THE BAS SPEAKER

BOSTON AUDIO SOCIETY

Vol. 9, No. 9
June 1981

The Speaker is one of several publications that have received a letter from Stephen Temmer, concerning what to call those flat round things on which we store music. The Editor and Publisher have used some of their copious free time to reply; you are urged to do likewise if the spirit moves you.

George Androvette sends more news from California; if he keeps this up we're going to give him his own monthly column. Larry Hardin tells us about the enclosure he built for his turntable: it helps, but only up (or, actually, down) to a point.

We've had some trouble with our April meeting report, and have been forced to temporize. The complete story to date is inside. Meanwhile, Mark Fishman has done a fine job of reporting on Alan Hill's presentation in May; this may be the first time you really understand how the Plasmatronics loudspeaker works.

Because of the long "In the Literature" and the other meeting reports, the account of the second May meeting will be published next time.

BAS members are by now familiar with the frustrating results that often occur when audible differences between electronic components disappear under controlled testing conditions. The subject has been hotly argued here and elsewhere, and the fight seems far from over. But the debate has until now concerned purely electronic components. It has generally been agreed that cartridges and speakers are easy to tell tell apart, and that there are lots of reasons why this is so. Now the magazine AudioScene Canada has conducted a series of cartridge evaluations which call this assumption into question. The write-up of these tests is reprinted this reprinted this time as our feature article, and it should stimulate plenty of argument. AudioScene has done some further tests, and we will be reprinting the second report soon.

This issue is the second one to be produced on a borrowed printer. If all goes well, the galleys for our next issue will be typeset on the Society's very own computer-driven typewriter/printer. We wish to thank the following people from Apt Corporation for their generous assistance: George Hand, Mark Saklad, Frank Kampmann, and Alice Bellinger.

When our printer finally comes on-line we should be able to produce camera-ready copy as soon as a section of the magazine has been typed and edited. At that point, we will see if our gamble in switching to the new production system is going to pay off as we expected. Cross your fingers.

Contents

The B.A.S Speaker (ISSN 0195-0908) is published monthly by the Boston Audio Society, 36 Circuit Street, West Medford, MA 02156. Subscriptions are available to members of the Society. Membership dues are $12 per year, October 1 through September 30 ($25 U.S. currency overseas, including air mail). $11.45 of the dues are a subscription to *The B.A.S. Speaker* including all issues of the applicable membership year. For further information and application form, write to The Boston Audio Society, P.O. Box 7, Kenmore Squre Station, Boston, MA 02215. Second-class postage paid at Boston, MA. POSTMASTER: Send address changes to: The B.A.S. Speaker, P.O. Box 7, Boston, MA 02215.

THE BAS SPEAKER

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INS AND OUTS OF THE BAS

Articles

The *Speaker* is, always has been, and will remain a free and open forum for the membership. We edit for style, grammar, and spelling, but do not enforce any particular point of view. Contributions should conform to the style of the *Speaker*, with a title at the top and your name and state at the end. Each item should begin a new page and should be separate from other correspondence; drawings should be clear and neat, and please send originals, not copies. All material should be **typed** and **double-spaced**; this helps us enormously. Address contributions to *The BAS Speaker*, Trapelo Road, Lincoln, MA 01773.

Reviews

We encourage you to report your experiences with components, but we must remind you that subjective reviewing is fraught with peril for the unwary. This is especially true if the listening environment is unfamiliar; for this reason, listening sessions in dealers' showrooms are frequently misleading. Be sure to describe in detail the methods and controls used for listening tests, so that others may judge the degree of certainty of your conclusions. For other particulars, see "Articles" above.

Ads

Ads are a free service for the personal use of members only. The line between an active equipment trader and a dealer is sometimes hard to draw, but we try: commercial advertising, and non-hi-fi ads, will not be accepted. Ads should be of reasonable length, typed or neatly printed, on a sheet of paper separate from other correspondence, and mailed to *The BAS Speaker*, Trapelo Road, Lincoln, MA 01773. Include everything you want printed, and nothing you don't. If your name or address is **not** to be included, leave it out of the ad itself and put it in the upper right-hand corner of the page. We cannot honor requests to run ads in more than one issue; if you want us to run it again, you'll have to send it in again. There is a delay of four to eight weeks built into the system.

Monthly Meetings

The normal meeting time is 6 PM on the third Sunday of the month. We send meeting notices to local members only, so if you are from out of town you may check your BAS directory, find a local member, and get the information you need. Meeting notices usually arrive about one week prior to the meeting.

Directories and Constitutions

For a copy of the current BAS telephone directory or of the constitution and bylaws, send a self-addressed, stamped envelope (business size) to P.O. Box 7, Kenmore Square Station, Boston, MA 02215, and mark it to the attention of Frank Farlow. Postage is 15 cents for either.

Address Changes

If you move, send notice two to four weeks previously to Box 7, attention Frank Farlow. Returned *Speakers* cost the Society about 60 cents each and create extra work for Frank, so don't delay.

Speaker Staffing

Editorial assistance is always welcome. We are particularly in need of meeting summary writers, who are now paid for their work. Volunteers should write to the Trapelo Road address or contact Brad Meyer.

FOR SALE

* CBS SQL-200 full logic quad decoder and stereo enhancer, new, $150 or best offer; Old Brook monaural tube amplifier, best offer; Browning FM tuner, best offer. Martin Steinmetz, 6 Ayer Road, Wellesley MA 02181, (617) 235-9472.

* Kirksaeter stereo receiver, best model, 150 W/ch, 6 months old, $1,900 new, $850. Scott Carpenter, 297 Turnpike Rd. Apt. 204W, Westboro MA 01581 or call (617) 366-1714 around 10 PM EST.

* Audionics CC-2 power amp, mint, papers & box, $275; Audionice RS-1 preamp, mint, papers & box, $575; Technics SL-10 linear tracking turntable with MC cartridge and integrated head amp, mint, papers & box, $350. Call (401) 421-9439.

* Dynaco PAT-5 preamplifier, factory-wired unit with walnut case and B-FET update kit, $185; Pioneer TX9500 FM tuner, $250; Acoustic Research AR-XA turntable with Shure M-95ED, in flawless condition, used less than 100 hours, $150; Kenwood KR-8010 AM/FM stereo receiver, 125 W/ch, with walnut case, $450; all units have original manuals and shipping cartons. T.D. Tyson, 707 Florham Drive, High Point NC 27260, (919) 885-2265

* Revox A77 Mk II quarter track, new heads, Scott Kent low noise mod (but power transformer not removed), $500; Advent 201A cassette deck, little used, $200; Advent 100A four-card Dolby B unit, with wooden case, $75; Teac AN-180 four-card Dolby unit, $250 (if I sell the Revox); Rogers LS3/5As, good condition, $350/pr. Call John Tooley at (302) 856-5260 weekdays, or leave name and number on tape.

* Audio/Pulse Model One, new condition. Nobody wanted it at $350; anyone interested at $250? Or make me any reasonable offer; I no longer have a need for it (I'm buying a Carver.) Dwight Lanpher, Box 472, N.E. Harbor ME 04662.

* Russound QT-1 patch bay, $100 plus UPS. George Mileon, 14 Border St., Lynn MA 01905, (617) 598-2487.

* Grace F9E cartridge, new, $125 firm; Ortofon STM-72 transformer, best offer; Connoisseur BD-103 turntable, no arm, SME cutout, fairly new, best offer. Call Chuck at (215) 623-0752.

WANTED

* Older British speakers: Hartley wide-range 10" (217), 12" and 8". Stentorian 10" (HF1012), 12" (HF1214), 12" and 15" duplex coaxials, 8" cone tweeters, pressure-type moving coil tweeters (T-12, T-10). Goodmans 8" (Axiette), 10" twin cone (Axiom 80), "Trebax" high frequency pressure driver with horn (Triaxiom 312, 212, 612). Tannoy 12" dual concentric speakers. Alto Bass Ltd. 2000 dual concentric 12", and other models. Lorenz (Kingdom Products Ltd.) 8" wide range (LP-208), 12" coaxial (LP-312, 1 & 2) ,tweeter (TB-2). Old Racon (American Racon Electric Co.) 12" 3-way (12-HTX). Trusonic (Stephens) coaxials, 8" (80CX), 12" (122AX and 120 CX), tweeters (5KT, 214, 216 etc.). Older Norelco full range 12" (like AD5200M), 8" (like AD4800M) -- made in Holland. Old Calrad (Japanese) 12" 3 way (12TX-1), 8" coaxial (CR-8X), 12" coaxials. Jensen 12" 3 way (SG300). University 12" Mustang (M-12T), 8" 3 way (308). Singles OK, No cabinets. Bill Kalish, 565 Walnut Ave, Redlands CA 92373 or call collect (714) 792-0220.

* Good, clean off-the-air copy of the August 3, 1981 NPR rebroadcast of the royal wedding. Prefer 7 1/2 ips Dolby open reel, quarter or half track. The original (live) broadcast of the event was plagued with problems, and I missed the second attempt. Nick Lombardi, 2203 Plaster Road N.E., Apt. N-1, Atlanta GA 30345 or call (404) 633-3822 (eves).

* A copy of (or a chance to copy and return) the owner's manual for the Tandberg 3500X tape deck. Will Martin, 1106 Bellerive Blvd., St. Louis MO 63111, (314) 351-8219.

* Volume three and earlier issues of the BAS Speaker. I'm particularly interested in everything I can find on the Allison One loudspeakers. Please indicate number of issues plus cost of shipment by either first class mail or UPS to Vernon Smith, 713 Clarendon St., Syracuse NY 13210, or call collect (315) 474-0450 between 2 and 10 PM EST.

* NAD 3020 amplifier. Andrew Buc, 6246 Camellia Ave, North Hollywood CA 91606, (213) 980-9983.

* BAS members interested in carpooling to monthly meetings. Please call Ginny Frisby at 236-1688.

Open Forum

WARNING

We have received a notice from The Audio Amateur which seems important enough to warrant passing it on here. If you are using Freon TF to dilute Cramolin (or for any other purpose), DO NOT store the mixture in a glass jar. At room temperature Freon develops a vapor pressure high enough to constitute a hazard; conceivably the glass jar could explode. Freon should be kept only in the pressure-tested metal containers it is sold in. If you want to dilute Cramolin, use isopropyl alcohol. (I have a video head cleaning cassette with an associated cleaning fluid that purports to be made of freon and alcohol. It is stored in a plastic bottle, which swells during storage and releases a puff of gas when opened. -- EBM)

A SPELLING DISKUSSION

Memo: To anyone who spells the word meaning "a round flat object" DISC instead of DISK.

As someone who is vitally interested in standards, under proper safeguards of course, I would like to convince you that there is only one proper spelling for the word DISK. It is derived from the Greek "diskos" in which the "k" sound is always spelled with a "k" (kappa).

The IEC (International Electrotechnical Commission) in Geneva, Switzerland, the world standards organization in the electronics field, has always spelled it DISK. The Journal of the Audio Engineering Society, afer years of trying to decide which way to go, finally came down on the side of DISK. Bell Labs, Western Electric, Westrex, and Billboard magazine are some of the famous names in this industry which have never spelled it any way but DISK.

The Encyclopedia Britannica index, under "Disc," has only a brief statement: "See DISK." Virtually the entire computer industry has always used the correct spelling, e.g. floppy disk, disk drive, etc. A notable exception is Hewlett-Packard, whom I am attempting to win over.

There simply is no English word ending in "sc." Do you know of any? (I know a pear... Ed.) Depending on which dictionary you consult, you may find several different listings for "disc"; here are some examples. "British spelling of disk," "Disk is preferred," "Disc refers to the zoological application only, i.e. vertebrates (sic) in your back." To the writer the word "disc" has always appeared to be the abbreviation for "discount".

I feel just as strongly about that strange abbreviation for microphone, "mic." Please use MIKE!

If you would like to have a "disk-ussion" with me about this, please feel free to call.

