human League tends towards a lyric romanticism while Heaven 17 is more politically oriented. Second, both have succeeded in demystifying the synthesizer, rendering sounds from it with a warmth and humanity very rarely found previously. Though nearly every non-vocal sound on both albums is synthetic, the sound is not the cold mechanical sound we have come to associate with synthesizers. The accents and subtleties each group achieves are marvelous.

Highlights of *Dare* include "Don't You Want Me" with its clever his side/her side storyline of a love gone sour, "The Things That Dreams Are Made Of," "The Sound of the Crowd," and the beautiful and inspirational "Open Your Heart." The League meshes the elegance of the best of The Righteous Brothers with mid-'60s Motown touches of melody in a canny, deft blend made surprising by the synthetic sound.

Heaven 17's album is more pointed and more devilish in its very distinct cleverness. "Fascist Groove Thang" is a nuclear cautionary fable served up with verve and zest. "Play to Win" and "Let's All Make a Bomb" are catchy little apocalyptic dance numbers about raw ruthlessness. Heaven 17 tends to snappier music than The Human League, but their political cutting edge may well limit their appeal, however unfairly.

Descending from the original Human League, both current bands are studio whiz-kids. All these folks know their way around the recording studio, so it is not at all surprising that both records are state-of-the-synthesizer with grand clarity and precision of sound.

They may well be the shape of sound to come, and then again they may represent a quick flash. But because of the superb songwriting and the raw savvy and smarts shown, I suspect we'll be hearing a lot from both The Human League and Heaven 17.

Michael Tearson

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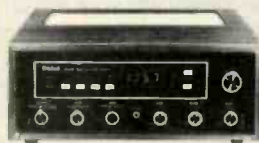
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EDWARD TATNALL CANBY



Dvořák: Symphony No. 9 ("New World"). London Philharmonic, Enrique Batiz.

Varese Sarabande VCDM 1000.190, digital stereo, \$15.00; dbx encoded, PS1037, \$18.00.

The dbx-encoded version of this recording is currently my choice for the finest all-out classical recording yet, on every count. It is one of those rarities that is not only a superb example of the recording art, all the way from microphones to pressing and dbx encoding (with full-range dynamics), but it is the finest performance I know of this familiar, easy-to-listen-to symphony, and I mean to include *all* the big-name conductors. I had not known of this Mexican conductor, Enrique Batiz, before. Take my word as a veteran listener that this man, in conjunction with the always enthusiastic British orchestra (the English still really relish the Romantic standard pieces!), makes more of the symphony's big shape and contour than I could believe; this work is anything but easy to put forth today, with its sometimes near-corny tunes and its enormous climaxes, à la 1894. And the detail work: Faultlessly beautiful phrasing and rhythm, immense care in shaping every smallest fragment, perfect synch

from end to end. All too often the music tends to be coarse, labored and overdone, but not here.

I carried this record, along with a few others from dbx, by hand to San Francisco (the decoder in my suitcase), where I played it on my favorite monster hi-fi system. In a spacious converted garage, with six channels, subwoofers, tri-amping, and plenty more, plus approximately 2,500 watts of amp power, this recording came into its own, and I learned some interesting pointers about big-scale home reproduction. Many recordings that are intended for average living rooms and average systems are at a disadvantage in a larger scale reproduction because the microphoning has favored solo instruments, or voices, amplifying them and bringing them forward as compared with an orchestral backing. A common procedure and OK in small rooms, but dreadful on a big system, played wide open!

I compared the Dvořák with another favorite recording of mine, the John Corigliano Clarinet Concerto (N.Y. Philharmonic, Mehta, "New World 309), now also dbx-encoded, and was astonished to find that, in this large listening place, it was not good at all—the solo clarinet was huge, gigantic, totally out of scale, far too loud. Where-

as in the Dvořák everything was in focus, even at the highest levels, an ideal musical balance and never the slightest feeling of exaggeration. And such beautifully articulate stereo separation! That, in spite of the four side and rear channels, which in this respect were, as they should be, consciously inaudible (unless they were turned off).

No—this was not "the best seat in the concert hall." It was a thing much better and more admirable, *the best possible translation of the basic Dvořák score into the audio recording medium.* That's what good recording is all about.

N.B. Because many still question the companding process as a means for quality sound reproduction, I made a point of asking everyone in sight, mostly young and with good ears, whether they noticed any odd "pumping" or other abnormal effects in the dbx sound. Only one person, a keen observer, I must say, noticed some slight background noise in the *loudest* parts of the record—where the masking effect is at its greatest and dbx is minimal! No problems with sudden transients, soft passages and so on. And this even though the original dynamic range of the symphony is positively awesome in its extent, completely realized in this reproduction.

Frankly, I would give the dbx version at least a three-to-one preference over the standard LP digital version, non-coded.

Brahms: Piano Concerto No. 1 in D minor. Maurizio Pollini, Vienna Philharmonic, Boehm.

Deutsche Grammophon 2531 294, stereo, \$10.95.

Reading the advance publicity that goes with this sort of high-prestige release, one would think that each and every example is an overpowering masterpiece of the recording art. True, quite often! But there are interesting differences, not usually mentioned in the publicity, which are easy for living-room ears to hear.

Thus, anybody who enjoys Brahms can hear the genial persuasiveness of this pianist with the Italian name, an expert player of German music who is a real Romantic and yet adds a certain

Italian airiness, a freshness, that is a big plus. This recording is in effect a Maurizio Pollini solo, with the legendary Vienna Philharmonic and Dr. Boehm distinctly in the background in more senses than one. You won't read *that* in the publicity.

These days the Viennese are not noted for lightness and air in playing their own masterpieces, and Dr. B. himself was always of the old reliable school, very, very thorough, moving great mountains at a snail's pace with much feeling but vast deliberation. Frankly, without the pianist this recording could be a bore. Too much heavyweight laboring, drawing things out and OUT. Maybe OK in a live Viennese performance. Not on records, unless you find it to your own taste.

I should quickly say that maybe this is all to the good here—since the Concerto, Brahms' first try, is one of those try-too-hard works which if pushed at all can become strained and harsh. Some conductors and/or pianists do just that, but not this pair. It isn't in either man's nature to make harsh sounds, or the Vienna Philharmonic's. So do not be afraid. It's OK.

The audio is grand, especially the impeccable piano sound, but I found the recorded balance bothersome. Here we have the traditional big concerto sound, the solo piano out front and close, always dominating the orchestra behind it. Too close; you hear relentlessly every detail that should melt into the orchestral eloquence. The ensemble is there but not compelling in its presence; the hall sound is present but intermittently, and the piano is simply not "in" the auditorium at all. Yet suddenly, a solo clarinet is up

close, right next to the piano. Accent mike? Whatever the mike technique, it provides a somewhat confusing perspective, though, to be sure, it gives Pollini's piano maximum exposure.

Note that all this has not a thing to do with audio sound quality itself. Recorded balance is a part of the musical aspect, contributing very directly to the impact of the composer's work as we hear it.



Maurizio Pollini

Mozart: Don Giovanni arranged for Wind Ensemble (Triebensee). Athena Ensemble.

Chandos ABR 1015, stereo, \$13.98. (Sine Qua Non Productions, 1 Charles Street, Providence, R.I. 02904.)

What a pleasure! All sorts of listeners are well served here. If you would like opera if only the voices would go away, here's the No. 1 opera of all time without a voice to be heard — just all the best "tunes," in delightful wind arrangements made back in Mozart's own day. If you are fond of "Don G.," and millions are, this is a novel approach to the familiar music, a whole hour of the best musical segments in a new guise, for the easiest listening imaginable.

But best of all is the original purpose of these arrangements, which suit us wonderfully well. The fancy nobility of Austria in Mozart's time were opera nuts (and paid for it), and for their long, leisurely festive banqueting they wanted music, opera tunes, played by live wind bands of eight or nine players, the so-called *Harmonie*. Even the Emperor had his *Harmonie*, to play while he ate. So this is strictly eating music, and where better to hear it than in your own dining room! Just try and you'll see what I mean. No formal concert could ever do it justice. You need a good steak.

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THE AUDIO INTERVIEW

DAVID LANDER

RUDY BOZAK





The first professional sound reinforcement installation with which Rudy Bozak was involved was the Lagoon of Nations at the 1939 World's Fair.

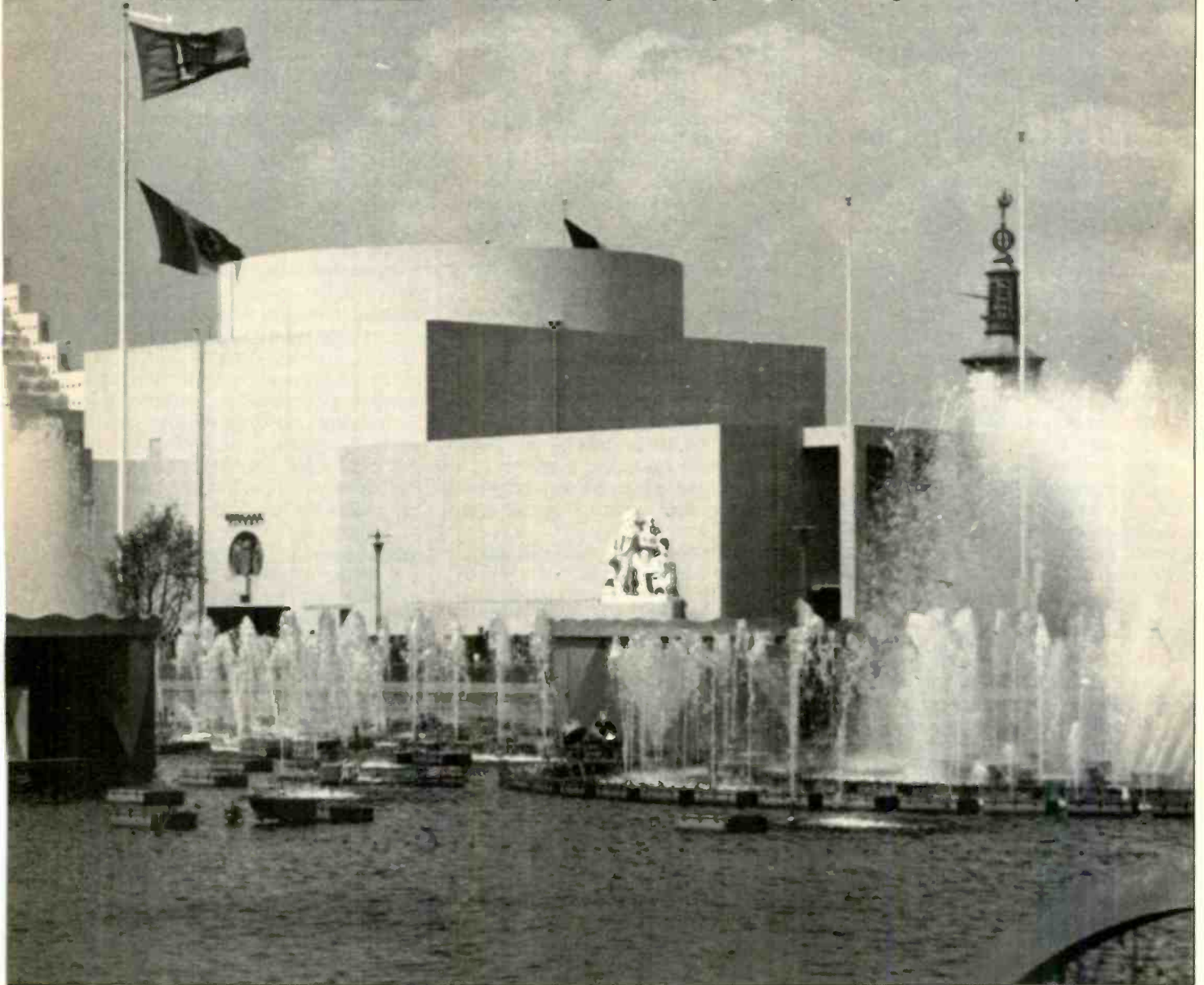
Sometimes it seems that irony is the pre-eminent governing principle in our universe. Audio's editor, Gene Pitts, and I had been talking for some time about interviews for this magazine, and we agreed that one of the first should feature loudspeaker pioneer Rudy Bozak. The last time I'd interviewed Rudy was shortly before Christmas in 1977. He had just sold his company and, though he had planned to stay on in a consulting capacity it wasn't long before he grew discontent with the direction the new management imposed and retired.

Not long before Christmas of 1981, I called Rudy at his Darien, Connecticut home. Though I had a 75-page transcript of two C-90 cassettes on file from our last discussion, I wanted to update the interview for this magazine. Rudy, always a gentleman, graciously

consented. He sounded chipper as ever and, when I asked how he was getting along, said something that struck me as very healthy for a man who had not particularly wanted to retire: "I don't have the time to do the things I have to do."

I never did get to Darien. CES intervened, then some of the century's worst winter weather. On Wednesday, February 10, I returned home from Boston, where I was on assignment for Audio, to learn that Rudy had died that Monday, shortly after suffering a heart attack at his home. The company he founded in 1949 had closed its doors in mid-January, only weeks earlier.

Born in Uniontown, Pennsylvania, on July 13, 1910, Rudolph Thomas Bozak, son of a stonemason, graduated from the Milwaukee School of Engineering in 1932. His first job, at Mil-



The ear educates itself in time, and it seems that age does to the ear something that time does to wine and other things.

waukee's Allen-Bradley Company, was designing radio tone controls. In 1936, he moved to Cinaudagraph in Stamford, Connecticut, rising to assistant chief engineer in a year.

Bozak began his work with loudspeakers at Cinaudagraph, which designed the bass system for the Lagoon of Nations at the 1939 World's Fair, the first of many sound reinforcement installations with which he was involved. His next job was at a band instrument company, C. G. Conn in Elkhart, Indiana, where he worked on the development of a speaker line. Rudy Bozak was fascinated by the way instruments were constructed, as well as the people involved, and later credited Conn with providing his "maximum supplemental education" in "this business of sound."

After nearly five years at C. G. Conn, Bozak moved to Wurlitzer, but economic conditions in 1948 led to his dismissal, and, at the urging of friends, he decided to design, build and market a loudspeaker of his own. Using the New York audio fairs of the early 1950s as a platform and the advanced hi-fi records of his friend Emory Cook to demonstrate what his speakers could do, he began to attract the attention of a burgeoning community of audiophiles.

The Bozak plant always mirrored its proprietor's insistence on quality and craftsmanship. Moreover, Rudy felt a strong responsibility to the artisans, some of whom had been with him from the beginning, who built his products. Visitors accustomed to the loudspeaker assembly lines so common these days were treated to the sight of woofer cones being molded from raw lamb's wool, paper and dye; mid-ranges being stamped from sheet aluminum and then hand-turned on a lathe, and voice-coils wound by hand.

If Rudy Bozak's attitude had to be summed up in a word, it might be "concern." He cared about his employees and the products they helped create. He cared about the people who bought these products. His speakers carried a 10-year warranty because Rudy thought they should satisfy their owners at least that long.

Not surprisingly, Rudy Bozak had some distinct ideas about sounds and the high-fidelity components designed

to recreate them. Excerpted from our 1977 conversation, some of these follow.—D. L.

When did you actually unveil the first Bozak speaker?

It was either January or February of '49 that we had our first public showing of our 201, which was a two-way system incorporating the kettle drum as an enclosure. That actually was developed at Cinaudagraph, where I was working back in 1937. It was very well-received so I proceeded to go out and peddle on my own. I made a tour from Buffalo to Boston, down the coast to New York and Philadelphia and back home, and I only made one sale on that trip. This was in about mid-year '49. And, of course, in 1949 Harry Reizes got the bright idea of putting on the first audio fair at the Hotel New Yorker.

Did you exhibit there?

I didn't buy any space at the show from Harry, but at that time they had a loudspeaker comparison on stage in the ballroom and we were invited to participate in this. We put our 201 there and it stood up with the best in the business at that time. There was Klipsch, Altec's 604, JBL, the names that prevailed at that time, and we made a definite impression. So I made another round and I still didn't hit off very well, but we struck a couple of places. Little bit by little bit we found dealers here, there, and elsewhere.

How long did it take before you were convinced your company would succeed?

The thing that really made Bozak, I must say, was that I struck up a friendship with Emory Cook, who at that time was an idealist in recording. The fact that I was an idealist in loudspeakers made for a mutual meshing of feeling there. Emory liked to dramatize things, very much so. He came to me and said, "Rudy, we want to steal the show at the 1951 audio fair. I will make some recordings and you give me a loudspeaker with good bass and good highs and we'll put this show on." Well, I proceeded, and that was the beginning of the Concert Grand. Emory went to Harmon on the New York Central tracks—two, three in the morning—and recorded passenger trains, freight trains coming through, the clonking of the rails, the horns, what have you,

and it was a very dramatic recording. So we played this and we just stole the show in 1951. The comments! Down the corridors, from around the corners, people would say, "Where are those railroad trains?" It was a very, very realistic sound, and that was where we took off and started to fly. Cookie stole the show again in '52. He, at that time, recorded organs. He also got a group of members from the Boston Symphony—I think it was a gathering of about 30—that made a number of orchestral recordings in Symphony Hall. So we had organ and symphonic material, but the thing that was so dramatic about it was that the quality was great and there was the unbelievable realism of stereo. He called it binaural at that time. It used two cartridges. In other words, he had two bands on a record, and it was the predecessor of the stereo that we know today. That was the stealer of the show again. And in '53 he went back to Symphony Hall and recorded the 16 cycles of organ pipes, so we had to build a loudspeaker that was capable of going down to 16 cycles—the first loudspeaker that really went down and produced a genuine 16-cycle tone.

And you did that in 1953?

In '53. And it was a monster of a loudspeaker. He also recorded a chorus in Symphony Hall, and that really stunned people. I remember in one particular case Saul Marantz walking into the room just as this was going on. He folded his hands and stood there as somber as all day. It was really a stunning and paralyzing type of thing. The program material that Cook made available and the work that I put into the loudspeakers really were perfect companionship, and we carried on until Cook finally gave up on doing what he called "Sounds of the Times" pressings.

How important has your ear been to your success in designing loudspeakers?

Well, that still is one of our basic standards, the ear. And yet the ear is a very queer thing. Our reaction to what we hear is subject to a number of things, not the least of which is our disposition of the moment. You know, I built my first radio set in 1922, and my loudspeaker system was a soup plate with a pair of earphones put in it. We were

If I can do a good job of recreating symphonic material, with satisfactory fidelity, then I have accomplished my goal.

tremendously impressed about how great the thing was, because in that particular instance the novelty matched everything else. It's only after continued hearing or association that people begin to be critical. We've noticed this over the years in the high-fidelity business. The neophyte would start with some cheap, pretty poor-sounding thing to us—but great to him—only to find that six months or a year later he wants something better. *So the ear can be educated.*
The ear educates itself in time. It does.

Audio pioneers Saul Marantz (left) and Rudy Bozak.

It seems that age does to the ear something that time does to wine and other things.

Speaking of wine, connoisseurs have their own terms for describing various varieties and vintages. They'll talk about one having a big nose, for example, and another possessing a certain flinty quality. Like wines, speakers can be very different from one another. How would you describe the various sonic qualities of the best speakers you've listened to?

In bass, a sense of feel and a sense of ease. With certain types of percussive sounds, there's a punch; it puts a feel into the thing. The sense of ease is a very difficult one to describe. It's feel, but without being obnoxious. Ease is best described by the fact that you

can sit and listen to the thing all day long. Nobody says, "Turn that off." *What about the rest of the frequency spectrum?*

In the midrange, the property you must have is clarity because, after all, here is the range where you have the fundamentals. The basic frequencies in all of our voices, whether male or female, are only an octave apart. Middle C is 256 on the piano, and the octaves below and above that are where all these fundamentals that are demanding of clarity are found. They may fringe over a little bit, but that's essentially it. It's essentially a two-octave span that you're working with, and unless you have freedom from distortion in that region, you don't have the clarity. And in the octave above that, from 512 to



1,024, you've got to continue with your clarity. Now here is the region where you often get into trouble with cone breakup.

And what about treble? What qualities do you look for in high frequencies?

Treble is the area where you have the fill-in harmonics, which really do the final defining of sound. It's mandatory that this area be devoid of any spurious sounds or harmonic generation. In the treble range you need a feeling of warmth and sweetness. In other words, when you listen to the musical instrument, whatever it is, there's nothing grating about it.

The woofer you designed for the 1939 World's Fair, which you've shown me a number of times, is more than two feet in diameter. Later you turned to multiple smaller woofers. Can you say a bit about this?

You want to move a lot of air, but you also want to faithfully recreate the signal, and it doesn't take very much imagination to realize that, if you have a relatively large diaphragm, it must have a substantial amount of mass. If this cone is heavy, it's going to be sluggish. Maybe it can't get up there and move. The analogy I used in the beginning days is that it's like comparing the acceleration of a freight train with that of a passenger train. The lighter, smaller guy gets off faster. That forms the basis for this multiple woofer approach which, incidentally, was not totally novel to me because Ed Kellog proposed the same type of thing about 10 years prior to my design. Of course, he was proposing eight-inch drivers, a great many of them, but it was the same basic concept. There are two other things that enter into this which I've learned over the course of my years in the business, and that is, not only do we want to have the cone light, but we also want to have it inert. A hard paper diaphragm will give you more apparent sound, but the output of that diaphragm is fraught with some inherent characteristics of the material itself. A Bozak development is a diaphragm of a light material, relatively rigid in structure and relatively dead. The reason it's dead is because it's a combination of wool and paper fiber.

You're talking about your variable density woofer. You mold these yourself, don't you, by a proprietary process?



Bozak's Concert Grand Model B410 Moorish-styled loudspeaker.

A speaker's sense of ease is very difficult to describe; it's feel but without being obnoxious.

A 100% proprietary process. And in addition to that there's a varying distribution of material from the apex out to the edge of the skirt. We deposit more material at the apex and it gradually diminishes as you go toward the edge. With subsequent treatment it's the basis of the variable density cone, which again is 100% unique to Bozak. What's this variable density system all about? Well, not only is this cone an air pump wherein we move air, but each one of those impulses from the voice-coil also propagates a wave in the material itself. By having variable density we dissipate that wave so that it doesn't go out to the edge, where it necessarily becomes reflected and gives us problems.

I'd like to get back to the importance of the ear in loudspeaker design. In your opinion, how many speaker designers have a good set of ears?

Dave, that's a very unfair question.

Well, what about your own ear? Surely it's been a factor.

Well, I think it's been somewhat of a factor. But, you see, in developing a loudspeaker you go through more than just listening to the damn thing. As I indicated, I had been indoctrinated, notably when I was at Conn, that the ear has been a contributing factor, but

it is certainly not the only factor.

Then the importance of the ear can be overstated?

It could be, yes.

What other criteria do you use when it comes to evaluating one of your speakers?

Well, all the preliminary tests I subject it to.

Such as?

Tone bursts, applause ... and the spatial effects ... evaluation of the spatial coverage.

Why tone bursts?

Well, the tone burst is a qualitative figure of merit that shows how quickly the loudspeaker can respond to the initial impulse that it's excited with, and it also indicates how much the loudspeaker hangs on once the impulse has ceased.

And why applause?

Applause is closest to anything that we have to evaluate a loudspeaker system that you might term absolute. In other words, if it's distorted you recognize it. There's some character about it. Any of us who have been to a performance in a hall where we've heard applause recognize all the qualities that are in it. Of course, this applies to the upper end of the frequency spectrum, not to the overall spectrum.

If we compared one of your speakers from 1952 with one of your latest models, how different would it sound?

It would be different. To attach a quantitative number, it's difficult to say.

Do your speakers sound better with one kind of program material than another, with a particular type of music?

My standard is that if I can do a good job of recreating symphonic material, where I have a vast variety of instruments from fairly deep bass to the highest pitch and everything in between, that if I can recreate those instruments with a satisfactory degree of fidelity, then I have accomplished my goal.

Do you feel that another person could have designed these speakers?

Had he used the same tools, I don't see why not.

I'm wondering how much the personality has to do with it.

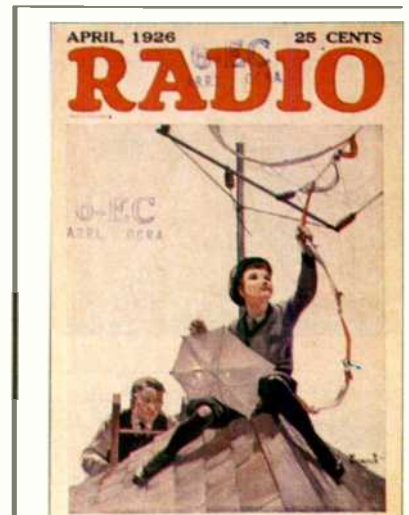
I don't think personality has anything to do with it. In other words, I don't think that my personality has entered into any of these things.

