

THE B.A.S. SPEAKER

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In This Issue

NOTE: All memberships/subscriptions end with this month's issue of The Speaker. Renew now or there's no October...

This issue's publications include some still interesting notes on the Atlanta IHF show by Paul Karagianis. There's also, finally, the Speaker index to Volume 5.

There are the usual features on tap inside, plus a response by Marantz to the problems of Donald Squires as noted in last month's issue, some short notes on the Chicago CES show, and notes on "air" in music -- it may be distortion you love to hear.

Strange-sounding FM may be due to Dolby-B encoding. Now that two local stations are beginning regular (if trial) Dolby FM broadcasts, Peter Storkerson has gone to Dolby's own literature and his pocket calculator and come up with some findings that deserve attention and which will hopefully trigger a more thorough investigation of the advantages/disadvantages and compatibility/incompatibility of Dolby-encoded FM.

Membership dues are \$14 per year (October 1 to September 30) or portion thereof. Dues include a one-year subscription to the BAS Speaker. (Note that almost the full amount of dues is allocated to production of the Speaker. The local activities of the BAS are strictly self-supporting.) For further information and application form, write to: The Boston Audio Society, P.O. Box 7, Kenmore Square Station, Boston, Mass. 02215.

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- *Pair of Rogers LS3/5A's (teak), less than six months old, \$350; bases for same, \$25. 923-2179 after 6 PM.
- *Audio Research Tympani I-C, black, chrome stands, mint, \$900; Quatre DG-250 with latest mods, \$300; Dynavector DV-505 tone arm, as new, \$200. All prices include shipping. Call (415) 494-3474, evenings.
- *Berning EA-150 hybrid amplifier, used three months. George Rowbottom, 7 Wilson Road, Annapolis, MD 21401, (301) 224-4848 days.
- *Dynaco PAT-5, \$120; Dynaco ST-400, \$240. Call (617) 598-6392 (Swampscott).
- *Teac AN-300 outboard Dolby, metered four-channel or two in and out simultaneously, in carton, \$200; Sony SQD-2020 four-channel adaptor, RM=SQ or synthesized rear channels, \$100; Teac A3300/3340 tape deck service manual, \$6. Rudy Boentgen, (617) 664-5239, evenings.
- *Nortronics QM4 Tapemates recorder care kit, brand new, never opened, \$15 postpaid. Clyde Parrott, 3070 Seneca Court, Columbus, IN 47201.
- *New Connoisseur BD2/A turntable with Shure V15-III, perfect condition, \$170. Call (617) 272-7759 or (617) 273-1596.
- *Used pre-recorded tapes, \$3/reel postpaid. Send for list. Carlos E. Bauza, GPO Box 1220, San Juan, PR 00936.
- *Rogers LS3/5A's, practically new, with custom walnut-oak stands, \$340; Rogers A75 Series II integrated amp, new, matches well with above, \$250. Both for \$550. (401) 783-3255 (Rhode Island).
- *Advent 100A Dolby, 110-220 Volt model, \$150. P.O. Box 132, Weare, NH 03281, (603) 529-2132.
- *Rogers LS3/5A mini-monitors, new 7/1/78, \$400/pair; Cizek Model 2, \$210/pair; Advent 300 receiver, \$200; Phase Linear 400 amplifier with 29,000 mics supply capacitance, \$350. Call Tom at (313) 588-1540 6-11 PM EDT.
- *Marantz 7C preamplifier and Marantz 15 amplifier, both in excellent condition, best offer. Harry Maynard, 14 Charcoal Hill, Westport, CT 06880, (203) 226-1394.
- *Yamaha TC-800GL deluxe cassette deck, \$250; Tandberg 3541 open-reel stereo deck, \$350; Dokorder 7140 open-reel four-channel deck, \$350; Concertone 801A open-reel stereo deck, \$75; Concord 550 open-reel stereo recorder, \$60; Viking 807 open-reel transport and playback head, \$20; BIC 960 with Grado F3+, \$125; Heath BC-1 AM tuner, \$10. You pay shipping. Call Bill Calkins at (805) 659-3219 evenings, or write P.O. Box 6353, Ventura, CA 93003.
- *Bryston PRO-3 amplifier, \$525. Call Dick at (617) 777-0598.
- *AEA preamp, \$450; AEA pre-preamp, \$129; PSII phono preamp, \$85; Rega 3 turntable w/o arm, \$235; AKG P8ES, \$95; KMAL M9BA tone arm, \$109; Acoustat X's, \$1, 600/pair. All equipment is in VEC w/all warranty cards. Shipped UPS prepaid. Call (703) 951-0135 nights after 8 PM.
- *Marantz 3800 preamp, excellent condition, includes walnut cabinet and all original packing materials, \$380. Call (603) 432-9477 after 6 PM and ask for Wayne Bovi.
- *Levinson JC-1AC, mint condition, \$100. Gary Vart, 10973 Lavinia Drive, St. Louis, MO 63123, (314) 849-0876.
- *Dynaco 416 power amp, built from kit, tested, meets all specs, mint condition, in warranty, \$600. Call (617) 354-3213.
- *Win Labs tone arm, strain-gauge cartridge, and power source, \$225 or best offer. No-cost bonus for Thorens 125 owners: above mounted on custom walnut board with Supex autolift. Call Frank Lundy (California) at (213) 993-1343, days, or at (213) 887-7241, evenings.
- *Infinity Servo-Statics, rosewood, mint condition, all panels new, transferrable warranty, \$1,400; Van Alstine Double Dyna 400 with latest modifications, capacitor bank, VU meters, and two-speed fan, \$800; Decca electric tone-arm lift with remote control, \$25; Decca record sweeper, unused, \$15; Radio Shack SPL, \$25. Call (617) 648-4191 before 8 PM EST.
- *Quatre Gain Cell pre-amp, \$100; Grace G-940 tone arm, \$70. Both absolutely perfect. Paul Trevithick, (617) 484-0912.
- *Channel Master 4409 FM antenna. Six-element Yagi, excellent performance, good condition. \$15. Bob Borden, (617) 276-3417 days, (617) 475-4817 evenings.

Wanted

*Audio Research D-75 or D-75A. Richard Manery, 6675 Faber Crescent, Delta, British Columbia, Canada V4E 1K1, (604) 594-1928.

*7 1/2 ips tape of "Rigoletto," directed by James Levine last winter in a WGBH simulcast, with MacNeil in the lead role. I want to copy Act II, which was erased inadvertently. H. Saint-Gelais, Salem, (617) 744-8453.

*I have some very old 15" discs that I would like transcribed onto open-reel tape or cassette. My present tapes are worn out, and I have not been able to find anyone with a turntable this large. If anyone has access to this type of equipment, I would like to hire him to transcribe a few of these old records. Paul Trevithick, 2 York Road, Belmont, MA 02178.

The Late Mr. Audio Is Risen

In the February 1978 Speaker on p. 25 there was mention of "the late Mr. Audio's Bimonthly." The magazine has been revived. A partner and I have taken over publication and issue no. 3 will be out in September (1978) -- honest!

Our new address is Mr. Audio's Bimonthly, P.O. Box 3022, Monterey, CA 93940.
-- Dow Williams (California)

SLAS Spawns Audio Horizons

The newsletter of the Saint Louis Audio Society has carried reviews of esoteric audio equipment in recent months. These reviews were written by SLAS member Len Hupp for the SLAS newsletter under the mock title The Audio Cryptic. Once the BAS Speaker publicized the existence of these reviews, the SLAS was deluged with requests for membership information from out-of-state applicants. Apparently many BAS members are eager to find an added source of information about audio products.

Meanwhile several members of the SLAS, myself included, had been so highly impressed with Len's abilities as an audio journalist that we began a campaign to convince him to start his own "underground" magazine. By this time he was already furnishing reviews to Audiogram and Sensible Sound, which also recognized his value as a reviewer. At length we prevailed over his evanescent modesty. He will publish under the more serious title Audio Horizons (Mr. Aczel was not amused by the earlier title) at regular but unspecified intervals, maybe even quarterly. Subscriptions will cost \$18 for 6 issues (\$24 foreign). The Address is Audio Horizons, P.O. Box 10973, Saint Louis, MO 63135.

The Saint Louis Audio Society newsletter will revert to its sleepy monthly publication schedule. We will continue to run articles by Len and other members, and we welcome members from out-of-state, but we felt that the coverage given us in the Speaker because of Len's contributions might have given rise to expectations that would not be met. Our newsletter has averaged four pages of single spaced typewritten copy per month over the past two years, and will probably continue at this modest level. Anyone wishing to join may do so by sending the \$10 yearly dues to the SLAS, 7435 Cornell, Saint Louis, MO 63130. Our membership is from date of joining -- we do not have back issues of the newsletter. -- Wylie R. Williams, President, SLAS

The Revox Buzz

Shortly after receiving my Revox A77 MkIV I began to notice a single frequency buzz in both channels (using headphones). At first I thought it was just on playback and was close to inaudibility, but then realized that it was getting onto the tape when recording -- and at a higher level. I would estimate it was at a level of about -45 dB. Record level settings seemed to have no effect on the buzz level.