-- Stephen F. Temmer (New York)

Peter Mitchell Replies:

I'm delighted that someone else is as irritated as I am by the widespread use of the idiotic "mic". In English, as in other languages, abbreviated forms generally arise as a sort of vocal shorthand, and in all such cases they are to be spelled the way they are pronounced, without regard to the spelling of the full-length version of the word. When a boy's name is Michael, his friends call him Mike, not "Mich". The common nickname for Elizabeth is Betty, not "Bethy." And a bicycle is universally called a bike, not a "bic".

The plural form, "mics," is especially ugly. Whenever I see it I feel a nervous tic, I flick my Bic, and I pronounce it like "micks" -- and as I am part Irish, "mick" sounds like an evil ethnic slur no matter how it is spelled.

There is only one place where MIC is acceptable: on a crowded instrument panel, together with VOL, BAL, REC CAL, TAPE MON, FWD, REW, and other abbreviations. But there is no excuse for ever using it in printed text.

As for "disc," the issue is less clear. After we received Mr. Temmer's memo I tried using DISK for a week in all of my writing, and the more I used it the less I liked it. I'm afraid that DISC is too well imprinted on my neurons to permit the change. Curiously, I recently acquired a Heath/Zenith Z89 computer (on which these words are being typed), and I have had no difficulty in accommodating to "floppy disk," but that's a different object than a musical record. Of course this is a purely personal reaction, not a valid etymological distinction.

Is it clear that our word is derived from the Greek, and not from the Latin word for a round flat object, discus? Athletes still engage in discus throwing, and in other Latinate languages the "c" is well established -- e.g. the French "discotheque." Would people dance as well in a "disko?" Sony and Philips, of course, are presently gearing up for the massive worldwide marketing next year of their "Compact Disc" digital record. On the visual side we have MCA DiscoVision, Pioneer LaserDisc, and most of the video magazines seem to have accepted "videodisc" as the standard spelling of that word. So it looks as if DISC will be with us for a while.

-- PWM

The Editor Replies:

I am in agreement with everyone here on the subject of "MIC".

My American Heritage Dictionary tells me what my intuition suggests: "disc n. Also disk. 1. (Informal) A phonograph record. 2. Variant of disk." No derivation is given. DISK, according to the same source, has the more general meaning, "Any thin, flat, circular plate." But the derivation of DISK is given as "Latin discus, from Greek diskos..." So which derivation should we follow?

Still, the American Heritage is a descriptive dictionary, by and large. The oldest and biggest prescriptive dictionary, the Oxford English Dictionary, which is so old that it defines "antibiotic" as "Opposed to a belief in the presence or possibility of life," and which therefore will not recognize the existence of phonograph records at all, has DISC listed as "A current variant spelling of DISK." The other spelling is listed as "DISK, DISC (disk). (ad. L. disc-us, a. Gr. diskos...) 1. The Discus or quoit used in ancient Greek and Roman athletic exercises... 2. A thin circular plate of any material..."

What has happened is that DISC has come to mean "phonograph record" and, by extension, "a flat circular disk containing recordings of sound and/or pictures". This very specific usage has attained not just common acceptance but respectability as well. I do not find Mr. Temmer's account of the word's Greek derivation persuasive given the Latin intermediate form. Maybe he'll have better luck with the next editor of the Speaker... --EBM

NEWS FROM CALIFORNIA

I had a most interesting meeting the other day with Ken Leyva, who works here at Dolby Labs' certification laboratory. Ken and other technicians are employed solely to test prototype models of new Dolby-equipped gear from manufacturers who desire to use any of the Dolby systems.

I learned some of the criteria Dolby sets for its licensees. For instance, the words "noise reduction" or the letters "NR" must appear on the front panel along with the Dolby name, as must the double-D symbol. And, of course, the distortion, wow and flutter, and other important parameters of performance must be within certain limits. I asked Ken what sorts of new tape equipment we might be seeing in the months to come, based on his observations of prototypes.

He told me that half-speed is the next big thing in cassette decks. He's seen several in the last few months, from well-known companies (he wouldn't name any.) He tells me Dolby C, which offers at least 10 dB more quieting than B but which is much more demanding of deck performance for proper tracking, will appear mainly on high-end machines. Dolby is making strict demands on manufacturers to keep "C" out of their bargain decks, perhaps justly. (But unsuccessfully: Pioneer has a Dolby C deck that lists for $200 --Ed.)

Ken says that Dolby's certification lab is an impressive facility, with around 100 people working there, in a thoroughly modern plant. I'll send more news when I see Ken again; if and when I get to visit the facility I'll send in my report.

-- George Androvette (California)

ONE SPECIAL MAIL-ORDER OUTLET

This is to recommend one unique (in my experience) mail-order outlet: Stereo Cost Cutters, P.O. Box 551, Dublin, Ohio, 43017.

They specialize in purchasing certain discontinued items which are very attractive. I believe their line of products contains many top-class items, many of which disappeared from the marketplace more for marketing reasons (having to do with manipulation of purchasers' volition) than for reasons of quality.

They have some Grado and Audio Technica cartridges, B.I.C tables, KLH and Philips speakers, and very attractive Philips components. But their important line is Dynaco! They purchased Dynaco's complete inventory of parts and equipment, which they say is several tons' worth. This includes the Quadaptor, the complete transistorized line, spare parts, and special modification items. They also have some tube models, some complete, some incomplete. These include the PAM-1 mono preamp and the MK-IV 40-watt mono basic amp (which is half of a Stereo 70) for truly bargain prices. They also have their own version of the Stereo 416 (known for good speaker interfacing, high power, excellent sound, and sophisticated protection circuitry) for $499.00!

For van Alstine fans, they can supply the same parts he would use in performing his modifications, thereby saving the time and expense of purchasing a stock unit only to throw away much of it later.

I purchased one PAT-5 BiFet, one Stereo 150, and one BIC table for a friend. They delivered promptly, and everything worked well upon arrival. The Stereo 150 wooden panels, which they produce, now come in beautiful unfinished solid wood. (I think this is great; I'm tired of oiled walnut.)

This is great news, I think, for perfectionists who care for their dollars.

-- Carlos Bauza (Puerto Rico)

ENCLOSING A TURNTABLE

R.A. Greiner's "Mechanical and Acoustical Feedback in Phonograph Systems" (October-November 1979 Speaker) was the most helpful single article on the subject that I have read. Since my Technics 110 platter and plinth are far too resonant and my arm is a balsa-wood version of the Rabco SL-8E, I decided that the best protection against airborne feedback was to build an enclosure around the turntable. The table itself rests on Audio-Technica isolators which stand on a weighted cabinet. The enclosure is bottomless, separated from the cabinet top by a quarter inch of felt. (I have no idea whether the felt is useful in this application. I got some of the expensive stuff with an eye to deadening some sections of wooden frame and molding on the front of my speakers, AR-9 style. Then I realized that loose hair was one of the last things that electrostatic elements need in their neighborhood. So I have approximately one square yard of industrial felt for sale, cheap.) The enclosure, which has no direct physical contact with any part of the turntable, has sides made of 1" particle board with a braced and pivoted (not hinged) lid of 1/4" plexiglass. I recommend that anyone who uses a dust cover of the usual flimsy construction replace it with heavy plexiglass to reduce resonances and sound transmission. Most cities have plastic fabricators who can make custom dustcovers quickly for ten or fifteen dollars.

Although the result is aesthetically pleasing, it is only a limited technical success.

Above 100 Hz it provides 5 dB or more isolation, but below 100Hz measurement shows it to be acoustically transparent and, at some frequencies, to yield 2 or 3 db higher SPLs than prevail outside the enclosure. These results, although somewhat disappointing, were not unexpected. Low-frequency sound transmission is almost entirely a function of mass per unit of surface area, and the tables in F. Alton Everest's excellent Acoustics for Home and Studio (Tab) led me to think that only rather drastic means would provide effective isolation at the lowest frequencies. To make a substantial improvement, I would have to give up the transparent lid and construct the sides from sand-filled panels or cinder blocks. Anyone contemplating such strenuous measures should remember to make all parts of the enclosure sufficiently dense and close-fitting, since low frequency sound waves readily turn corners and pass through small apertures. Just as receiving antennas are precise analogues of transmitting antennas, a really effective box for shielding a turntable from low frequencies must be an analogue of a sealed woofer enclosure, although the requirements will be less in proportion to the reduced acoustical pressures at the turntable. With the current installation I can play a record like Robert Fulton's "Organ Music at Westminster" at maximum levels of 95 dB at my listening location (measured with a Radio Shack SPL meter), using an 18" subwoofer, without any untoward effects; but I suspect that if my passions led me into the 100 dB range I'd be in trouble.

-- Larry Hardin (New York)

ANOTHER MAGAZINE

Another new audio publication has burst forth on the scene. Joining the ranks of the underground press is Audio Alternatives, edited in Midlothian, Virginia and printed in Richmond. The editor is Ian L. Uydess, assisted by Glenn O. Strauss. The size of the publication is 5 1/2 x 8 1/2 inches, the same as TAS, the Stereophile, and others. Audio Alternatives carries a good deal of advertising. There are classified ads, too, although they are not free like the ones in the Speaker or the Audio Amateur.

In issue #1 the editors proudly boasted that, unlike many of the other undergrounds, their journal would stick to a quarterly schedule because it was locked into a contract with its printer -- they had to get the material in on time or pay a penalty. By now we all have learned to be wary of such claims; however, Audio Alternatives has kept to its schedule. The first issue went out in August 1980, the second in December, and the third arrived in April of this year.

In style and presentation Audio Alternatives is a combination of several other undergrounds. There is a good deal of subjective information presented, as in The Absolute Sound. There is an effort to present technical information; the staff has access to some instrumentation, and they describe their test procedures. (One of their toys is an electron microscope, which they seem to love dearly. I think that by now most of us have seen enough grooves and diamond tips to last a lifetime. Well, AA has more pictures of both.) Reviewers' reference systems are listed in each issue.

AA also has quickie reviews consisting of a short subjective paragraph, as in The Sensible Sound and the Stereophile. The writing style is easy to absorb: specs and measurements are interspersed with the subjective jargon as in The Sensible Sound. Readers familiar with The Audio Journal from Macon, Georgia, will notice a strong similarity to that publication as well.

Issue #1, 40 pages in length, introduced the staff and editorial policy. Seventeen products were reviewed plus four mini reviews and a couple of technical tips. Equipment reviewed in #1 included Beveridge RM-1/RM-2 preamp, Belles "A" amp, Marcof PPA-1 pre-preamp, Denon 103C cartridge, Dahlquist DQ-10, Janis Bass System, Hafler DH-101 preamp, Hafler DH-200 amp, Conrad-Johnson preamp, Adcom GFA-1 amp (OK but the Hafler sounds better and costs less), Acoustat, Magnepan MG-1, Grade G1 cartridge, Carver "Sonic Hologram" preamp, Magnepan Unitrac tonearm, Audio Research D-79 amp, Denon DL-303 cartridge (the 103D is liked better), and Polk 7B speakers. Except as noted, all were liked.

Issue #2 expanded into 90 pages. Products reviewed were the following: the RG Dynamics preamp, SKS Intaglio speaker, PSE power amp, Dynavector Ruby cartridge, ARC SP-6B preamp, ARC D-120 amp, Quad electrostatic loudspeaker (disappointing), VPI HW-2 turntable isolation Base, Berning BT-10 preamp (too expensive, not enough "sound per dollar"), the Magnepan Unitrac tonearm (a rave review; the best the staff has ever used or heard), the Grado G-2 cartridge, Impulse Model One loudspeaker, Beveridge RM-1/RM/-2 preamp, the Audible Illusions Minimite preamp, Supex SDX-1000 and JMAS MIT-1 cartridges, Capps Master recording stylus, RAM Labs RM-4 headamp, Audio Interface transformer (too expensive), Bedini 45/45 amp, 3D Acoustics loudspeaker, Counterpoint SA-1 preamp, Mariah LS-1 loudspeaker (has limited dynamic range), Beveridge Model 3 loudspeaker (harshly criticised: a "shame", a poor-sounding product), Denon 103D cartridge, Denon HA-500 head amp, Hapi-2 preamp, DB Systems DBR-15A preamp, Stasis 3 amp, Acoustat MK-121 interface transformer, Stax ELS-8X Electrostatic loudspeaker, Stasis 2 amp, and Marcof PPA-1/improved preamp.