Audio's **35th** Birthday



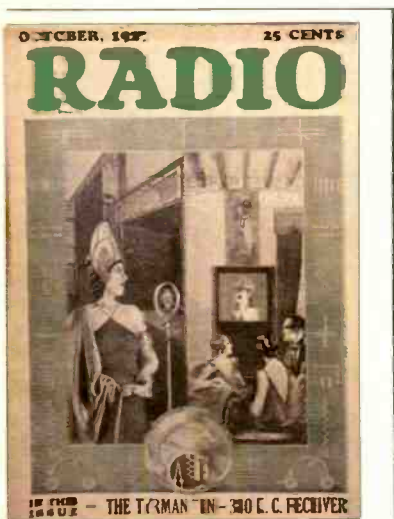
January 1917. With most of the world engulfed in war and only three months left of U.S. neutrality, a new magazine was quietly born at the San Francisco Radio Club. Entitled *Pacific Radio News* and edited by H. W. Dickow and Paul R. Fenner, the new magazine was launched amid some pretty stiff competition. Although interest in wireless and radio had not yet developed much past the "amateur" stage, several magazines devoted almost exclusively to radio/wireless were already in existence. *Wireless Age*, published by American Marconi, dated back to 1913, while the first official issue of the Amateur Radio Relay League's *QST* was published in December 1915. Scores of useful articles about wireless could also be found in Hugo Gernsback's *Electrical Experimenter*, as well as in *Popular Science Monthly*, *Popular Mechanics* and the *Scientific American*. None of these magazines, however, featured West Coast wireless activities, and because of this *Pacific Radio News* found a ready audience.

Before *Pacific Radio News* had much of a chance to grow, however, the United States plunged into the First World War in April 1917. Upon entering the war, the U.S. government sus-



John P. Wolkonowicz

Audio's 35th Birthday



pendent amateur wireless activities for the duration. Thus, publication of *Pacific Radio News* was temporarily halted with the May 1917 issue. When publication resumed with the January 1920 issue, a completely new radio industry had come into existence. The World War had demonstrated to the U.S. the strategic importance of wireless communication in wartime. As servicemen returned home, "bitten by the radio bug," interest in amateur radio surged. Countless new companies were formed to supply the almost endless demand for "wireless gear," and the new radio industry was off to a flying start.

Pacific *Radio News* grew steadily during 1920, catering strictly to the amateur wireless enthusiast. The original 6 x 9 inch format was increased to 9 x 12 inches in August 1920 (and was continued through 1935). With the advent of programmatic broadcasting by stations WWJ and KDKA in late 1920, *Pacific Radio News* gained a new audience: The "B.C.L." or "broadcast listener." October 1921 saw a change in management and a new editor, Arthur H. Halloran. Halloran's first move was to change the name of the magazine in November 1921 to *Radio*. The new name signified the magazine's emergence as a national publication aimed at both the amateur and the B.C.L. The broadcasting boom of 1922 ensured *Radio's* success. By May 1922, circulation had reached 40,000 issues per month and was still climbing.

By 1923, a conflict had developed between the amateur and the B.C.L. *Radio* clearly stated its position on the cover of the April 1923 issue: "An Independent Magazine Serving the Needs of the Radio Amateur and Commercial Operator." The editorial page of the November 1923 issue entitled "Radiatorial Comment" explained the purpose even more clearly: "*Radio* is primarily the amateur's magazine. It contains information whereby any 'B.C.L.' can so perfect himself as to be advanced to the 'ham' degree." Despite its statements, however, *Radio* ensured a wide audience by publishing articles of interest to both the broadcast listener and the amateur. Technical editor Gerald M. Best's arti-

cles were always of great interest. "The Best 45 kc Superheterodyne" became one of the "hot" circuits of the mid-'20s. Nearly every issue of *Radio* contained an article on either a new and improved version of the "Best Superhet" or plans to improve upon existing models.

By 1928, however, the amateur radio boom began to fade. February 1928 saw the near-demise of Hugo Gernsback's once-giant *Radio News*, while by March 1928 *Radio* had been trimmed down to a scant 48 pages. Competitor *Popular Radio*, published since 1922, succumbed in May. Clearly a change was necessary.

Nineteen twenty-nine saw the slow but steady transformation of *Radio* into a trade magazine for the radio industry. The transformation was complete by September 1929, when the "new" *Radio* emerged as "The National Trade Magazine" complete with advertising on the front cover. The idea looked promising, and the magazine grew quickly in size—a sure sign of success. This growth was short-lived, however, since the stock market crash of October 29, 1929, and the ensuing Depression quickly put a stop to all expansion in the radio industry. *Radio Broadcast*, once a formidable competitor published by Doubleday-Page, went under in April 1930. *Radio* somehow managed to survive under the leadership of its new editors, P. S. Lucas and K. N. Ford, but the magazine became progressively thinner as the months passed. Publication was erratic in early 1933 and finally ceased with a combined February/March 1933 issue—the last of *Radio* as a trade magazine.

After merging with *Modern Radio*, publication resumed under new management with the June 1933 issue, and *Radio* became, once again, an amateur radio enthusiast's magazine with considerable emphasis on short-wave radio. The short-wave craze did much to spark a recovery in the radio industry. Unfortunately, *Radio* didn't find itself a part of this recovery. By mid-1935, a lack of advertising caused *Radio's* size to drop to 40 pages.

Rescue came in the form of a merger with another amateur radio enthusi-

ast's magazine, *R/9*, which had been published under that title since September 1932. Under the guidance of technical editor R. S. Kruse, *R/9* had gained a steady following among ham operators. With the January 1936 issue, *R/9* and *Radio* were combined to form the single publication, *Radio*. The magazine now had over 100 pages per month, was 7 x 10 inches in size and printed on glossy paper. Its appearance and content were much like its competitor *QST*. During this period, *Radio* was published 10 times per year; the summer months were "slow" among hams, so the August and September issues were skipped each year between 1936 and 1941.

The new format proved quite successful, but once again outside circumstances caused a decline in readership—this time in the form of World War II. Due to the enlistment of many of its readers, *Radio* again found it necessary to change its format. The transformation to a radio broadcast and design engineer's magazine began slowly with the rather thin February 1942 issue. The April 1942 issue was skipped, and by May the editorial offices had been moved to the East Coast. *Radio* had become a 9 x 12 inch magazine devoted to "Radio, Sound, and Electronics." After a squabble with *Electronics* magazine, this became, in September 1942, "Design, Research, Production, Operation."

In April 1944, John H. Potts became editor of "RADIO—the Journal for Radio-Electronic Engineers." Slowly, emphasis shifted towards the interests of the broadcast engineer. During this period, *Radio* was not sold on the newsstands as no price appears on the cover. Once again, due to a decline in advertising, the magazine grew progressively thinner—dropping to 32 pages by late 1946. Another change was necessary.

A letter to subscribers from Editor John Potts in the combined February/March 1947 issue announced the change: Beginning with the May 1947 issue, *Radio* would be known as *Audio Engineering*. In Mr. Potts' words, the change was made "Because there has been no technical magazine devoted solely to this field. All engineers inter-

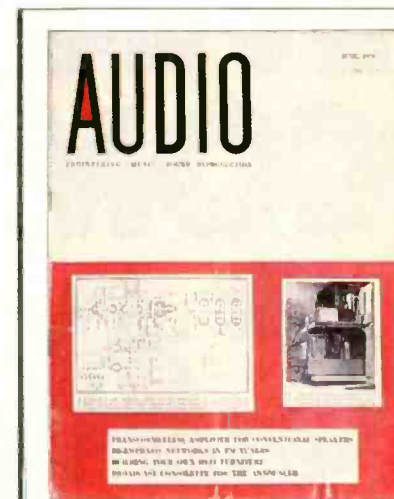
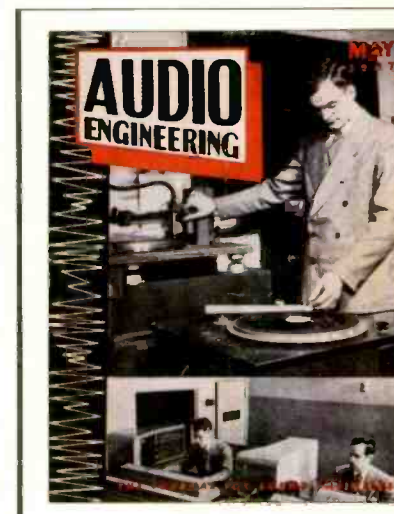
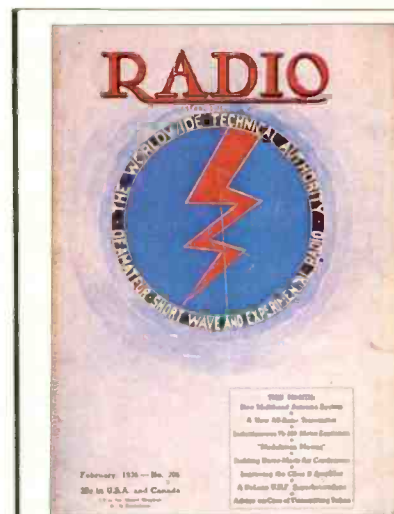
ested in audio engineering had to gather piecemeal, from a large number of sources, such information on the subject as is published. To render greater service to our readers and to the industry we have decided to devote our magazine exclusively to the audio engineering field."

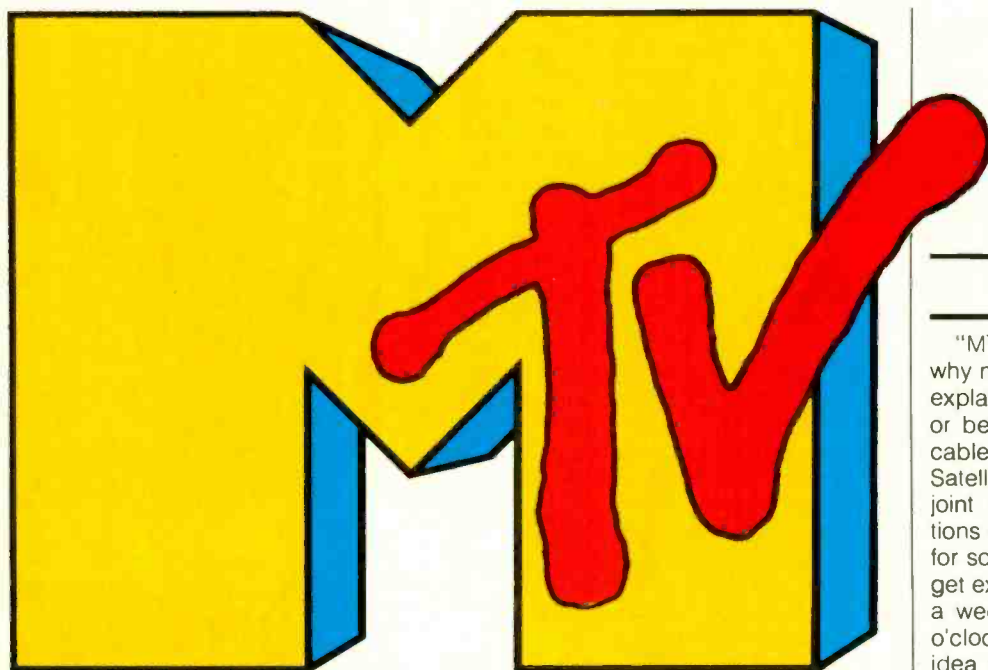
And so, three years before the emergence of the audio industry, its first booster, *Audio Engineering*, was born. The first issue, May 1947, featured Norman Pickering on the cover. The appearance was completely new, page count was up to 56, and under the guidance of John H. Potts and C. G. McProud, *Audio Engineering* was on its way. Early issues were devoted entirely to the audio and broadcast engineer, but with the emergence of the audio enthusiast, the magazine soon contained hobbyist-related articles as well.

After the death of Mr. Potts in March 1949, C. G. McProud assumed editor's duties. One of the co-founders of *Audio Engineering*, Mr. McProud would head the magazine for the next 18 years! After the founding of the Audio Engineering Society in 1948 and its excellent publication in 1952, AE's emphasis shifted slowly towards the audio hobbyist. By 1954, the change was complete enough to drop "Engineering" from the title, leaving simply *Audio*. Since 1954, *Audio* has modernized its format several times but still maintains the successful blend of technical and construction articles, product reviews, and record reviews pioneered by Mr. McProud in the early '50s. *Audio*'s readers have become accustomed to looking first to *Audio* for the latest: The loudness control, Williamson amplifier, and FM-multiplex stereo are only a few of the innovations reported first in the pages of *Audio*.

Thus, over 65 sometimes stormy but always interesting years, *Pacific Radio News*, *Radio*, *Audio Engineering*, and *Audio* have reported the birth and growth of both radio and audio. **A**

(Note: Readers desiring a more detailed history of *Audio* since 1947 should refer to *Audio*'s 10th, 15th, 20th, 25th and 30th anniversary issues of May 1957, 1962, 1967, 1972 and 1977.)





MUSIC TELEVISION™

**MUSIC
COMES TO
CABLE**

JON & SALLY TIVEN

"MTV was a result of examining why music on television did not work," explains Bob Pittman, who designed—or better, invented—the format of the cable TV program for Warner Amex Satellite Entertainment Co. (WASEC), a joint venture of Warner Communications and American Express. "It's hard for someone who really loves music to get excited about just an hour of music a week. People don't think 'It's eight o'clock—time for music.'" Pittman's idea was that music on TV had to be accessible 24 hours a day, always at the viewer-listener's beck and call. So Pittman, a Senior VP for Programming, set about finding ways to break the fixed time-frame mold into which music had traditionally been fitted on TV. Drawing on his previous experience as a radio programmer, Pittman put together a group of short video tapes which irregularly rotate through the broadcast schedule at the call of the video jockey, or VJ. Interspersed between the song segments are music-oriented movies, concerts or specials.

The second major innovation of the WASEC folks was getting a true hi-fi stereo signal available right from the cable. Andy Setos, the Vice President of Engineering and Operations for WASEC, explains:

"What we wanted to do with MTV was essentially to create a radio station with pictures, to be able to play any tune in any order. This meant we had to put it together like a radio station, but the equipment itself had to be TV gear. Since it was going to be a radio station, with every hour fresh rather than prerecorded, there was no way we could edit it together like a conventional program. To do that, we would have been editing in several video tape editing rooms for 24 hours a day just to come up with 24 hours' worth of program. In order to play any

tune at any time, we selected an Ampex cartridge machine, but it was mono because regular TV sound is monaural."

Ironically, Setos had been involved with New York WNET's simulcasts when fresh out of college in 1971. At that time he had approached Ampex about making NET's AVR-1 machines stereo, and they had turned him down. Simulcasts then were very difficult to do, what with trying to keep audio tape machines in sync with video tape machines and not having a computer or time base to check on things. However, in 1976 Ampex did modify the WNET machines, essentially by taking the single monaural channel and splitting it into two channels. Normally, such a splitting would have reduced the signal-to-noise ratio, but through use of Dolby A-type professional noise reduction, they actually gained back more than they lost. This was one of the first applications of Dolby noise-reduction technique to television.

For MTV, Setos found himself again calling on Ampex, this time to modify the ACR-25, a two-inch quadraplex machine, which is also mono in its normal configuration. They obliged, and Warner-Amex now owns the only three ACR-25s in the U.S. that are stereo capable. Setos believes that there is one in Japan which handles stereo, and points out that TV in Japan is already stereo. Commenting on the results of the modification, he says:

"We were very pleased, as it's not easy to modify a machine designed in 1970 to do something today. We ended up with a signal-to-noise ratio of about 68 dB, and that's rather respectable when you consider that the original material we're getting is not up to that level. The cart machines are not the narrowest funnel in the pipe, and the power they give us to program any tune at any time and play all this back-to-back, together with our animations and IDs, is used to good advantage. All those things come off the cart in real time, actually being selected and played as you see them."

Most of MTV's programming comes from promotional video tapes supplied by various record companies, and a somewhat wider variety of artists appears than the usually tightly programmed FM station would play. Pitt-



Top, New Year's Eve celebration at New York's Diplomat Hotel shown live on MTV; middle, Anna Bella Lwin, lead singer of The Bow Wow Wow; bottom, Nina Blackwood interviewing David Johansen at The Diplomat.





man feels that playing older video promo material from a record company's catalog is not bad, even in the case of a group that didn't make it big. He says, "I always contended that you really couldn't tell what the consumer wants unless you put it out to them and gave them a chance to decide. If, after a month, nothing happens, then it's reasonable to take it off." Certain video clips, however, do get a heavier rotation, such as those from top acts like The Rolling Stones.

Putting the tapes into the proper format for MTV carts and play is Setos' area. He explains that "Many clips are produced for promotional reasons, to be shown in record stores, used as advertising or as fillers on Home Box Office. But they exist in *mono*, so I have to marry the stereo release to the picture. And we want to make the picture as good as possible. First we convince the record companies to make copies of the master tapes, which is done at 150 ips on the highest quality tape we can get our hands on, usually

Ampex Grand Master. All this is done at our expense, about \$400 a clip.


"Then we take the picture, whether it be on film or on ¾-inch, one-inch, or two-inch video tape, and we send it and the audio tapes out to Image Transform, a Los Angeles company that specializes in making high-quality pictures out of whatever you have, using a lot of proprietary techniques they developed in their own labs. In New York, at Regent Sound, the sound is mixed using a computer synchronized to match the sound."

The stereo signal is piped down the cable in the same fashion as an FM radio signal so that the listener-viewer needs to have his FM tuner or receiver hooked up to the cable in addition to having a connection for his TV set. Is this the marriage of audio and video that industry analysts have predicted for so long? Perhaps there has been a secret marriage all along, for Setos points out that WASEC's national research indicates that nearly two-thirds of their audience has their stereo in the

same room as the television set. MTV uses one of the vacant spots in the FM band for their programming, so the viewer-listener effectively bypasses the poor quality of most TV set audio sections.

To distribute the MTV programming, WASEC uses satellite feed, but the stereo signal requires cable companies to buy a \$1,500 black box, which is inserted between the satellite antenna dish and the feed link to the cable. WASEC's Director of Engineering, Dom Stasi, was able to find two sources for the down-link box, Wegner Communications and Learning Industries. The signal-to-noise ratio on the link is about 70 dB, according to Setos, so there is no degradation in that portion of the chain. However, the FM transmission is Dolby B encoded, which provides a relatively compatible form of noise reduction, and a justifiably proud Setos thinks this is the first TV broadcast or TV network distribution done with Dolby B NR.

MTV is not all promo films of artists connected by the VJ, as they have taken to showing rock-oriented movies and filmed concerts, as well as doing some live broadcasts. The filmed concert has been the main staple of MTV's special fare, but this has traditionally proved to be a difficult format since few directors and producers appear to understand quite why the rock audience is at a concert. Rarely has the excitement or anything beyond the superficial theatrics of a musical performance been captured on film/tape without the man in charge interjecting an editorial subjectivism which interferes with the art of the performer. Pittman is intent on proper coverage of concerts, saying "We're trying to do something that's never been done on TV before, trying not to take a concert and package it as a TV show, but rather run it as coverage of an event that's worth covering."

Pittman and colleagues will have to be very creative to pull this off, and whether he—and indeed MTV—will succeed or will be forced to develop a new format is best left to future pundits. For the present, it's enough to note that there is an element of creative spontaneity to the relatively free-form format that's both interesting to watch and hear. 



Adam of Adam & The Ants being interviewed by Nina Blackwood



Karla DeVito at the 1982 New Year's celebration



Here's how we kiss the hiss goodbye.

BASF Chrome. The world's quietest tape.

With BASF Chrome, you hear only what you want to hear—because we “kissed the hiss goodbye.”

In fact, among all high bias tapes on the market today, only PRO II combines the world's lowest background noise with outstanding sensitivity in the critical high frequency range for superior dynamic range (signal-to-noise ratio).

PRO II is unlike any other tape because it's made like no other tape.

While ordinary high bias tapes are

Magnified
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Perfectly shaped and uniformly sized particles of pure chromium dioxide provide a magnetic medium like no other tape in the world.

made from modified particles of ferric oxide, only PRO II is made of pure chromium dioxide. These perfectly shaped and uniformly sized particles provide a magnetic medium that's truly superior—so superior that PRO II was chosen by Mobile Fidelity Sound Lab for their Original Master Recording™ High Fidelity Cassettes—the finest prerecorded cassettes in the world.

PRO II—a tape so superior, a cassette so reliable, that it was the one chosen by Mobile Fidelity Sound Lab for their Original Master Recording™ High Fidelity Cassettes.

For the best recordings you'll ever make.



BASF

Audio/Video Tapes

And like all BASF tapes, PRO II comes encased in our new ultra-precision cassette shell that provides perfect alignment, smooth, even

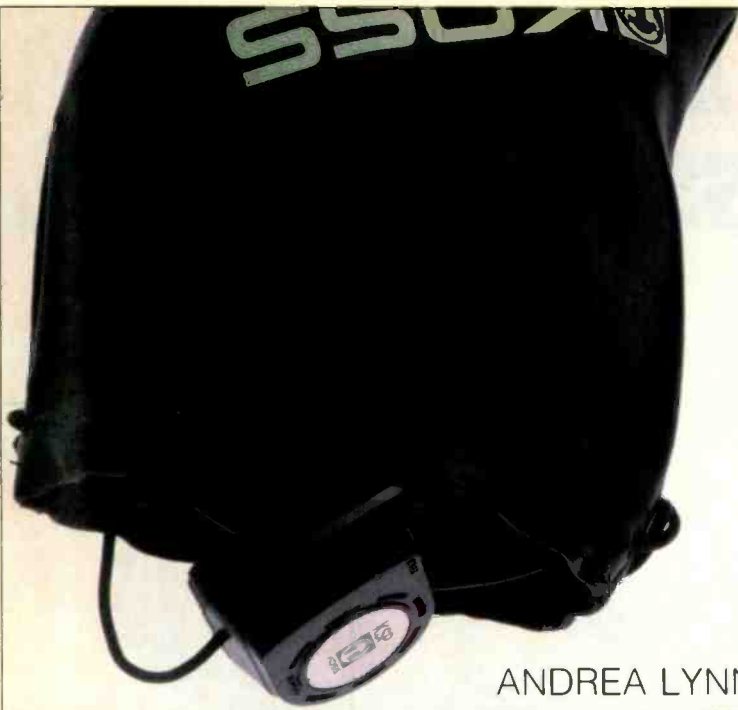


BASF designed and developed the world's only Measurement Reference Tape Cassette. And our new ultra-precision cassette shell is the logical culmination of that development.

tape movement, and consistent high fidelity reproduction.

So when you want to hear all of the music and none of the tape, turn on to BASF Chrome. It's the one tape that kissed the hiss goodbye.