After much letter writing to Revox they suggested a local Revox authorized service station for warranty repair. At first, the service station, Danby Radio Corp. in Philadelphia, had trouble detecting the noise, but determined it originated with the speed control -- it was 1600 Hz at 7.5 ips and 800 Hz at 3.75 ips. However, after calling Revox they still were unable to find out the proper fix (Revox was no help), so apologetically returned the deck to me, suggesting I try contacting Revox myself. This I did, and Nashville admitted that in "some" Mk IV's the servo control signal leaks into the record circuits. They sent the fix to Danby, who promptly fixed the deck and were pleased that I had coaxed Revox into admitting the problem and supplying a method of fixing it. (Revox's service facility in New York did not know how to fix it either!)

The happy conclusion of this episode would have been difficult to reach without the high level of interest and technical skill provided by Dan Greenfield and his technician Troy at Danby Radio Corp., 15 South 21st Street, Philadelphia, PA 19103. I was impressed by their honesty and real interest in a somewhat esoteric problem. Members who have read some of my previous contributions are no doubt aware of my strong leanings toward purchasing from discounters, and my general ambivalence toward "high end" dealers selling at list. At the same time I would recommend someone purchasing a high-end tape deck use a technically skilled and honest dealer if the purchaser is unable or unwilling to at least adjust his deck for the tape he uses. Unfortunately, I suspect that many, if not most, high-end dealers are not nearly as technically skilled as they would have you believe. Danby Radio has no decent showroom (the store is quite small), but my experience with them, including discussions of tape decks in general, has convinced me that they can and will provide that extra measure of technical support that can make paying list price worthwhile for many people.

Meanwhile, back to my now buzzless Revox. -- Bob Sellman (New Jersey)

Tuner Testing and Dynamic Range

I am perplexed by the inconsistencies between measurements of tuners by different reviewers. For example, Popular Electronics, in its January 1977 issue, and Consumer Guide to Stereo & Tape Equipment, in its Winter 1976 issue, both have reviewed the Sansui TU-9900, with the following results:

	<u>Popular Electronics</u>	<u>Consumer Guide</u>
Greatest Quieting, Mono	74 dB	84 dB
Stereo THD, Wide, 100 Hz	.32%	.1%
AM Rejection	71 dB	58 dB
Separation, Wide, 100 Hz	60 dB	43 dB

I have noted other seemingly significant discrepancies between Stereo Review's and Audio's profiles of FM tuners. Since an FM tuner's real-world performance is supposed to correlate with its electrical measurements, it seems that consistent data could be of considerable value to the consumer. Does anyone have an explanation or suggestions regarding the above?

Also, what is the maximum S/N needed in a tuner to reproduce the greatest dynamic range found in a live broadcast of uncompressed classical music? My impression is 75 dB in stereo (105 dB crescendos in a quiet hall with a 30 dB noise floor), but I'm not sure.

-- Michael P. Ziecheck (Vermont)

The results Ziecheck quotes suggest that Consumer Guide used the manufacturer's data sheet and that Hirsch reported his actual test results on a particular tuner. For example, .1% distortion looks like a manufacturer's maximum spec. The difference in noise may have resulted from measuring with the tuner tuned according to its center-of-channel meter, which may not have been precisely aligned by the manufacturer. It could also suggest that the manufacturer uses an A-weighting or external subcarrier (19 and 38 kHz) filter for this measurement. Generally, measurements by a particular reviewer will be consistent, but with FM tuners especially, they will tend to reflect the specific peculiarities of his test bench. Also, some distortion measurement techniques include noise as well, while others separate out the distortion products.

Ziecheck's estimated S/N figure is dead on. Although the noise floor in Symphony Hall may be slightly higher than 30 dB, WGBH's "Adventures in Sound" broadcasts two years ago had hiss levels in that region (although hum was slightly greater). WBUR has been playing dbx-encoded concert tapes for the past year, and these tapes seem to require the full dynamic range of the station's excellent signal chain -- 75 to 80 dB. All these figures are unweighted, which means that much FM programming in Boston has a dynamic range in excess of that of a tape recorder without noise reduction.

-- Scott Kent (Massachusetts)

Marantz Responds to BAS and Squires

We are in receipt of your letter of July 16, 1978 (see BAS Speaker, August 1978, page 4) referring to the problem Mr. Squires has had with his Marantz Model 2240B and Brands Mart (sic) Sound Service.

We have apologized to Mr. Squires for all of the delays which unfortunately we don't have much control over. As soon as we learned of the difficulty he was having, we requested that Mr. Squires forward his 2240B to our branch facility in New York for immediate repair; we also contacted the people responsible for the delay at Brands Mart (sic) Sound Service.

In regard to the scratch on the top panel of his unit, we are very sorry and we are forwarding a new metal cover to Mr. Squires which can easily be replaced by the customer. However, the pilot light is not a consumer serviceable item.

We hope that Mr. Squires will regain his confidence in our product and we apologize for all of the delays and inconvenience that Brands Mart (sic) Sound Service and our company may have caused.

Jeffrey A. Kirk, Manager, Warranty Administration

Dolby FM May Be Dangerous to Your Signal

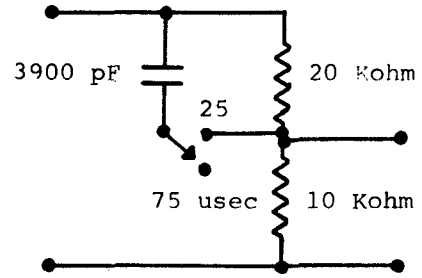
(Editor's Note: Two local stations broadcasting classical music are presently using "Dolby-B" model 334 broadcast encoders. At a glance one would expect benefits to the user with an appropriately equipped tuner or to a user outboarding a de-emphasis network and a Dolby-B decoder. And Dolby Labs promises a measure of "compatibility" with non-Dolby-equipped systems.

The promised benefits include improved signal-to-noise ratio. Dolby claims an approximate 9-dB improvement for FM at higher frequencies but fails to state clearly that this is a figure arrived at using rock music, not classical music with its wider dynamic range and differing typical FM modulation levels. Here it is alleged by others that the apparent difference is more like 4 dB. (Note: Is the 4-dB worth it? A dbx 117 set at 1.2 compression, could yield a 12 dB SNR improvement in a station having a 60-dB basic SNR with the signal properly expanded. And as Adventures in Sound has proven RF signal processing may not be necessary at all.) But there also are hard-wired problems inherent in the system -- the model 334 encoder uses a full-wave detector while almost all Dolby-B decoders use half-wave detectors. This is a built-in incompatibility.

Also, it appears that the two local stations, at least, use different "Dolby reference levels" making re-calibration between stations necessary; an inconvenience if a listener knows about it, a fidelity buster if he does not.

Finally, since there are far more non-Dolby tuners available than otherwise, the compatibility question is real, and it is here that the system appears to break down. "Compatible" Dolby-B appears to act much less gently upon the signal than alleged; rather like a clumsy frequency and amplitude-sensitive compressor. Control room A-B comparisons between the raw and Dolby-B encoded-decoded signal are said to have revealed noticeable degradation in sonic quality, and worse effects (especially in the midrange) when the "compatible" signal is not decoded.

Fig. 1. Dolby recommended network to "adapt" 75 μ sec output to 25 μ sec operation



f (kHz)	Level, dB			
	-40 dB	-30 dB	-20 dB	-10 dB
0.1	0	0	0	0
0.2	+5.5	+5.5	+5.5	+5.5
0.5	+3	+2.5	+2	+5
1	+5.5	+5	+4	0
2	+7	+6	+2	-5
3	+6	+5.5	-1.5	-3.5
4	+5.5	+5	-3.5	-5.5
5	+4.5	+3	-4.5	-6
6	+4	+1	-5	-6.5
7	+3.5	-1	-5	-7
8	+3	-2	-5.5	-7.5
9	+3	-3	-5.5	-7.5
10	+3	-3	-6	-8

Frequency response versus level of Dolby encoded FM played through standard non-Dolby (75 μ sec) tuner. 0dB = Dolby level, 50% modulation, Note: The generator is not accurately frequency calibrated and may be incorrect by 10%. Frequencies above 10 kHz are omitted to avoid the pilot.

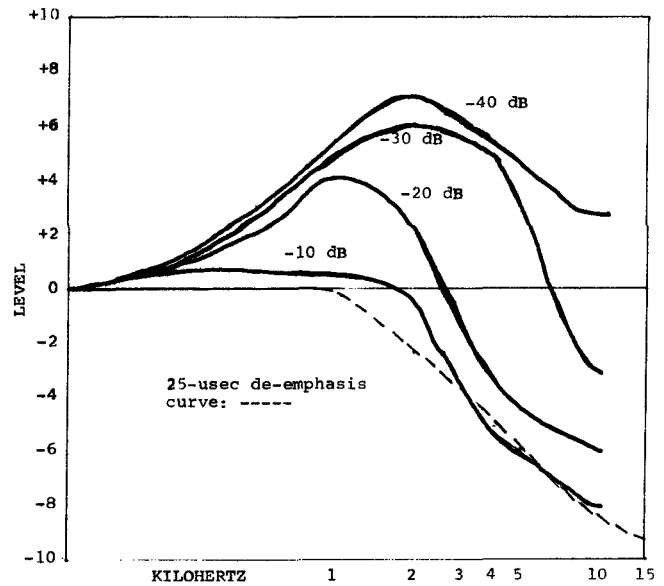


Fig. 2. Observed frequency response of B-Dolby and 25 μ sec signals as played without decoding