You may have noticed that some of the above are repeats; not enough was said in issue #1. Most of the reviews are written in a tone that would not offend manufacturers, although the language was rough on a few. Issue #2 also contained a short interview with Julian Hirsch and two pages of letters to the editor.

Issue #3 found AA still evolving. Pages remained at 90, but the equipment review section was subdivided into a full-review section, a short review section, a recap section on points missed, and a section on audio accesories. Editorial philosophy and technical tips continued as before.

The full review section contained: Acoustat speakers with Mk-121 interface, Audible Illusions Mini Mite II amp, VPI HW-9 base, Daniel Queen speakers (poor imaging; the reviewer admits he doesn't like direct-radiating speakers like the Quad and the Queen, an odd statement as the Queens are horn-loaded), Bedini 45/45 amp, Stax SR-Lambda

Earspeakers, ARC D-120 (a solid-state amp, sound is not the same as ARC's tube designs), Counterpoint SA-1 preamp, Dynavector DV 505 tonearm, Audible Illusions MX2B headamp, Carver M-400 amp, Threshold Stasis 2 amp, and Mark Levinson ML-3 amp ($5,000). The accessories section gave the author's preferences for speaker cable, mats, etc, but shed no new light on these subjects.

As for the tone of the writing, AA has made a few comments about other journals but hasn't yet done any real name-calling. Those interested in name-calling will have to look elsewhere, it seems.

Audio Alternatives is an attractively packaged magazine that has kept to a schedule and has presented a very clear view of audio components as seen thru the eyes of its authors. The price of products reviewed has ranged from the hundred dollar range to the five thousand dollar range. Only tuners have been neglected in AA. Still evolving, Audio Alternatives is a welcome edition to the underground corps. A subscription to Audio Alternatives costs $18 for one year (four issues) for Third class, $22 for First class, $36 overseas. Their mailing address is P.O. Box 466, Midlothian VA 23113.

-- George Mileon (Massachusetts)

A GREAT SPEAKER

In his thoughtful discussion of the Dahlquist DQ-10 (November '80) Ed Osborne asked other members to come up with alternatives to this excellent speaker. Well, the Webb speaker is a true alternative, sound-wise and price-wise. Of course, you must build it yourself, but that's a better way to spend your time than watching TV or listening passively for "air" or some other elusive quality in your existing system.

-- Carlos Bauza (Puerto Rico)

In The Literature

AUDIO, May 1981

* Audio ETC (p.6): On the ubiquity of ignorance.
* Tape Guide (p.12): Q & A.
* Audioclinic (p.14): Stamper life et al.
* Dolby C Noise Reduction (p.20): A clear, thorough, and detailed exposition of the ideas behind Dolby C NR, with a nice set of typical performance curves.
* Featherweight Headphones (p.30): About the outer ear's comb filtering and the virtues of open-back headphone design.
* Video Screen In Your Future (p.34): Enthusiasm for the Sony Profeel TV.
* Equipment Reviews (p.36): JVC KD-A7 cassette deck (very good performance, remarkably flat response). MTI 500 "preamplifier" (actually an integrated amp since it includes a 16 W/ch power amp; performance is mostly excellent; "subsonic" filter rolls off audible bass; costs $900). SME 3009 Series III tonearm with Shure V15/IV cartridge (arm is excellent, with 5-gram effective mass; cartridge is good; its frequency response is sloped with 47K impedance, flatter with 100K, tracking is terrific, sound lacks spaciousness).
* Top of the Pile (p.58): Victor Campos is now in New York; here he discusses the excellent In Sync recorded cassettes.
* Behind the Scenes (p.85): Some of the best speakers heard at the Winter CES.
* Video Scenes (p.90): Projection TV et al at the Winter CES.

AUDIO, June 1981

* Audio ETC (p.6): About RCA's "Evolution of Excellence" German-made superdiscs.
* Paul Voigt (p.12): In memoriam.
* Tape Guide (p.22): Q & A.
* Audioclinic (p.26): RFI et al.
* The Roots of High Fidelity Sound: All about Arthur Keller of Bell Labs and his remarkably wide-range 1930s recordings, some in stereo. Lots of historical details.
* Telefunken Digital Mini Disk (p.45): Details on the format that is losing the standards battle to CED.
* Linear Tracking Turntables (p.49): Surveying the many new straight-line trackers.
* Equipment Reviews (p.54): Nakamichi 1000ZXL cassette deck (the world's best; at $3800 it had to be). Shure MV30HE plug-in cartridge/arm assembly (fits SME Series III arm; extremely low mass, terrific tracking, flat response, superb sound, much better than the V15/IV). Mitsubishi LT-30 turntable (straight- line tracking, fine performance, $700).
* Behind the Scenes (p.102): Bert Whyte names some spectacular discs.
* Video Scenes (p.106): Despite the column title, a short review of coming Technics digital audio gear.

AUDIO ENGINEERING SOCIETY JOURNAL, May 1981

* Three-Dimensional Interferometric Display (p.314): Details of Celestion's laser interferometer which yields remarkably vivid views of cone/dome breakup modes.
* Frequency Modulation Distortion in Loudspeakers (p.320): A reprint of the original 1942 Beers/Belar study of Doppler distortion. Klipsch loves it. (Recent work by Allison and Villchur calls into question the assumptions in this paper and suggests the numbers may be too high by a factor of three. --EBM)
* A New Distortion Mechanism (p.327): How distortion can arise from the mutual inductance between

power-supply wiring and signal wiring in amplifiers.

• A Different Way to Record (p.329): A naturalistic miking technique involving two omni capsules 7 inches apart with an absorbent 11-inch vertical disk between them, to be used with acoustic crosstalk cancellation ("sonic holography") in playback.

• 68th Convention Program (p.356): Summarizing papers from the March AES convention.

• 100 Years With Stereo (p.368): Reprint of an 1881 article on a demo of real two-channel sound in Paris!

* News (p.374): Details of a controlled Detroit test of Dr. Diamond's digital stress using the blind ABX switcher. Diamond's results were duplicated in an uncontrolled experiment, but when double-blind procedure was followed there was no correlation between digital sound and deltoid response.

AUDIO HORIZONS, Spring 1981

* The State of the Art (p.1): A nice essay on manufacturing economics, marketing factors, and the real demand for high-end products.

• Reviews (p.3): Audio Components platter assembly for Linn-Sondek (a dramatic improvement). Audio Components patch cords (bright, forward, out of focus, cloud-like haze; possibly the best cables available; price $110 for 3-foot length). Cart-a-lign phono protractor (recommended). JMAS MIT-1 cartridge (Van den Hul stylus, a mix of great virtues and flaws). LAST record treatment (dramatically reduces IM distortion, reveals subtle detail, incredibly beneficial). Levinson Silver patch cords (poor value). Magnepan Unitrac tone arm (well made, nice performance). Marcof PPA-2 pre-preamp (very quiet, very good, recommended). Mendota patch cords (bright top, anemic bass, threadbare transients). Orsonic DS-250 disc clamp (a good value). Sumo Nine power amp (very good at its price, wipes out the Hafler, Apt, Amber, and Adcom). Win Labs SDC-10 turntable (lousy as delivered, wonderful after modifications by the reviewer).

• Subjective Differences -- Real or Imagined? (p. 19): "All cables grossly pervert the signal", thus all A/B comparisons are worthless.

• Turntable Mat Survey (p.21): Of nine mats, best liked were Marcof Glasmat, Musashino glass, and Fulton.

• Speaker Cable Survey (p.31): Of 18 cables, best liked were Esoteric Audio, Live Wire 301, Great Lynx, and Fulton Gold ($114).

FM GUIDE (Canada), May 1981

• Reviews: Dual CS741Q turntable with Ortofon cartridge (mechanically sound, easy to use; heavier mat would have helped with ringing; isolation not ideal at 30 Hz; other cartridges not usable due to low arm height; cartridge has a 2 dB dip from 4 to 8 khz; warps handled well; tracking ability about average).

• Three Canadian-made Speakers: Mission 770 (bass good to 50 Hz, tweeter located at bottom, sounds best when raised off floor, maxima at 50 Hz and 15 kHz, smooth response, excellent imaging. Pulse Two, (clean down to 30 Hz, hollow-sounding midrange, relatively efficient). Energy One (passive radiator, good to 40 Hz, elevated treble, some crossover problems, gritty sound, OK for rock, not classical).

HIGH FIDELITY, May 1981

* CrossTalk (p.10): Q & A.

* Equipment Reports (p.21): Sony TC-K81 cassette deck (superb performance, unusually flexible tape selector, bias and rec cal trimmers with calibration tones, excellent metering, three heads with monitoring, a best buy, but Dolby B only). Epicure 3.0 loudspeaker (4 ohm impedance, high power handling, good deep bass, excellent sound, fantastic stereo imaging). Micro Acoustics 630 electret phono cartridge (very low mass, superb tracking, correct VTA and rake angle, outstanding performance). Aiwa AD-R500U cassette deck (bi- directional record/play with very fast turnaround; poor visibility of meters and control labelling; pretty good performance). Celestion Ditton 130 speaker (very smooth response on and off-axis, high power handling, excellent sound, but no deep bass). Advanced Audio DNR-450 dynamic noise filter (uses the new National IC based on a Burwen design, remarkably effective hiss removal with little audible breathing, an excellent value).

• The Best Budget Receiver (p.35): Good shopping advice for the beginner.

* A Renaissance for AM (p.38): Speculating about stereo.

• Car Stereo '81: What's new.

HIGH FIDELITY, June 1981

* CrossTalk (p.16): Common questions and good advice.

* Loudspeaker Testing (p.18): Explaining High Fidelity's new loudspeaker test procedure in which the speaker is measured in a room instead of an anechoic chamber, with the aid of AR's microcomputer program.

• Equipment Reports (p.20): NAD 6150C cassette deck (the first deck with Dolby C; response slightly thin in the bass, otherwise excellent; Dolby C is superbly quiet.) Boothroyd-Stuart Meridian M-2 powered speaker system (fantastic stereo imaging; good sound overall, tweeter beamy in the top octave, bass measures weak but sounds solid; costs $2700). Altec Lansing Model 6 loudspeaker (remarkably constant dispersion, high efficiency, unusually flat response, solid bass despite measured 62 Hz system resonance, excellent owner's manual, good sound). 3D Acoustics 610B bass module/satellite system (modest price, mediocre power handling, spacious imaging, bass good but not super-deep, good sound at the price). Acoustat Model Two electrostatic speaker system (beamy treble, somewhat irregular response, peculiar tweeter control action, impedance goes below 2 ohms at some frequencies, very amplifier-sensitive, low efficiency, can't play extremely loud; but the sound is wonderfully clear, detailed, and transparent). BSR 883 loudspeaker (high efficiency, so-so power handling, 4 ohm impedance, lots of bass energy down to 60 Hz, not super-accurate response but good at its price).