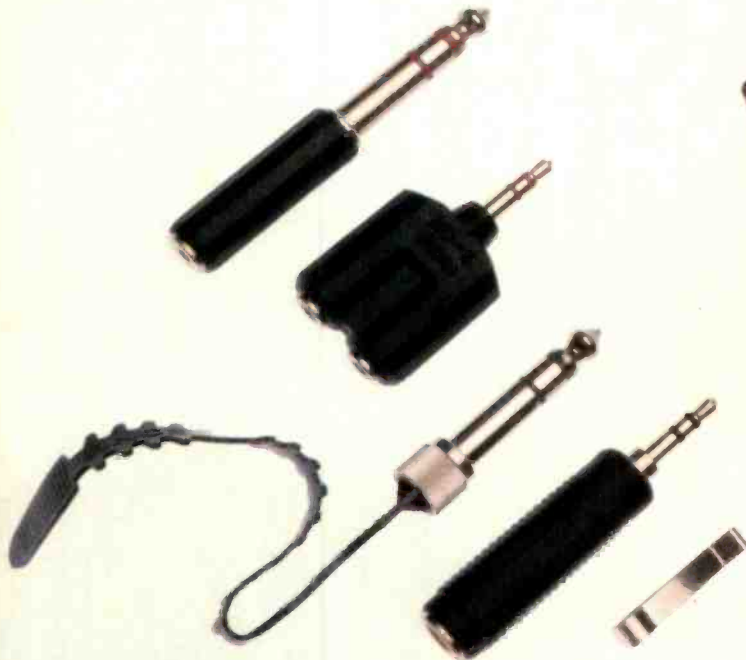


ANDREA LYNNE HECKER

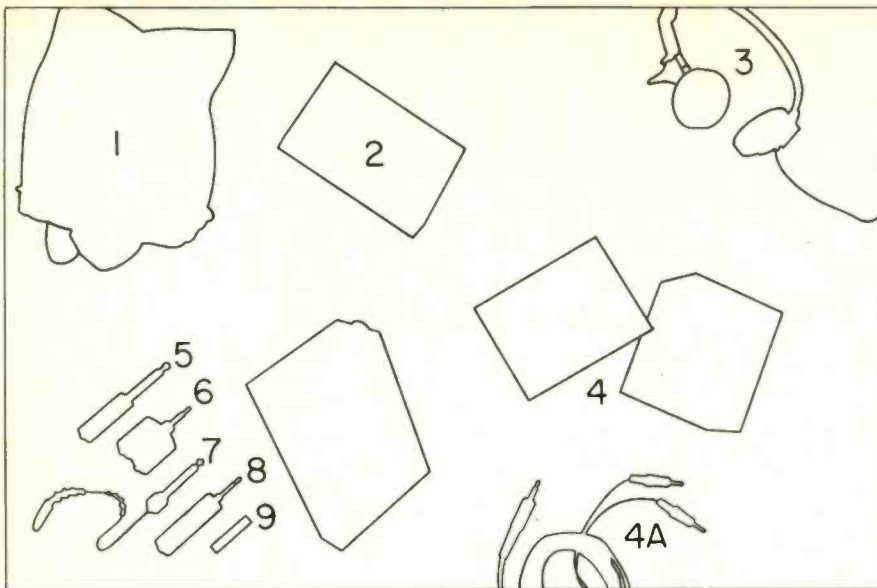
HEADPHONE HINTS

Pictured here is a selection of accessories for use with your light-

weight headphones; the Proton FM stereo receiver is representative of all the minis which can use these items (explained overleaf).







Y-connector harness (shown below the speakers [4A]), linking the speakers with your portable. I noticed that when used with the Proton, the speakers tend to drain the batteries quickly, so I suggest that you use an a.c. adaptor.

Adaptors come in many varieties, and items 5 through 8 are some of the most useful and innovative on the market.

5 Adapts from a mini jack to a standard phone plug, the type probably found on your receiver.

6 Adapts two mini jacks to one mini plug.

7 Sony's threaded adaptor is from a mini jack to a phone plug, with the threads insuring a solid connection. The notched plastic tail, with a threaded portion, allows the adaptor to be secured when not in use. Available from Sony with some microphones and headphones.

8 This adaptor is from a phone jack to a mini plug, allowing use of a regular headphone with a personal portable. Note that sensitivity variations can make this an unworkable combination.

9 Jerking phone wires can be eliminated with this clip by attaching the wire to the clip and the clip to your lapel or other piece of clothing.

1 The Koss Sound Partner is "in the bag," its own leather-like pouch. You can see the headphones peeking out, and they are constructed to collapse into a small circle with a hook-closing, making the unit secure, while the pouch protects the headphones from dirt.

2 The Denon AH-P5 Pocket Headphone uses a folding design. Two flicks of the wrist, and the phones change from flat to fully extended. They are housed in a clear

plastic box, the exact size and shape of a cassette box, providing safe storage and easy transport.

3 The Sony MDR 80 headphones can upgrade your personal portable. With its "look ma, one hand" design, they are easily adjusted with a slight push of one headphone—up tightens and down loosens.

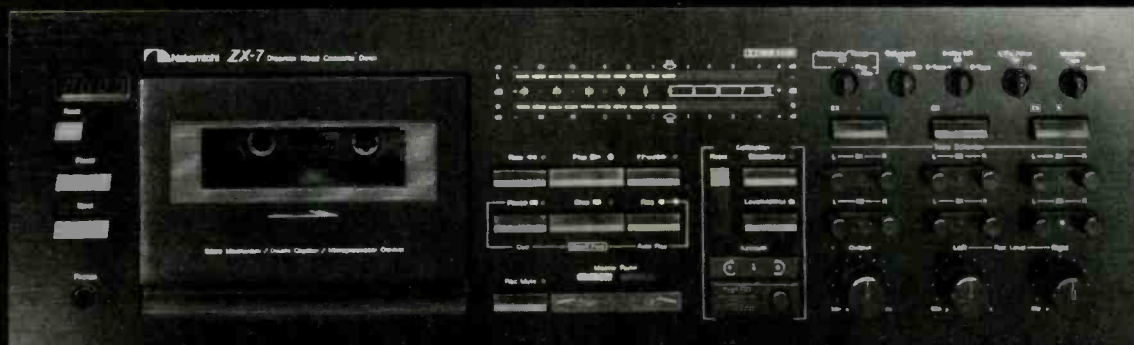
4 AudioSource has small compact speakers that can be used with any mini, offering big sound. The LS-One comes with its own

ZX-7...Maximum Performance through Complete Control

With the Nakamichi ZX-7 you command and optimize the vital record parameters—bias, level, and azimuth—which bring to life the true potential lying dormant in every cassette. This kind of control, plus the most advanced technology and features in cassette history, make the ZX-7 a serious recordist's dream-come-true.

Maximum Performance...The ZX-7 awaits you now at your Nakamichi dealer.

Nakamichi For more information, write Nakamichi U.S.A. Corp., 1101 Colorado Ave., Santa Monica, CA 90401.



DESIGN INTEGRITY:

The same Dynamic Servo Tracer tonearm technology found on our \$6,200. DP-100M...
Cutting Lathe Motor AC Direct Drive Turntable.

... can be found on our \$525. DP-52F...
Microprocessor-controlled Fully Automatic AC Direct Drive Turntable.

... and on our \$199. DP-11F.
Fully Automatic Flat-Twin Direct Drive Compact Turntable.

Instead of gimmicks, the Denon DP-100M uses the same cutting lathe motor that creates disc masters. Its Dynamic Servo Tracer system, working in concert with a Denon high-precision, ultra-low mass tonearm effectively suppresses resonances while providing the proper damping for the widest variety of cartridges.

The same Dynamic Servo Tracer system is incorporated on the DP-52F, making it one of the most effective playback systems ever developed for warped and hard-to-trace records. Damping, anti-skating and tonearm lift/locate are all applied through microprocessor-controlled non-contact electronics. Its AC Servo motor employs the same drive principle and magnetic speed control found on Denon's DP-100M.

The DP-11F introduces Denon design technology to a new price category. It features magnetic speed detection, a Flat-Twin Direct Drive motor and the same Microprocessor-controlled Dynamic Servo Tracer tonearm system found at the very top of our line.

Design Integrity: Denon's products share more than name alone.

DENON

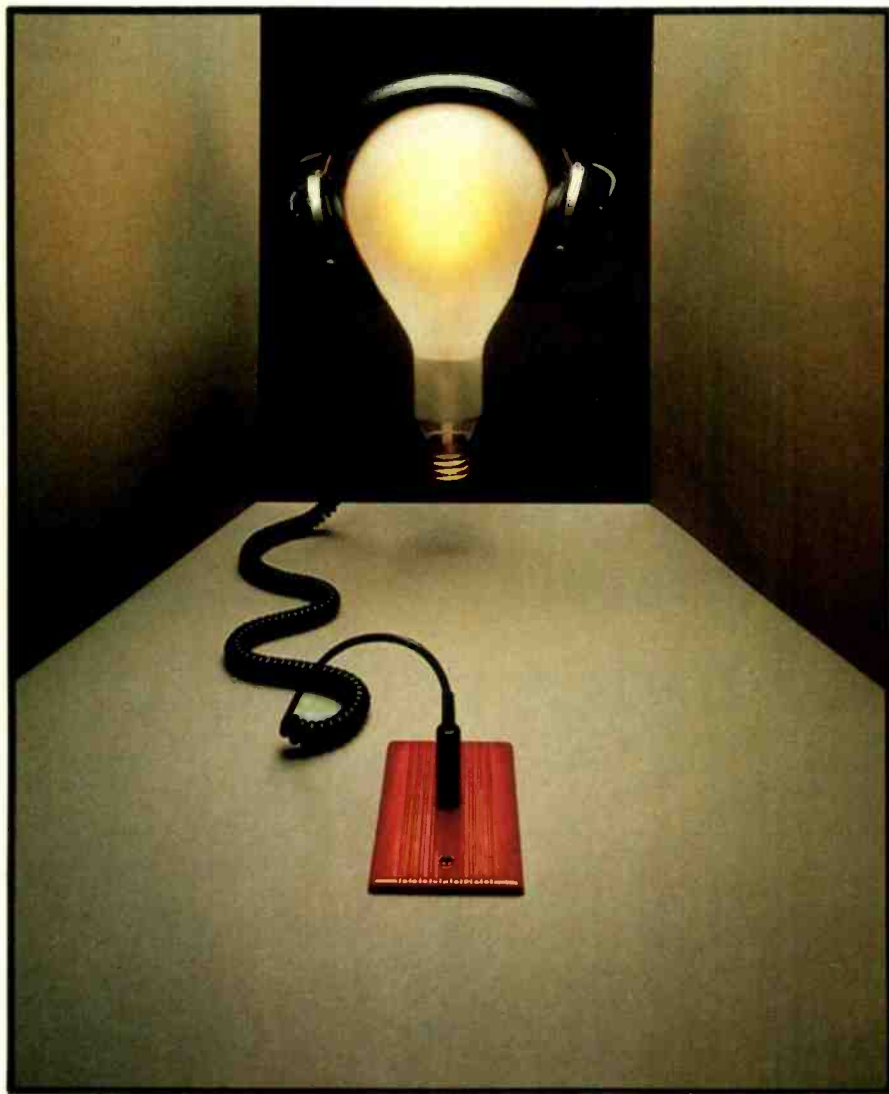
Imagine what we'll do next.

Enter No. 9 on Reader Service Card

Denon America, Inc., 27 Law Drive, Fairfield, N.J. 07006

HOW THEY WORK

PETER MILTON

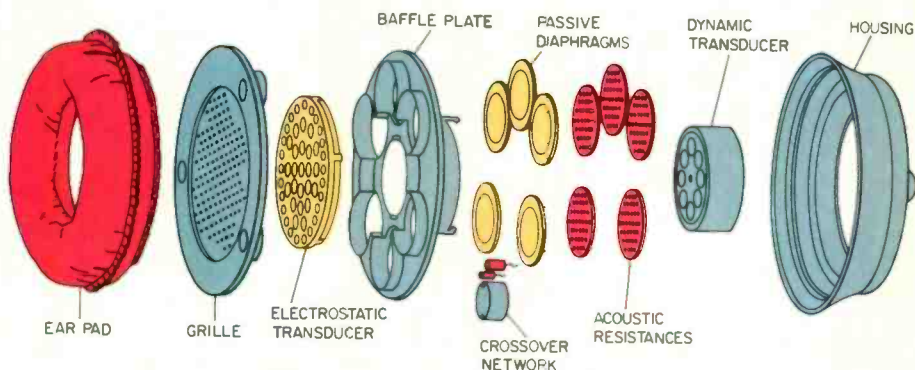


The private world of stereophones has attractions unmatched by the impersonal and "accurate" realm of loudspeakers, despite the fact that they have long been regarded as second-class substitutes for loudspeakers. This has tended to delay their recognition as genuine components instead of mere accessories to a hi-fi system. Tradition has forced us to expect that music should come from a single general direction and moreover, since music is an external happening, to be enjoyed properly, it should be shared. From this point of view, listening via headphones can be regarded as an antisocial activity.

However, there is a different way of looking at things. Loudspeakers, it is said, are becoming increasingly accurate, yet they only approximate the presence of the musicians, themselves only the means of communication between the composer and the listener. Headphones produce sound which is often perceived as being inside the head. This is not a fault—music started out that way. Beethoven did not need his external physical ears to hear his last symphony.

Loudspeakers are part of the external world and aim to preserve the illusion of the source of music. Headphones are intensely personal and internal. Some can have appalling quality, but with the best, there can be an almost ecstatic and mystical joining with the spirit of the music. The very young have discovered this and, with fingers snapping and heads bobbing, strut their rhythmic way downtown,

HEADPHONES



AKG uses electrostatic and dynamic transducers, together with passive diaphragms, in their headphones.

wearing their glittering mini-phones as symbols of their rejection of the real world of the '80s.

Many welcome the spread of the new style of headphones, for with each set sold there is one less transistorized radio to blare its tinny message across the quiet countryside. Wearing headphones can be seen as a sign of consideration rather than as unsociability. Often, being compelled to share a symphony second-hand is disliked as much as being surrounded by second-hand cigarette smoke.

The current trend in headphone styling is towards the ultra-lightweight portable type, popularized by Sony with the Walkman series, although lightweights, such as those made by Sennheiser, have been available for several years.

There is a very wide range of styles and prices and, although you could pick up a pair of surprisingly good lightweight headphones for \$25 or so, a set of top-quality electrostatics can easily cost more than a good pair of loudspeakers. The trick in choosing something as personal as a pair of stereophones, as in most other audio components, is to know what to expect from each type. Audio quality is an obvious criterion, but this is not always the deciding factor. Comfort, portability, and repeatability must also be considered. And there is the small matter of the budget, of course.

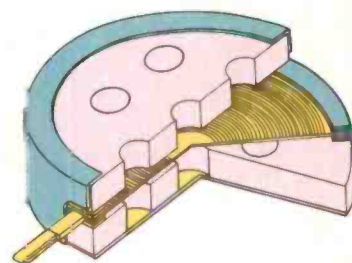
The operating principle of headphones is similar to that for loudspeakers. The signal from the amplifier drives a light diaphragm which, in turn,

vibrates the air in the ear canal. The way the diaphragm is driven and the method of coupling the air to the ear determines the type of the headphone. The first stereophones produced by John Koss were, in fact, small loudspeakers sealed at the rear by cardboard covers and mounted on a military headband. The modern stereo headphone is far more sophisticated, but there are still inexpensive "off-shore" models to be found which simply use small loudspeaker drivers as the sound-producing elements.

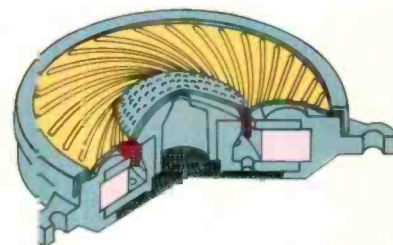
It is easiest to understand how the various classes of headphones came into being by thinking in terms of a complete system, consisting of the combination of headphone driver and the human ear.

In a normal hi-fi situation, the loudspeakers simulate the presence of the musicians and recreate the original pattern of soundwaves which existed in the studio. The sound travels to the listener, where it is modified by the complex folds of the external ear, or pinna, before it reaches the ear canal. The resonances and acoustic shadows produced by the pinna determine, to a large extent, our perception of distance and direction. Headphones "short circuit" the pinna, and the output from the diaphragm is coupled directly to the eardrum so that many subtle aural clues are missing. Many of the early designers missed the point (and some still do) that the frequency response of the driver unit must make up for the effect of the pinna.

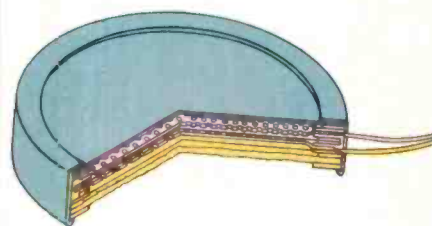
The shape of the external ear varies



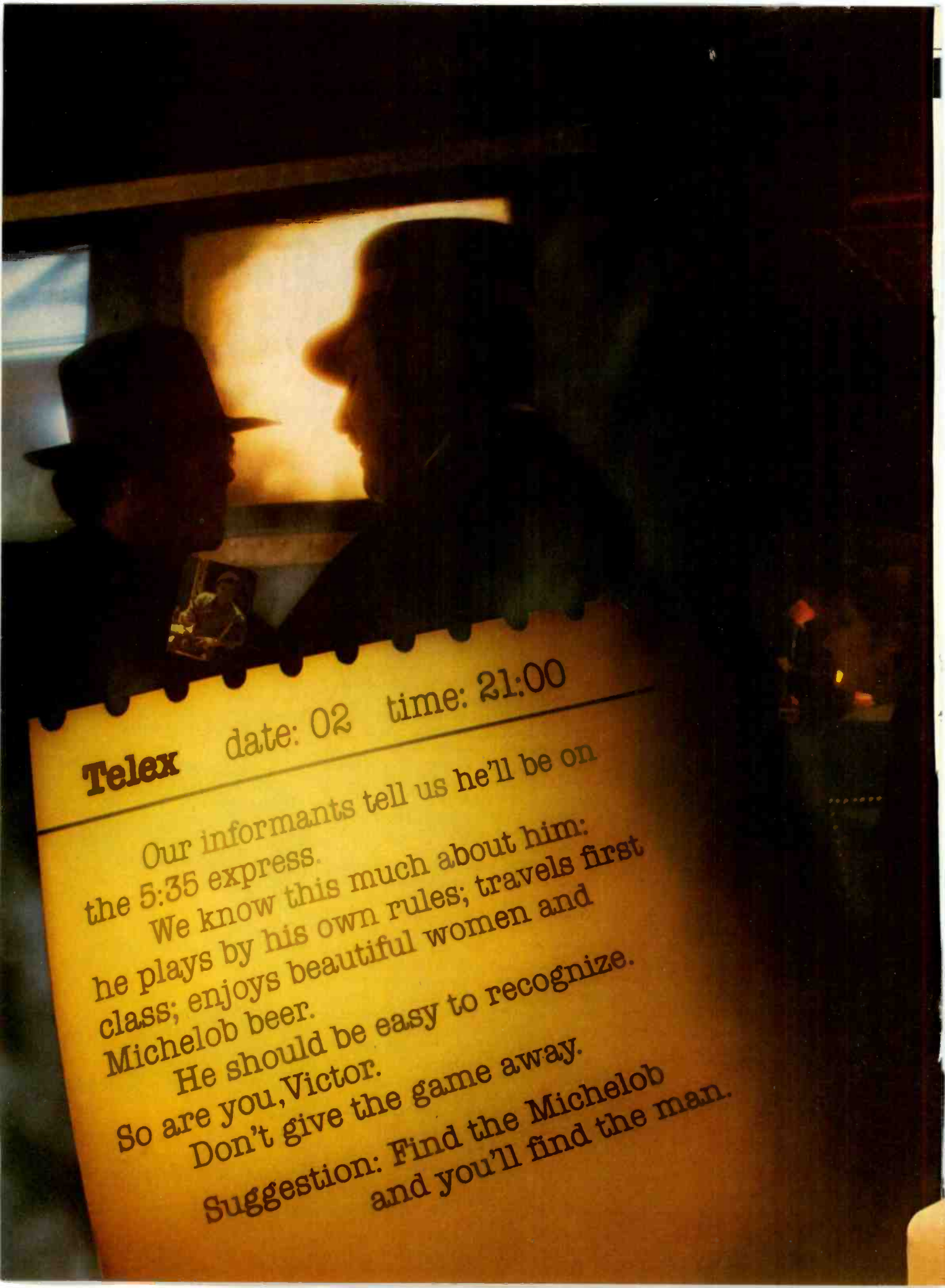
Cutaway view of the Audio-Technica Planar Coil dynamic element.



Cutaway view of a typical Audio-Technica dynamic element. Note how the coil extends downward into the gap.



Cutaway view of a typical Audio-Technica electret condenser element.



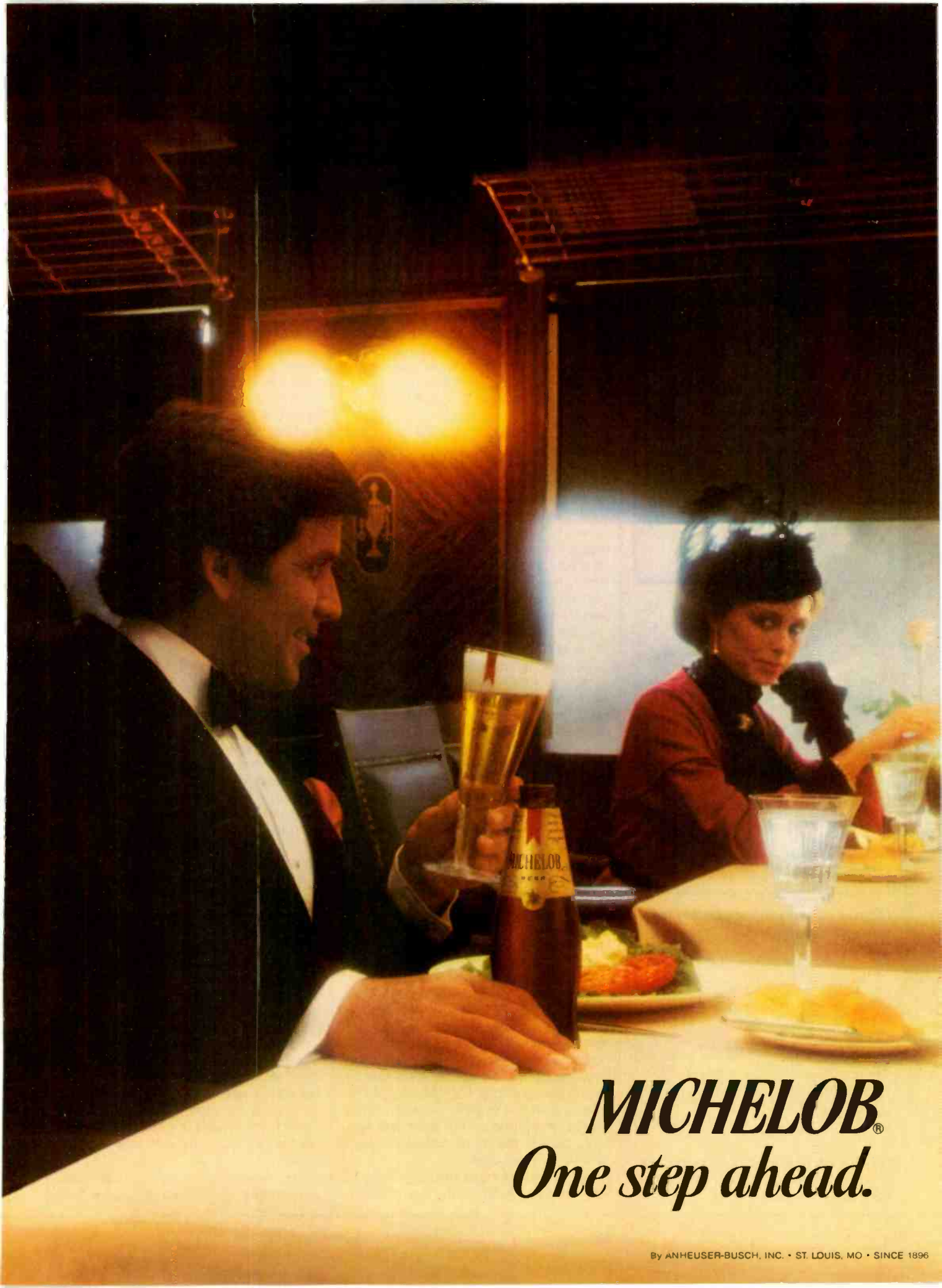
Telex date: 02 time: 21:00

Our informants tell us he'll be on
the 5:35 express.

We know this much about him:
he plays by his own rules; travels first
class; enjoys beautiful women and
Michelob beer.

He should be easy to recognize.
So are you, Victor.
Don't give the game away.

Suggestion: Find the Michelob
and you'll find the man.

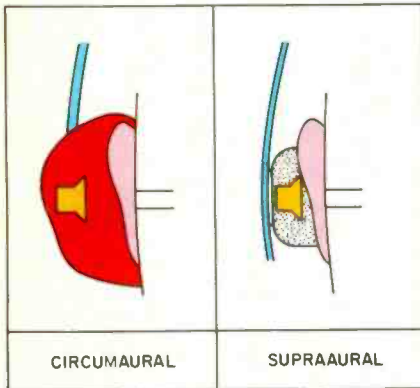


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HEADPHONES



AKG K 340



The two basic methods of fitting the headphone to the ear.