Fig. 3. Transfer characteristic of B-type Dolby encoding at 1 kHz and 5 kHz

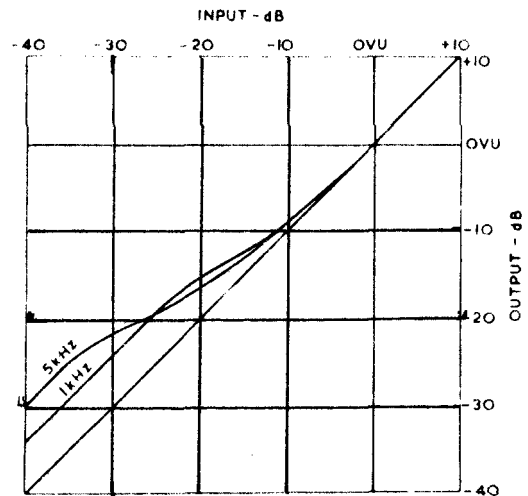
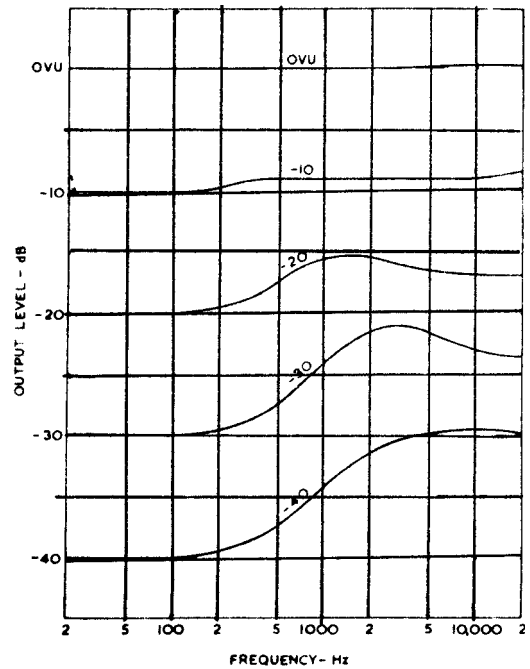


Fig. 4. B-type Dolby record processing characteristics. When added to Fig. 5 they give the overall response that should accrue to playback of a B-type Dolby encoded signal



f(kHz)	Attenuation, dB		Difference
	75 μ sec	25 μ sec	
1	0.1	0	0.1
2	2.7	0.4	2.3
3	4.7	0.9	3.8
4	6.6	1.4	5.2
5	8.2	2.1	6.1
6	9.5	2.7	6.8
7	10.7	3.4	7.3
8	11.8	4.1	7.7
9	12.8	4.7	8.1
10	13.7	5.4	8.3
11	14.4	6	8.4
12	15.2	6.5	8.7
13	17.1	8.1	9

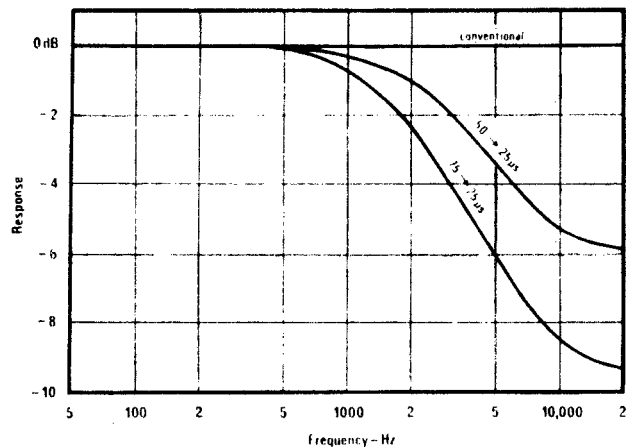


Fig. 5. The high-frequency attenuation difference between 75 μ sec and 25 μ sec (normalized to 75 μ sec)

This is a topic that deserves exploration and recording engineer Peter Storkerson begins below by drawing conclusions from Dolby's own literature. It is hoped that other members also will contribute to the discussion. -- JBB)

Dolby FM introduces changes in frequency response for the average user of up to 7 dB. Dolby FM also operates as a broadband compressor with rather peculiar or specific characteristics. Nevertheless Dolby FM is said to be "compatible" with normal reception. The following largely uses Dolby data to explore these issues. The procedure used to gather these data was as follows: a low-output-impedance generator was used to drive a B-type Dolby decoder through the passive network shown in Figure 1. See page 6. This network is specified by Dolby Laboratories to change 75 μ sec to 25 μ sec de-emphasis. All parts were checked and values trimmed, after which the network was calibrated to the expected characteristic shown in Figure 5. The Dolby then "played" the output of the generator as modified. This would amount to playing a non-encoded broadcast with a 25- μ sec de-emphasis and a Dolby decoder. The errors yielded are of the right absolute value but of the wrong sign so the sign has been reversed in the table and graph of Figure 2. These are experimental results derived from an average of three Dolby decoders. It could be theoretically derived by adding the curves of Figures 4 and 5. Figure 4 from a Dolby publication "Dolby B-Type Noise Reduction for FM Broadcasts" by D. P. Robinson AES June 1973, is not adequately calibrated to be precise but you will find the apparent correlation good.

Therefore, the graph of Figure 2 gives a good description of the actual frequency response of a Dolby FM signal reproduced without decoding. It is the response error of Dolby and a description of its "compatibility." The frequency-response curves, generated at various levels, speak for themselves and the reader can assess the "compatibility."

Figure 3 may be used to assess the similarity between B-Dolby encoding and limiting. It is taken from the same article by Robinson. It might be confusing plotted as a transfer characteristic so the reader should note that the encoding or compression must be read as the vertical displacement of the output on the 1 kHz and 5 kHz lines (not diagonally). Again, as in the former response graphs, one sees that the 1 kHz region is elevated to levels of -25 at which point compression begins. It begins much earlier at 10 kHz, approximately -40, but note that there is almost 6 dB of compression between -40 and -30 dB. This compression ceases near -10 when the device becomes effectively passive. This is generally the opposite characteristic of a compressor which will bring up very low level signals and compress high level ones while leaving the mid portion of the dynamic range alone. Moreover since the unit ceases to operate at -10 it is most unlike a limiter that will leave the signal alone until it approaches full output and then limit it hard. Hopefully the operator will rely on it as little as possible. Indeed with Dolby FM there is still a limiter in the system though one designed for 25 μ sec. (An alternative method for compressing the signal that would seem worth trying would be to employ something like a dbx 117 at 1.2-to-1 linear compression. Its "transfer characteristic" might well be more desirable and its operation would be equally decodable and without any need for calibration.) The relative steep compression in certain ranges may explain the surprising audibility of mis-calibration of B-Dolby equipment.

-- Peter Storkerson (Massachusetts)

The Stereo Sound System -- A System Engineers Viewpoint

To improve the performance of any system, one should first determine the weakest link. Improvements made to the strongest components in a system usually result in very small gains in performance. Improvements made to the weakest components will yield the most direct system performance gains.

The basic stereo sound system block diagram is shown in Figure 1. The sound or signal source is the record. The signal flows through the phono cartridge into the preamplifier, through the power amplifier to the speakers, and out of the speakers across the room to the signal receiver, the listener.

Records and room acoustics are a critical part of the system. However, the following discussion concerns itself with the cartridge, preamp, power amp and speakers. The preamp and power amp are electronic devices that convert electrical energy to more electrical energy. The

TABLE I

(1) PRE-AMPLIFIERS	AVERAGE H.D. 0.035% AVERAGE I.M.D. 0.036% HIGHEST DISTORTION 0.5% AVERAGE f_{LOW} 10 Hz to 20 Hz AVERAGE f_{HIGH} 30 kHz to 100+ kHz	SAMPLE 62 MFG. 114 MODELS
(2) POWER AMPLIFIERS	AVERAGE H.D. 0.14% AVERAGE I.M.D. 0.16% HIGHEST DISTORTION 1% AVERAGE f_{LOW} 0 Hz to 20 Hz AVERAGE f_{HIGH} 25 kHz to 100+ kHz	SAMPLE 68 MFG. 232 MODELS
(3) PHONO CARTRIDGES	DISTORTION TYPICAL < 2% @ 15 cm/sec DISTORTION (QUALITY) < 1% @ 15 cm/sec DEVICE AVERAGE f_{LOW} 5 Hz to 20 Hz AVERAGE f_{HIGH} 20 kHz to 65 kHz	SAMPLE 26 MFG. 130 MODELS
(1) TYPICAL PRE-AMPLIFIER	< 0.2% DISTORTION 20 Hz to 50 kHz	
(2) TYPICAL POWER AMPLIFIER	< 0.5% DISTORTION 20 Hz to 30 kHz	
(3) GOOD CARTRIDGE	< 2% DISTORTION 20 Hz to 22 kHz	
TOTAL (1), (2), (3)	< 2.7% DISTORTION 20 Hz to 20 kHz	