HI-FI NEWS & RECORD REVIEW, April 1981

* Assessing Microphone Performance (p.31): Details on a very thorough procedure for testing mikes.
* The Bottom-End Equation (p.44): A discussion of the physical tradeoffs among cabinet size, efficiency, bass response, magnet size, et al in woofer design.
* Four Budget Amplifiers (p.87): A thorough comparative review, rankings as follows: Technics SU-V2 (best of group; unlike earlier Technics amps it worked impressively well with low and reactive impedances, very good overall performance at the price). JVC AX1 (almost as good, lacks infrasonic and ultrasonic filtering). Seoum SA4160 (lots of features for the price, doesn't like difficult impedances). Marantz PM310 (doesn't like reactive loads, sounds metallic).
* Four Cassette Decks (p.93): All four defective in some way. Ranked as follows: Teac A660 (best of group, good value at its modest price, its main problem is sloppy settings of internal service adjustments). Grundig CF5100 (quietest of group thanks to inclusion of HighCom NR; outboard attenuator needed to avoid input overload, poor braking from fast-wind, dull sound with Dolby). Pioneer CTF400 (excellent tape handling but poor flutter, mis-calibrated Dolby). BIC T2 (distortion in the electronics, gross distortion on chrome tape, rising response in low bass, otherwise OK).
* Mammoth Microphone Review (p.100): Must reading for anyone shopping for mikes in the price range from $50 to $150 each; a very thorough and thoughtful study of 18 cardioid dynamic and electret mikes. Only one mike was found to be really good: the Calrec 652 (at $110 a fantastic best-buy since its sound is nearly equal to the Neumann KM84 used as a reference; a true capacitor mike, it needs an external 48V power supply; very smooth response, good bass, low noise and high overload). Five models were acceptable with reservations: the Sony ECM260 (somewhat bright), Philips N8501 (distorted at high levels), Superscope EC-9P (a mild peak at 7 kHz, internal hiss not quite low enough by professional standards, pretty good otherwise), Audio-Technica AT811 (treble is a bit peaky, otherwise a generally good value, unusually good bass), Beyer 81LM (formerly marketed in the U.S. by Advent, no deep bass or extreme top but good in between). Ranked lower: Akai ACM100, AKG D190E, AKG D1200E, Audio Technica AT813, Eagle M90, JVC MD725, Sennheiser MD412, Shure 515, Shure 588, Sony ECM220, Technics RP3330, Technics RP3540.

HI-FI NEWS & RECORD REVIEW, May 1981

* Show Report (p.20): Looking at new British goodies at a London show plus international new products in Paris and Las Vegas.
* Audio Patents (p.27): Including the formula for Discwasher fluid.
* The Stereo Image (p.30): Arguing that precise imaging is a desirable property of speakers.
* Positive Feedback (p.34): Low distortion in the bass is important, but experiments with speakers good down to 3 Hz show that filtering below 15 Hz does no musical harm.
* The Bottom-End Equation (p.44): Part 2, nicely illustrating the tradeoffs among woofer efficiency, bass response, box size, and sealed vs. vented design.
* Mammoth Microphone Review (p.51): Three mikes with special patterns, all mediocre (Beyer M69, Eagle M40, Sennheiser MD402), the Sennheiser MKE2002 dummy-head binaural mike (overpriced but terrific), and five two-element stereo microphones, all thin in the bass and too hissy by professional standards (JVC M201 and Sony ECM990 fairly good sounding, Eagle SME900 and Technics RP3210 worse, Teac MC210 awful).
* Quality Monitor (p.67): Reassessing the sound of the best recent discs.
* Can Amplifiers Sound Different (p.99): Describing a procedure used for subjective comparison of amps. One result: a DC amplifier (Threshold) was ranked low in comparisons when a vented speaker was used but ranked high in tests involving a speaker immune to DC offsets and infrasonic disturbances. Moral: infrasonic filtering should be used with vented speakers.
* Five Integrated Amplifiers (p.101): Lentek (best of group, also most expensive at $1500; not flawless but mostly excellent). Sansui AU-D9 (very good overall, filters are shallow, output is good at 4 ohms but not below). Marantz PM-5 (no infrasonic filtering, bass sounds overly rich, performance pretty good in class B, sweeter in class A, copes well with difficult loads). JVC A-X9 (pretty good at 8 ohms, can't drive difficult impedances). Aurex/Toshiba SB-66 (okay considering its modest price, but not a great amp).

HI-FI STEROPHONIE (GERMANY), April 1981

* Test Reports (p.406): Sumo "The Power" amplifier (extremely powerful, no problems with difficult loads). Tandberg TPT 3001 tuner (excellent, its three-step IF bandwidth very useful). Micro Acoustics MA733 System II cartridge (low mass electret type, very low FM distortion, not as "fast" as advertised, sounds like the best MCs). Onkyo CX-70 and Rising TS-3100 "casceivers" (not satisfying in several repects). Quadral am1203, am1003, am803, and am702 speakers (only fair at the price). Canton Ergo loudspeaker (an interesting active design, top class, uncolored, transparent, powerful). A listening test: Infinity RS 4.5, Arcus TL-1000, and Canton Ergo speaker systems (ranked as listed, the differences were small in sound but large in cost when the usable power amplifiers were included, a case of diminishing returns).
* Speaker Cable -- How Short, How Thick, How Expensive? (p.440): Suggesting that the desired cross-section area of the conductor in sq.mm. can be computed by dividing the cable length in meters by 5 (for 4-ohm speakers) or by 7-10 (for 8-ohm models). If the length is greater than 8 meters, low inductance cable is preferred, especially if the loudspeaker's impedance is low in the treble.

HIFI STEREOPHONIE, May 1981

* Test Reports (p.526): Aiwa series 50 mini-components (ST-R50 tuner, SA-C50 preamp, SA-P50 power

amp, all very good, and SD-L50 cassette recorder, should be better at its price). Aiwa AX-S50 mini receiver (good tuner, rather high crossover distortion in the power amp). Four top-class phono cartridges: ADC Astrion, AKG P25MD, Dual MCC110 (very low mass, high compliance, MC with user replaceable stylus), Goldring G900IGC (has van den Hul stylus). Audio Pro A4-14 speaker (uncolored, capable of high sound levels, bass is tight and extended despite the unit's restricted dimensions). Restek Laser active speaker (3-way, small, high power rating, very good).

* Festival du Son 1981 (p.548): New products in Paris.

IAR HOTLINE No. 7

• Interconnect Cables: A review of some 3-foot stereo patch cords, ranked as follows: Mendota (best, price $60), Bansei, Theta MF-1, Denon, Peterson ZO, Spica, Supex LRO/15, Audio Interface, Peterson ZD, Fulton, Verion/Cotter, Audio-Technica Litz, Mark Levinson, Sound Connectors, Gold Ens (worst, but still a lot better than conventional patch cords). Moncrieff joins Len Hupp of Audio Horizons in identifying major sonic aberrations in pieces of wire, but his "best" (Mendota) was severely castigated by Hupp (above). Credibility, anyone?

• Plasmatronics, Part 2: Analyzing the Hill tweeter's high-level transient behavior, concluding that its flaw is probably the fault of the high-voltage crossover.

* Oracle: A long, defensive clarification of the IAR 5 review.

• FM: Why vertical tilting of an antenna can help to optimize reception.

IAR HOTLINE No. 8

* Audio Fallacies: Arguing that the real virtue of a subwoofer is cleaner midrange sound thanks to reduced modulation distortion in your main speakers.

* Speaker Cables: A clear and logical exposition of why speaker cables should be expected to sound different from each other, and why those differences are speaker-dependent. Plus an observation that speakers draw huge peak currents during high-frequency transients.

POPULAR ELECTRONICS, May 1981

* Review (p.22): JBL L112 speaker (accurate, uncolored, well made, high power handling).

POPULAR ELECTRONICS, June 1981

* Digital Sturm and Drang (p.18): Defusing digital critics.

• Review (p.23): Sansui AU-D11 integrated amplifier (beautifully made, massive power supply; very conservatively rated, produces almost twice its rated power at 4 and 2 ohms; clean and quiet; lousy filters, no mono mode).

• Dolby Does It Again (p.58): A basic description of Dolby C.

RADIO-ELECTRONICS, June 1981

• Headphone Design (p.51): Technical details on the development of the lightweight Sony MDR headphones.

SPEAKER BUILDER, 1981 No.2

* Thick as a Brick (p.7): Using a concrete block as a rigid enclosure for a cheap speaker.

* The Tractrix Horn Contour (p.9): Details on the classic Paul Voigt design for a shorter horn speaker.

* A Diffuser Port (p.16): A way of putting a long duct in a short box -- put part of it outside.

* Fine Points of Vented Speaker Design (p.18): Practical details, worked-out examples, and system tolerances.

* Loudspeaker Literature (p.26): Continuing an extremely thorough bibliography.

STEREOPHILE, Vol.4 No.9

* As We See It (p.2): Acerbic and pointed insights about the failings of both subjectivist and objectivist camps, and a challenge for a showdown with statistically serious procedures.

* Equipment Reviews (p.7): M & K satellites with Volkswoofer powered bass module (satellites can play amazingly loud, their imaging is fantastically good, superb inner detail; the system's tonal balance is adjustable; bass module is good at the price but not great). KLH/Burwen TNE-7000A transient noise eliminator ("works marvellously with most records, absolutely uncanny, very highly recommended").

* Quickies (p.15): Seven speaker cables (FMI Gold and Monster Cable best of group). Shure M97HE cartridge (tracks great but sounds so-so). KA Stat speaker (plays loud, is colored, has venetian-blind lobes). Audionics LK-1 turntable (rivals the Linn). Signet TK-33 headphones (not neutral but rich wide-range sound). Genesis V-6 speaker (a clear bargain.)

STEREO REVIEW, May 1981

* Audio Q & A (p.14): Bionic audio et al.

* Tape Talk (p.16): Clear answers to common questions.

* Audio Testing as a Career (p.18): In which we learn that Julian Hirsch does not intend to retire soon.

* Equipment Reports (p.20): Sennheiser HD222 headphones (very comfortable, circumaural, very low distortion, good deep bass, mellow tonal balance). Siare Delta 400 speaker ($800, superb midrange, crisp highs, some deep-bass distortion). Toshiba SA-2500 receiver (an impressive bargain, lists for $250, lots of dynamic headroom -- 80 watts/ch at 4 ohms; tuning indicator is correctly aligned for lowest distortion; shallow infrasonic filter, bright tuner). Nakamichi 1000ZXL cassette deck (easy to use, lots of features, wonderful performance, defines the current state of the art). Denon DP-33F turntable (medium-low arm mass, excellent overall performance, superbly human-engineered, arm fully controllable with cover closed, a delight to use).

* Las Vegas CES (p.42): An extremely thorough 12-

page survey of new products for 1981.

STEREO REVIEW, June 1981

* Audio Q & A (p.22): Basic advice.
* Tape Talk (p.26): Practical Q & A.
* Technical Talk (p. 32): Judging reliability.
* Equipment Reports (p.33): Technics RS-M270X cassette deck (extremely low flutter, excellent performance with Dolby B, wonderful with built-in dbx; no bias trimmer; controls poorly differentiated; dbx light stays on regardless of whether dbx circuits are in use; can be used to decode dbx records). B & O 8000 turntable with B & O mmc20CL cartridge (fantastically good isolation from vibration; "combines the best of turntable and cartridge engineering with total simplicity of operation). Audio Pro TP-150 tuner/preamp and A4-14 powered loudspeaker (tuner performance is so-so, tone controls and filters are shallow, but the microprocessor receiver control is fine and the system sounds great). Allison Six speaker (wide dispersion, smooth response, fine sound). Sansui AU-D11 amplifier (conservatively rated, lots of output at low impedances, super-clean, beautifully made, flexible and logical controls, shallow filters, a great amp).
* Car Stereo (p.59): The compleat basic intro.
* Las Vegas CES, Part 2 (p.64): What's new in car stereo, headphones, audio accessories, and video.

STUDIO SOUND, April 1981

* Review (p.80): A thorough comparative test of open reel tapes, eleven 1.5-mil and six 1-mil, tested at 15 ips. The competition is pretty close; Ampex 456 emerges as the best overall except for its poorer than average print-through.

STUDIO SOUND, May 1981

* Reviews (p.82): Ten phono cartridges suitable for broadcast work as well as home use (the Stanton 881S emerges as the best of the group, the others being the AKG P10ED, P15MD, P25MD; the Audio-Technica ATP1, ATP2, ATP3; the Shure SC39ED and SC39EJ; and the Stanton 680SL). Dominus MC pre-preamp (excellent).

-- Peter Mitchell
Jiri Burdych
George Mileon

April BAS Meeting

The April 26, 1981 regular monthly meeting of the B.A.S. was held at GTE Labs in Waltham, Mass. President Peter Mitchell being absent, the meeting was chaired by corresponding secretary Frank Farlow.

OPEN FORUM

John Allen announced the upcoming special meeting at the Community Playhouse, Wellesley Mass., set for Saturday, May 23, 1981. Allen recently installed a state-of-the-art sound system in the theater, making it perhaps the best in the greater Boston area. The day-long meeting/demonstration was to include showings of the complete film "Star Trek" and parts of "Superman", "Apocalypse Now" and other films, plus a discussion of the new sound equipment.