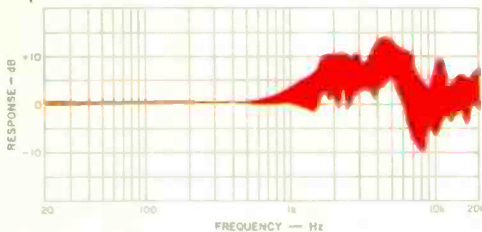


Fig. 1—The envelope into which headphone response must fall so that it will sound natural.

considerably, but it is possible to define, within broad limits, the sort of frequency response a driver should have in order to produce natural sound. Figure 1 shows a response envelope based on work done by Dr. A. G. Shaw of Ottawa, Canada, and Contributing Editor Jon Sank. An accurate frequency response in itself is not enough. Work is still going on to reproduce the phase changes at the pinna which bring the headphone sound out of the head.

The direct coupling between the diaphragm and the eardrum removes the effects of the room but introduces problems of its own. As long as there is a complete seal, the total pressure change produced by the diaphragm is used to move the eardrum, and the response can extend down to d.c. This is a very useful way to extend the bass response and is the basis of the *circumaural* type of headphones, which use a large soft pad surrounding the complete external ear and act as a seal. There are several disadvantages to circumaural headphones in practice. From the wearer's point of view, the completely sealed ear cups and large pads are fairly heavy, and the lack of ventilation makes them hot and uncomfortable after a very short time. A more serious acoustical objection is that slight leaks caused by spectacle frames and the user's hair-style reduce the bass response severely, and these leaks are quite unpredictable.

The situation is avoided by the use of *supra-aural* headphones, i.e., ones which rest on the outer ear. The cushions are often soft liquid- or foam-filled plastic rings, or they can simply be plain foam discs, as in the new lightweight types. The back of the diaphragm is open so that there is a controlled cancellation between the front and rear surfaces. In this type of driver, the response is arranged so that the movement of the diaphragm increases as the frequency is reduced, making up for the cancellation due to the huge leakage. The velocity of the diaphragm in this case is proportional to the amplitude of the electrical signal, hence the term *velocity* headphones for this class.

Naturally, the bass response cannot be extended indefinitely; the physical

limits of the suspension determine the particular combination of sound output and bass extension which is practical. A roll-off starting between 200 and 300 Hz is normal for the new style of headphones. Fortunately, loudspeakers having a well-damped and not overpowering bass are becoming more acceptable to the general listener so the open headphones do not lose too much by comparison.

The completely sealed headphones isolate the listener completely from the external world, and all the sounds produced in the studio, except those which are felt directly, can be reproduced. The 30 to 40 dB of isolation which can be achieved gives privacy—in both directions—but many listeners prefer to keep in touch with their surroundings and prefer the negligible isolation provided by the open types. For them, the music provides sufficient masking and the ability to monitor conversation and background household noises.

Headphones can also be classified according to the principle used to drive the diaphragm. The most common type is the electrodynamic, or more simply, the *dynamic* driver, which resembles a small speaker. The Koss dynamic stereophones, for instance, use a molded dome, similar to a tweeter in shape, which is driven at the edge by a relatively large diameter voice-coil moving in a circular magnetic gap. The outer suspension is molded with the diaphragm and contributes to some of the sound output.

Electrostatic headphones have the attractive feature of a very low-mass diaphragm which provides an excellent acoustic match to the surrounding air. An electrostatic charge is applied to the diaphragm, and the signal is fed to perforated plates on either side. The advantage is that the drive to the diaphragm is distributed evenly over the surface, and distortion due to break-up is eliminated. The clean drive and superb transient response make electrostatic headphones a natural choice for those who wish to have the very best, but the need for an outboard power unit makes them more expensive and not as simple to use as other types.

Electret headphones combine the advantages of electrostatics with the

HEADPHONES

convenience of dynamic types. An electret is a permanently polarized material, currently one of the fluorocarbons, carrying a permanent electrostatic charge—the electrostatic equivalent of a permanent magnet. The Yamaha electret headphones use a thin metallized polyester diaphragm stretched between two perforated electret plates. The system operates in the push-pull mode, and by separating the function of the electret from the diaphragm, it has been possible to reduce the matching requirements to the use of a simple matching transformer.

The search for a uniform drive is not limited to electrostatic drivers. Toshiba uses an extremely thin polyester diaphragm which carries an integral spirally wound coil. The coil is divided into sections wound in opposite directions and is stretched between two waffle-shaped magnets. The poles are arranged so that the lines of magnetic flux pass radially across the surface of the coil, which ensures an even drive.

There are many ways to make a good set of stereophones—magnetic, electrostatic, even piezo-electric. At the moment, there is no internationally accepted way of defining the perfect response curve, although envelope response curves seem to be gaining acceptance. These curves are usually made with the driver resting on a rubber replica of a standardized human ear, with a probe microphone placed at the entrance to the ear canal. The mechanical model is not perfect, and considerable work is being done to bring the tests in line with actual perception.

Even if it were possible to reproduce an actual ear for the purposes of the tests, the choice of a set of stereophones would still be an intensely personal matter since ears vary widely in shape and size. No one design can compensate for the elimination of the effect of the pinna completely. Consequently, no one listener can say definitively what is right for another. In this, the loudspeaker designer has the advantage since it is only necessary to provide a flat response in a given room; any acoustical compensation required is identical for all listeners.

The choice of a set of stereophones should be as thorough as looking for a suitable pair of loudspeakers. It could

even be more time-consuming since quick A-B comparisons are not possible. Decide on the purpose of the headphones first. Are they to be used at home or are they for a portable personal system? Lightweight units are best for outdoor use. If the headphones are to be used with your hi-fi system, consider comfort and lightness versus deep, deep bass and complete privacy. You might want to try one of each type for a short while to see which is most comfortable for extended listening.

Once the style and price bracket have been decided, the choice will narrow down considerably. At this point you could examine the fit of the headband and the ease of adjustment. Some ear pieces are difficult to adjust and will slip during use. Comfort is essential, and a clear favorite style will soon emerge. Once all but a handful of possible choices have been eliminated, the listening tests can begin. These should not be conducted hastily. The acoustic perspective is usually completely different from listening with normal speakers, and an initial impression can be deceiving. Listen for a satisfactory balance between highs and lows. The open types sometimes have a slight peak in the upper bass to compensate for the lack of true depth. As in speakers, a distant sound indicates a lack of middle frequencies. Many drivers have resonant peaks which could compensate for the effect of the pinna except that they are displaced in frequency and so sound unnatural. The normal rules of listening still apply, so look for smoothness and a good overall balance. As a rough guide, cross-check in A-B fashion between the speakers and the phones while in your favorite chair.

The choice is wide and intensely personal; there are no absolutes. You may opt for perfect, although cumbersome, sound or casual comfort. Headphones are getting better all the time.

How will you know your choice is right? You will not know immediately, but I have always found, whether the item be a phono cartridge, speaker, a recording of a particular symphony or a pair of headphones, the best one for me is always the one which remains at hand. The rest have usually been given or put away. A

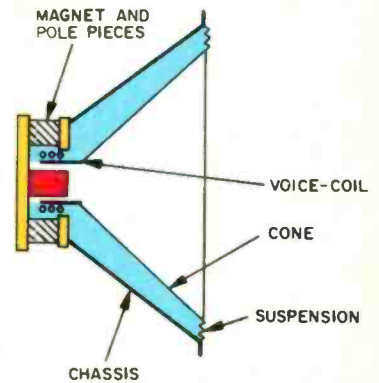


Fig. 2—The basic parts of a moving-coil speaker used in dynamic headphones, as well as loudspeakers. (After G. J. King's *The Audio Handbook*.)

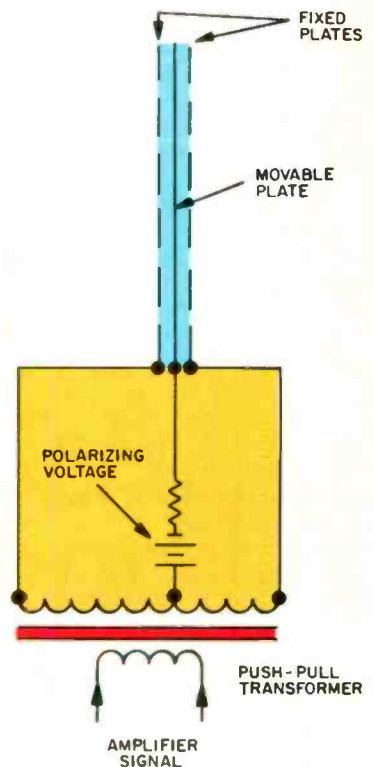


Fig. 3—The basic parts of an electrostatic speaker system. (After King.)

1

TECHNICS SU-A8 PREAMP and SE-A7 POWER AMP

SU-A8 Control Amplifier

Manufacturer's Specifications

Frequency Response: MM phono, RIAA ± 0.2 dB; MC phono, RIAA ± 0.5 dB; high level, d.c. to 20 kHz, -0.2 dB.

Maximum Output Voltage: High level, 10 V.

Rated Output Voltage: 1.0 V (150 mV at record-out jacks).

THD: MM phono, 0.003%; MC phono, 0.01%; high level, 0.002%.

Input Sensitivity for 0.5-V Out: MM phono, 1.25 mV; MC phono, 85 μ V; high level, 75 mV.

S/N Ratio: MM phono, 79 dB; MC phono, 75 dB; high level, 100 dB.

Maximum Phono Input Voltage: MM, 150 mV; MC, 10 mV.

Phono Input Impedance, MM/MC: 47 kilohms/220 ohms.

Main Output Impedance: 2 ohms.

Tone Control Range: ± 10 dB at 50 Hz (bass) and 20 kHz (treble).

Subsonic Filter: 12 dB/octave below 20 Hz.

Loudness Control (Volume at -30 dB): $+9$ dB at 50 Hz.

Power Consumption: 15 watts.

Dimensions: 17 in. (43.18 cm) W x 2-3/32 in. (5.32 cm) H x 14 $\frac{3}{8}$ in. (36.51 cm) D.

Weight: 9.9 lbs. (4.45 kg).

Price: \$350.00.

SE-A7 Power Amplifier

Manufacturer's Specifications

Rated Power Output: 60 watts per channel, 8- or 4-ohm loads, 20 Hz to 20 kHz (120 watts in mono mode).

Rated THD: 0.003% at 8 ohms, 0.007% at 4 ohms or mono.

Dynamic Headroom: 1.5 dB.

SMPTE IM Distortion: 0.003%, 8-ohm loads.

Damping Factor at 50 Hz: 100.

Frequency Response: 20 Hz to 20 kHz, $+0$, -0.1 dB.

Input Sensitivity: 130 mV.

Power Consumption: 316 watts.

Dimensions: 17 in. (43.18 cm) W x 2-3/32 in. (5.32 cm) H x 14 $\frac{3}{8}$ in. (36.51 cm) D.

Weight: 20.9 lbs. (9.405 kg).

Price: \$500.00.



The SU-A8 control amp and SE-A7 matching power amp represent two-thirds of a new slimline series which Technics calls its Studio Collection. The remaining component, the ST-S8 frequency-synthesized tuner, is, like the units tested for this report, only a fraction over two inches high.

The SU-A8 is a preamplifier-control unit that employs d.c., Class A circuitry from input to output, and FET differential inputs in all stages for input capacitorless operation. The only coupling capacitor used in the entire signal path is at the phono equalizer output. A single-ended push-pull stage is used as the output amplifier of this unit, and the phono equalizer/preamp stage consists of low-noise dual FETs.

The circuitry of the matching SE-A7 power amplifier features Technics' version of dynamic output-stage biasing, which they term New Class A, as well as their innovative Linear Feedback circuit. An interesting new feature is called Auto Load detection. When the SE-A7 is coupled to loads of less than 6 ohms, for example, the amplifier automatically reduces the voltage supplied to the power supply at the power transformer level. This reduction in operating voltage limits the heat buildup that might otherwise occur when driving multiple speaker systems or low-impedance loads.

The front panel of the SU-A8 preamp has a power switch at its extreme left, near which is what appears to be the outline of a door. This door defied my attempts to open it until I read the owner's manual and discovered that it's actually a motor-driven shelf and can therefore only be opened (or closed) when power is turned on and an adjacent control button depressed. With the shelf ejected, I gained access to slide controls for bass, treble and channel balance functions, a loudness on/off switch, and a subsonic filter switch. Those audio purists who shun tone controls and other signal-processing circuitry need never open the little shelf (perhaps that's why Technics took such pains to "hide" these secondary controls inside it) and can, in fact, bypass the tone controls entirely by setting a nearby operation selection button to "Straight DC." A tape/source button and a tape 1/tape 2 button are to the right of the operation selector, followed by three larger pushbuttons for tape monitor and program selection (MM or MC phono and tuner or AUX, selected as alternate pairs). Tiny lights above this group let the user know which functions or program sources have been selected. Still further to the right is a slide control button which is moved horizontally to adjust volume level.



Although the goal of audio equipment must be good fidelity, there's no harm in lending a touch of elegance—as Technics has done in this pair.

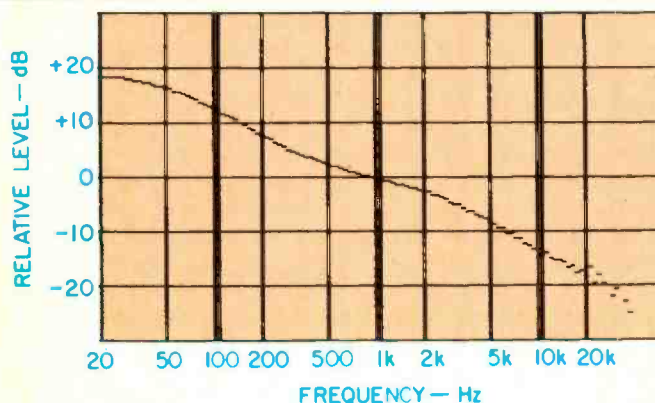


Fig. 1—RIAA playback characteristic, Technics SU-A8 preamplifier.

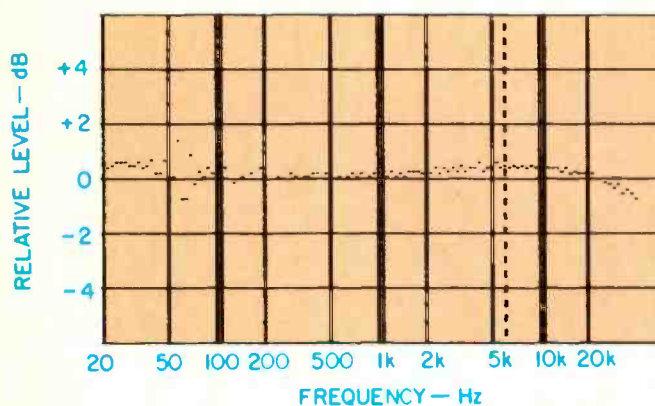


Fig. 2—Expanded plot using inverse RIAA test signal shows deviation from RIAA response, SU-A8 preamplifier.

As the slider is pushed to the right, a volume-level scale illuminates to indicate relative levels selected. Finally, at the extreme right is a button labelled "Fader" which, when depressed, smoothly fades volume down to barely audible levels for telephone-answering or other listening interruptions. I must agree that this fader's action is a lot more elegant than the abrupt muting switch normally supplied for this purpose. To restore full volume, the fader is simply touched a second time. While the primary goal of any piece of audio equipment must be good sound reproduction, there's no harm in lending a touch of elegance, and Technics has certainly done that with their motorized tone-control "drawer" and smooth fader switch.

The rear panel of the SU-A8 is equipped with the usual pairs of input and tape output jacks, three a.c. convenience outlets, and two pairs of output terminals. One output pair is d.c.-coupled, while the other is intended for connection to non-d.c. power amplifiers.

Turning to the layout of the matching SE-A7 amplifier, we find that it is aesthetically almost identical to the control unit. The power switch is at the left, and adjacent to it is a

headphone jack. Three buttons near panel-center handle main or remote speaker selection and peak-power indicator range (times 1 or times 0.01). Further to the right, illuminated indicators tell which speakers are engaged, whether mono operation has been selected (via a rear-panel switch), and what power range has been chosen for the peak-power LED indicators (which occupy the right-most section of the front panel). Having a hundred-fold increase in sensitivity of these indicators enables the user to utilize them meaningfully, even when listening at background-music levels.

A pair of input jacks are at the left of the rear panel, and the mono/stereo switch is next to them. Color-coded speaker terminals are of a new type which I have seen only a few times before. The plastic terminal is turned counterclockwise, and the stripped end of a speaker wire is inserted in a hole in the rotatable plastic cap, which is then turned clockwise to "lock" the wire in place. With the speaker wires stripped the proper amount, it's just about impossible to cause a short between them. A single unswitched convenience outlet completes the rear-panel layout.

Control Amplifier Measurements

Input sensitivity for the moving-magnet phono inputs measured 1.1 mV for the standard referenced 0.5-V output at 1 kHz, while the signal level required for that same output for the MC phono was 75 μ V. High-level inputs took a 66-mV input level to deliver 0.5-V standard output. Phono overload (maximum input) was 165 mV for the MM inputs and 11 mV for the high-gain MC inputs. These figures are slightly better than those claimed. Figure 1 is a plot of amplitude versus frequency via the phono inputs and shows the familiar RIAA playback characteristic.

In Fig. 2 I used an inverse RIAA test signal and an expanded vertical scale (2 dB per division instead of 10 dB per division, as in Fig. 1) to show the departure from RIAA of the phono equalizer section. Worst-case deviation was +0.5 dB at 6 kHz, but since there were no negative deviations in the response curve, it would be fair to say that RIAA equalization was accurate to within ± 0.25 dB. Signal-to-noise ratio for the moving-magnet phono inputs was an incredibly high 90 dB—about as high a number as I have ever obtained for a phono preamp input referenced to 5-mV input and 0.5-V output levels. Even the moving-coil inputs, which normally do not yield as good a signal-to-noise ratio as the lower-gain MM inputs, yielded a S/N of 78 dB, which I consider to be excellent. Remember that in accordance with the new amp measurement standards used for this test, the 78 dB figure is referenced to a mere 0.5-mV input and 0.5-V output. High-level inputs showed signal-to-noise ratios of 91 dB, while residual noise (with volume control at minimum) was 95 dB below 0.5-V output. The subsonic filter was slightly mistuned in that it rolled off response to -3 dB at 30 Hz instead of at 20 Hz as claimed. Maximum output of the control amplifier (before noticeable clipping) was 11.0 volts as against 10.0 volts claimed. Tone control range and loudness control action are depicted in Figs. 3 and 4. Note that this loudness control circuit boosts bass frequencies only. I have always maintained that this is the preferred approach to noncontinuously variable loudness circuits.

The Technics SU-A8 and SE-A7 are ideally matched to each other not only in cosmetics but in terms of performance, sound quality, and features.

Power Amplifier Measurements

Technics notes in their spec sheet for the SE-A7 that it was necessary to use a spectrum analyzer to measure the low residual harmonic distortion levels it produced. For all but a few extreme measurements my test equipment was not up to the task of measuring THD either (the signal source itself contains 0.002% THD at most test frequencies). Nevertheless, I put together as good a graphic plot of distortion versus power output as I could, using my distortion analyzer and a spectrum analyzer, where necessary, and the results are shown in Fig. 5 for both 8- and 4-ohm loads. Normally, I would have drawn separate curves for 1 kHz, 20 Hz and 20 kHz power vs. distortion, but in this case, distortion at the frequency extremes is so close to the distortion observed at mid-frequencies that all three lines (six, if you try to combine 4- and 8-ohm operation) would have fallen on top of each other, or very nearly so.

Of perhaps more practical use is the fact that the amplifier delivered just under 75 watts into 8-ohm loads before noticeably clipping, and precisely 100 watts per channel with 4-ohm loads for the same degree of clipping. Twin-tone CCIF IM measured 0.0009%, while IHF IM, usually somewhat higher, measured exactly the same minuscule 0.0009%. Dynamic headroom was precisely 1.5 dB as claimed, and low-frequency damping factor measured 108, or a bit better than claimed by Technics. Input sensitivity for 1-watt output was 130 mV; for rated output (60 watts per channel), 1.0 V of input signal was required. Slew factor was greater than 5—or beyond the limits of my test equipment. The A-weighted signal-to-noise ratio measured 116 dB below rated output. Frequency response extended way out to 100 kHz for a -1 dB roll-off and out to 200 kHz for a -3 dB roll-off.

Use and Listening Tests

The Technics SU-A8 and SE-A7 are ideally matched to each other, not only in size and cosmetics but in terms of performance, sound quality, and features. The preamp-control unit will appeal to both audio purists as well as those who want some control over the overall response of their equipment. In my use tests, I was somewhat perplexed by the fact that when I turned off the system and then turned it back on again, the previously selected program source had to be punched in again. I consulted the owner's manual and found that this quirk only occurred because my tests were of such short duration. Normally, when power is plugged in and the system is used for more than one hour, the last-selected source (high-level or phono, tuner or AUX) will come on again for as long as a week later! With the SE-A7 as companion amplifier, I was able to use the d.c. output jacks on the SU-A8. In doing so, however, I would advise others to choose a turntable system that exhibits low rumble content. Otherwise, you may find it necessary to operate the system as an a.c.-coupled pair of units or, in more extreme cases, with the subsonic filter turned on. That would tend to defeat all the trouble that Technics went to in creating a true d.c. system, from the high-level preamp inputs to the speaker outputs.

It wasn't too long ago that sophisticated separate components of this sort were the province of a very few small

Fig. 3—
Range of bass
and treble
controls,
Technics SU-A8.

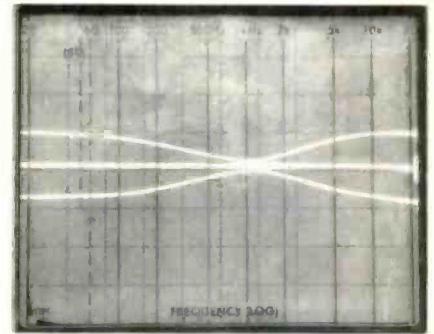


Fig. 4—
Action of
loudness control
at various settings
of master volume
control on
Technics SU-A8.

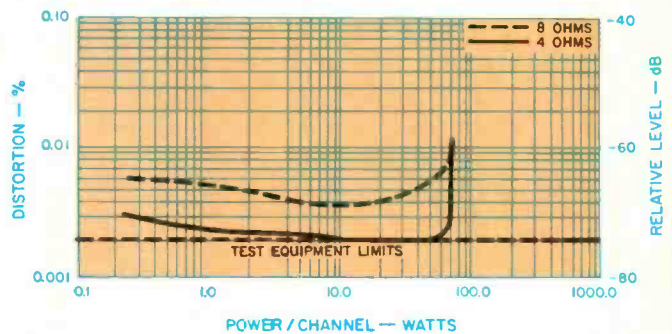
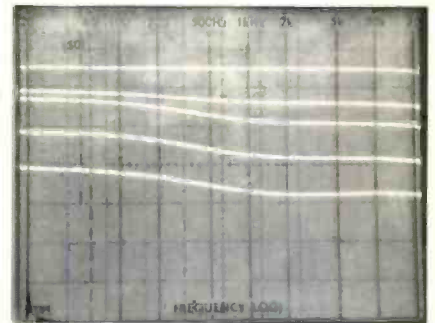


Fig. 5—Power output vs.
THD, Technics SE-A7
amplifier.

manufacturers who, because of their limited production runs, charged outrageously high prices for such "purist" components. It's nice to be able to obtain a combination of components such as the SU-A8 and SE-A7 for well under \$1,000.00, thanks to the purchasing, design and production power of a giant company like the Technics Division of Panasonic, which is, of course, a division of the even bigger Matsushita Electric Company.

As for the sound quality of this combination, it was simply superb. Highs were open and transparent, while bass was as tight as you would want it. With the SU-A8 and SE-A7 as the nucleus of your sound system, your main concern will be finding speakers and program material that's good enough for these components.

Leonard Feldman

Enter No. 90 on Reader Service Card

2

NAKAMICHI ZX-7 CASSETTE DECK

Manufacturer's Specifications

Frequency Response: 20 Hz to 20 kHz, to 21 kHz with metal tape.

Harmonic Distortion: 0.8% at 0 dB.

Signal/Noise Ratio: 72 dBA with Dolby C NR.

Separation: 37 dB.

Crosstalk: 60 dB.

Erase: 60 dB.

Input Sensitivity: Line, 50 mV.

Output Level: Line, 1.0 V; headphone, 45 mW at 8 ohms.

Flutter: $\pm 0.08\%$ wtd. peak.

Dimensions: 17 $\frac{3}{4}$ in. (450 mm) W x 5-5/16 in. (135 mm) H x 11-13/16 in. (300 mm) D.