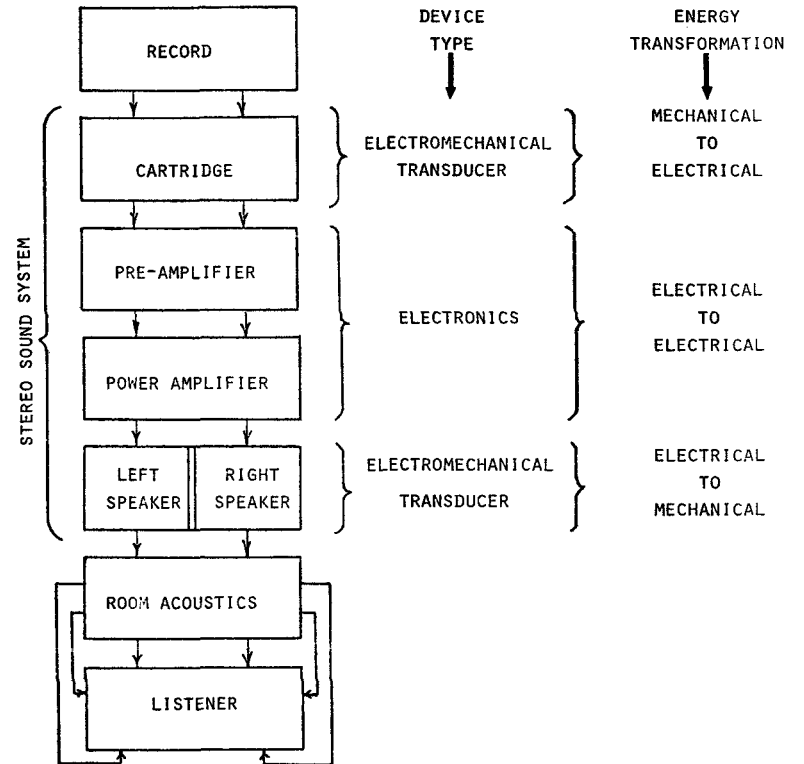


FIGURE 1

cartridge and the speakers are electromechanical transducers. The cartridge converts mechanical energy to electrical energy at low power levels. The speakers convert electrical to mechanical (acoustic) energy at high power levels. Devices that convert energy from one form to another are much more difficult to design and construct than devices that operate on only one form of energy. The order of least difficult to most difficult is (1) preamp, (2) power amp, (3) cartridge, and (4) speakers. In order of component performance, best to weakest: (1) preamp, (2) power amp, (3) cartridge, (4) speakers. No random coincidence here. This "rash" statement is verified by manufacturer specs and test reviews. Averaging the distortion and bandwidth specs for 114 preamps from 62 manufacturers, 232 power amps from 68 manufacturers, 130 cartridges from 26 manufacturers, and over 200 speakers from 75 manufacturers gives the results shown in Table 1.

A typical preamp has less than 0.2% distortion and is flat from 15 Hz to 50 kHz. A typical power amp has less than 0.5% distortion and is flat from 20 Hz to 30 kHz. A high-quality cartridge has less than 2% distortion at less than 15 cm/sec recorded velocity and bandwidth from 20 Hz to 22 kHz. A typical speaker has more than 10% distortion when driven at only half its rated power, and its 30 Hz to 20 kHz bandwidth specs are typically ± 6 to ± 10 dB.

Therefore, the combined error in system performance caused by the preamp, power amp and cartridge is much less than the error caused by the speaker system. It would seem that if one is to make a significant improvement in audio reproduction, one must first look to making improvements in the speaker system. A good rule of thumb is that the speaker system should cost about as much as the combined cost of the preamp, power amp, cartridge, and turntable. If they do not, you are probably not getting the most sound per dollar out of your stereo system.

I hope that what I have written here will provide food for thought and help you examine your own stereo system with greater objectivity. -- E. C. Kapplinger (Maryland)

Using Transformers to Match Moving-Coil Phono Cartridges to Preamplifiers

Moving-coil phonograph cartridges generally have lower output signal and lower output impedance than magnetic cartridges. Hence they need to have some sort of pre-preamplifier or matching transformer placed between them and regular RIAA preamplifiers. It is necessary to have a voltage gain equivalent to about 25 to 35 dB with most cartridge/preamplifier combinations. Transformers are made for this matching job and there are in addition many microphone-type transformers which might be used. Experience with several of these matching schemes has yielded varied results and shown that some care in selection of transformers is necessary.

Careful measurements and listening tests were performed on matching an Ortofon MC-20 to a precision, laboratory, RIAA, preamplifier. All measurements were made with professional equipment made by Hewlett Packard, General Radio, Tektronix, Ballantine, etc., and with CBS test records ST 100 and ST 130.

The Ortofon is a low impedance cartridge, 3 Ohms, with an output of about 0.1 mV per 5 cm per sec. Thus a gain by a factor of 50 (34 dB) is necessary. -Ortofon makes a matching transformer for this cartridge which matches 3 Ohms to 47 kOhms. When properly used this transformer gives good results. It is flat within 0.5 dB from 100 Hz to 10 kHz. It is down on the low end by 1 dB at 50 Hz and by 2.5 dB at 20 Hz. At the high end, the response depends upon the load capacitance. With 47 kOhms resistance it responds as follows: at 20 kHz it is down 0.1 dB with 5 pF, down 0.5 dB with 100 pF, down 1.5 dB with 220 pF, and down 3 dB with 470 pF.

The above values are for the transformer. The cartridge itself is actually up 2.5 dB at 20 kHz with either CBS 100 or 130 test records. Since it is the natural behavior for moving-coil cartridges to have some rise at the high end, it is not all bad to have some compensating droop in the transformer response. With the normal input capacitance of many preamplifiers of a few hundred pF, the result should be very nearly flat.

If this transformer, STM 72, is used with another cartridge there may be trouble, however. This transformer is very sensitive to the impedance of the cartridge and must be used with a

3-Ohm cartridge. At 30 Ohms, for example, the response is down 10 dB at 20 Hz, down 4 dB at 50 Hz, 1 dB at 200 Hz, reasonably flat in the midrange, and down again by 4 dB at 10 kHz, and 9 dB at 20 kHz. This latter response is not acceptable. It is certainly not advisable to mix-and-match carelessly.

Several microphone transformers were evaluated as well. The A11J, by Triad, gives 26 dB gain when used in the 50 to 60 kOhm connection and the Shure A95 gives about 20 dB gain. These transformers gave good results with both low impedance sources, 1 Ohm, and with higher impedance sources up to 100 Ohms. They are, however, quite sensitive to capacitive loading. At the high end the results were as follows: at 20 kHz, and with 47 kOhms resistance, down 0.2 dB with 5 pF, down 2 dB with 100 pF, and down 6 dB with 220 pF.

Thus it is very important to have a minimum possible capacitive load on the transformer if microphone-type transformers are used. At the low end the microphone transformers were only 0.5 dB down at 20 Hz. None of these transformers exhibited peaks, dips, or bumps of any kind in the audio band as some so-called "golden ears" would have you believe exist. This should not come as a surprise, since matching transformers are used freely in all professional equipment. However, it is necessary to use transformers properly. That means correct source and load impedance matching.

A side issue to these tests is that the lower gain transformers seemed to be a bit safer to use. A gain of 26 dB instead of 35 dB is more than adequate for most cartridge/preamplifier combinations, and the lower gain is more likely to not overload the input stages of marginal preamplifiers.

-- R. A. Greiner (Wisconsin)

The Chicago View -- CES

The Consumer Electronics Show in Chicago, while not showing any knockout product, was better organized than any previous summer show. Many audio exhibitors were again housed in the McCormick Inn, but a number of major and minor exhibitors were brought together at the Congress hotel under the Esoteric title. Thus in three days, it was possible to sample only some of the wares of the three (with McCormick Place) locations.

This edition of the CES was unusual in that many speaker exhibits produced poor results. After last year's great live-vs. -recorded drum exhibit, AR this year demonstrated the AR-9 attempting to reproduce a direct disc from an AR turntable -- a disaster. The Dahlquist speakers were for the first time sounding unclear. Was the cause the new Mylar capacitors in the crossover? The Hill Type-1 Plasma Speaker system represented the greatest engineering effort at the CES. The result was below-700-cycle response bettered by a bookshelf, a harsh top end, and a friend's comment that he could smell ozone. B&W failed to rekindle the enthusiasm I felt last year. I had hoped for the spatiality of the DM7 and the low end response of the DM6 and indications that maybe next year there would be a DM8. Instead they had a DM2II. While appearing to again prove they are the best engineering team for speakers, the live versus recorded demo did not have you guessing.

The demo of the Dayton-Wrights using the Schreiber decoder was interesting. The speaker had less sizzle than the previous version I heard two years ago. A dealer next to us complained his speakers kept losing gas. Schreiber has moved to New York and personally checks out each decoder. His partner was very anti-Tate this year, saying it could ruin the chances for SQ due to its imperfections. One minute was all I could tolerate of the \$3000 Transtar Full Range Heil Speaker. I almost felt something must have been wrong at the Genesis suite; their speakers sounded just the way they do in showrooms and in houses -- my congratulations. The Genesis 1-plus is their new one (woofer from the II and 2 dB more efficient).

Neal Ferrograph is the only company that has a full line of A-V cassette recorders. This enables one to give an A-V program in stereo and sync, stereo and dual sync, four in-line channels, Dolby in all channels, etc. Standard options include 3 3/4 speed, electrical pause, and input or output modes. All use the Wollensak transport.