Dave Ranada reported that at Stereo Review he has begun running controlled listening tests on about 15 different pairs of $90 to $100 loudspeakers. Several BAS members were invited to participate in the tests. They were told to bring source material and plan to spend at least one full day listening.

Al Foster distributed some sample "holographically" encoded flexible plastic Soundsheet records (the type you sometimes find bound into magazines). The retail value of these items is to be one dollar each. They include a special noise test to help the listener find optimum speaker and head placements, plus a music selection: "the acoustical guitar should appear to be coming from an area left of the left speaker and the electric guitar from right of the right speaker", according to the liner notes. (And so they do, notwithstanding the otherwise lo-fi sound quality. --PB)

Al Foster gave an update on the Shop Talk saga. The ad hoc Shop Talk committee met with WBUR station manager Jane Christo and was given an offer that just had to be refused. Only Peter Storkerson, Brad Meyer, and perhaps Richard Goldwater would be allowed to host the show; it would run for one half hour Sundays at 7:30 p.m., thus conflicting with B.A.S. meetings, a dilemna to which Ms. Christo was totally unsympathetic (she offered to run music instead). It appears that there is no further hope for Shop Talk at WBUR. Inquiries to other radio stations have not gotten very far; their programming is already very crowded. Although Shop Talk ran for three special programs on Harvard station WHRB this past winter, there is not much hope for a speedy return to the airwaves on a regular basis. (Shop Talk will again be on WHRB from 9:00 to 11:00 PM on Monday, October 5, Monday, November 9, and Monday, December 7. --Ed.)

John Allen provided an update on the WGBH strike situation: The station's engineers were still locked out. As a result, there had been no maintenance for a long time and nothing was calibrated anymore. (Indeed, the Saturday night, April

25, Boston Symphony live broadcast sounded horrible -- PB) The station will be cutting back on its broadcast schedule this summer; it may never be the same again. The reason is basically a lack of money. No long-term predictable funding mechanism exists, and the deficit-ridden public television side of WGBH draws most of the money that does become available. Now, as cable television and new enterprises like Ted Turner's station threaten to capture its TV audience, and as government funding dries up, it is hard to see a rosy future for WGBH.

Treasurer Dave Bredemeier reported on the Society's financial condition. Volume 8 of the Speaker just about broke even. The modest advertising campaign for new members netted a few, but not as many as were wanted to cover rising costs. There are currently about 1125 members. Production costs for the BAS Speaker have gone from about $750 per issue last year to about $1000 this year. If we actually publish 14 issues of the Speaker this year as planned (making up for the shortfall last year), there may be a slight deficit by the end of the fiscal year. This means that the officers would have to wait a while for their honoraria. This year's deficit isn't catastrophic, since we have been able to cover it by using the cash surplus left over from last year. Next year we won't have that cushion, so dues will probably have to go up. Expenses for next year are estimated to be about $24,000. For 1000 members, that translates into $25 annual dues; for 1600 members, $16. Any suggestions on how to increase membership and/or cut Speaker production costs will be welcomed. Inflation has at last caught up with the BAS! (As we go to press, the picture has turned out to be not quite that bad; the new dues are $15 for out-of-state members, $17 for those who wish to receive meeting notices. --Ed.)

Frank Farlow mentioned another problem that bedevils the Speaker; as it becomes better known, the better and more prolific writers are drawn away to other publications. Perhaps the hoped-for membership growth will also increase the writing base.

MEETING FEATURE

Frank introduced David W. Stebbings, president of KM Labs, New York, U.S. distributor for the parent firm in Belgium. He studied at Cambridge U. (England). He then worked for 12 years at the BBC research department, doing work in analog and digital audio and video; he left there in the early '70s to form Chartwell, an early manufacturer of high-end mini-speakers. In 1975-76 he and two colleagues patented the use of polypropylene in loudspeaker cones. Two years ago he came to the U.S.

(Editor's note: The remainder of this report was promised us for the first time last May. Since then the author, Pieter Bras, has apparently disappeared from the face of the earth. He reappeared briefly in mid-summer, turned in the portion above, and promised to complete the report shortly. Since then he has not returned phone calls or responded in any way to messages left on his answering machine, and has refused to mail back the tape of the meeting. He lives in a secure apartment building and has not answered his bell. Anyone knowing anything of the whereabouts of Mr. Bras or the tape of the April meeting (which incidentally is the property of the BAS) should contact me at 31 Trapelo Road, Lincoln MA 01773 as soon as possible. We will publish the summary of Mr. Stebbings' talk as soon as this bizarre situation is rectified; in the meantime we offer the following summary of KM Labs' products, which will be repeated along with Mr. Stebbings' comments when possible.

In the meantime, we extend our most sincere apologies to David Stebbings, and assure him that he will be treated more hospitably the next time he visits us. -- EBM.)

The KM product line includes two preamps, a turntable, three conventional speaker systems, three powered speaker systems, and an electronic bass enhancer.

The preamps are very different in character. The MP-1 is designed for disco or other professional use. It has six parallel slider-controlled inputs, two of which are for phono cartridges and include AC power switching for the associated turntables. There is a cue channel with its own selector switch, and a separate headphone amp with its own level control. The MP-1 costs $995. The other preamp is an audiophile design with gold-plated jacks, simple signal paths, cascode differential inputs, and separate modules for MM or MC cartridges. It has tape dubbing facilities, a muting circuit, and tighter RIAA specs than the other model. It is called the SP-700, and retails for $700.

KM's "conventional" speaker systems are all vented designs. The AC510 is a two-way with a 5" woofer/midrange and a 5" rear-facing passive radiator. Crossover to the 1" soft dome tweeter is at 2700 Hz. Its bass extends to 50 Hz, its efficiency is 85 dB/W/m, and it costs $200. The AC530 has a larger cabinet and an additional rear-facing "ambience" tweeter. The AC530 is 4 dB more efficient that the 510, goes down to 45 Hz, and sells for $275 each. The AC550 is a three-way design with a 9" woofer and a 9" midrange, three tweeters, two for "ambience", a low-frequency range of 37 Hz, and a price tag of $750.

The powered speakers are: the KM-32, a two-way design with a 6½" woofer and passive radiator, and a 1" soft dome tweeter. Like the other powered models, it can be driven from a preamp (which it loads with 4.7 kOhms) or, via a 150-ohm high-level input, directly from another power amp. The KM-32 costs $750 per pair. The larger KM-52, $1100/pair, features motional feedback and a 60-watt power amp. The low frequency cutoff is 38 Hz, and the crossover point is at 2200 Hz. Maximum output at 1 meter it 105 dBA.

The big brother of these systems is the professional model 205, a two-way horn-loaded system with separate cabinets for the tweeter and woofer. An electronic crossover (600 Hz) sends the signal to the two built-in power amps, which put out 120 watts into the woofer and 60 into the midrange/tweeter. Maximum output is 125 dBA at 1 meter, and the price is $3000 per side.

The SSO-330 Servo Sub-Octavator is an electronic bass enhancer with variable hinge frequency and bass boost. The device contains complex circuitry to help the consumer balance and adjust the response without the need for expensive measuring equipment; this will be described in detail in the upcoming supplement to this report. The SS-330 has a 10 kOhm input impedance and a price tag of $400.

The turntable imported by KM is the Transcriptors, an armless belt-drive unit with built-in adjustable suspension system. Suggested retail price is $340.

May 17 BAS Meeting

President Peter Mitchell called the meeting to order at 6:20 and noted that the primary business was a discussion of the projected budget for the coming year. As this would affect non-local members as well as those of us who can attend meetings, it was considered in depth.

Dues have been reduced below the actual cost of running the Society in the recent past because there was a budget surplus. The surplus has now been exhausted, and considering the recent and continuing inflation, expense projections for the Speaker on a membership of 1,200 will require dues of $16.60 just to break even. Also to be considered was the likelihood that higher dues will cause some present members to drop out of the Society, aggravating the problem. The most pessimistic available estimate of expenses was about $24,000, allowing for both inflation and for some issues of Volume 9 being produced under Volume 10's budget. This would of course require dues of $20 from a membership of 1,200. However, at the moment new memberships were running ahead of normal, and there were ads placed in The Audio Amateur and Speaker Builder as well as in Audio magazine.

Among the points raised in the ensuing discussion was that meeting notices cost a significant amount and go to 437 members (out of a total membership of 1200), and that only about half of those receiving notices ever actually attend a meeting. A two-tier membership was suggested, with dues of $16 and an additional, optional, $2.50 to receive meeting notices. A quick show of hands indicated about a 5:1 ratio in favor of a $2.00 surcharge for those wishing meeting notices, and dues of around $15. No formal vote was taken at the meeting, but this arrangement has since been officially ratified.

Also raised was the idea of modifying the Speaker's publishing schedule, to include a combined issue or two, or even nine issues to a volume instead of twelve. Please send us your thoughts on these and any other ideas you may have concerning the format of our publication.

Brad Meyer announced that the December issue had been mailed, January was being sent to the printer and February was in typing. March and April were being combined and were to have been in typing by the end of May.

The December issue may turn out to be the thinnest of the year; it actually had the same number of pages as usual, but was printed on thinner paper, i.e., 50-pound stock instead of 70-pound. Future issues will compromise by using the heavier paper on the front and back sheets, and lighter paper inside. (Our previous printer used 60-pound stock throughout, which has the nicest feel of all. But the printer we're using now offers it only in 11x17 sheets. which can't be cut in two because the grain of the paper lies the wrong way. Cross-grain paper curls and does other nasty things a few weeks after you print on it, we are told. Life is complicated. --Ed.)

John Schlafer took the opportunity to remind us all that we are supposed to leave the meetings by the secuirity desk where we enter. GTE lets us use the room free of charge, so obey the rules -- we don't need additional expenses at this point.

The joint meeting with the Audio Engineering Society which was supposed to be held in conjunction with a Boston Pops recording session had been postponed at least until the fall, as the local AES chapter does not meet during the summer.

Peter Mitchell began the open forum part of the meeting by saying that he had written to WGBH-FM in regard to the possibility of air time for Shop Talk, now that WGBH's labor dispute has been settled. No word yet.

Steven Temmer of Gotham Audio (you remember him; he claimed that setting a digital audio standard would be an act in restraint of trade) has written to various people proposing that, whereas a DISC is part of the spine, we should all henceforward write DISK when we're talking about records; the IEEE apparently agrees. (Is discus/ diskus from Latin or from Greek? Do we have to start going to diskos instead of discos? Do we care? DISC seems OK in England. --MPF) (See the front of this issue for more about this vital question. --Ed.)

Bob Graham has been doing some extensive research on tonearms, and the results should surface soon. A tonearm of his design is going to be manufactured soon by McIntosh. It has tungsten carbide bearings, aerospace-quality connectors, interchangeable weights and arm tubes, and an optional fluid damping attachment. The effective mass is about six grams. With either a Stanton 980 or a moving-coil cartridge the resonance of the damped version is located between nine and twelve Hz, and is only a few dB high.

Lou Souther reported that he had used both Permostat and the Audio Technica antistatic products; he found that Permostat seems to shed something onto the stylus, and that the A-T product does not do this.

Dave Hadaway reported on the two-part article in The Audio Amateur about the Old Colony Record Care Kit, which consists of a liquid "facelift" cleaner and an antistatic mixture. The facelift uses distilled water, and the antistatic properties are claimed to last forever -- it might be difficult to verify that. The chemicals are produced by Cyanamid Corporation, and you mix the required one-half- per cent solution yourself; the antistatic treatment increases the noise level of the record, but the facelift removes the noise and leaves the antistatic property. In short, it seems to work. Could this be audio nirvana for $8.95?

MEETING FEATURE -- ALAN HILL OF PLASMATRONICS

Dr. Alan Hill, inventor of the Plasmatronics loudspeaker, was for ten years an Air Force physicist working on the development of high-energy lasers. He lives now, as during the last fifteen years, in Albuquerque, New Mexico, where he explores his two hobbies, hi-fi and caving. This meeting was part of a "fast" speaking tour, so Dr. Hill was traveling light; as there is no local Plasmatronics dealer, there (unfortunately) could be no demonstration of the speaker to accomplany the slide presentation.