Weight: 21 lbs. (9.5 kg).

Price: \$1,250.00.



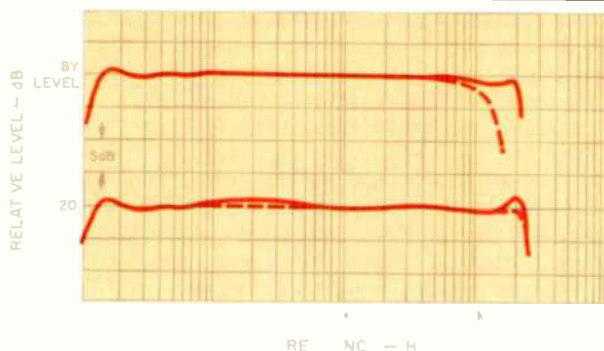


Fig. 1—Frequency responses with Nakamichi EXII tape with and without (---) Dolby C NR.

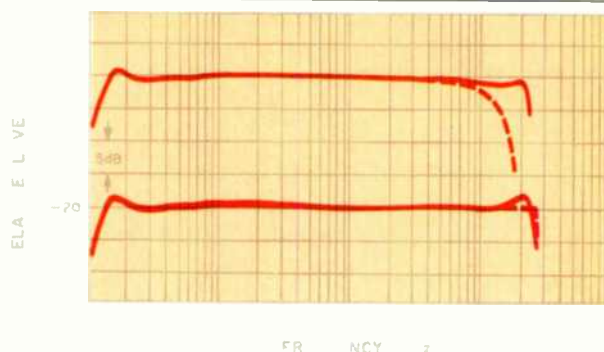


Fig. 2—Frequency responses with Nakamichi SX tape with and without (---) Dolby C NR.

The ZX-7 is a very worthwhile addition to Nakamichi's line of premium cassette decks, and it has a host of useful features. Of particular note are the built-in calibration facilities for setting bias, record level, and record-head azimuth; the Dolby C NR; an automated up/down fader; a microprocessor control, and the 50-dB record-level metering. The front panel is solid black with the exception of the white designations, which are easily read with any sort of lighting. The 32 horizontal LED-bar level meters (16 for each channel) are at the top, in the center, covering from -40 to +10 for level monitoring and from -20 to +4 for the calibration mode. This is an excellent scheme, not only for the wide range covered, but for the increased resolution for the calibration process.

Pushing *Level* when in record/pause mode initiates calibration. This button, and many others on the front panel, are wide bars with angled and grooved fronts, making for easy actuation. They all have status lights, which are needed since these microprocessor inputs do not have locking positions. The calibration requires the selection of tape type and 70- or 120- μ S EQ. Under each of the three tape-type switches are L & R trim pots for record-level setting and for bias. Adjustments are easily made with the small knobs, and slip-over covers forestall diddling by the curious. Status indicators with each set of pots show which ones should be adjusted for the desired display. Before *Level* is set, *Azimuth* is adjusted, and a three-LED display gives immediate and direct indication of any need to turn the record-head azimuth-adjust knob. Finally, *Azimuth* is released, *Bias* is selected, and the corresponding trimmers are used to get a zero meter indication for both channels. A push of *Reset*, and the deck does a fast rewind to the tape location where calibration started.

The tape-motion button switches are light touch but still have a nice snap-action when pushed. The microprocessor gains some extra functions, including two-speed cueing, flying-start recording, and auto play from either wind mode.

Rec Mute is also provided with a separate momentary-contact switch. Five rotary switches with small bar knobs select memory or timer functions; 70- or 120- μ S EQ; Dolby NR Type B, Type C, or off; multiplex filter on/off, and monitor, tape or source. There are separate L and R record-level pots and an output-level pot, all with medium-size knobs with good knurling.

An unusual feature of this Nakamichi deck is the automated master fader. When in the record mode, a simple push on the left side of its control bar starts an automatic fade of the level in both channels. With a light push, the fade takes about six seconds. A heavier push, which gets an additional click from the switch, results in a two-second fade. Fading up is done the same way by pushing on the right side of the bar. Two wide-bar LEDs above show where the fader is at any time by their brightness. Starting calibration causes an automatic down fade, and *Stop* in record mode results in an immediate up fade—both niceties of the total scheme.

The cassette compartment door contains a small lamp which provides good illumination of the tape pack. The eject button switch is the same design as that for power on-off and is just below it, which might cause a little confusion at times. The four-digit LED-type counter and its reset button are just above. It is quite easily read and has very good resolution but is rather displaced from the tape-motion controls. The phone jack for stereo headphones completes the front-panel features.

On the back panel are the line in/out phono jacks and two DIN-type sockets: One for the optional remote control and the other for the Nakamichi BlackBox accessory series, which includes the MX-100 microphone mixer. Removal of the top and side cover revealed three large p.c. boards, each with excellent soldering. All parts were identified, and adjustments also had function labels. The transport system appeared to be well constructed, and the positioning of the head assembly under the control of the motor-driven cam was fast and non-jarring.

The ZX-7 is a very worthwhile addition to Nakamichi's line of premium cassette decks.

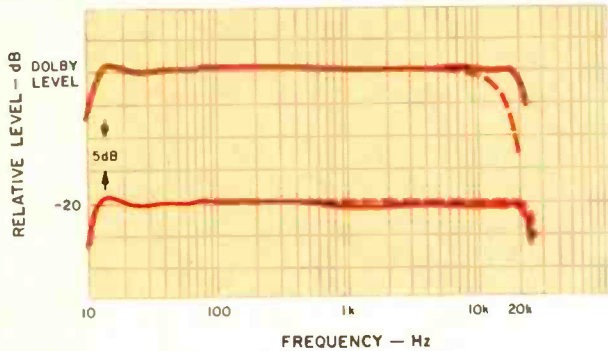


Fig. 3—Frequency responses with Nakamichi ZX tape with and without (---) Dolby C NR.

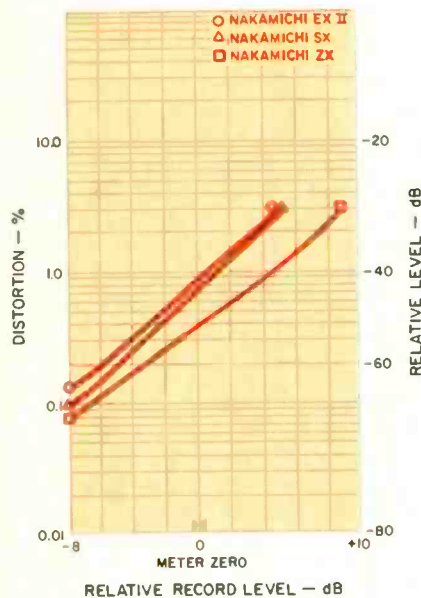


Fig. 4—Third harmonic distortion vs. level at 1 kHz with Dolby C NR.

Measurements

The playback responses were checked for both equalizations, and they were excellent. This was particularly noticeable at 70 μ S with a new BASF test tape, with only two points as much as 0.8 dB off and most within ± 0.2 dB! Play speed was very accurate, within $\pm 0.05\%$. Playback of a standard-level test tape gave the correct indication, within the resolution of the LED meter display. A fast check of the record/playback responses at -20 dB was made using pink noise and a $\frac{1}{2}$ -octave RTA. Close to 30 different formulations were tried with Dolby B, Dolby C and without NR—following the normal calibration procedure with each tape.

Only two tapes couldn't be matched, and they both were "cheapo" low-bias types. All of the detailed testing that followed was done with the Nakamichi samples provided with the deck, but I did note that the fast-check results were especially fine with BASF Professional II, Sony UCX-S and TDK SA-X.

The tests with each tape started with azimuth alignment and level and bias set. Record/playback with a 10-kHz tone showed that interchannel phase was within $\pm 5^\circ$ at that frequency—superb results. Phase jitter was 15° total at most, also excellent. Swept responses were run at Dolby level and 20 dB below that both with Dolby C and without NR. The plots are shown in Figs. 1 to 3, and the -3 dB limits are listed in Table I. The extension of high-frequency headroom with Dolby C is apparent in all cases—a most worthwhile improvement. Dolby tracking at the lower level was excellent, and the slight peak at 20 kHz with EXII and SX should not be considered significant. With the exception of those peaks, the plots are within ± 1.5 dB from less than 15 Hz to at least 20 kHz, even at Dolby level.

The output polarity was the same as the input, whether in Source or Tape. The record sensitivity controls (Level) had a range of ± 4 dB at 400 Hz. The bias controls had a range from -20 to over $+5$ dB with SX tape. With the multiplex filter in, the response was down 3 dB at 16.5 kHz and 31.6 dB at 19 kHz. Bias in the output during recording was minuscule. The 400-Hz (393-Hz actual) and 15-kHz (14.7-kHz actual) oscillators evidenced some distortion, but it was quite acceptable for the intended uses. Erasure of metal tape at 100 Hz was 69 dB, separation at 1 kHz was 43 dB, and crosstalk was down over 80 dB. All of these figures are excellent and also better than those specified by Nakamichi.

Measurements were made of the third harmonic distortion at 1 kHz with Dolby C NR over a range of levels, up to the point where $HDL_3 = 3\%$. The results were fine for all tapes, especially so with the ZX metal tape, as shown in Fig. 4. HDL_3 was also determined with recording 10 dB below Dolby level from 30 Hz to 7 kHz, also with Dolby C NR and ZX tape. Take note of the fact that the distortion was less than 0.1% from 50 Hz to 3 kHz—quite impressive.

The signal-to-noise ratios were measured with and without Dolby C NR for all three tapes with both IEC A and CCIR/ARM weightings. Table II lists all of the results, with references to both Dolby level and the 3% distortion limit. The low noise obtained with Dolby C NR is quite evident, and the high S/N ratios for ZX tape are indicative of the excellent magnetic design of the deck.

The line input sensitivity was 48 mV, and the input overload was at least 22 V. The input impedance was about 47 kilohms at midband with the input pots centered. Output clipping appeared at a level equivalent to $+17.4$ dB relative to meter zero. The automated master fader introduced at least 65 dB of attenuation. Line outputs were 980 mV with a 0-dB indication, and they fell to 800 mV with a 10-kilohm load, indicative of the 2.2-kilohm source impedance. The headphone output was 52 mW with 8-ohm loading, and high volume levels could be obtained from all of the headphones tried. The output pot sections tracked within a dB from maximum down for about 45 dB, quite acceptable for

The automated master fader worked very well for fading in musical intros and fading out applause at the end of a performance.

this purpose. The level meter response times were very close to the IEC standard for peak program meters, both for charge and decay. In general, the meter scaling was quite accurate, but there were some points that were wayward by a dB or so. The frequency response of the metering was 3 dB down at 26 kHz at the high end and at about 28 Hz on the low end; this seems a bit far for meters to be off on a recorder with response to 11 Hz.

Tape play speed was very steady, and it did not vary with changes in line voltage. Flutter was consistent throughout the lengths of various cassettes, and there was little change from one sample to the next. On a weighted-peak basis, the flutter was $\pm 0.07\%$, and it was $\pm 0.05\%$ or less weighted rms. Wind times for a C-60 were 55 seconds. Response times for changes in transport mode, including run-out to stop, were always less than a second, and there was loose-loop take-up with the insertion of the cassette.

Use and Listening Tests

Loading/unloading was smooth and easy, and the in-door lamp helped in observing the tape. Maintenance tasks were most easily performed with the clear cover removed and the door half closed. All controls and switches were completely reliable throughout the testing cycle. It was pleasing to have flying-start recording and auto play with wind added to the list of features. The automated master fader was used to good effect a number of times. It worked very well for fading in musical introductions, as well as fading out applause at the end of a performance. By pushing the control bar harder, it was most easy to speed up a slow fade for a final cutoff. This feature has extra value on the ZX-7 because of the separate record-level pots. The scheme also allows keeping the record-level setting for the next piece.

The LED-bar level indicators were quite easy to read under a wide range of light levels. Peak levels could be set very quickly, and the intensity of the top-most LED gave accurate indication of even very short peaks. The advantage of their wide level range was immediately obvious with the recording of classical music, where initial settings had to be made at -30 dB. The calibrations were straightforward and took little time, and rewind with *Reset* was of definite help. The expanded scale for this process is an essential part of this successful scheme.

The owner's manual has excellent text and illustrations. It contains good calibration instructions, a list of recommended tapes, and many helpful notes.

Listening tests included sources ranging from pink noise to virgin discs. The records were primarily from Mobile Fidelity (such as *Days of Future Passed* by The Moody Blues) and dbx (*Empire Brass Quintet* and *Baroque Brass* from Sine Qua Non). The Dolby tracking was excellent, and only the slightest shifts could be detected with purposely high reproduction levels. The advantages of Dolby C NR showed up both at high levels in the high-frequency region and at low levels, particularly with the low-noise dbx-encoded discs.

Record, pause, and stop sounds were all well down into tape noise. *Rec Mute* was used to advantage a few times. Timer start put the deck into play or record mode, as selected, after a delay of several seconds following the

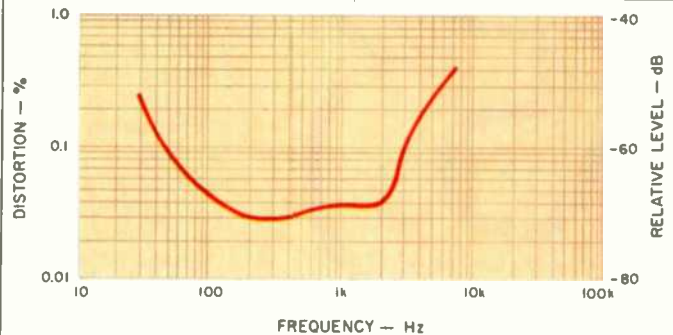


Fig. 5—Third harmonic distortion vs. frequency with Dolby C NR at 10 dB below Dolby level using Nakamichi ZX tape.

Table I—Record/playback responses (-3 dB limits).

| Tape Type | With Dolby C NR | | | | Without Dolby NR | | | |
|-----------------|-----------------|------|----------|------|------------------|------|----------|------|
| | Dolby Lvl | | -20 dB | | Dolby Lvl | | -20 dB | |
| | Hz | kHz | Hz | kHz | Hz | kHz | -Hz | kHz |
| Nakamichi EX II | 12 | 20.7 | 11 | 25.2 | 12 | 11.6 | 11 | 25.7 |
| Nakamichi SX | 12 | 20.4 | 11 | 24.8 | 12 | 10.3 | 11 | 25.6 |
| Nakamichi ZX | 11 | 22.2 | 11 | 25.6 | 11 | 14.3 | 11 | 26.4 |

Table II—Signal/noise ratios with IEC A and CCIR/ARM weightings.

| Tape Type | IEC A Wtd(dBA) | | | | CCIR/ARM (dB) | | | |
|-----------------|----------------|-------|------------|-------|---------------|-------|------------|-------|
| | W/Dolby NR | | Without NR | | W/Dolby NR | | Without NR | |
| | @ DL | HD=3% | @ DL | HD=3% | @ DL | HD=3% | @ DL | HD=3% |
| Nakamichi EX II | 65.3 | 69.6 | 50.0 | 54.0 | 66.3 | 70.6 | 47.0 | 51.0 |
| Nakamichi SX | 67.6 | 72.1 | 51.6 | 55.8 | 70.4 | 74.9 | 51.1 | 55.3 |
| Nakamichi ZX | 67.0 | 75.3 | 51.5 | 59.7 | 67.8 | 76.1 | 49.6 | 57.8 |

initial transients with turn-on. This Nakamichi deck does lack microphone inputs, but that is easily rectified with a small investment. The calibration functions are not automatic as in some decks, but their manual character allows the user to trim responses as desired. Many times improved Dolby tracking can be gained with some minor "deviations." Beyond this, the ZX-7 offers other valuable features and excellent to outstanding performance in all areas. For the high-level audiophile or the laboratory/studio professional, it has much to offer for its premium price.

Howard A. Roberson

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3

HITACHI FT-5500 TUNER

Manufacturer's Specifications

FM Tuner Section

Mono Usable Sensitivity: 10.8 dBf.

S/N: Mono, 85 dB; stereo, 78 dB.

Frequency Response: 20 Hz to 15 kHz, ± 0.5 dB.

Selectivity: Wide mode, 45 dB for ± 400 kHz; high-selectivity mode, 65 dB for ± 300 kHz.

Image Rejection: 80 dB.

I.f. Rejection: 95 dB.

AM Suppression: 65 dB.

Capture Ratio: 1.0 dB.

THD at 1 kHz (Wide Mode): Mono, 0.04%; stereo, 0.06%.

Stereo Separation: 60 dB at 1 kHz.

Output Voltage: 550 mV for 100% modulation.

AM Tuner Section

Sensitivity: External, 12 μ V; loop, 250 μ V/m.

Image Rejection: 50 dB.

Selectivity: 50 dB.

S/N: 54 dB.

I.f. Rejection: 40 dB.

Output Voltage: 165 mV, 400 Hz, 30% modulation.

General Specifications

Power Requirements: 120 V, 60 Hz, 9 watts.

Dimensions: 17 $\frac{1}{8}$ in. (43.49 cm) W x 2 $\frac{3}{8}$ in. (6.03 cm) H x 12-1/16 in. (30.63 cm) D.

Weight: 8.8 lbs. (3.96 kg).

Price: \$350.00.

It doesn't seem all that long ago since you had to pay well over \$1,000 to buy a true frequency-synthesized FM tuner that could be electronically tuned with crystal-controlled accuracy and could "memorize" a few of your favorite stations for touch-button recall. Yet here we have a neat, slim FM/AM tuner from Hitachi costing a fraction of what such a unit would have cost five years ago and incorporating additional circuit refinements that no one would have dreamed about back then.

The most interesting of these new circuit features is called F.C.C.S., which stands for Field Condition Computer System. The microcomputer governing F.C.C.S. operation performs the following: (1) After first lighting an indicator to show that it is in operation, it performs a computer search to

determine whether or not any adjacent station is preset which might interfere with the desired station. In addition, it searches further (in frequency) to determine whether or not any station which can cause r.f. intermodulation interference is present. (2) It sets the r.f. and i.f. selectivity modes in accordance with the results of the search. (3) When the settings are complete, the system memorizes both the frequency of the desired station in one of its preset memories and the settings of r.f. and i.f. selectivity for that particular preset station. The next time the station is called up by means of one of the preset buttons, it is not only tuned to with frequency accuracy, but with optimum selectivity settings for the r.f. and i.f. stages of the tuner.

Front panel controls include a power switch at the left, FM



tuning, FM mode (mute), record level (activating an internal tone for presetting tape recorder levels) and an AM/FM selector switch. Further to the right are the memory switch (which also functions as the F.C.C.S. operation switch), 10 preset buttons for memorizing as many favorite FM and AM stations, up and down tuning keys, a signal strength meter, and, of course, the digital frequency display associated with frequency-synthesized tuners. To the left of this display are three more indicator lights which display high-selectivity r.f., high-selectivity i.f., and stereo reception when any of these modes is active.

At the left of the rear panel is an AM channel spacing switch with positions for 9 or 10 kHz. Until recently, it had been thought that countries of North, Central and South America would join in favoring a 9-kHz AM channel spacing, the practice of much of Europe and Asia. However, such a change was indefinitely postponed at a recent international meeting, so the countries of the Western Hemisphere will continue to use 10-kHz spacing between AM stations. Still, having this switch on this and some other tuners we have seen will allow you to properly tune in AM stations in other parts of the world if you should relocate to areas where 9-kHz spacing is used. (Of course, in that event, a step-down transformer would be needed for the U.S. version of this tuner, since those countries also use 220/240 volts a.c. instead of 120 volts.)

A coaxial 75-ohm FM antenna connector, a ground terminal, terminals for connection of an external AM antenna, a built-in "loop" AM antenna, and a pair of output terminals complete the rear panel layout of the FT-5500 tuner.

Measurements

Usable FM sensitivity for the FT-5500 in mono measured 11.0 dBf. Since there is only a 75-ohm input on this tuner, that translates to 0.98 μ V (which is a good illustration of why we now quote sensitivity figures in terms of power rather than voltage; dBfs are the same regardless of input impedance). Stereo sensitivity was governed not so much by the r.f. and i.f. sections of the tuner as by the threshold setting at which reception switches automatically from mono to stereo; this setting was at 24 dBf for the sample tested. Fifty-dB quieting in mono was obtained with a signal strength of 14.2 dBf, while for stereo, the reading was 35.3 dBf. Since I was dealing with single-generator measurements in all of these tests, the tuner was automatically working in its "normal" r.f. and i.f. selectivity modes. Signal-to-noise ratio in mono, with a 65-dBf signal, measured a very high 82 dB, while in stereo I obtained a reading of 78 dB, exactly as claimed by the manufacturer. Both of these S/N readings are excellent for any tuner, let alone one employing frequency synthesis (which, until recently, had a tendency to compromise S/N results in return for accuracy of tuning). Quieting and mid-frequency harmonic distortion characteristics are shown in the graphs of Fig. 1. THD for a 1-kHz, 100% modulating audio signal measured a very low 0.06% in mono and an even slightly lower 0.046% in stereo. Twin-tone IM (using 14- and 15-kHz signals) measured less than 0.05% in mono and less than 0.1% in stereo.

Harmonic distortion as a function of modulating frequency, plotted in Fig. 2 for stereo and mono reception, re-

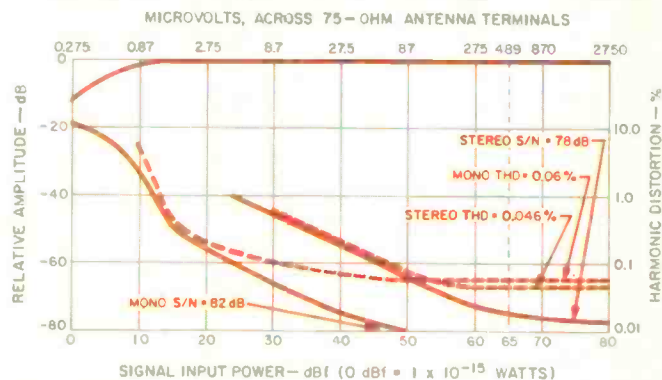


Fig. 1—Mono and stereo quieting and distortion characteristics, FM section, Hitachi FT-5500 tuner.

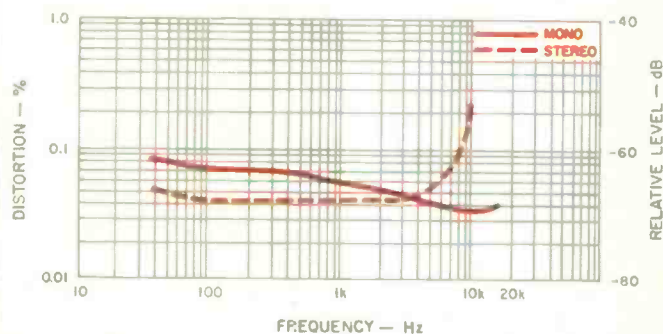


Fig. 2—Distortion vs. frequency.

mained well below audibility levels at all relevant frequencies in both modes. I should point out that this is the first tuner I have tested with the aid of the Sound Technology Model 1020A FM Generator. This instrument allows measuring FM distortion fully one whole order of magnitude lower than was possible with the Model 1000 generator, which could only guarantee THD readings down to 0.1%. In other words, I now have the capability to read FM tuner THD down to as low as 0.01%! Another new capability afforded by this generator is its ability to evaluate a tuner's SCA rejection capability in accordance with IHF (now EIA) standards. That is, not only must there be a 67-kHz subcarrier signal modulating the main carrier to the extent of 10%, but that subcarrier must, in turn, be modulated with an audio signal of 2.5 kHz, to a deviation (of the subcarrier) of ± 6 kHz. The new generator provides such a signal, and, for the Hitachi FT-5500, SCA rejection measured a high 71 dB.

Figure 3 is a spectrum analyzer plot of frequency response (upper trace) and stereo separation versus frequency for this tuner. Separation measured 58 dB at 1 kHz, 53

The Hitachi FT-5500 costs a fraction of what a similar unit cost five years ago and has refinements no one dreamed of at that time.

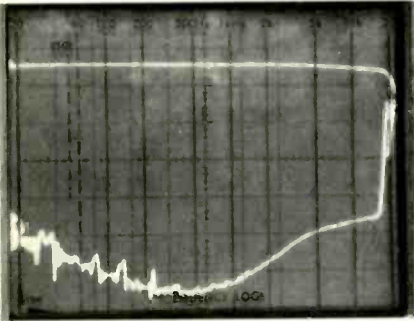


Fig. 3—Frequency response (upper trace) and stereo separation vs. frequency; sweep is logarithmic, from 20 Hz to 20 kHz.