McIntosh introduced four electronic products (a receiver, preamp, integrated amp, and a power amp) and two speaker systems. Highlights of the \$1500 MAC 4100 receiver include C-32 switching and volume control, a new PLL-decoder chip with no SCA interference (Motorola France), and Phillips Signetics TDA 1034 integrated circuit phono preamp. The C-29 preamp (about \$1000) had a C-28 style, TDA 1034 phono preamp, C-32 volume control, and IC's in high level sections. The \$1200 (est.) MA6200 integrated amp had an improved Mac power amp circuit, TDA 1034 phono preamp, and C-32 switching and tone controls. The power amp features refined Mac power amp circuit, 50 watts with 0.05 clip light, no autoformer, and a glass front. It's a mono amp, which starts a new series of low distortion amps. The XR-6 loudspeaker with time-aligned drivers was added to the speaker line along with the approximately \$3000 multi-driver speaker system which time did not permit my hearing.

RG dynamics showed their improved line of processors. Up to 20 dB expansion produced no audible pumping. PS audio (which only advertises in Audio magazine) showed their improved phono preamp (\$120), a moving coil preamp (\$140), a tone control high level unit (\$199) and a power amp (\$380). All units are assembled. They appear to be taking over the Dynaco tradition for affordable sound.

Mitsubishi showed a self-contained PCM digital audio recorder using a VHS cassette. Tandberg had a new line of tape recorders designed to use the new Scotch "metal" audio tape, a studio monitor, and restyled receivers. Lux, which introduced many new items, again featured their underrated Reference series. Sony and others introduced liquid crystal (or plasma-Nak test equipment) meters into their cassette decks. -- Norman C. Relich (Illinois)

Audio Salesmen's Competence

BAS members have occasionally complained about incompetence and lack of sensitivity on the part of consumer audio sales persons. A survey of 874 consumer electronic retailers conducted by Audio Video and published in their July 1978 issue provides at least one reason for that low level of competence.

The average dealer sales person's annual income (42% are on straight salary) is between \$10,000 and \$12,000. With the Fed pegging the family minimum subsistence level at \$10,481, the audio-video sales person isn't making all that much, and the field obviously isn't attracting many people of the calibre you'd like to deal with in the purchase of complex and expensive components.

According to this survey, the audio sales person is early twenties, has two years of college, and stays at the job only two to three years. Over half receive their training exclusively from other sales people (as opposed to manufacturer or dealer-conducted training programs) which tends to propagate the older myths at the expense of the newer gospel.

Perhaps, as a rather knowledgeable and demanding group of customers, we are expecting more sales expertise than the present system of retail distribution can deliver.

-- Dick Lewis (Massachusetts)

Books on Hearing

The hearing process is to this day not really well understood. Fortunately, a good deal of progress has been made recently. Thus a good and recent book on the subject of hearing is welcome. It is An Introduction to Hearing by David Green, published by John Wiley, 1976, \$16.50.

This is a text book that is quite readable. In fact it should be read by many hi-fi persons who write about their listening experiences so they would better understand what they are hearing. I believe more and more that the stuff I am told about equipment is in fact attributable to the particular way listeners hear and the peculiarities of their physical posture and their listening rooms.

If you find Green too difficult (or too expensive) try the nice little pocket book by Bergeijk, Pierce, and David published by Doubleday, 1958, only \$2.50. Either book will be informative and useful to the interested audiophile. - R. A. Greiner (Wisconsin)

Problems with Sub-Woofers

Audio has somehow survived a variety of acoustical catastrophes such as the bass reflex enclosure and various tuned pipe types of loading of the loudspeaker. In the name of getting cheap bass response we have with us still the tiny-box-over-massive-high-Q loudspeakers.

The latest fad seems to be single-piece sub-woofers. Now it is certainly true that many high quality and sometimes exotic systems need help in the bass region, but a single sub-woofer has some really serious problems that should be mentioned.

(1) It is fundamentally a bad move to mix a stereo signal, even only below 80 Hz, down to a monaural signal. While much of this signal is already mono due to limitations of the disc record, there is still considerable out-of-phase information on the record, and there is no excuse for throwing this information away. A mixed signal does not sound like the same signal when reproduced by two loudspeakers even if they are placed very close together.

(2) The extreme phase discontinuity at the low-frequency crossover caused by the distance between the woofer and the upper bass speakers is a gross violation of common sense. This is a particular criticism in view of the current concern about phase alignment of loudspeakers.

(3) The fact that the single piece sub-woofer excites the room at one point causes exaggeration of certain acoustical nodes in the room. On the other hand, two woofers, normally placed, excite the room in a much more complex and natural way. The single piece woofer often results in severe bass "dead spots" and "hot spots."

(4) The single piece woofer should be recognized for what it is: a lower cost compromise to doing the job the right way. It is obvious that the cost-effectiveness of the single piece sub-woofer is very low.

(5) Finally, many sub-woofers are made with too-small, over-massive, high-Q loudspeakers. And thus one is right back to the beginning with poor quality, underdamped (boomy) bass. -- R. A. Greiner (Wisconsin)

A Note on "Air"

Art Scott's comments on "air" and the skinny discs/platter pads reminded me of a possibly related experience with the impression of "air" about a recording. As he points out, the impression of "air" may very well be related to the presence of distortions and resonances that are caused by deformation at the contact point between the groove wall and the stylus.

Some time back I had some guests who claimed to be absolute experts on pickups and "air." It was clear that a certain pickup they brought over to demonstrate had more of this elusive quality than any of several pickups I was using at the time. However by adjusting the tracking force, and thus both the tracking ability and the tracking angle of the stylus, we were able to generate as much "air" as we wanted. It turns out that when about equal quantities of "air" were generated that the pickups were set at about equal tracking abilities. The less the force, the more the "air." In fact it appeared that the quality of "air" was incipient mistracking.

Subsequent listening and measuring has shown the distinct relationship between poor tracking and "air." It is quite possible that "air" in playback is additional distortion of some sort caused by marginal contact between the stylus and the groove wall. Perhaps it is related to inadequate indentation of the "footprint" of the stylus on the wall or some groove-wall surface effect. In any case, with properly tracking styli this form of distortion can be eliminated.

-- R. A. Greiner (Wisconsin)

(Rich Greiner's comments raise psychoacoustic questions about what kinds of distortion are objectionable and what may be tolerable -- or even desirable -- and imply financial questions about what it is worth to reduce the different kinds of distortion (assuming they can be identified and then reduced). Wow and flutter will head many audiophiles' list of objectionable distortion. "Air" will probably head many lists of tolerable distortion. With a good tonearm and a carefully-aligned cartridge I've learned to like "air" -- and the greatly increased stylus life. -- DFT)

Recommended Recordings

In the category of commercial records, I have found the Stravinsky Firebird (1919 version) and Jeu de Cartes (DG 2530 537) with Abbado and the LSO, to be far above the average in sound quality. I am not a Stravinsky expert, but I find no fault with the performance.

Two excellent imports are the Granados Goyescas played by De Larrocha (Decca SXL-6785) and the Chopin waltzes (Phillips Universo 6580 173). The latter is exceptional, in my view, in that Nikita Magaloff is one of the few pianists who have any real feel for Chopin.

Among the expensive American recordings there are two that merit special mention. One is the Mark Levinson Volume One (mostly Bach organ and choral music). This is not a direct to disc cutting, but the sound is outstanding. The bass seems to me to be the cleanest and most accurate I have ever heard on a stereo disc. The other one is the Schubert Fifth by the St. Paul Chamber Orchestra under Dennis Russel Davies; this one is done by Sound 80, 2709 East 25th Street, Minneapolis, MN 55406. Apparently this can be ordered directly from Sound 80, although I bought my copy (Serial #01849) from Audio Perfection in this area. This is a direct-to-disc recording. I was not a Schubert enthusiast by any means, but I bought this one largely to support the St. Paul Chamber Orchestra and to support what I hoped would be an ongoing high quality recording enterprise; to my delight, it turned out to be an outstanding recording. The St. Paul orchestra was able to produce more real music in this performance than I had ever heard in any of Schubert's work before.

-- Edward G. Hustad (Minnesota)

In the Literature

Audio, September 1978

- *Compleat Microphone Evaluation (p. 35): On the procedures used in Audio's microphone tests.
- *58 Cassettes Tested (p. 42): Evaluations of most of the available brands including some of the cheapies; a very detailed and thorough test report.
- *Performance of High Energy Magnetic Materials (p. 55): A discourse on remanence, coercivity, and the magnetic properties of cassette tapes; its point is that due to self-demagnetization phenomena in the magnetic particles, increased coercivity and improved squareness ratio (in the B-H curve) are the keys to better cassette recording performance, while improved remanence is relatively less important. (It's not an easy article to read, and Audio's unfortunate new sans-serif typeface makes it even harder.)
- *Equipment Profiles (p. 70): Pioneer SX-1980 receiver (excellent tuner, flexible and quiet pre-amp with selectable cartridge loading, very powerful amp). McIntosh C-27 preamp (pretty good; but the high and low filters have only 6 dB/octave slopes, the phono preamp uses the new IEC standard with its deep-bass rolloff and 6 dB/octave subsonic filter, and the "loudness" compensation yields rather broad bass boost). ReVox B77 tape recorder (mechanically and electronically superb). Nakamichi CM-700 electret microphone system with interchangeable omni/cardioid capsules (superb -- smooth, wide-range response, low noise, high overload, superb polar pattern with the omni capsule, pretty good polar pattern with cardioid, modest bass rolloff with cardioid is easily corrected if desired).
- *European Records (p. 110): John Wright's periodic column on good new releases.