Both the Plasmatronics driver and the Ionovac tweeter, which was built in the 1950s, use ionized air. There are some very important dif-

ferences, however, as will become clear. Dr. Hill began his presentation by talking not about loudspeakers but about lasers and laser plasmas, whose properties form the basis of his loudspeaker design.

Fifteen years ago Dr. Hill moved from Ann Arbor, Michigan, to Albuquerque to work for the Air Force on the world's first high-power carbon dioxide laser. At that time carbon dioxide lasers were capable of about 75 watts continuous output, or 1000-watt pulsed output, per meter of length. A cavity filled with the gas is subjected to an electrical discharge of about one megavolt plus a steady field of lower voltage. A self-sustaining "discharge column" is produced along which the gas in the tube is ionized. In the ionized gas, the molecules have had their outer electrons stripped off while many of the remaining electrons have been excited (raised to a higher energy level) without being completely dissociated from their molecules. This ionized gas (the charged molecules and free electrons) comprise the plasma. The plasma generates the laser beam by releasing the energy in the excited bound electrons.

Some problems exist here. First, the laser shuts down if the temperature of the gas exceeds 500 degrees C; the gas must therefore be made to generate the laser beam before the energy heats it too much. Second, if the discharge column is uneven, it collapses. The collapse occurs as follows. Since the plasma consists of free electrons and ionized molecules, its concentration is proportional to the ionization rate. The ionization rate is inversely proportional to the density of the gas. Now as the gas heats up it expands and thins out; the lower density stimulates faster ionization, producing more plasma; the population of energetic ions produces hot spots in the gas, and the resulting concentration rapidly shrinks to a "singularity". This mechanism sets the limit on continuous power input/output of sealed-tube lasers, because as you try to scale everything up this problem occurs more and more easily.

By using a stream of gas that is flowing at speeds between Mach 0.4 and Mach 0.8 (Mach 1 is the speed of sound in air), the problem of collapsing singularities can be avoided. Induction (Rayleigh) heating, which is less direct than the self-heating of the static plasma, is used to maintain the plasma even as the gas is flowing. In this way, a continuous power output of up to three kilowatts is achievable.

The plasma itself, however, does not "scale" with the size of the cavity or the volume of the gas. Because of the relationship between the ionization rate and the density of the gas, the plasma tends to collapse to a line; the thickness of this line reaches an equilibrium determined by the rate of diffusion of heat from the center of the line out through the cooler parts of the plasma and away. (In lightning, for example, the plasma is usually from one to two inches in diameter.)

The electrical current density in the plasma is related to the pressure, so multiple electrodes will produce multiple plasmas, resulting in uneven distributions and a distorted laser beam. The plasma can be homogenized, though, by creating shock waves inside the chamber. The gas particles are literally dragged around by aerodynamic effects while in their ionized state. To do this requires that the gas flow at Mach 1.7, at a pressure of only 50 torr, normal atmospheric pressure being about 760 torr, or millimeters of mercury. (Torr is short for Torricelli, a student of Galileo who did extensive work with barometers. --MF.) Working at Wright-Patterson AFB in Ohio, Hill and his project team successfully generated flows at these speeds and pressures in a chamber one meter square by ten centimeters high, with an input of 200 acoustic watts (about the same energy as 150 symphony orchestras all playing fortissimo at once.) The resulting laser beam made seventeen trips back and forth through the chamber before emerging with a continuous power of 25 kW, through mirrors machined under equivalent heat and pressure so that they would warp into, not out of, shape. (In case you were wondering where your defense tax dollars were going... --Ed.)

This laser burned a two-inch hole through four inches of cement in two seconds, shooting flames and burning cement twelve feet. The gas was pumped by blowers having a total output of 200 horsepower and a capacity of 22,000 CFM. At this point, Dr. Hill said, "We've built speakers that resemble all of these lasers I'm describing to you. After I'm through, you'll think the Plasmatronics driver is simple and practical."

Avco has done lots of work on fast-flow pulse lasers that operate at one atmosphere and use an electron beam for ionization. The e-beam doubles the static temperature of the gas, and the laser pulse that results has a peak power of 50 to 60 megawatts. Most of this machine is made up of a huge muffler; the laser is triggered several hundred times a second, and the acoustic wave that results must be cleared out before the next pulse.

To create a plasma without using an electron beam, Dr. Hill built an amplifier capable of pulsing an external field to a level of 36 kV in 15 nanoseconds. This is equivalent to a slew rate of four megavolts per microsecond, and was accomplished, of course, with vacuum tubes. "This shows that tubes are best, and at Christmas it makes a nice tree." A fifty-nanosecond pulse increases the population density of free electrons from a million per cc to about ten trillion (10 to the 13th power); with a duty cycle of 50 nanoseconds on and 50 microseconds off, this device can simulate continuous operation for a few milliseconds.

The flow laser has problems, too: variations in flow speed and field density will warp the beam. The solution was to use sixteen separate electrodes, each driven by a 40 kV amplifier, and apply a different field to each one to linearize the result.

At this point, Dr. Hill took up the history and description of his ion driver. The first prototype was built in his study, using field-emission to generate electrons. "It worked fine, but you had to get within a few centimeters of electrocution to hear it." E-beams are not really practical in the home; they generate x-rays, whose unpleasant side effects are well-known. Nevertheless, Hill built a 150-kV grid-controlled e-beam to ionize open air, applied an external field, and produced a pressure wave from the thermal effects. Then he built a bigger one, which used a transmitter to send the control signal

to the receiver which floated on the grid at 150 kV, -- plus a brick wall to shield himself from the x-rays. It was a good way to study the physics of the driver, but was not really very commercial.

A slight variation on this theme took the form of the jet engine loudspeaker. It was motivated by the desire to produce a phased-array laser shifter, and was capable of 186 dB SPL inside the source. (Six dB more will completely evacuate the air from between the crests of the sound wave.) The prototype would only operate for one second at time, because it used a pressure tank instead of a real jet engine.

An electron beam was used to create a plasma in a constricted passage (a venturi), and a grid in the plasma floated at a nominal grid voltage plus the audio signal. A DC voltage placed across the plasma caused heating in proportion to the audio signal. When the tank (or the jet) was opened into the venturi, the flow velocity went from Mach 0.15 to Mach 0.84, cooling the gas by thermodynamic effects. The cooling was modulated by the plasma temperature, creating the sound.

At this point is is probably best to explain how a plasma can be used to generate sound. It is commonly supposed that the charged particles are directly moved by the applied varying field, resulting in a form of momentum transfer. This is NOT what happens.

The thing to remember is that the pressure, volume, and temperature of a gas are all related to each other: PV/T = constant. If you add heat to a gas slowly enough, the volume will increase while the pressure remains essentially unchanged. If heat is added or removed rapidly, the volume cannot change fast enough, and the pressure changes instead. The ear is a pressure-sensitive organ, so we hear the resulting pressure wave as sound.

If you light a bunsen burner, you can hear it hiss audibly. The internal density variations caused by the burning gas are the cause of the noise, and the thermal balance is maintained by heat flow out of the flame.

An acetylene torch, when turned off, produces a loud "pop". This is a rarefaction wave, caused by the sudden cooling of the place the flame used to be. Heat cannot flow in fast enough to prevent the density from rising suddenly, and air cannot flow in fast enough to maintain a smooth gradient of density; so the pressure changes locally and the pressure transient travels outward as a wavefront. Thunder is the compression wave produced by the same process in reverse: lightning heats the air in a small volume faster than either the heat can escape or the air can expand and decrease its density, so the pressure changes instead, and an acoustic wave travels outward from the disturbance.

If you want to cause a plasma to generate a continuous (AC) signal, you have to add and remove heat from it rapidly, where how fast "rapid" is depends on the size of the volume involved. If the volume is too small, the heat escapes without generating a pressure wave; if it is too large, the pressure waves cancel within the plasma, and the sound never emerges from the ionized column. When the column is just the right size, the boundary layer acts like a container or "massless" diaphragm, and the process is an adiabatic expansion. From the standard adiabatic linear approximation (see any decent thermodynamics text) we can see two things: the distortion will be under 1.2% if the change in temperature is less than 1% absolute, and there is a thermal time constant which predicts a resonant frequency for a plasma of any given size. The differential equation for heat flow in a fluid can be used to calculate the frequency and shows that the magnitude of the peak is 40 dB.

A driver with a 40 dB peak in its response will not sound good; the Plasmatronics achieves reasonably flat response over a wide range because it is actually a composite of many plasmas of different sizes, whose combined output curves sum to produce the desired result. This is why it appears to be trapezoidal -- narrower at the top than at the bottom. The size of the largest plasma, and the overall temperature, were determined by the decision to produce 102 dB at 700 Hz from the plasma driver with no more than 1.2% total harmonic distortion.

The Hill Type 1 Plasmatronics loudspeaker is a three-way system, using a dynamic midrange and a 14" surface-treated woofer with an Alnico magnet. Hill will use Alnico magnets as long as he can; ceramic magnets do not have as high a field density. The free-air resonance of the woofer is 18 Hz.

The midrange driver is an Audax 6-1/2" unit, in a sub- enclosure which contains a rock. The rocks are handpicked from a place Dr. Hill knows in Colorado. They must be just the right size, well-rounded, with no flat surfaces. They serve to break up standing waves as effectively as (and more cheaply than) building a curved enclosure of the same rigidity and volume. ("Pairs are sold with matched rocks.")

Each speaker includes a built-in 700 watt class A amplifier whose "waste" energy is used to help maintain the plasma. The plasma is in series with the B-plus supply to the output tubes, so of course there is no output transformer in the circuit.

The crossover frequencies are 120 and 700 Hz, and there are no amplitude dips from phase anomalies. The plasma driver will produce as much as 108 dB, but it runs into trouble (defined here as a harmonic distortion of 1% or more) at about 102 or 103 dB. With two drivers in a stereo pair, you can increase that level by 3 dB. According to Hill, "Your ears will clip before the system will." IM distortion from 4.6 and 5 kHz mixed 1:1 at 85 dB SPL is claimed to be almost unmeasurable.

There are many theoretical advantages to a plasma driver. With no membrane, there is no phase lag, no stretching, no spatial eigenmodes (standing waves), no Doppler shift, no membrane shift or crackle. There are no support resonances, as there are no supports. There can be no out-of-phase reflected back wave coming out of the enclosure, as there is no enclosure. The source acts like a pulsating sphere, with both extremely wide dispersion and superb imaging. Why not, then, build a full-range plasma driver?

The reason is that to extend the bass as far as necessary and still retain the desired output and distortion chracteristics, the nominal temperature would have to be increased. (Remember that the percentage change in temperature must be kept under

1% to hold down the adiabatic distortion.) This yields an energy requirement of 12 kW per speaker instead of the present 700 watts. The center temperature of the present driver is already 3000 degrees; the boundary layer goes from ambient to that value in about one millimeter.

The high temperature of the plasma necessitates some form of protection for the electrodes or they would burn up. (The Ionovac had no protection other than the layer of stagnant air inside the throat of the horn.) Dr. Hill uses helium, which is supplied continuously from a tank behind the speaker, for this and other purposes. The gas also aids the thermal distribution and conditions the plasma, which is made from room air. The external electrical field ionizes the air and accelerates electrons by storing energy in certain vibration states, notably the carbon-dioxide-laser transition; the helium serves to deactivate these electrons to ground state. At the recommended flow rate, one tank of helim should last about 300 hours of listening, although increasing the flow rate improves the distortion performance slightly. (A novel tradeoff: distortion versus tank-changing interval. --Ed.)

Dr. Hill's company breaks even on these loudspeakers at their price of $10,000 per pair, including two 700-watt tube amplifiers and the crossovers. Currently they are selling about six pairs a month; one of their best markets is in Singapore, where there are thirteen pairs in private homes and four pairs in one disco!