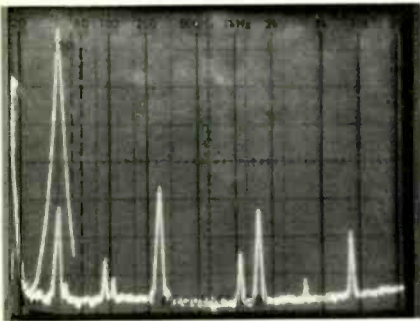


Fig. 4—Crosstalk and distortion components of 5 kHz, 100% modulated signal, left channel only. Horizontal scale is linear from d.c. to 50 kHz.

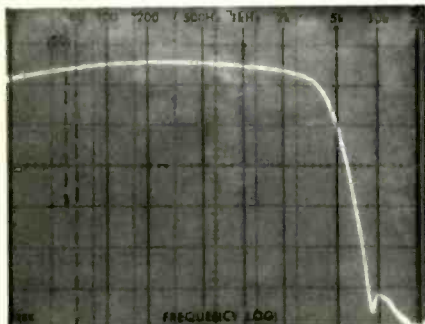


Fig. 5—Frequency response, AM tuner section. Sweep is logarithmic, from 20 Hz to 20 kHz.

dB at 100 Hz, and 42 dB at 10 kHz. Frequency response was well within the published limits (± 0.5 dB) from 20 Hz to 15 kHz. AM suppression measured 65 dB as claimed, while i.f. rejection and image rejection were both higher than claimed, with readings of 100 and 87 dB respectively. Capture ratio measured exactly 1.0 dB, as claimed.

It was only when I began to measure selectivity that I was able to "force" the tuner into its high-selectivity modes. The microcomputerized F.C.C.S. system interpreted the second generator signal as an interfering signal (which, indeed, it was in these tests) and "flipped" the circuitry into its alternate high-selectivity mode. Under these conditions I measured a selectivity of over 80 dB (for 400-kHz spacing). I'm not sure *how* Hitachi measures the "normal" selectivity values, unless they use the single-generator method to plot r.f. and i.f. response directly, on a point-by-point basis, since any attempt to use two generators throws the system into the high-selectivity mode (as it should).

Figure 4 shows the crosstalk and distortion components arising in the output of the unmodulated channel when a 5-kHz signal (tall spike at the left of the display) is used to modulate the opposite channel. While 19- and 38-kHz components are fairly large (the two components near the center of the display), other crosstalk components are quite small and separation at 5 kHz (as measured by the difference in amplitude between the tall spike at the left and the shorter spike contained within it) is around 48 dB. Vertical scale in this display is 10 dB per octave.

Figure 5 is a plot of frequency response of the AM tuner section. The FT-5500's AM tuner section was better than most as far as fidelity is concerned, with useful response extending up to beyond 4 kHz. Note, too, the "notch" filter action at around 10 kHz—an added circuit which, unfortunately, all too few AM tuner designers incorporate into their products these days.

Use and Listening Tests

The Hitachi FT-5500 performed extremely well, offering noise-free performance on all the stations I normally expect to receive. Stereo threshold might have been set a bit lower since, by the time stereo switches in, signal-to-noise is already 40 dB or better. The same holds true for the muting threshold, which is set at around the same 24-dBf point as the stereo threshold. Still, from a practical point of view, if you use an outdoor FM antenna (as indeed this tuner deserves), you should be as pleased as I was with the clean, noise-free, accurate signals delivered by the FT-5500. One interesting final note: The FT-5500 switched over to its high-selectivity mode (thanks to the action of the F.C.C.S. system) only for two stations in my area. One was a local, low-power station that was only 200 kHz from a more powerful metropolitan area station; the other was a fairly powerful station that was 400 kHz removed from another strong station. Frankly, even in the high-selectivity modes that resulted, I couldn't detect any significant increase in distortion, nor did separation seem to suffer. All in all, a cleverly designed and very well-built tuner at a price that makes it affordable for a great many people who are serious about high-quality FM reception.

Leonard Feldman

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4

SIGNET SK305 ELECTRONIC STYLUS CLEANER

Price: \$29.95.

Keeping the phono cartridge stylus clean is an ever-present problem for the audiophile. Not infrequently, the stylus is only partially cleaned because the user may fear damaging the stylus and cantilever on an expensive phono cartridge. This fear may now be allayed, thanks to an electronic stylus cleaner from Signet.

The Signet SK305's cleaning head consists of thousands of tiny nylon fibers gathered tightly together to form a brush. This brush is vibrated *vertically* by a magnetic system driven by an IC and powered by one AA 1.5-volt penlight battery located in the body of the device. While the brush bristles are vibrating, a light illuminates them so that you can see where to place the stylus.

Prior to using the Signet SK305, make certain that the power to the turntable and amplifier has been turned off. Place the SK305 on the turntable platter, with the brush facing up and towards the platter edge. Next, apply one or two drops of the supplied stylus cleaner fluid onto the surface of the brush. Turn the device on and carefully lower the stylus onto the cleaning brush, using only the normal cartridge tracking force to keep the stylus on the brush. Never put any additional downward force on the cartridge as it may damage the stylus and



cantilever. Also, make certain that the turntable platter remains stationary while the SK305 is cleaning the stylus as its movement may also damage the stylus and cantilever. The platter may be held motionless by placing the thumb in contact with the platter and turntable base plate simultaneously, or by using a rubber anti-rattle window wedge, gently placed between the platter and turntable base. The cleaning time should not exceed 20 seconds at any one time. If the SK305 is used regularly (e.g., weekly), then five seconds of cleaning time should be sufficient, either with or without the cleaning fluid. When the cleaning time is up, raise the stylus from the brush and return the tonearm to its rest. Finally, turn the SK305 off, replace the

plastic cover over the brush, and store the device for future use.

The stylus brush usually supplied with a phono cartridge may be used to periodically clean dirt or dust from the SK305 brush. Although Signet supplies a stylus cleaner fluid, most any stylus cleaning fluid may be used, such as any good commercial cleaner or a 60% alcohol solution.

I have used the Signet SK305 electronic stylus cleaner for many months and find it to be a safe, high-performance device that removes all dirt and deposits from the stylus within a few seconds without the need of removing the stylus or cartridge from the tonearm. The end result is a stylus in pristine condition.

B. V. Pisha

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5

SHURE SM85 UNIDIRECTIONAL CONDENSER MICROPHONE

Manufacturer's Specifications

Type: Cardioid condenser, electret bias.

Frequency Response: 50 Hz to 15 kHz.

Polar Pattern: Cardioid (unidirectional).

Output Impedance: Rated, 150 ohms; actual, 85 ohms.

Output Level at 1 kHz: Open-circuit voltage, -74 dB re 1 V/microbar (-54 dB V/Pa).

Clipping Level at 1 kHz: 800-ohm load, -4 dBV (0.63 V); 150-ohm load, -15 dBV (0.18 V).

Maximum SPL: 800-ohm load, 142 dB; 150-ohm load, 134 dB.

Hum Pickup: -7.5 dB equivalent SPL in a 1-millioersted field, 60 Hz.

Output Noise (Equivalent SPL): 29 dB typical, A weighted.

Dynamic Range: 113 dB, maximum SPL to A-weighted noise level.

S/N Ratio: 65 dB at 94 dB SPL, per IEC 179.

Power: 11 to 52 V d.c. at 1 to 1.2 mA current.

Connector: Three-pin professional audio (Switchcraft A3M).

Case: Black vinyl-finished aluminum handle with black Teflon-coated steel mesh grille.

Dimensions: Overall length, 7-9/16 in. (192 mm); head diameter, 1-15/16 in. (48.8 mm); handle, 25/32 in. (20.1 mm).

Weight: 6.3 ounces (180 grams).

Cable: 25 ft. (7.6 m), two-conductor shielded with A3M and A3F type connectors (cable and mike connectors are black).

Supplied Accessories: Windscreen, 49A57; swivel adaptor, A57E; cable (Model SM85-CN only), C97CN.

Available Accessories: PS1 and PS1-E2 a.c. power supplies for two SM85 mikes; PS1 is 90 to 132 V a.c., 50/60 Hz; PS1-E2 is 90 to 132/180 to 250 V a.c., 50/60 Hz.

Prices: SM85 mike (less cable), \$231.00; SM85-CN mike (with cable), \$252.00; PS1 power supply, \$135.00; PS1-E2 power supply, \$164.00.



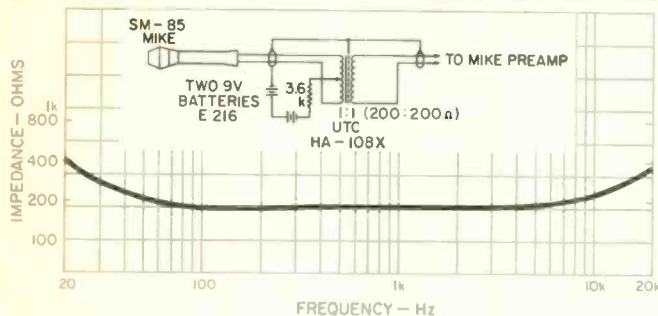


Fig. 1—Impedance vs. frequency, Shure SM85 microphone, with schematic of battery/transformer power supply (unbalanced test circuit).

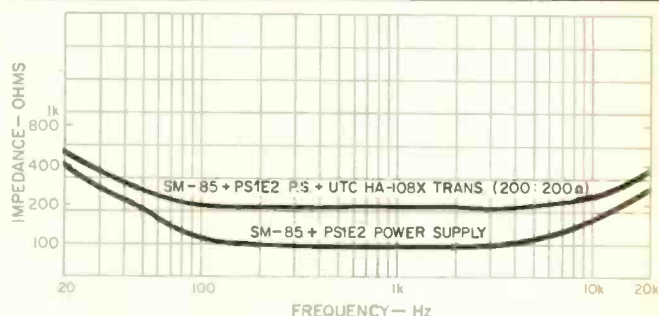


Fig. 2—Impedance vs. frequency with Shure power supplies (unbalanced test circuit).

The Model SM85, the second professional-grade electret condenser microphone manufactured by Shure, is intended primarily for hand-held vocal applications. It features highly durable construction plus a "space-frame" shock mount that is said to offer resistance to handling noise and mike-stand vibration by performers. Audiophile applications would appear to be geared to voice recording and musical-instrument reinforcement, but the published data hint that the SM85 may be useful in more diverse applications such as choral pickup and accent of musical instruments (i.e., brass and woodwinds) plus sound system applications where vocal clarity, feedback immunity, and people-proof reliability are desired.

The all-black finish is a radical departure for the conservative Shure firm, but it is a logical choice considering that the musical amplifiers and speakers often used by "pop" groups are also finished in black. (This harkens back to the days before TV when mikes were finished in black-and-chrome combinations and were intended to be visible.) The SM85 handle and grille are all metal, and the plastic finishes seem to be extremely durable. However, compared to the SM81 (see *Audio*, August 1980) which has a vinyl metallic nickel paint finish, the SM85 gave the impression of a plastic microphone. This impression is strengthened by the indents in the transition piece between the handle and the head, which give the appearance of a molded plastic part.

Powering is by an external supply via the familiar phantom system which Shure calls "simplex." In this scheme, ordinary two- or three-wire shielded microphone cable is used, with both audio lines carrying positive d.c. power and the negative power carried by the shield or ground conductor. Phantom powering is basically a balanced-circuit concept and is somewhat tricky to adapt to unbalanced inputs which are prevalent in audiophile tape recorders. Some mixers and sound reinforcement amplifiers used by audiophiles may have balanced inputs but may not have a provision for d.c. powering of microphones. The "Measurements" section of this report, in addition to test results and

studies on powering, will offer suggestions for audiophile use of the SM85.

The electronics in this mike are generally similar to those in the SM81. The block diagrams for the two microphones are identical, except that the SM85 does not include a capacitive capsule attenuator. The SM85, being "performer-proof," has no operable switches, so the high-input SPL rating must be achieved by reduction of capsule sensitivity and/or reduced amplifier gain. Since total dynamic range can only be stretched so far, the noise level (equivalent SPL) of the SM85 is 29 dBA compared to 16 dBA for the SM81. Total dynamic range (maximum SPL minus noise SPL) is rated at 113 dB for the SM85 as against 119 dB for the SM81. (My calculation based on Shure specifications for the SM81.) As a reference, dynamic range of 110 dB should be considered excellent for a professional-grade microphone preamplifier.

Cable is not included with the SM85. If the user wants a matching black cable with a black-finished connector, Model SM85-CN must be ordered. Otherwise, any microphone extension cable having three-pin connectors (Switchcraft A3M, A3F, or similar) may be used with the SM85.

Power-Supply Considerations

Every time I have reviewed externally powered condenser microphones, including the air condenser and electret varieties, I have used the a.c. power supplies furnished by the manufacturers. Each one, I have found, is designed differently, so that each series of tests begins with a study of powering. My principal concern here is for the audiophile who will want to connect the SM85 to an unbalanced low-impedance input found on many tape recorders. Phantom (simplex) powering, as mentioned above, is basically designed for use with balanced circuits. When the output of a condenser microphone and power supply is connected to an unbalanced input (one audio line grounded), there may be a loss of level, hum or noise or, in the worst case, sparks and smoke! The latter problem is less frequent these days since manufacturers incorporate coupling capacitors that

The SM85 may be of value for accenting individual instruments in symphonic recording.

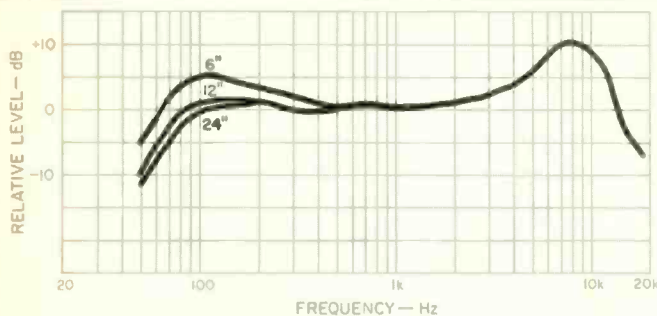


Fig. 3—Frequency response vs. distance to source.

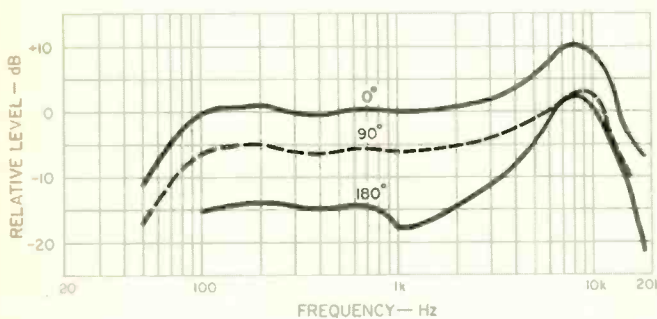


Fig. 4—Frequency response vs. angle.

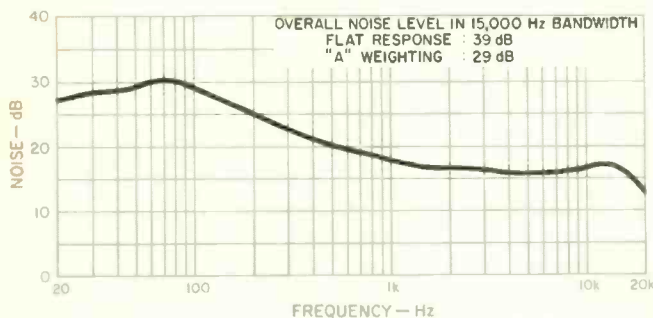


Fig. 5—One-third octave band spectrum of noise from SM85 microphone with Shure PS1-E2 power supply.

block the d.c. from appearing on the output pins; the Shure power supplies have these capacitors.

Electret microphones with internal batteries do not react badly to unbalancing the output because they have integral transformers, and the audio output is from a secondary winding which is isolated from ground. When I've had problems in the past with external power supplies, I've introduced an audio line transformer between the supply and the test gear. This allowed connecting the microphone audio to balanced or unbalanced circuits and avoided the attendant problems.

In general, most, if not all, power supplies having output transformers may be connected to unbalanced or balanced inputs with impunity. However, the "active" or transformerless supplies may be connected to balanced inputs, but not to unbalanced inputs unless recommended by the manufacturer. The PS1-E2 power supply used for testing is an "active" type, but Shure indicates that the audio output may be unbalanced. The concern with unbalancing an active supply is that a short-circuit on one-half of the audio could cause distortion. This is why the manufacturer should be consulted before proceeding to unbalance the output.

Measurements

When I began testing the SM85, I lacked the PS1 or PS1-E2 power supply, so I rigged a battery-transformer supply as described in the Shure instructions. The schematic of this supply and the resulting impedance curve are shown in Fig. 1. The transformer is an expensive, well-shielded unit but is not highly copper-efficient, and it adds about 80 ohms to the midrange impedance due to winding resistance. The rise in impedance at low and high frequencies is a characteristic of the SM85 (Fig. 2). The impedance (with the Shure PS1-E2 power supply, output unbalanced) is below 100 ohms as per specifications at 1 kHz. When the transformer is added, the midrange impedance increases by 80 ohms, as above. Thus, the impedance test reveals no problems with unbalancing the output of the Shure PS1-E2.

The axial frequency response versus distance to source shows a flat and very smooth response at 12 to 14 inches from 80 Hz to 2 kHz. At six inches, some bass boost from proximity effect is seen; if the performer "swallows" the mike, the bass boost will be considerable. Presumably, the increased "warmth" or "boominess" will be welcomed by the performer, for otherwise, a bass roll-off equalizer will be required at the mixer. The response rises smoothly from 2 kHz to a rounded peak of +10 dB at 8 kHz. This, presumably, is responsible for the "sizzling highs" mentioned in the Shure catalog sheet and which are desired in contemporary "pop" music.

The frequency response curves (Fig. 4), taken at different angles of incidence, show the well-controlled cardioid pattern I have come to expect in Shure microphones. The 90° rejection is 6 dB, as in an ideal cardioid throughout the useful frequency range. The 180° rejection approximates 15 dB up to 2 kHz. Above this frequency, the rejection is less, probably because of unavoidable diffraction effects, and, of course, room noise and feedback are much less of a problem at this high a frequency.

The noise spectrum (Fig. 5) shows a smoothly falling

The microphone performs as advertised, with measured data values meeting or exceeding the mike's specifications.

characteristic and an overall level of 29 dBA equivalent input SPL, which meets the Shure specifications. For this test, I used the Shure power supply in the balanced mode.

The frequency response curves were measured with both balanced and unbalanced inputs using my transformer supply and Shure's power supply. There was no change in frequency response, just small changes in overall output levels. With a balanced input, sensitivity was -54 dBV/Pa with the transformer supply and -53 dBV/Pa with the Shure supply. With an unbalanced input, the sensitivity with the Shure supply was -55 dBV/Pa, but the transformer supply showed no change in sensitivity.

The clipping level (with transformer supply unbalanced) was ± 0.4 V (peaks viewed on scope). This is -8 dBV (peak) or -11 dBV (rms), which translates to an input SPL of 137 dB. This value is in between the two values Shure specifies with different loads, and I think it is quite sufficient for the loudest rock vocalist with "mike-in-mouth."

The total dynamic range I measured, therefore, is 137 dB minus 29 dB, or 108 dB. This is lower than the specification value, but since the latter is noted as a "maximum," the measured number is not contrary to spec. A dynamic range of 108 dB is quite acceptable for the intended applications.

Use and Listening Tests

As in previous reviews, the reference microphone for subjective comparison tests was a Nakamichi CM-700 with a cardioid capsule. This reference microphone was chosen because of its uniform frequency response and directivity, and not because it is a better mike for the application than the unit being reviewed. For this test, I did not have the opportunity to compare the two microphones with live music as a source; I used master tapes of live concerts played back over studio monitor speakers. To add some low-frequency noise to the room, I turned on an air conditioner.

The Shure, as compared to the Nakamichi (flat response), exhibited greater rejection of room noise, while showing greatly increased high-frequency sound with distant voice or music sources. In a quiet room, the self-noise of the SM85 could be heard as "hiss." (Presumably, the Shure will not be used for pickup of very low-level sounds.) With close-up speech at six inches, and the Nakamichi on "Lo-Cut," the SM85 picked up more room noise, but the voice sound had much more punch due to warm bass plus very crisp highs.

The magnetic hum pickup of the SM85 as compared to the reference mike on flat response was virtually nonexistent (20 dB less?). Thus, the SM85 can be used near high-powered musical instrument amplifiers with little problem.

Without the supplied accessory foam windscreen, the SM85 was slightly more sensitive than the reference mike to "pop" or breath-blast sound when each was held very close to the mouth. For this test, the Nakamichi was on "Lo-Cut" and used with its accessory screen. The slight difference seemed to be related to the greater bass response of the SM85 under these conditions, which caused a low-frequency thump sound. With the foam screen in place, the Shure was essentially free of pop noise, like the reference. I would recommend using the foam screen whenever the SM85 is used at very close distance. Popping should not be a

problem without the foam screen if the performer uses professional microphone techniques.

The vibration and handling noise sensitivity of the Shure mike was about the same as the reference with the latter set for "flat" or "Lo-Cut" response. This indicates that the internal shock mounting of the SM85 is effective.

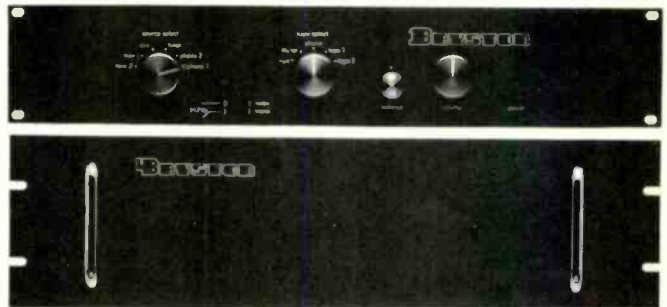
The Shure SM85 performs as advertised, and measured data values meet or exceed specifications. I can highly recommend it as a vocal microphone. Since the frequency response extends more than an octave above and below the voice range, the SM85 is certain to be used for music pickup where it will enhance the sound of the treble instruments. Obviously, it is not the best mike for recording a symphony orchestra, but it may be of value in adding clarity to choral recordings and for accenting individual instruments.

The SM85 may be connected to unbalanced inputs of tape recorders via the Shure power supplies or a home-made transformer supply. By referring to the detailed instructions in the Shure data sheet, the audiophile may be able to devise other powering schemes to suit his or her particular recorder or mixer.

I highly recommend the SM85 to "pop" music recording enthusiasts, and hope that classical recordists will try it as suggested.

Jon R. Sank

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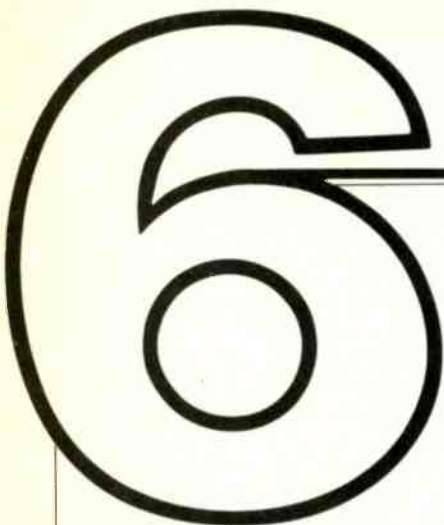
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KM LABS SP-100 PREAMP

Manufacturer's Specifications

Phono Section

Input Impedance: 50 kilohms/47 pF (adjustable internally).

Gain: 32 dB at 1 kHz.

RIAA Accuracy: Within ± 0.1 dB, 20 Hz to 20 kHz.

Input Sensitivity: 2.5 mV.

THD: 0.001% at 0.5 V out.

SMPTE IM: 0.002%

S/N: 87 dB, A weighted.

Phono Overload Level: 420 mV.

Slew Rate: 100 V/ μ S.

Main Amplifier Section

Rated Output: 0.5 V.

Gain: 20 dB.

Frequency Response: 3.5 Hz to 2 MHz, +0, -3 dB.

Slew Rate: 110 V/ μ S.

S/N: 107 dB, IHF A weighted.

THD: 0.001% at 0.5 V.

SMPTE IM: 0.0015%.

Maximum Output: 16 V.