Audio Times, August 1, 1978

News items: Fisher, which as a division of Sanyo, has been Japanese-made, is setting up a factory in San Diego. Garrard, losing money fast, is for sale. Since people are buying rack-mount products, Ultralinear is coming out with rack-mount speakers, too, with handles just like a power amp. According to BASF, worldwide cassette sales of all brands exceeded a billion tapes last year. Six tape makers have now announced plans to make videocassettes: Ampex, TDK, Scotch, Fuji, BASF, Memorex. At GAS the long-awaited Godzilla power amp and Charlie the tuner will finally go into production this fall; Godzilla, at \$2500, offers 350 watts/channel into 8 ohms, 1000 watts/channel into 2 ohms, and a slew rate of 1000 volts per microsecond. Meanwhile GAS founder Jim Bongiorno is getting ready to market a new line of Sumo brand products (named after obese Japanese wrestlers?).

Audio Times, August 15, 1978

News: Brands Mart is suing Advent for cancelling their franchise. Sansui is spinning off a pro sound division. The 15% "countervailing duties" suit brought by Zenith against Japan is finally dead. Flammability standards have been proposed for foam grilles. Denon will market cassette tape. Empire will soon introduce a new record cleaning product, DiscoFilm: you spray it on the disc, wait until it dries and congeals into a solid plastic film, then peel it off. The new Audio Pro TA-150 receiver from Sweden has no mechanical controls at all; all functions are microprocessor controlled. Advent bought Audiomobile, the car stereo manufacturer.

Gramophone (England), June 1978

- *Sounds in Retrospect (p. 116): Reviewing the sonics of records lately released.
- *Reviews (p. 128): Shure V-15/IV pickup (excellent, with strong praise for the dynamic stabilizer), Tungsram 3F receiver (fairly good), Micro Seiki MB-10 turntable (respectable), Bib Groovstat 3000 anti-static gun and "static tester" electrometer (excellent and economical).

Gramophone, July 1978

- *Record Quality (p. 269): A survey of readers reveals that 23% of all records purchased by respondents had major pressing faults, with Philips getting the least blame. The surveyed readers purchased at least one record per week on the average -- 60 records per year.
- *Reviews (p. 271): Sony 229 cassette deck (outstanding, though like all Sonys it requires Ferri-

chrome tape for best results). Sennheiser Unipolar 2000 electret headphones (superb sound and unusual comfort), IMF TLS 80 Mk. II speaker (excellent).

Hi-Fi News & Record Review (England), July 1978

- *News (p. 39): Includes the best explanation yet seen in print of how the Aphex Aural Exciter works.
- *Cunard Show Report (p. 42): News of new products seen at the Hi Fi '78 show last spring.
- *A Subjective Amplifier Test (p. 49): In which college students were unable to distinguish consistently among amplifiers in a controlled blind A/B comparison. Of course it may be argued that the listeners were too inexperienced, or the listening session too brief, to be definitive.
- *The Linn/Ariston/Robertson Affair (p. 53): Update on the patent suits between Ariston and Linn Sondek.
- *Letters (p. 65): Assorted comments on reviewing philosophy, including a hilariously bad-tempered one from David Gammons of Transcriptors.
- *FM Radio (p. 79): Angus McKenzie describes an extraordinary Chinese live stereo concert broadcast, relayed from Peking to Europe via satellite!
- *Quality Monitor (p. 81): The quarterly re-review of the sonic quality of recent releases.
- *Ten Pickup Cartridges (p. 119): A comparative review, both objective and subjective, of ten cartridges ranked approximately in this order -- Stanton 881S (best), Elac 555E, Ortofon M20FL, Micro-Acoustics 2002e, ADC ZLM, Grado G1+, Sony XL45, Excel ES70E, Signet TK7 SU, and Shure V15/IV. Two of these results are especially noteworthy: the Shure measured rather well but its sound was strongly disliked by the listening panel, and the Grado G1+ which is well liked by some BAS members was judged mediocre in the review (perhaps because only 1 gram of tracking force was used).

HiFi Stereophonie (Germany), August 1978

- *Music-Tone Art or Penmanship? (p. 934): About the historic role of the notation, its bounds, surpassed by the musical graphic art.
- *Music for the Eye (p. 940): The bearing of the notation upon the shape of the sound.
- *Sound and Equipment in Rock Music (p. 948): Sine qua non.
- *Test Reports (p. 996): The Dual CS621 turntable (high quality direct-drive at a low price), the Technics EPA-100 tone arm (controlled damping makes it equally well suitable for low and high compliance pickups), fifteen phono pickups tested: The Excel ES-70E, ES-70EX and ES-70EX4, the Ortofon M20E Super and M20FL Super, the Pickering XSV 3000, the Shure V-15 Type IV, the Technics EPC-100C and EPC-300MC, the Toshiba C-400, the Ultimo 10A and 10X, the Weinz Parotronic Standard and 77, the Zeepa Black Devil (the electret Toshiba and MC Zeepa rather disappointing, the latter being rather expensive, Shure Dynamic Stabilizer found quite effective), the Sharp Optonica RT-3838 cassette recorder (the microprocessor can be useful, but the user's manual has to be studied carefully and one has to be prepared to pay for this feature), the JLB 60/90, 80/120, 60/100A and 80/130A loudspeakers (the latter two have cast aluminum enclosures, their sound was found better than that of their wooden counterparts).

High Fidelity, September 1978

- *Legislative History (p. 4): On Senator Goldwater and RFI legislation.
- *Equipment Reports (p. 53): DBX Boom Box (stunningly effective with pop music, less so with classical; response graph is mis-labeled). Sanyo 2900K receiver (pretty good). Cerwin-Vega Metron PR-1 preamp (excellent). Scott PS-57 turntable (okay; some rumble noted). ADC XLM Mk. III (superb). Koss Pro-4 Triple-A (excellent for monitoring recordings).
- *A Bountiful '79 (p. 67): Survey of all the new stuff revealed at the summer Consumer Electronics Show, so much that it takes 13 pages just to skim over lightly.
- *Input/Output (p. 126): Reviews of the Allen & Heath Pro Limiter (too obvious and slow in its reaction), Beyer capacitor microphones (excellent).

Boston Phoenix, September 5, 1978

The stereo supplement includes a feature article on the BAS, a test report on inexpensive cassette tapes, stories on simulcasting and TV audio, a report on the Pioneer TV sound tuner, an explanation of hi-fi pricing trends, an interview on equipment servicing, a new products survey,

and a basic beginner's guide. To get it, send \$1.00 to the Circulation department of the Phoenix, 100 Massachusetts Avenue, Boston 02115.

Popular Electronics, September 1978

- *Stereo Scene (p. 22): Notes on some of the new products shown at the Atlanta IHF show.
- *Audio Report (p. 26): Julian Hirsch discusses amplifier classes.
- *Test Reports (p. 32): Sony TAN-88 PWM power amp, a class D amp with switching power supply (very compact, cool, pretty good performance except for some RFI production; the review includes a very thorough explanation of how the amp works). Electro/Voice Interface B-U speaker (excellent -- bright, clear, transparent, bass solid but not heavy).
- *How to Design PC Boards from a Schematic (p. 50): A clear and logical approach to circuit layout for home-brew jobs.
- *New IHF Standard for Amplifier Measurement (p. 54): What the new specs mean, with full details on measurement procedures.
- *A Disco Preamp/Mixer (p. 61): Design for a home-brew preamp allowing mixing and cross-fading among signal sources.
- *Phono Equalization (p. 70): Favorable comment on the IEC's proposed deep-bass rolloff and shallow infrasonic filter.
- *Hi-Fi Television Sound (p. 72): How the new A T & T diplexer works to provide network relay of two channels of wideband sound.
- *Metal Cassette Tape (p. 73): The data on Scotch Metafine.
- *Build a Super Audio Filter (p. 74): Actually a capacitance multiplier to eliminate power-supply ripple (hum).
- *Protection for DC-coupled Speakers (p. 75): A circuit to detect amplifier DC and automatically shut down the amp.
- *An Interface Panel (p. 80): A clever approach to making a versatile and inexpensive patch panel, described for test equipment but also useful for complex audio systems.
- *Light Dimmer RFI (p. 99): The cause and cure of SCR dimmer buzz.

Practical Hi-Fi (England), July 1978

Ten Tuners (p. 34): A thorough comparative evaluation of ten FM tuners; the project involved both measurements and subjective listening comparisons, the latter via a closed-circuit "broadcast" of records through the Sound Technology FM stereo generator, permitting an A/B comparison of the tuner's output with the direct output of the phono preamp which fed the generator. The objective measurements included the distortion at 50% modulation as well as the conventional measurement at 100%; surprisingly, many tuners exhibited higher distortion at the lower (i.e., more typical) modulation level. And as the BAS tuner clinic found, many tuners deliver least distortion when mis-tuned according to their own meters. Conclusions: Pioneer TX-9500/II best, followed by Lux T110 and Kenwood KT 7500, then by Yamaha CT 1010, Rotel RT 925, and Sansui TU717, then by the ReVox B-760, H-K Citation 18, Sony ST 5950, and Marantz 2120.

Practical Hi-Fi (England), September 1978

- *Systems Spotlighted (p. 60): A mostly enthusiastic review of the NAD 3030 amplifier and 4030 tuner (the amplifier's only notable flaw is that its switchable infrasonic filter rolls off too early to be really infrasonic).
- *Ten Pickup Cartridges on Test (p. 68): A comparative assessment of ten mid-priced pickups, with lab tests and a subjective evaluation. Conclusion: all ten judged to be good, with various strong or weak points. Best overall: Grado F3E, Satin M18E, Audio-Technica Signet TK7E, Ortofon FF15E Mk. 2, ADC VLM Mk. 3, AKG P7E; followed by Shure M75E, Goldring G900SE, Empire 2000E/III, and Stanton 500EE.
- *Interference (p. 100): Causes and treatments for RFI.
- *Static (p. 102): How it arises and how it may be treated.