In response to questions about the speaker, Dr. Hill stated that the plasma is completely contained in an interlocked Faraday case so that there is no way for prying fingers to touch it. There are no X-rays produced at the power supply voltage of 4 kV; to produce energy in the X-ray band you need at least 16 kV. The device does not make enough ozone to raise the background level in most locations. There is some UV emitted, but its wavelength is relatively long; it will not tan your skin or burn your corneas from across the room, and you would have to stand six inches away for eight hours to equal the EPA standard exposure. The light is a glow discharge, not an arc. Interference to TV is not a problem either, since all the voltages except the audio input are DC. The only significant output is sound, and a pair of the systems will, on musical material, produce up to 125 dB SPL at one meter in a normal listening room.

In response to a comment about the noise level of the driver itself, Hill stated that the electrode must be perfectly stable in relation to the discharge to prevent noise. In part because of the helium, the Plasmatronics driver is stable to the extent that "it has no inherent noise; any noise that you might hear is from the amplifier or the signal source."

The bias power, nominally 700 watts, can be varied from 500 watts to 1 kW, and like the helium flow rate, it will affect the distortion curve. Upgrades in design are available at cost to owners of earlier production models. There are currently no plans for plasma headphones: "There would be no place to put the rock."

-- Mark Fishman

The following article is reprinted from the April, 1980 issue of AudioScene Canada. The magazine has undergone a few changes since the original date of publication, among which are its name and address. If you wish to subscribe, you should write to:

Audio Canada
425 University Avenue
Toronto, Ontario
M56 1T6

A one-year subscription for U.S. residents is $15.50 Canadian; consult your newspaper for exchange rates.

A follow-up article, with additional experimental data, was published a few months after this one, and will be reprinted in due course. Our thanks go to editor (then, as now) Ian G. Masters for permission to reprint this material.

Audiolab TEST REPORTS

Six Phono Cartridges

Over the years, we have often made the observation that the phono cartridge is among the most critical elements in the hi-fi chain. However good the other parts of the system may be, if they don't have a good signal to work with, the sound you get out will not be as good as it should be. And for most use, it is the cartridge that injects that original signal into the system.

Like a speaker, a phono cartridge is an electro-mechanical device, in this case converting mechanical motion into an electrical audio signal. The opportunities for non-linearities in such a device are considerable; and it is remarkable that today's top cartridges are as good as they are.

The tests we have done on cartridges over the past few years have been tributes for the most part to the ingenuity of cartridge designers in producing high-precision transducers in miniature. Flat frequency response is the rule rather than the exception; crosstalk routinely exceeds 25 or 30 dB; and tracking ability gets better and better. As with all good hi-fi components, all this progress means that cartridges are getting more and more alike, at least in terms of our standard measures of performance. And for most people, there is precious little difference in sound quality from one cartridge to the next.

That's not to say that there are *no* differences. Spectral irregularities still crop up, particularly in the higher frequencies; and under the proper conditions, these should be — and are — audible.

But beyond that, lately we are hearing more and more about differences that cannot be attributed to the normal performance criteria — differences in sonic perspective, imaging, depth, and so forth. Often the descriptions of these aspects of cartridge sound are somewhat imprecise; but that they exist is a canon of faith amongst many audiophiles.

We decided, therefore, to try to identify some of these sonic differences, using six top cartridges, and then to attempt to measure them in some fashion. In this way, we hoped to supplement our regular tests in a way that would account for differences between cartridges that otherwise tested similarly.

Special turntable in isolation mount with three SME III tonearms used for subjective comparisons.

An elaborate procedure for subjective comparison was devised, and our listening panel set out to learn what subtle differences there were to hear. The six cartridges used were all top models, most of them the flagship unit of their various manufacturers. Three were moving coil designs, and three moving magnet; and all are highly respected cartridges with many fans. The units were the AKG P8ES, the Denon DL-103D, the Ortofon MC30, Pickering's XSV-4000, the Shure V15 Type IV, and the Technics EPC-305MC.

THE MEASUREMENTS

Before the listening tests, conventional measurements were performed on each cartridge — frequency response, channel balance, channel separation, and tracking ability. Each cartridge was set at its recommended tracking force, and overhang adjustments were performed for minimum horizontal tracking angle error. Vertical tracking angle was set by adjusting the top of the cartridge body so it was parallel to the record surface. The electrical load in each case was that specified by the manufacturer. For each cartridge, antiskating adjustments were made to the tonearm so that tracking performance was the same in each channel.

The graphs for each cartridge show frequency response and crosstalk for both left channel (solid curve) and right channel (dotted curve). These measurements were made using a Bruel & Kjaer test record (Type 2009) up to 1 kHz, and a JVC TRS 1005 test record from 1 kHz to 40 kHz. The records were calibrated by means of a method using reduced-speed playback (the discontinuity in the crosstalk curves is a result of the differences in the test records).

Channel balance can be observed as the difference between the two frequency response curves (upper curves); and channel separation is the distance between the upper and lower curves. These latter were measured by playing a band with a signal in one channel only and measuring the output of the other channel.

Tracking ability was tested using Shure's TTR-103 test record, which contains a series of signals that increase in level in 2 dB steps. For low frequency tracking, signals of 400 and 4000 Hz are mixed in a 4:1 amplitude ratio; for middle frequency tracking, signals of 1 kHz and 1.5 kHz are mixed at equal level; and for high frequencies, a 10.8 kHz pulsed tone is used. The highest of these signals in each band that a cartridge would reproduce without mistracking was noted. The mistracking, when it

This Audiolab report was prepared by Kenneth Mews

occurred, was immediately audible; but a visual check was also made, using an oscilloscope.

THE CARTRIDGES

AKG P8ES. This Austrian-made moving magnet cartridge was introduced about three years ago, and it has built up quite a "cult" following among audiophiles — the sort of reputation that usually attaches to somewhat more exotic and expensive items. The P8ES carries a very reasonable suggested list price of $209.00.

Perhaps one of the reasons that this cartridge has such a following is that it is one of the few top-line units with an identifiable "character". In the frequency response curves, a slight dip centring on 5 kHz is visible, combined with a hump between 10 and 20 kHz; and we found this spectral imbalance to be quite audible — possibly aggravated by what would appear to be resonances between 10 and 20 kHz, which show up in the crosstalk curves. Whether or not this distinctive sound is a drawback is a matter of taste — many people like this sound a great deal.

Channel balance is very good with the P8ES, and separation is adequate to provide proper stereo imaging. With a recommended tracking force of 1.0 grams, this cartridge would track up to 24.0 cm/sec in the low frequencies — a pretty typical performance; in the mid frequencies, it made it to 31.5 cm/sec, again a common result. In high frequencies, however, the AKG fared less well than some other top-rated cartridges, tracking a maximum of 24.0 cm/sec.

Purists may fault the P8ES for having a distinct character, but many audiophiles love it — including some who consider themselves purists.

Denon DL-103D. This moving-coil cartridge is the next-to-top-model from Nippon Columbia — a company that has become known as much for its moving-coils as for anything else, in this country at least. It lists for $499.00, to which will have to be added the cost of a transformer or head amp, if your preamp doesn't have one built in. This can cost you an extra $200 to $600. For this kind of money, you would expect to get pretty good performance.

And you do. Frequency response is reasonably flat, with a smallish dip between 2 and 10 kHz, rising to a peak above the audible region — the result being a slightly rising top end, not uncharacteristic of moving-coil designs. Channel balance is within 1 dB across the spectrum, and channel separation is at least 20 dB at all frequencies — enough for good stereo imaging.

With a recommended tracking force of 1.5 grams, the DL-103D demonstrated fairly typical low-frequency tracking ability: 24.0 cm/sec; similarly, the mid-frequency reading of 31.5 cm/sec, and the high-frequency measurement of 30.0 cm/sec compared well with other top-quality cartridges, and the other cartridges in our test group.

Obviously a fine cartridge, if (like all moving coils) somewhat expensive. How well it sounded will be discussed below.

Ortofon MC30. Another leader in the world of moving coil cartridges is Denmark's Ortofon, and the MC30 is the top model in their very extensive cartridge line. It is the most expensive unit in our sample, at a suggested list price of $750.00, and the addition of a transformer or head amp could push this up to the $1300.00 mark. Once again, we would expect to get spectacular performance for this amount, and we were not disappointed.

Ortofon's engineers have managed to push the inevitable high-frequency peak well above the audible range, so the frequency response curve is much flatter than many we've seen, with only slight irregularity around 8 kHz. We would expect to hear a neutral sound, and we did. Separation is at least 20 dB over the whole range, and the crosstalk curves are also a lot smoother than in most moving-coil cartridges, indicating a lack of resonances. Channel balance is within 1.5 dB across the board — a bit more than with the other cartridges in this group, but not seriously so. Things could probably be evened up by twisting the headshell a mite.

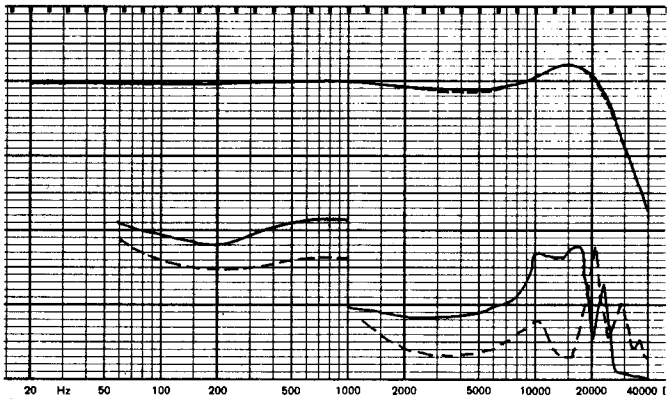
At the recommended tracking force of 1.5 grams, the MC30 managed 24.0 cm/sec in the low frequencies, 31.5 cm/sec in the mid-frequencies, and 30.0 cm/sec in the highs — all typical, good results.

It's always a question, of course, whether *any* cartridge is worth what the MC30 costs. But there's no question that it's an excellent cartridge.

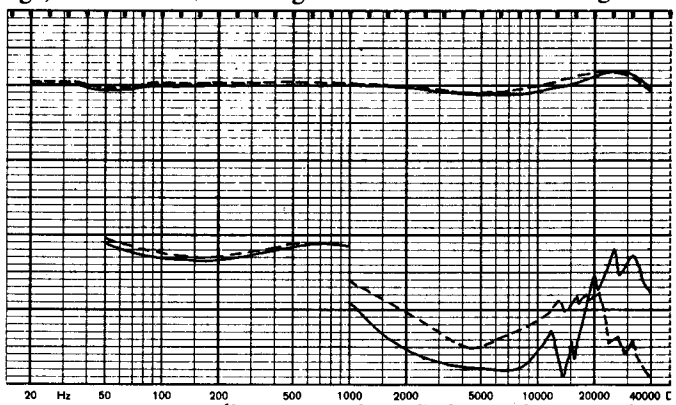
Pickering XSV-4000. Pickering is of course, one of *the* names in cartridges, and this American company has chosen to stick with moving magnet designs. The XSV-4000 is a pretty good example of what can be done with this sort of cartridge, as it is the equal in performance of the other units in our sample, but at a very reasonable price. In fact, at $189.95, it is the least expensive of our sample.

Frequency response is very well-behaved, with only a slight dip between 2 and 10 kHz, rising slightly to 20 kHz — a spectral shape that wouldn't be out of place in a moving-coil design. Similarly, the unevenness of the crosstalk curve, indicating some ringing at high frequencies, is sort of MC-like; but it's of high enough frequency that it shouldn't be too problematical. Otherwise, the crosstalk curves show at least 20 dB separation — enough for all practical purposes.

Using the recommended tracking force



Frequency response (top curves) and channel separation (bottom curves) for the AKG P8ES cartridge. Solid curves: left channel; dotted curves: right channel. On vertical axis, each major division = 10 dB.



Frequency response (top curves) and channel separation (bottom curves) for the Denon DL-103D cartridge. Solid curves: left channel; dotted curves: right channel. On vertical axis, each major division = 10 dB.

of 1.0 grams, the XSV-4000 proves itself to be an excellent tracker. At low and high frequencies, the unit would track 30.0 cm/sec, not unusual for today's better cartridges; but in the mid band, this cartridge managed to hang in there right up to 40.0 cm/sec. An excellent result.