Output Impedance: 220 ohms.

General Specifications

Subsonic Filter: -3 dB at 16 Hz, 6 dB/octave.

Subwoofer Filter: Low-pass output, -3 dB at 115 Hz, 12 dB/octave; high-pass output, -3 dB at 115 Hz, 6 dB/octave.

Maximum Tape Output: 9 V rms.

Gain: -6 dB, tape in to tape out.

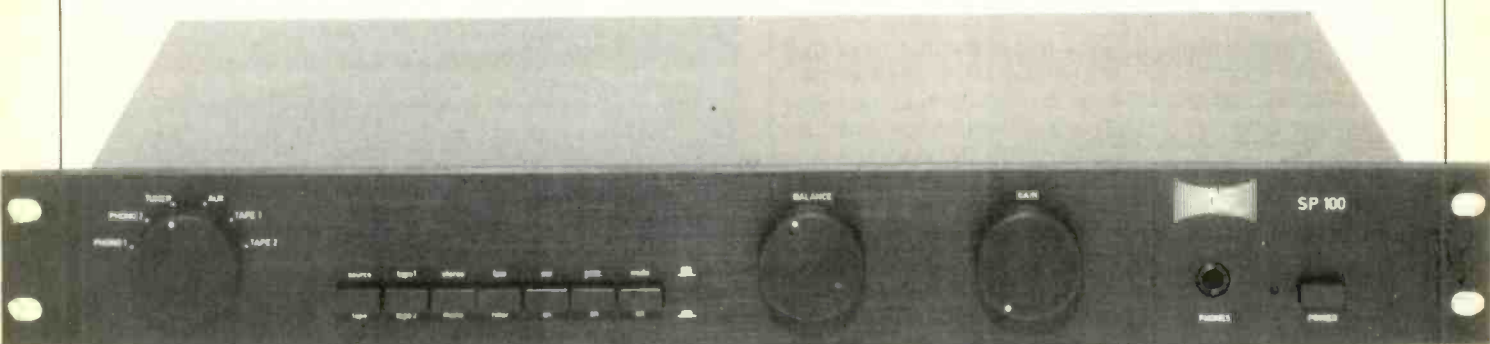
Headphone Driver: 9 V rms maximum.

Input Impedance: High-level inputs, 20 kilohms.

Dimensions: 19 in. (48.26 cm) W x 2 $\frac{3}{8}$ in. (6.03 cm) H x 10 $\frac{1}{2}$ in. (26.67 cm) D.

Weight: 11 $\frac{1}{4}$ lbs. (5.06 kg).

Price: \$699.00; optional MC phono module, \$99.00.



David Stebbings, the president of KM Laboratories, appears on the cover of the brochure introducing this superb preamplifier to prospective consumers. He is quoted as saying, "I designed the SP-100 with one unwavering goal in mind: Keep the signal path as simple as is humanly possible." Indeed, the signal path in the SP-100 is about as simple and straightforward as it can get, but Stebbings hasn't ruled out the possibility that some listeners (even avowed audiophile purists) may, at one time or another, want to do some signal processing after all. Accordingly, he's left a lot of room inside the preamp's slim chassis to accommodate such optional drop-in processing boards as a rear-channel "Space Expander" module, a graphic equal-

izer, a compressor/expander, or even an SQ quadraphonic decoder module for those diehards who still own and play four-channel discs.

The elegantly styled, rack-mountable black front panel has only three rotary controls (a program selector switch, balance control and master gain control), a power on/off button and indicator light, a stereo phone jack, and a row of seven pushbutton switches. These include source/tape selection, tape 1/tape 2 selector, stereo/mono switch, low filter on/off, subwoofer on/off (about which more in a moment), processor on/off (for introducing optional modules), and a mute on/off button.

The rear panel of the SP-100 has its inputs and outputs

neatly grouped in separate clusters. Gold-plated phono input jacks are provided, with the second pair intended for connection of the optional pre-preamp if a moving-coil cartridge is used. When you stop to think about it, having the MC input available as an option makes a good deal of sense, since those who are happier with MM pickups should really not be obliged to pay for a feature they may never use. Besides the tape 1, tape 2, main 1 and main 2 outputs (the latter pair being in parallel), there are a pair of outputs labelled *Back* for connection to a second amplifier if the user has incorporated a rear-channel reverb unit or KM's SQ decoder, and another pair of outputs identified by the letters *SW*, which stand for subwoofer. When the front-panel *SW* button is depressed, a built-in electronic crossover system comes into play, feeding all signals below 115 Hz to these jacks; signals above 115 Hz are channeled to the main output jacks. Adjacent to the subwoofer output jacks is a subwoofer level control which permits the user to balance levels in a biamped system even if the associated power amp used with the subwoofer lacks its own input level control. In short, if you plan to go to the biamp route in setting up a component system, choosing the KM Labs SP-100 would be very practical, since you won't have to purchase a separate electronic crossover unit.

Although I was not provided a schematic diagram of the SP-100, I did spend some time examining its internal layout and construction. I discovered that monolithic FETs are used as input stages to the phono and main amp sections and that cascode differential amplifier configurations are used so that load impedances remain absolutely constant, regardless of what external sources are connected. The cascode configuration also permits all of the input-stage FETs to operate at optimum low-voltage, low-noise conditions, while allowing the total overall voltage to be high enough for a superb phono overload factor and high output-voltage swings. Only one capacitor is wired in series with the total signal path (used as a safety measure against possible d.c. inputs), and it is a polypropylene, 1% tolerance type, as are the capacitors found in the phono equalization circuits. Metal-film resistors are sprinkled liberally throughout the SP-100, and a toroidal power transformer is used in the power supply section. Both the volume and balance controls are thick-film, vacuum-deposited stepped attenuators. All switch contacts are silver-plated.

Measurements

It almost goes without saying that, having examined the published specifications for distortion, I saw little point in trying to confirm those readings since my lab equipment has residual distortion levels of the same order of magnitude. I was, however, able to measure and evaluate many other operating parameters. The unit tested was equipped with the optional MC module, and the inputs to this module had a sensitivity (for 0.5-V output) of 0.11 mV, exactly 20 dB lower than the 1.1-mV input sensitivity measured for the moving-magnet inputs. KM Labs has not yet adopted the standard reference levels of the new amplifier measurement standards, hence their input sensitivity figure of 2.5 mV for the MM inputs and 0.25 mV for the MC module inputs. Phono overload measured 420 mV using the moving-mag-

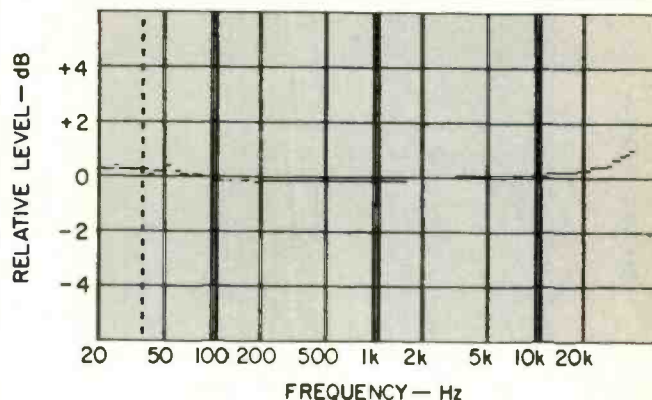


Fig. 1—Deviation from RIAA equalization using input through an inverse RIAA network.

net inputs, exactly as claimed, and 40 mV for the MC inputs. Signal-to-noise ratio for the moving-magnet phono inputs measured 84 dB, A weighted; for the moving-coil inputs (referenced to 0.5-mV input and 0.5-V output) it was just short of 70 dB.

High-level input sensitivity was 46 mV for 0.5-V out, while signal-to-noise ratio for the high-level (tuner, AUX, or tape) inputs was a very high 98 dB (referred to 0.5-V in and 0.5-V out), A weighted. Figure 1 is a plot of RIAA equalization accuracy, from 20 Hz to beyond 20 kHz, in which an inverse RIAA signal is applied to the phono inputs. If RIAA equalization were perfect, the plot (which was made using an amplitude scale of 2 dB per division) would be a straight horizontal line. In fact, a deviation of +0.3 dB was observed at 37 Hz. The slight rise in response at the high-frequency extreme actually occurs beyond 20 kHz, which is represented by the right-most vertical line in this video printout. The more familiar RIAA playback curve, plotted on a scale of 10 dB per division from 20 Hz to above 20 kHz and using a constant amplitude input rather than the inverse RIAA signal of Fig. 1, is shown in Fig. 2.

Figure 3 is a plot of the response obtained when the front-panel subwoofer switch is depressed. Main output response rolls off at the low end at a rate of 6 dB per octave, while the output from the *SW* jacks provides ultra-bass frequencies only and crosses over at 115 Hz, where each of the two response curves is at approximately the "half power" or -3 dB point.

Use and Listening Tests

I used the SP-100 preamplifier with both moving-coil and moving-magnet cartridges. Results were excellent with the moving-magnet cartridge, but residual noise was a bit higher than I would have liked when using the moving-coil cartridge. If you plan to use an MC pickup with this preamp, try to choose one that has relatively high output so as to get the signal up and away from this residual noise and hum

KM Labs has solved a problem found in many high-gain preamp circuits: The SP-100's phono input is relatively immune to r.f. interference.

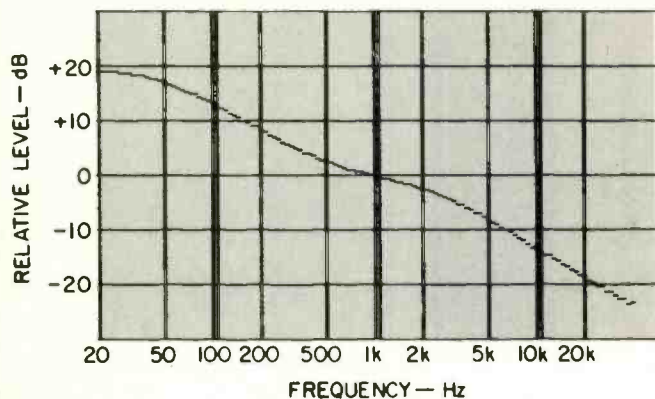


Fig. 2—RIAA playback curve with constant amplitude input.

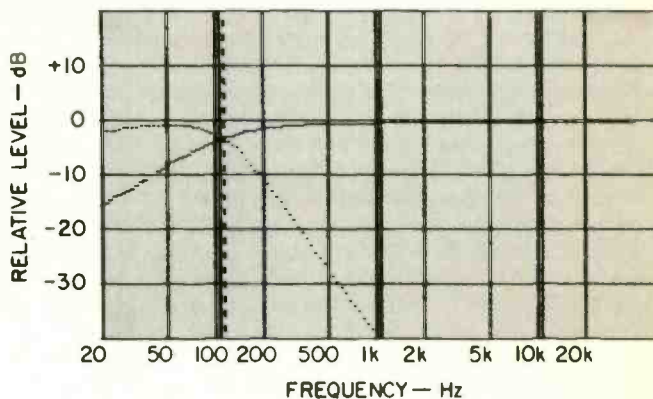


Fig. 3—When used as an electronic crossover for subwoofers, the SP-100 crosses over at 115 Hz.

"floor." You needn't fear overloading the pre-preamp module since, as I noted, 40 mV at 1 kHz is a long, long way from 0.11 mV—the nominal input sensitivity of this module.

All switches and controls operated smoothly without inducing pops or any other form of electrically induced noise. The phono input (even the high-gain MC input) was relatively immune to radio frequency rectification—a problem encountered with many other high-gain preamp circuits. The ultra-wide bandwidth of this preamp may well be responsible, at least in part, for the open musical quality I perceived when listening to some of my favorite program material. I was told that KM Labs actually measures response and phase shift through the preamp using video test signals and video test equipment. I didn't go quite that far in my tests, but feel fairly certain that any preamp that has flat response and minimum phase shift to beyond 1 MHz, as this one does, is not about to have slew-induced distortion problems, audible coloration, or imaging problems. The wide

bandwidth, incidentally, makes this preamp's resistance to r.f. interference all the more commendable.

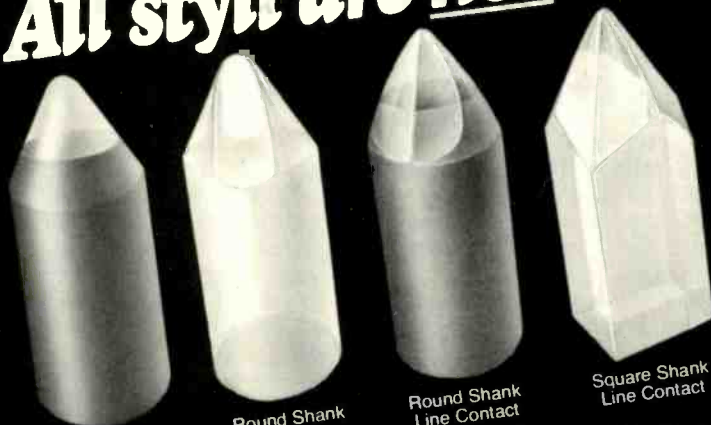
One word of caution. If you buy this preamp and use it with a moving-magnet cartridge, make certain that you read about how to add any needed picofarads of capacitance to the cartridge load. Terminal strips inside the unit were made specifically for such customizing and load matching, and unless you have a fair amount of capacitance in your turntable cables, chances are you'll need to add a bit of "C" here, since the supplied value is only 47 pF.

I feel that the SP-100 has been carefully designed to do the job that its makers intended it for—conveniently controlling and amplifying a variety of input signals with a minimum amount of tampering with the nature and content of those signals. The degree to which that goal has been achieved justifies the price of the KM Labs SP-100 preamplifier.

Leonard Feldman

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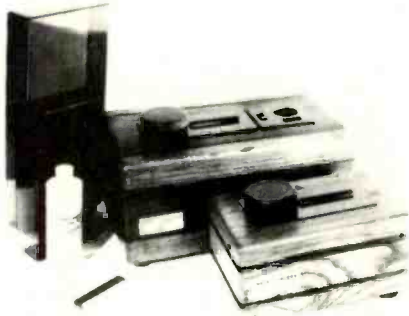
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In the past five months we have given you a brief description of who we are, and of the kind of innovative and imaginative thinking that has been instrumental in the development of our complete line of loudspeakers. In this column we would like to discuss with you our loudspeakers on an individual basis. Please note, however, that the systems described below are only suggestions; all GNP products are modular and may be "mixed and matched" in accordance with individual listening, space, and budgetary requirements. Of course, this flexibility makes it exceptionally easy to upgrade and improve your system whenever desirable.

The **LEAD CYLINDER** (Pat. Pend.) represents our contribution to the state-of-the-art in dynamic loudspeaker design. The innovative and functional shape and construction, designed to both ensure phase coherence and minimize diffraction effects and cabinet resonances, are responsible for its effortless, unstrained, and open sound. Moreover, the **LEAD CYLINDER**, as with all fine audio components, is a loudspeaker whose superior qualities become even more apparent and respected after extended listening.

The **SYSTEM TWO** employs much of the advanced and innovative technology of the state-of-the-art **LEAD CYLINDER**, including a fully braced, highly damped enclosure for the tweeter and midrange drivers. Its sound quality represents only the slightest of compromises, and even that is audible only in direct comparison to the superlative and unsurpassed **LEAD CYLINDER**. The **SYSTEM TWO** features outstanding clarity, focus, and resolution, along with an ability to handle music dynamics in a completely unstrained fashion. Like the **LEAD CYLINDER**, the **SYSTEM TWO** employs the identical woofer system, thus permitting easy upgrading should your listening requirements change.

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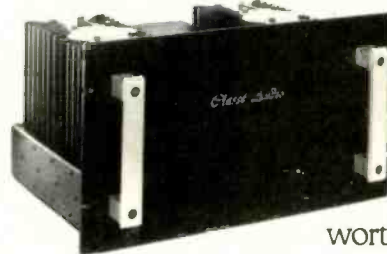
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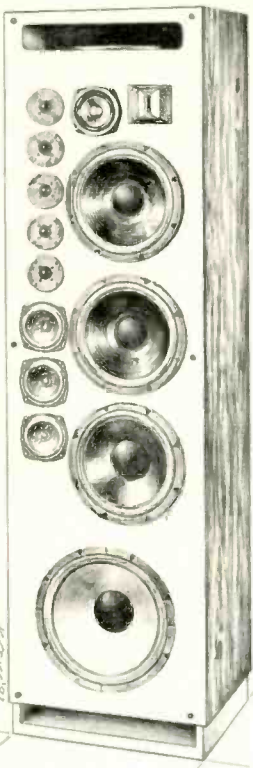
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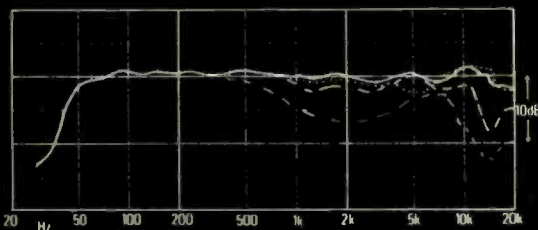
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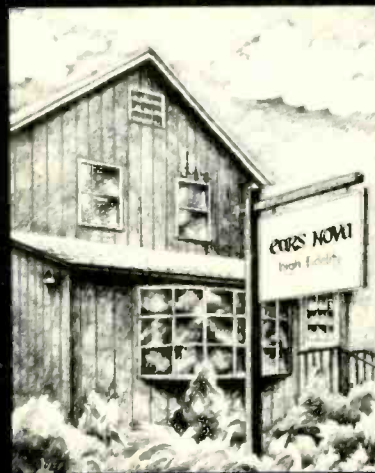
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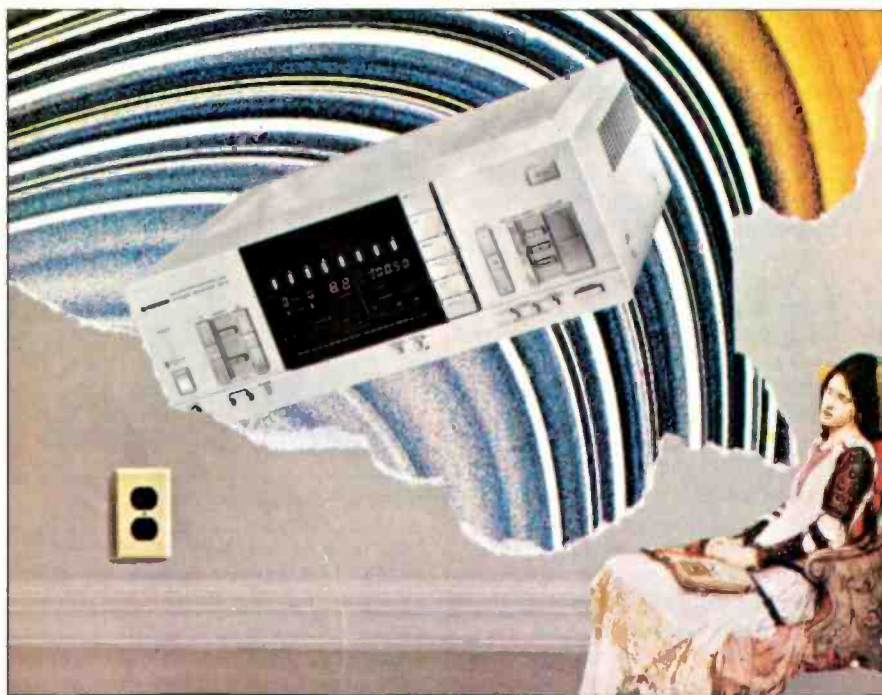
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I have been working with digital recording since 1977 and have a profound respect for the entire spectrum of digital technology. Its implications are enormous and, barring the unforeseen, it will most likely be the technology of the future. However, there is no doubt that it will be quite a while before we attend the interment of analog audio. The continuity of analog audio is reflected in the proliferation of new products shown at the WCES in January, especially in the area of playback equipment for phonograph records.

Dynavector introduced two new moving-coil phono cartridges, the 17D and the 23R, as successors to their Diamond Karat and Ruby Karat cartridges. The top-of-the-line 17D features a diamond cantilever only 1.7 mm in length, said to be the world's shortest and less than a quarter the length of conventional cantilevers. The shortness of the cantilever and the extreme hardness of the diamond are intended to afford shorter transit time and near-perfect phase coherence of frequencies traveling from the stylus tip to the coils. The result is claimed to be improved clarity, faster transient response, and considerable attenuation of unwanted resonances. In fact, the resonant frequency of the 17D is well above 70 kHz. Because of this, no rubber damping is necessary in the moving system and performance should be unaffected by aging or extremes of temperature and humidity. By using a smaller cantilever, Dynavector reduced the size of the diamond, and this has brought down the cost from the \$1,000 of the previous model to \$650. The 23R cartridge uses ruby for its cantilever. Here, too, the 2.3-mm long cantilever is much shorter than that used in the earlier DV Karat Ruby model and in conventional cantilevers. The same benefits afforded by the 17D accrue to the 23R. However, the resonant frequency is at 50 kHz, and the transit time through the cantilever is slower. Its price is \$310.

Many audiophiles like a number of the features of moving-coil cartridges, but one drawback, the requirement for tracking forces in the range of 2 to 2.5 grams, has caused some to reject this type of cartridge. At the WCES, Denon introduced the DL 207 moving-coil



cartridge which operates at a tracking force of 1.4 grams. A special boron cantilever and improvements in the moving system result in an effective tip mass of only 0.25 mg and a vertical compliance of 35 microdynes per centimeter. Frequency response extends to 60 kHz, so anyone who still plays CD-4 quadraphonic discs could presumably use this new model.

Sony has introduced the XL-88D, a very special moving-coil cartridge, as part of its prestigious Esprit audio system, but it is also available separately. Like Dynavector's 17D cartridge, the XL-88D features a diamond cantilever, although the stylus and cantilever are integrated. Incredibly, the stylus and cantilever are laser-machined from a single diamond shaft, and Sony claims faster transit time and transient response because of this integrated design. Another advance is the use of a figure-eight shape for the coils, resulting in about twice the output voltage of conventional coils. The XL-88D is also capable of tracking at 1.5 grams, less than most moving-coil cartridges. The use of so much diamond in the stylus/cantilever assembly is bound to be expensive, so the \$1,000 price is not at all surprising.

As I have quite candidly admitted at

other times, receivers are not my cup of tea. However, even the modestly priced receivers offered at the show have superior performance over the best preamps and amplifiers available only 12 to 15 years ago. The horsepower race in receivers is long since over, with the emphasis now on lower distortion and a multiplicity of features. Receivers have become increasingly complex, and the new champion in this respect is probably the Pioneer SX-8. This 100-watt-per-channel stereo receiver has a microcomputer control center which handles almost every conceivable function. There are no rotary knobs or mechanical switches on this unit, because the microcomputer affords control of volume, loudness, muting, balance, function selection, bass and treble levels, and AM/FM tuning. The SX-8 will even commit these functions to a memory circuit. If the likes of "Space Invaders" turns you on, this kissin' cousin quite likely will satisfy your yen for flashing lights and automatic functions, all for a mere \$800.

In the area of esoteric electronics, Audio Research kept the faith for tube aficionados by offering a monster 400-watt mono amplifier. At \$4,000 each, this adds up to \$8,000 for the most

Although digital will likely be the technology of the future, it will be quite a while before we attend the interment of analog audio.

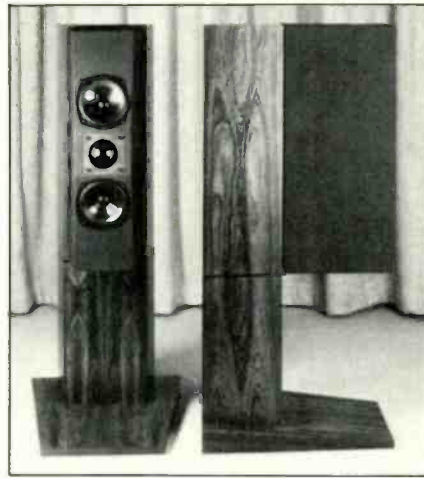
expensive stereo amplifier extant. Since these units are built in the frigid clime of Minnesota, perhaps they do double-duty as space heaters!