Radio Electronics, September 1978

- *Audio Testing with Pink Noise (p. 44): A basic introduction to using a pink source with an equalizer to tailor the speaker/room response. Unfortunately it makes the stupid mistake of recom-

mending the Superscope EC-5 cardioid over the EC-1 omni microphone just because the cardioid has flatter on-axis anechoic-chamber response; what counts in room measurements, of course, is the mike's random-incidence response, which is rarely flat with a cardioid.

- *Pioneers of Radio (p. 46): Some interesting and little-known history. Did you know that Oliver Lodge was the big man in the wireless field at the turn of the century?
- *Innovations in Phono Cartridges (p. 51): The big story of the design of the Shure V15/IV. Is there any magazine left that hasn't participated in Shure's big P. R. campaign?
- *Reviews (p. 54): RG Dynamics Pro-16 dynamic processor (excellent, substantially better than the old RG-1, though clearly based on the same concept); Leader 5500 audio analyzer (an effective combination of oscillator, voltmeter, flutter meter, and oscilloscope).
- *Antique Radios (p. 60): How to rebuild and restore them.
- *Hobby Corner (p. 76): Clear information on easy ways to produce regulated power supplies having any desired low voltage.

The Real Paper, August 26, 1978

The stereo supplement is mostly fairly basic and routine, but includes an interesting compilation of interviews with tape manufacturers on current developments in the cassette field.

Rolling Stone, Issue No. 274 (September 7, 1978)

The annual stereo supplement includes a profile of Ray Dolby, some background on direct-to-disc records, notes on declining disc quality, and recommendations of good components at various price levels.

Stereo Review, September 1978

- *Tape Talk (p. 33): The first published review of Scotch Metafine tape, measured on a prototype of the Tandberg TCD 340AM. Considering all of the hoopla about metal-particle tape, the actual improvement seems rather modest: a few dB of added high-frequency headroom and a few dB of improved S/N ratio.
- *RFI Update (p. 36): What happened at the Senate hearings in June on the Goldwater RFI bill.
- *Technical Talk (p. 38): How Julian tests speakers, Part 2.
- *Test Reports (p. 40): Luxman 1120 receiver (tuner excellent, power graph mislabeled, amplifier good except for deep bass rolloff in phono, and it lacks preamp-out/main-in connections). Rotel 5000 power amplifier (extraordinary in every way: price \$2650, weight 117 lbs, current consumption too high for standard home wiring, power output 600 watts/channel at 8 ohms and 900 watts/channel at 4 ohms, distortion very low). Advent/1 speaker (very good considering its price; but its impedance is 4 ohms rather than 8 as rated). Accuphase C-220 phono preamp (state-of-the-art performance, ridiculously complex -- 125 transistors -- and ludicrously overpriced at \$900; surprisingly it does not include either an effective infrasonic filter nor selectable input capacitance). Aiwa 6800 cassette deck (effective flat-response bias trimmer and peak-hold meters, excellent performance with premium ferric and ferrichrome tapes, but poor S/N with chrome-equivalent tapes, and severe wow with C-120s).
- *Everything You Need to Know about Antennas (p. 80): Basic but thorough discussion of antennas, cable, rotors, preamps, installation -- everything but specific recommendations.
- *CES 1978 (p. 92): Details on the vast array of new products.

Stereo Test Reports, 1979 edition

Since High Fidelity's annual reprints of product reviews have proven popular, Audio and Stereo Quarterly are now doing compiled reprints of their own reviews. Stereo's are worth reading since Ed Foster pays attention to many aspects of performance ignored by other reviewers (e.g., infrasonic filters, input capacitance). This "1979" compilation contains 75 reviews.

-- Peter W. Mitchell and Jiri Burdych

August BAS Meeting

Mike Riggs is taking orders for a discount group purchase of the new Stereo Review test

record. If anyone knows how to obtain the test record produced by the German High Fidelity Institute, please let us know, as several members would like to get a copy. Mark Saklad reported that the RFI Panel has been inactive but will meet again before the next monthly BAS meeting. Dick Lewis reported that since the Audio Technology LED level display (usable either as a wide-range peak-reading live/recording level meter or as an amplifier power display) is hard to find in stores, it can be ordered directly from the factory. Jim Brinton announced that the Sept. 5 edition of the Boston Phoenix will include a feature article on the BAS.

Meeting Feature: Series Twenty

In 1934 a young Japanese Christian founded Fouquin (Gospel) Electronics to supply P.A. speakers to churches. From that beginning grew Pioneer, the world's largest maker of hi-fi electronics, whose annual sales worldwide now approach a billion dollars. The products of Pioneer's factories are distributed in the U.S.A. under four brand names, by four different marketing organizations: Pioneer hi-fi components (U. S. Pioneer), Pioneer car stereo and Centrex mid-fi compacts and portables (Pioneer of America), TAD sound reinforcement and disco equipment (Technical Audio Devices), and Series 20 high-end audiophile components (Series Twenty). The newest of these is Series 20, and it was introduced at the August meeting by marketing manager Jim Teal, engineer Marty Zanfino, and representative Clayton Anderson.

Teal began by admitting that one of his first tasks is to unsell Pioneer's mass-market high-volume image and to communicate the high technology and quality of the Series 20 products. Despite coming from Pioneer's Tokyo factories, the Series 20 components will be marketed entirely independently from other Pioneer products in the U.S. They will be sold by specialist audio dealers who sell other high-end audiophile equipment, and it is expected that they will not be subjected to the competitive high-volume discounting that is common with Pioneer's standard line.

The Series 20 product line includes the C-21 low-profile preamp (\$390 list), U-24 switchbox with multi-way tape dubbing (\$200), D-23 electronic crossover (\$600), M-22 30-watt/channel Class A power amp (\$790), F-26 FM tuner (\$1000), F-28 tuner (\$690), M-25 120-watt power amp (\$1200), and A-27 120-watt integrated amp (\$1250).

The C-21 preamp is a stripped-down, low-flexibility design, with only one tape-monitor circuit, no headphone amp, and no tone controls, so much of its cost is in its parts. These include separately filtered and regulated power supplies for each channel, metal-film precision resistors throughout, polypropylene and polyester capacitors, and silver contacts on controls. The specs are suitably exotic, with harmonic distortion typically 0.005% and a maximum phono-stage output level exceeding 20 volts. A differential-input 7-transistor phono stage minimizes phono input interaction, and the preamp's one concession to flexibility is elaborate front-panel selection of input resistance and capacitance. The capacitance varies from 100 to 500 picofarads in 6 steps, and the resistance ranges from 10K to 100K ohms in 5 steps for moving-magnet cartridges plus a 100-ohm position for direct connection of high-output moving-coil pickups (e.g., Satin, Dynavector). Zanfino's discussion of the desirability of adjusting the preamp's input impedance characteristics to provide the optimum load for the pickup led Al Southwick to remark on the important requirement for Pioneer and other turntable makers to specify the capacitance of their arm wiring and signal cables. Zanfino responded that Pioneer tables -- both the last generation and the current models -- have a total arm and cable capacitance of 60 pF (75 pF for the forthcoming Series 20 carbon-fiber tonearm which comes with longer cables). Tom Holman announced that Audio's annual directory in October will include cable capacitance in its turntable listings.

Zanfino began his discussion of power amplifier design by pointing out that transistors are inherently non-linear at low levels, requiring a minimum base/emitter voltage difference of at least 0.6 volt just to turn the transistor on and make it conduct. Thus a pure Class-B amplifier exhibits crossover distortion where the signal passes through zero going from a positive to negative voltage. Conventional amplifiers use a small bias voltage on the output transistors to keep them turned on and out of this severe non-linearity. A purist approach is to use Class-A biasing, setting the bias about midway between zero and the maximum available power-supply voltage (the clipping voltage), so that the signal never goes through the non-linear region around zero. This ensures minimal distortion and in particular assures that the distortion decreases at low power levels; thus the lowest distortion is provided at the low power levels used in reproducing the subtlest details in musical sound. The Series 20 M-22 amplifier takes this approach, and with

high-efficiency speakers its sound is quite smooth and pure. But since the transistors are always conducting a lot of current, the amplifier has the size, weight, and cost of a 200-watt conventional amplifier.

A different approach is taken in the M-25 power amp, which is technically a Class-A/B amp since its output biasing is between that of Class A and that of Class B. But the bias is set considerably higher than the 0.6 volt used in most conventional AB amplifiers. Experience shows that average home listening levels commonly involve power levels in the 1 to 3 watt range, with higher levels reserved for peaks and climaxes. So the bias in the M-25 is set high enough to cause the output transistors to operate in Class A up to a 3-watt output power level and then in Class AB up to the rated 120-watt maximum level. Thus while the M-25 can be thought of as a 120-watt Class AB amp, it is more appropriate to see it as a 3-watt Class A amp having 117 watts of headroom for peaks. Converting to decibels, this becomes a 5 dBW Class A output with an additional 16 dBW of Class AB headroom. Since it operates at low efficiency only at low-to-average power levels and high efficiency at high power levels, its heat dissipation is not severe, so the M-25 employs the same heat-sinking and chassis as the 30-watt Class A M-22.