From the figures, it would be hard to choose between this cartridge and others in our test group. From the price, the XSV-4000 emerges a clear winner.

Shure V15 Type IV. Like all of Shure's top cartridges for many years, this has become a standard in the industry — a cartridge against which others are judged. For this reason, we decided to include the V15 IV in our test group, in spite of having tested it before. Shure is firmly in the moving magnet camp (it owns the patents), and this cartridge carries a price of $235.00.

The main characteristic of the Shure's frequency response is for it to stay flat — even roll off a touch — where others rise, in the high end. The two channels are virtually identical up to about 5 kHz, where one begins to droop slightly to -2 dB at 20 kHz. Channel separation is more than 20 dB at all frequencies and the smoothness of the curve attests to this cartridge's lack of resonances, as does the absence of the familiar high-frequency hump seen in most cartridges.

With a tracking force of 1.0 grams (no brush), the V15 IV turned in a tracking score that matched the other good cartridges we have seen: 30.0 cm/sec in the highs and lows; 31.5 cm/sec in the mids.

The Shure has earned its place in the cartridge pantheon honestly. When performance, price, and reliability are all taken into account, the V15 IV still comes out a top choice, even in the face of exotic competition.

Technics EPC-305MC. This Japanese company is relatively new to the cartridge market, on this side of the ocean anyway. The EPC-305MC is its top moving-coil model, with a suggested list price of $350.00. As with other moving coils, the price of a transformer or head amp must usually be added to this. It's a worthy debut, however, and we found it an excellent performer.

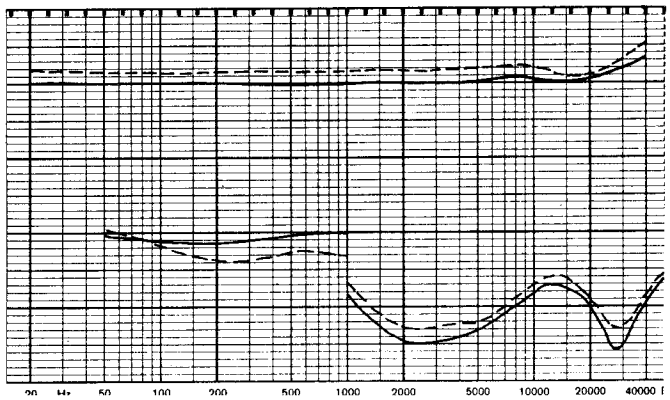
Frequency response is almost ruler flat up to 10 kHz, rising sharply from there to 20 kHz — a not uncharacteristic, if a trifle exaggerated, shape for a moving coil. Channel balance was almost perfect up to 15 kHz, deviating by only a bit more than 1 dB up to 20 kHz. Channel separation is a sufficient 20 dB minimum across the band, and the curve is quite smooth until about 12 kHz — suggesting that Technics's engineers have managed to push the high frequency resonances well beyond audibility.

Tracking at a recommended force of 1.5 grams, the EPC-305MC handled a typical 30.0 cm/sec at both high and low frequencies. In the middle frequencies, however, the cartridge got up to 40.0 cm/sec — as high as we have seen.

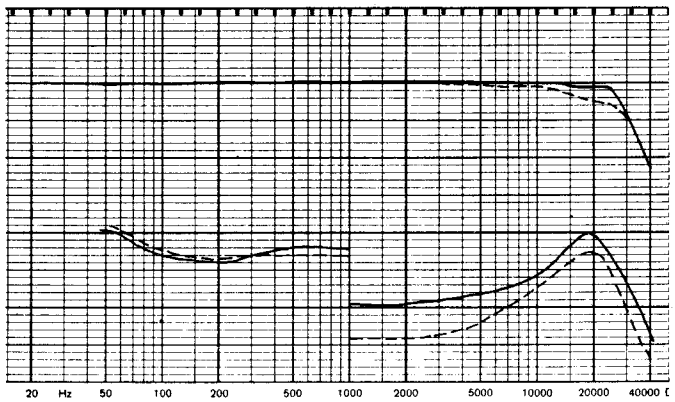
That Technics should be able to make an extremely high-quality cartridge is no surprise; as with all moving-coils, however, we must wonder whether it's worth the price.

THE SETUP

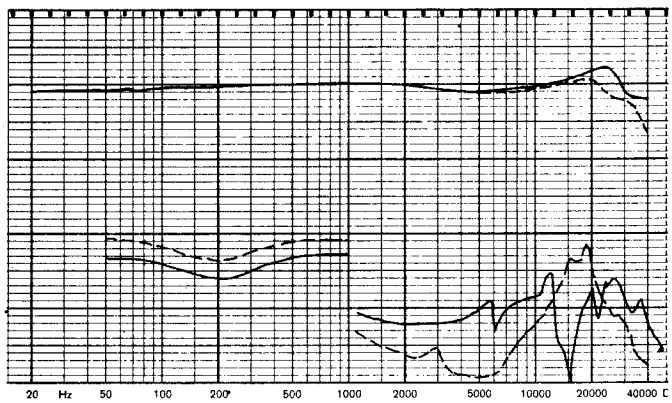
Having measured each cartridge separately, and having satisfied ourselves that they



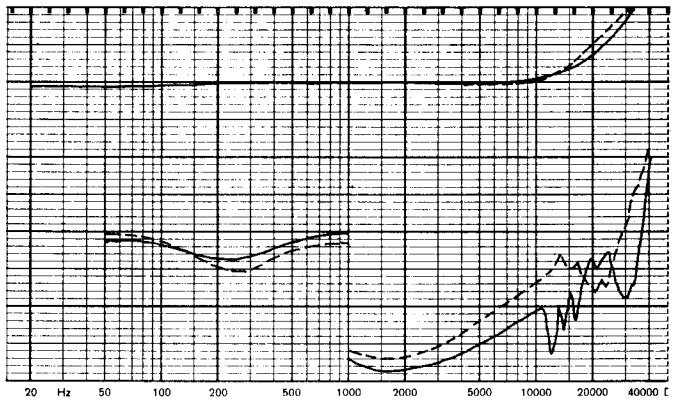
Frequency response (top curves) and channel separation (bottom curves) for the Ortofon MC30 cartridge. Solid curves: left channel; dotted curves: right channel. On vertical axis, each major division = 10 dB.



Frequency response (top curves) and channel separation (bottom curves) for the Shure V15 Type IV cartridge. Solid curves: left channel; dotted curves: right channel. On vertical axis, each major division = 10 dB.



Frequency response (top curves) and channel separation (bottom curves) for the Pickering XSV-4000 cartridge. Solid curves: left channel; dotted curves: right channel. On vertical axis, each major division = 10 dB.



Frequency response (top curves) and channel separation (bottom curves) for the Technics EPC-305MC cartridge. Solid curves: left channel; dotted curves: right channel. On vertical axis, each major division = 10 dB.

were all technically good products, it became time to perform some subjective, controlled listening tests.

A special, limited edition direct-drive turntable from Sony (model TTS-4000) was used, modified by the addition of extra mass and damping materials, and a properly-contoured Sony mat. Mechanically, the turntable was doubly isolated (see February, 1977 for description). Three tonearms can be used at any given time, and SME 3009 Series III-S arms were chosen. All the cartridges were mounted in separate carrier arms for ease of interchanging. Three identical preamps were used for the tests (Technics model SU-9070), each individually calibrated and matched. No filters were used, and the DC outputs were employed throughout the tests.

Moving magnet cartridges were fed to special networks to provide proper loading (470 pF for the AKG, 265 pF for the Shure and Pickering) and then to the moving magnet input of the preamp. For moving coil cartridges, stepup transformers were used, the output of which were also fed to the moving magnet preamp inputs. The Ortofon T30 was used for the Ortofon cartridge (set to 3 ohms) and for the Technics unit (set for 24 ohms); the Canadian RWR MCT-1 transformer, set to the appropriate position, was used with the Denon cartridge.

Outputs of the preamps were fed via a level-matching switching unit to an Amcron DC-300A power amp. Level matching was done not only from cartridge to cartridge, but from channel to channel, to remove any spurious results arising from channel imbalances. The speakers used were Yamaha NS-1000Ms, which were selected on the basis of being speakers that are uncommonly good at revealing differences.

For each cartridge, the tracking force was set to its recommended value, using a stylus force gauge. Back-to-front levelling was performed visually, and side-to-side levelling performed by adjusting the cartridge until crosstalk measured equal in both channels, using the CBS STR-100 test record. Anti-skating was adjusted for equal distortion in both channels, using the mid-frequency bands on the Shure TTR-103 tracking test record. And overhang was individually adjusted using a horizontal tracking angle gauge.

These elaborate measures were undertaken to ensure that the path from the cartridge to the speakers was precisely the same for each cartridge, and that each cartridge was set up optimally. Any audible differences would be strictly caused by performance, not setup.

A number of seats were set up in the listening room along a line equidistant from the two speakers (dubbed by the panel the "Stereo Train"). From test to test, listeners switched seats, so that differences in acoustic environment could be averaged out.

Part of the AudioScene listening panel seated in the "Stereo Train" which places them equidistant from left and right speakers: (from left) Ian G. Masters, Alan Lofft and Kenneth Mews.

In groups of three, the cartridges were placed on records carefully selected to bring out differences in the cartridges being listened to, and the switch box used to change instantaneously from one cartridge to the next. The order in which each cartridge group played the record was varied from batch to batch to minimize effects of vinyl deformation. The cartridges were placed on the records in such a fashion as to repeat a reasonably long passage three times, so that it could be heard using all three cartridges.

The purpose of all of this, to begin with at least, was to isolate *differences* in cartridge performance, rather than to rank the units in order of preference. Then, it was hoped to explain and quantify these differences. When the *AudioScene* panel had done its extensive tests, a number of local "golden ears" — dealers and audiophiles — were invited to see if they could hear anything we couldn't.

THE RESULTS

After a couple of rounds, our first reaction was dismay. We were hearing only the tiniest of differences between most of the cartridges. Only the AKG stood out, but this was easily explained by its spectral characteristics.

Nevertheless, as time went by, our hearing became more acute, and identifiable personalities began to emerge from the cartridges. They were extremely small, and would hardly be sufficient to cause anyone to select one cartridge over another in a buying situation, but they did exist.

But were they something new, or explainable by the measurements we had already made? We made a concerted attempt to try to hear differences in imaging, to hear instruments shift position side-to-side, or front-to-back, as we switched from one cartridge to the next. Try as we might, at least the units in this test would not oblige.

Moving magnet or moving coil, it didn't really matter. The images stayed firmly put, and the sonic perspective changed not a whit. The differences we were hearing, and continued to hear more and more clearly as our ears became accustomed to resolving such tiny variations, could reliably be explained in terms of spectral balance or frequency response, tracking ability, or high-frequency resonances.

Turning the test over to the "golden ears" didn't change things. Their comments tended to be couched in somewhat more colorful language, but the basic interpretation was the same.

The bottom line of all this — remembering that this is just a start, and that it was a very small sample of cartridges — is that there is very little to choose between moving magnets and moving coils, in terms of technical quality (price is another matter entirely). But there are predictable differences, which might cause someone to prefer one style over another.

In most cases, the moving coil designs were distinguished by a rise in the top end, while moving magnets were either flat, or rolled off slightly. This is the main reason that the "moving-coil sound" seems to be "crisper" than the moving magnet. Also, the moving coil design, being mechanically more complex, tends to have more resonance information at the high end, as suggested by the uneven shape of the crosstalk curves; and the ringing this causes is interpreted as a virtue when it may not be. These resonances can contribute both to spectral imbalances and to tracking performance.

But this all may be mostly academic. To elicit these responses, we had to choose records very carefully; with 99% of the discs available, the differences simply would not occur.

What we are left with is the conclusion that, while moving coil cartridges can be superb performers (and usually are), they are no better inherently than their moving magnet brothers. And moving magnets obviously win out on price.

As for the mysterious differences in depth, sonic perspective, imaging, and the like — we didn't hear them. What's more, neither did the "golden ears", in the final analysis.

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