Threshold has brought out a new line of preamplifiers and amplifiers with updated versions of their highly regarded Stasis technique. The amps do not employ overall corrective feedback, and the Stasis circuitry maintains a constant current/constant voltage linear state of operation. Threshold has applied the Stasis technology for the first time in preamplifiers with the \$2,000 FET-One and \$1,000 FET-Two. The new Stasis stereo amplifiers are the 75 W/channel ST-150 at \$2,000, the 150 W/channel ST-300 at \$1,800, and the 250 W/channel ST-500 at \$2,700. Top-of-the-line is the monophonic ST-1000, a brute of an amplifier putting out 500 watts per channel! This behemoth has 250-watt power transistors—72 per module—and allows a reserve capability of a staggering 125,000 watts! Slew rate has been increased to 80 volts/microsecond.

Acoustat, known for their fine electrostatic loudspeakers (at least 15 pairs of which were used for demonstration by manufacturers at the Jockey Club), has now introduced an unusual power amplifier, the Trans Nova Twin 200, priced at \$995. Using patent-pending MOS-FET technology, with a new feedback circuit, this unit is rated at 200 watts per channel. Six power MOS-FET output transistors are used per channel, allowing high current capability. There is a great deal of new technology in this amplifier, said to combine the advantages of tubes and transistors. I heard the Acoustat Four speakers produce some lovely sounds when driven by the Trans Nova, especially in string tones.

Other amplifiers of note at the show were the Krell 200 W/channel amplifier, which is claimed to be pure Class A and is now in production, and Bedini's 100 W/channel version of their Mega Hertz amplifier series.

Spectral demonstrated their new DMC-10 in Las Vegas, a preamplifier which uses power MOS-FET transistors and is extremely fast. Teamed with a 150 W/channel Class A amplifier of their own design, this setup was used to drive a pair of Quad ESL 63 electrostatic loudspeakers. The combination



Meridian three-way speaker.

was one of the best sounds at the WCES, with the fine electronics doing justice to the smoothness and accuracy of the Quad electrostatics.

Speakers that I would want to listen to a second time were rare at this show. Soundlab had a pair of big \$6,000 full-range ES speakers which were very clean and smooth, with good low-frequency response. KEF's mid-price 303.3 is a very clean and well-balanced loudspeaker. Dick Shahinian of Shahinian Acoustics had one of the better sounds with his new three-way Eagle speakers which, at \$450 each, had plenty of punch and great clarity with good imaging. The companion subwoofer, Diapason at \$295 each, afforded a solid, tight bass extension that shook the room. In the Anglo-American rooms, the new larger "active" three-way Meridian speaker produced some very impressive sound, with exceptionally good imaging. Plenty of clean output here, with 150 watts on the woofer and 75 watts each on midrange and tweeter. Details were sketchy, but the price is tagged at \$3,900 the pair. Also on hand was the B & W 801F, with the "F" standing for Fibrecrete. The midrange/tweeter head assembly is now made of polystyrene lined with glass fiber reinforced concrete, affording more than 10 dB reduction in resonance, with noticeably better transient response, better clarity and definition, and even an improvement over the vaunted 801's imaging and depth perception. Dealers will arrange exchange of the old

801 heads for the new "F" units, and the exchange price is around \$300 per speaker.

It is apparent from the foregoing report that there were quite a number of worthwhile new audio products at the WCES. It is equally apparent that as this new audio equipment enables us to reproduce music with ever higher fidelity, the need for superior program material is more compelling than ever. I was reminded of this when I ran into Larry Vittes of Brilly Corp. at the B & W room. Larry is a veritable storehouse of information on phonograph records, especially of the imported variety, and his company brings many interesting foreign label records into this country, not the least of which is EMI from England. A number of knowledgeable audiophiles seek out original EMI recordings from England rather than buy the same recordings pressed in this country by the affiliate Angel. Almost invariably, the EMI original is superior to the Angel pressing in terms of surface noise, dynamic range, and total fidelity of reproduction. Evidently Angel indulges in some "processing" which appears to include compression and equalization of the sound on their cutting master. There is much great classical music with superb performances and splendid sound on the EMI label, but purchasing these records in this country has been a problem. Original EMI recordings have been imported by several companies on a rather spotty basis, and they are difficult to obtain even in New York. Now Brilly brings in new EMI releases and, most importantly, catalog items on a regular basis. Distribution in key cities in the U.S. is being set up, but in the meantime, the EMI originals can be obtained directly from Brilly (155 North San Vicente Blvd., Beverly Hills, Cal. 90211; 213/658-5304). If you desire, Larry Vittes will send a list of "audiophile demonstration quality" EMI recordings, a group which contains many sonic blockbusters. Two outstanding records are Sir Malcolm Arnold's *Symphony No. 2 and English Dances* (ASD 3353) and *Music of the Four Countries* (ASD 2400) which includes the rousing overture, "The Wreckers." These recordings will give even the most sophisticated audio system a real workout!



Continental Divide

Q. While stationed overseas, I purchased a European model of an AM/FM stereo receiver. After setting up my equipment back in the United States, I noticed that, although the receiver has a voltage selector switch for use at 117 volts, there is no provision to switch from 50 to 60 Hz. Will the use of this receiver with 117 V, 60 Hz current damage it in any way?—Geddes MacLaren, Cascade, Md.

A. You do not need a means of switching between 50 and 60 Hz powerline frequencies. It is safe to say that a device which has been designed to operate at 50 Hz will also operate properly at 60 Hz. The power transformer will run slightly cooler when operated at 60 Hz than at 50 Hz. However, it may not be possible to operate a device designed for 60 Hz at 50 Hz. Where a power transformer runs very hot at 60 Hz, chances are that the transformer will burn out if run at 50 Hz. Sound reproduction will not be affected, regardless of powerline frequency.

While what I have said holds true for tuners, amplifiers, preamplifiers and other signal-processing equipment, it may not be true of tape recorders, turntables, or other devices containing motors.

Tracking Down a Step-Up

Q. I am making my own electrostatic speakers and have questions about step-up audio transformers. How is it possible to have a transformer step up an audio signal to a sufficient voltage to drive an electrostatic speaker and not have the transformer cause distortion and loss of frequency response? I would like my electrostatic speakers to cover the entire audio range and therefore need a transformer which will permit this. Where can I get such a transformer or how can I make one?—William Hird, Jr., Pawtucket, R.I.

A. I suggest using a good output transformer, the kind used with tube amplifiers, between the plates of the output stage and the loudspeaker system. This transformer will have the center-tapped winding needed for a balanced speaker system.

Good output transformers have always been capable of producing a very wide frequency response, even

up to frequencies as high as 100 kHz. I have measured the output voltage of such transformers for possible use in projects just like yours and found that many of them could produce in excess of 1,000 volts of audio frequency signal with a relatively modest 15 watts of drive. These transformers were typically 8 to 10 kilohms plate-to-plate.

It is possible that manufacturers of transformers may produce units specifically designed for your application, so checking their catalogs should be most helpful. Newark Electronics, in particular, offers a wide variety of transformers and they have offices in major cities across the country.

If at First You Don't Succeed . . .

Q. I have a problem with my solid-state amplifier. This unit replaced a dual 35-watt tube unit, and about three months after purchase, it failed.

The service center that repaired the amplifier said the power transformer burned out. The transformer was replaced, but about three months later the amplifier failed again, showing the same symptoms as before.

I have a multi-speaker setup controlled by a six-speaker selector switch. During the first three months of operation I used a combination of speakers just as I had done with my tube amplifier. The lowest impedance used was 3.2 ohms, and most of the time I was operating with about a 5-ohm load. When the unit failed, I was running a pair of 8-ohm speakers and a 16-ohm large speaker connected to one of the channels.

The large speaker is home built, consisting of a horn midrange, tweeter and a 15-inch woofer, impedance unknown, with two crossover networks.

When the amp came back from being serviced the first time, I never operated it with less than 5-ohm loads, just in case that was the problem. I also changed the connections of my large speaker system. By using the six-speaker selector switch, I paralleled the two channels. When the amplifier failed the second time, I was running only the large speaker at low volume.

I have used this same setup for almost 20 years with my old equipment and never had a problem.—Richard W. Curdo, Ayer, Mass.

A. It may be that the original problem stemmed from running your amplifier at nearly full output; the 3.2-ohm impedance is less than the 4-ohm minimum recommended load for many amplifiers. This added load will result in increased heat, leading to premature failures. I suspect that the output stage blew, taking the power transformer, but we will never know for sure.

I also get the impression that, at times, you have two channels connected in parallel. This arrangement might well damage your amplifier. With some program material, one channel would try to drive the other channel in addition to driving the speakers. The impedance presented to the output stage could be very low at such times. Unless there are specific provisions for doing so, never parallel the two outputs. I suspect that this is what led to the trouble the second time.

The large speaker may also be suspect. Although you state that its impedance is 16 ohms, you also say that the woofer has an unknown impedance. Should it happen that the woofer's impedance is really 8 ohms or 4 ohms, the impedance of your total system at low frequencies will not be 16 ohms, but 8 or 4 ohms or even less.

Thus, the amplifier may have been loaded more heavily than you suspect, both in your original installation and in the installation which ultimately produced the second amplifier failure.

Tube equipment is much more forgiving of overloads. Solid-state equipment is often more forgiving of being operated without a load.

Ratio Rationale

Q. I recently read an old review of the Bose 301 speakers. However, the efficiency was stated as 3.9 watts input for 94 dB at 1 meter. All current speaker reviews state acoustical output referenced to 1-watt input. Is there a simple conversion formula to use?—Denis A. Bryan, New Orleans, La.

A. At 1-watt input, the Bose 301 would produce about 6 dB less than it would when driven by the 3.9 watts

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you mentioned. Therefore, if the speaker, as reviewed, would produce 94 dB SPL, with 1 watt feeding into it, it would produce something on the order of 88 to 89 dB SPL at 1 meter. Please note that the 1-meter distance must be held constant for all measurements. All this assumes linearity of output with input.

To make conversions of the kinds you need, set up the 1 watt in a ratio to the power used in the old measurement, 3.9 watts. The ratio is, of course, 3.9 to 1. If you look this up in a decibel table, such as is given in many reference books, you will find that the dB difference is 6 dB. This 6 dB is then simply subtracted from the 94 dB SPL measurement obtained with 3.9 watts input, and the result is 88 dB.

May The Force Stay with You

Q. Is it necessary to adjust the anti-skating and/or tracking forces when playing records which have been treated with a record preservative?—Richard Torres, APO N.Y.

A. There is no reason to adjust either the anti-skating or tracking force because of the use of a record preservative. Even if such adjustments were necessary, they would be small and would require the use of very special test records and test equipment to make accurately.


Right and Wrong Angles

Q. I just mounted a cartridge in a turntable recently purchased and I noticed that the headshell, cartridge, and the stylus don't appear to be set up properly relative to the record. When viewed from the front, the stylus isn't at 90° to the disc, and the top of the headshell isn't parallel to the record's surface.

Is this normal? I thought that the stylus should be at a 90° angle when viewed from this perspective and that the headshell should be parallel to the record plane. Is this a defect?—James Eggerman, Seattle, Wash.

A. It is true that the cartridge should be parallel to the surface of the disc or, to put it another way, the stylus should be 90° with respect to the surface of the disc when viewed from the angle you mention.

Apparently there is something wrong with the way the shell is mounted inside the arm, or perhaps the shell itself was not made correctly. Try to gently turn the shell; if this doesn't work, then try a new one. If the new shell does not solve the problem, the arm will probably have to be replaced.

Failure to remedy this will result in added record wear and degraded channel separation. 



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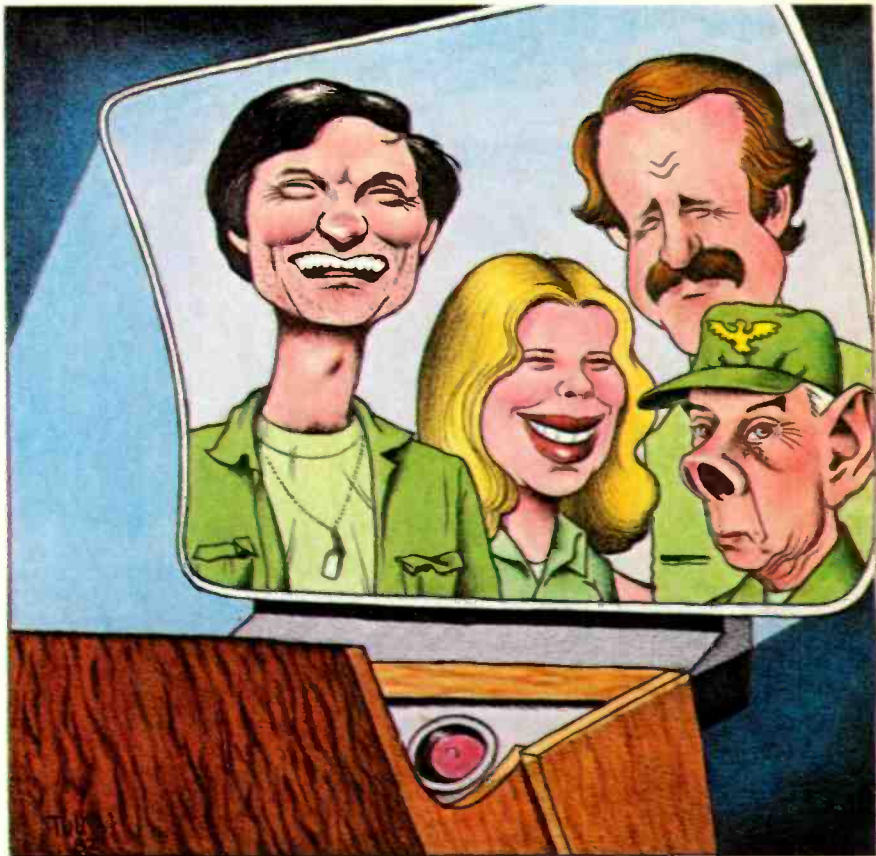
Models shown: Preamplifier/Control Unit 101, FM Tuner 104, InterActive Loudspeaker M2

VIDEO SCENES

BERT WHYTE

Last month in my report on video activities at the 1982 WCES in Las Vegas, I gave an overview of developments in the videodisc field and pointed out some of the problems encountered by both the laser disc and CED camps. As I write, it is just slightly over a month since the show, and, unfortunately, in this short period problems in the videodisc industry have grown. There is little doubt that the pressures of the current recession have exacerbated the situation.

It appears that Pioneer is undergoing a period of retrenchment and consolidation. The updated Pioneer LaserDisc player which was to have been equipped with CX noise reduction, among other refinements, was not introduced at the WCES. Now the word is that it has been "postponed indefinitely." For another thing, apparently the new higher quality LaserDiscs from Pioneer's Japanese plant will not reach the U.S. market as soon as anticipated. As for RCA's CED videodisc, I reported on its various problems, including that projected sales for the CED players were below target by more than 50%. This was particularly disappointing to RCA because it was felt that a videodisc player priced just under the "magic" \$500 dollar point would have no substantial trouble in the market. Currently, some of New York's more flagrant discounters are offering CED SelectaVision players for \$279, and there is said to be consumer resistance even at that figure. This is quite astonishing, as a little simple arithmetic will show. Assuming the dealer gets a good 40% discount, his cost for the unit would be around \$300, so one is hard put to believe the dealer is selling the player for a profit. Of course, there is the old dodge of featuring such a dramatically discounted product as a "lost leader" with the expectation of recouping losses through disc sales. However, since New York dealers are not known for their magnanimity these days, RCA must be offering the dealers even more generous terms and one wonders what the break-even point is for RCA. On top of this, we have yet to see any SelectaVision discs from MGM/CBS, and because there don't appear to be any technical problems, one would have to assume this is the result



of a cautious marketing decision. I will keep my eye on this ongoing videodisc saga. In the meantime, a JVC spokesman reports that the scheduled June 1982 introduction of their VHD videodisc player is on target and it will be launched with appropriate fanfare. I was also pointedly reminded that the VHD player will also play AHD digital audio discs. Apparently, unless there is an official EIAJ decision to adopt the Sony/Philips CD disc as the standard for digital discs, JVC intends to market their AHD digital disc. This would give purchasers of the VHD player a dual-purpose machine which conceivably could make selling the entire VHD concept more attractive.

Projection TV was supposed to flourish in 1981, but it didn't meet expectations, though sales figures were comfortably ahead of 1980. While more companies got into projection TV, many of their offerings were OEM models with a certain "sameness." There hasn't been much in the way of

really new advanced technology, but at the WCES a pair of interesting projection TV systems caught my eye.

The Mitsubishi VS520UD, a 50-inch, one-piece unit with the projector mounted in a pull-out drawer, is among the first projection systems to feature facilities for stereophonic sound. This Mitsubishi set is equipped with two 10-watt audio amplifiers and a pair of two-way speakers. There is also provision to connect outboard speakers for greater stereo separation, and the unit features audio and video inputs for connection of VCR and videodisc players. With a screen brightness of over 120 lumens, it has the brightest picture of any integrated projection TV system I have seen. Price is around \$3,800.

Henry Kloss usually has some interesting ideas for projection TV, and his new Novabeam Model Two from Kloss Video reflects his innovative concepts. The Model Two is essentially a portable projection TV system that weighs

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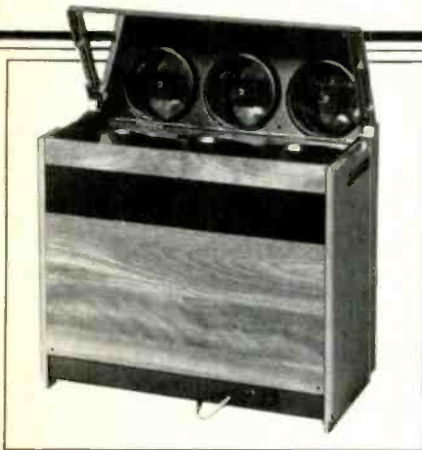
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The Kloss Video
Novabeam Model Two



60 lbs. and opens to a height of 30½ inches when in use. The Model Two uses the Novatron tubes, much like those used in the highly regarded Kloss Model One. These tubes put out over 200 lumens, which is very bright indeed, and in fact is brighter than the screen in most movie houses. Uniquely, the Model Two is designed to project its picture on a flat white wall, so there is no screen as such. Its relatively low price of \$2,000 (including remote control) is possible because the Model Two is set up as a monitor. In other words, there is no TV tuner; either a component TV tuner or the tuner in a typical VCR must be used. The Model Two is set up four feet from the wall used for viewing. It is recommended that the room be darkened, in spite of the high brightness level, so that full brightness will be maintained even for those viewers sitting off axis. The question obviously arises: What if you don't have a *white* wall? The wall may be colored or even wallpapered, but if the wall is patterned you might consider using a standard home movie or slide projection screen. But be warned: Most of these are of the glass-beaded variety, and as with slides the projected TV picture will be softened, diffused, and lose sharpness. One alternative is to use an appropriate size piece of white plasterboard rigged with wire and hung like a picture. Professional photograph supply houses sell large rolls of "background paper," or "seamless," available in plain white. If you want the very best, Leica Camera Co. makes a slide screen with a surface called "Blankana White."

With the advent of the Sony Profeel component TV system, and others of similar design, we will need a whole new category of components to interface the various elements between audio and video systems. Kenwood has taken the first step in this direction with their KVA502 50-watt audio/video amplifier. This \$400 dollar unit also performs multi-interconnections for VCR, videodisc, and even standard hi-fi sources. It has a built-in r.f. converter and a built-in video dubber and enhancer to provide sharper viewing quality on dubbed tapes. It also has a denoiser circuit which works on the audio track of video tapes, and in addition, there is a phase-shifting circuit which manipulates the mono TV sound signal and converts it to a sort of "pseudo-stereo" to present a broader sound stage. I criticized a "cheapie" model of this kind of device some months ago, mainly because that firm was blatantly proclaiming their device would convert mono sound to stereo—with no qualifying "psuedo" or anything else. For the burgeoning numbers of videophiles who are sure to become involved in the new component TV systems, this Kenwood unit should prove to be a boon. I predict we will soon see more equipment of this type. A

Addendum

In the April issue, the photos of The Plasmatics on pages 40 and 41 were shot by Ebet Roberts.

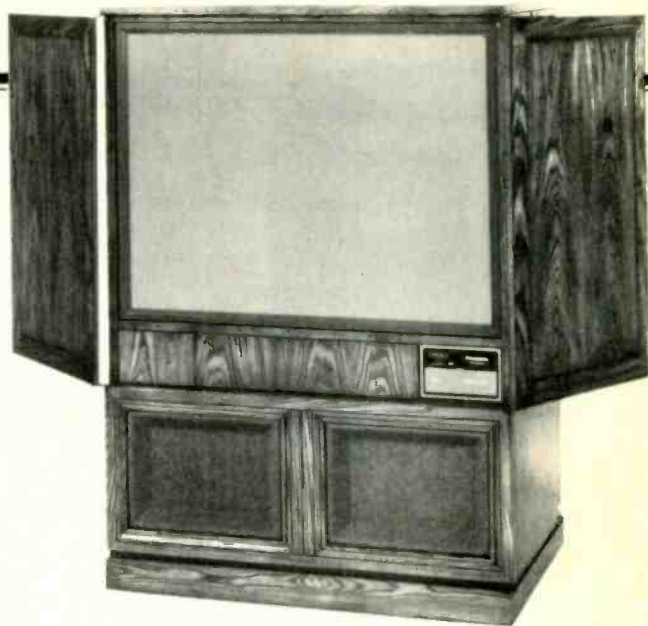
WHAT'S NEW IN VIDEO



Bush Video Center

The Model CE-1220 combines the look of fine traditional furniture with a design specifically tailored to handle VCRs and videodisc players. Finished in oak vinyl veneer, the unit features a roll-out shelf for the VCR or videodisc player and a slip-in area for 19-inch TV units. The storage area has both disc dividers and a step-type shelf, while hidden heavy-duty casters provide ease of movement. Overall dimensions are 50 inches high by 30 inches wide by 19 $\frac{3}{4}$ inches deep. Price: \$239.95.

Enter No. 111 on Reader Service Card



Panasonic Projection TV

The CinemaVision Model CT-4600 adjusts color quality from station to station automatically and is "cable-ready" for direct hook-up of 35 cable channels, in addition to 12 VHF and 70 UHF channels. Its washable screen measures 45 inches diagonally, and each of the

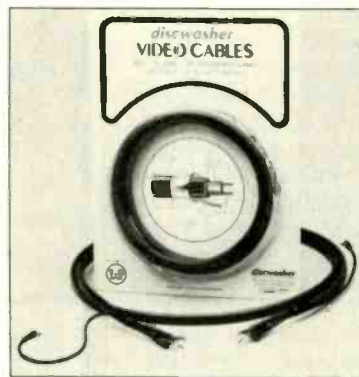
three picture tubes has its own lens to provide sharp color and high contrast in normal room lighting. Separate bass and treble controls afford higher quality audio, and video in/out and left-right audio in/out jacks are provided for use with VCR and videodisc players. Price: \$3,499.00, including remote control.

Enter No. 112 on Reader Service Card

Discwasher Video Cables

Two cables, designed to reduce interference and breakdown, are offered in 75-ohm to 75-ohm or 300-ohm to 300-ohm "F" type TV connectors in 1.5-meter lengths. With gold flashing for secure contact, the connectors feature the firm's Studio Shield for interference protection. Price: \$10.95 each.

Enter No. 110 on Reader Service Card



Sony Videocassette Recorder

The Betamax SL-2500 is an ultracompact unit only 17 inches wide by 3 $\frac{1}{8}$ inches high by 13 $\frac{3}{8}$ inches deep, and weighing only 20 $\frac{3}{4}$ pounds. Special features include front

loading, high-speed picture search, multi-speed bidirectional playback, and freeze-frame capability. An electronic tab market indexing system allows random access to nine positions, while the programmable timer allows

settings up to two weeks ahead. The linear tape counter reads out hours, minutes and seconds of both recording and playback time as well as tape time remaining. Price: \$1,500.00.

Enter No. 113 on Reader Service Card

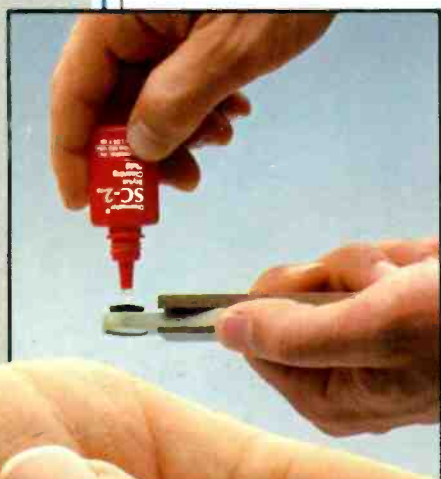
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