The M-22 and M-25 amplifiers are essentially "dual mono" amps, with separated circuitry and separate massive power supplies for each channel. Wideband design is part of the philosophy, with response extending down almost to DC and up to radio frequencies. In the case of the M-25 this involved development of a new "ring-emitter" transistor. It is well known that small-signal transistors can easily produce excellent ultrasonic performance, but large power transistors conventionally have high junction capacitance and thus poor performance at very high frequencies; most power amps exhibit a distortion curve which rises with frequency. The ring-emitter is, in effect, a large number of wideband small-signal transistors constructed on a single silicon substrate and operating in parallel to gain the required power-handling capacity and speed. Thus the M-25 is specified to deliver 120 watts/channel at under 0.01% THD to beyond 30,000 Hz. Although only 30 dB of feedback is employed, the output impedance is kept low (damping factor high) through the use of heavy-gauge wire, copper bus bars, thick PC-board etching, etc. As evidence of the M-25 amplifier's freedom from TIM and slew-related distortions, Zanfino described a test involving 90- and 92-KHz tones at full power; the 2-KHz IM distortion product was 76 dB down (0.016%).

Tuners. As we discovered in the BAS tuner clinic a couple of years ago, many tuners don't meet their specs in ordinary use because the center-tuning meter is not an accurate guide to the optimum tuning point for minimum distortion. Thus a major advantage of digital frequency-synthesis tuners is that they can't be mistuned; they will only tune to one frequency in each broadcast channel, so the designer is obliged to make the tuner deliver its specified performance at that fixed tuning point. The F-26 is Series Twenty's approach to providing exact tuning. A temperature-compensated 6.4 MHz quartz crystal oscillator is divided by 2 six times to yield an exact 0.1 MHz reference which gates a sampling circuit which is looking at the tuner's local-oscillator signal (whose frequency is 10.7 MHz above the frequency of the desired station). The sampling circuit extracts a 10-nanosecond bit of the local oscillator signal. If the latter is not an exact multiple of 0.1 MHz, then the sampled bit will be at a different phase in each successive cycle of the local-oscillator waveform, and the output of the sampler becomes a correction voltage used to tune the oscillator. Thus the tuner is incapable of being mistuned for more than a few seconds by its user; it automatically drifts into "lock" at an exact multiple of 0.1 MHz, with essentially the same accuracy as a digital frequency-synthesis tuner. A similar but not identical system is employed in the Pioneer SX-1980 receiver; no such system is in the top-of-the-line regular Pioneer tuner (TX-9500/11), but one might be in the new regular-line Pioneer tuners which will be introduced next spring.

The F-26 tuner employs independent narrow and wide IF strips; the narrow IF contains four ceramic filters for maximum selectivity while the wide IF uses a SAW (surface acoustic wave) filter plus a Bessel filter. The SAW provides optimum group-delay for extremely low distortion in stereo, while the Bessel provides the out-of-band rejection (selectivity) that the SAW alone lacks. A monitor circuit continually assesses the potential interference from adjacent stations and automatically switches from wide to narrow IF as required; the switching is silent, with indicator lights on the front panel to reveal which mode the tuner is in at any time. In the wide IF mode the tuner's specs are extraordinary: under 0.05% THD and 84 dB S/N in stereo. Few tuners measure that well even in mono. The F-26 maintains this performance at input signal levels

from 80 dBf (3,000 microvolts) up to 120 dBf (550,000 microvolts), so it is tolerant of strong signals. However Zanzino did not know how immune the F-26 would be from cross-modulation at high signal levels.

The WBUR/WGBH interference problem was raised repeatedly by members. Many listeners hear faint modulations from WBUR's strong signal (90.9 MHz) superimposed on the sound of WGBH's weaker signal (89.7 MHz). It is usually assumed that this is due to the tendency of most Japanese tuners to overload and cross-modulate at signal levels above about 200,000 microvolts. But one member suggested that the problem may be traced to inadequate IF rejection, since many sharp filters of the kind used in FM IF strips have response ripples outside of the passband. Conventional specs don't reveal this; IF response curves commonly show the filter selectivity out to 400 KHz (0.4 MHz) away from the center frequency and no farther, so if the filter has poor rejection of signals 1.2 MHz away no one will know it. Zanzino did not know how the Series 20 tuners would perform in this respect. (And of course the tuner designers in Japan have no incentive to investigate this problem, since selectivity problems don't exist in Japan. There are only three FM stations in Tokyo.)

The detector circuit in the F-26 is a parallel-balanced linear detector -- two detector circuits tuned 3 MHz apart yielding a linear composite slope about 1 MHz wide. This wideband detector ensures good linearity and minimum phase shift over the portion of the detector slope that is actually used (about 250 KHz), yielding low stereo distortion and good tolerance of overmodulated broadcasts. Stereo decoding is done in a phase-locked loop IC with one unique feature: since the decoding depends on the 19 KHz stereo pilot tone, which could be contaminated by interference or noise or distortion components in the broadcast, a very high-Q narrow band filter is used to deliver a "clean" pilot to the decoding circuit. The resulting stereo separation is nearly 60 dB in the wide IF mode. Pilot cancellation (rather than filtering) is used to remove the 19 KHz pilot from the audio outputs, using a circuit which tracks and cancels the actual frequency and amplitude of the broadcast pilot (some pilot-cancellation schemes assume a nominal value which is not correct for all stations).

The F-28 tuner is similar in many ways to the F-26, but there are notable differences. One difference is in the tuning circuits: the front-panel tuning dial actually conceals a grid with a light shining through it to a detector; as the tuning dial pointer is moved the light striking the detector is modulated, and a counter circuit uses these modulations to divide down a reference signal; the result is phase-compared to the tuner's local oscillator signal and used to lock it on the desired tuning frequency. Like the F-26, the F-28 contains narrow and wide IF circuits, but the switching between them is manual rather than automatic.

In response to questions, Teal and Zanzino commented on Pioneer's high-polymer film tweeter, the \$1000 PCM disc system under development, the large carbon-fiber cone woofer marketed by TAD for use in very high sound level applications (discos and live rock concerts), and possible future Series 20 products such as an amplifier with switching power supply and a remarkable ribbon tweeter capable of high output and very linear response to 100 KHz. The ribbon tweeter's disadvantages include a strong external magnetic field and a high price tag (several hundred dollars).

Two accessory products complete the Series 20 array. The U-24 is a completely passive switchbox permitting selection of five inputs, three outputs (to power amps), and dubbing among four tape recorders with monitoring of any of them. The D-23 electronic crossover can be used for bi-amping, tri-amping, or even quad-amping. Each of its three crossover frequencies may be set to any of 11 crossover points (spaced at 1/3 octave intervals), and each of the high-pass and low-pass slopes may independently be set to either 6, 12, or 18 dB/octave, with each passband having a stepped level control which may be adjusted independently for each channel to compensate for asymmetric speaker placements. It appears to be easily the most versatile and precise electronic crossover on the market.

Natural Sound in Framingham has been selected as the first Boston-area dealer for Series 20 components.

-- Peter W. Mitchell

Guide to The BAS Speaker, Volume 5

October 1976 - September 1977

This guide is in the form of a table of contents covering Volume 5 of the Speaker. The following abbreviations are used: S - guest speaker, P - publication, N - short note, R - recommended recording. Certain regular features, such as "In This Issue" and "In the Literature" are omitted.

- Oct. 1976 No. 1
- N: Treasurer's Report (Zwicker)
 - N: Sound Guard's Secret Ingredient (see also 11/76, p. 8; 5/77, p. 5) (Sherwood)
 - N: More on Phase/Phase/Phase Distortion (see 7/76, Pub.) (Shanefield)
 - N: Construction Hints ... -- on building speaker enclosures (Bauza)
 - N: BASF Leaves Recorded Music (Satz)
 - N: On the AR Tonearm (Bauza, Campos)
 - N: Damping, and the Shreve/Rabco Tonearm (see also 2/77, p. 10) (Shreve)
 - N: Where's Win ... (Williams)
 - R: Notes from Japan: High Quality Records (Sayanagi)
 - N: Book Review -- On Davis's Sound System Engineering (Tyrrell)
 - N: ESS Mk. I Headphones -- a Listening Report (see also 12/76, p. 5) (Belot)
 - N: Full-range Heil Speaker Announced (Brinton)
 - S: Roy Cizek: Design of the Cizek Loudspeaker
 - P: Tape Machines for Stereo Field Recording, Cary Lu
 - P: A Modified Version of the Dynaco PAT-5 (see also 1/77, pp. 6-7; 2/77, p. 10), Michael Riggs
- Nov. 1976 No. 2
- N: Feedback on the BSR FEW-III Equalizer (see also 4/76, pp. 13-14) (Sommerwerck, Zwicker)
 - N: WBUR Friends
 - N: George Szell Concerts Wanted (Miller)
 - N: Errata -- Lahti Switchbox (see also 5/76) (Sherwood)
 - N: Modification of the Pioneer RG-1 Dynamic Range Enhancer (Davis)
 - N: The Compleat Acoustic Suspension (see also 1/77, pp. 4-5; 3/77, pp. 3-4) (Graham)
 - N: TIM (see also 4/76, pp. 9-10) (Curl)
 - N: Licenses to Record in the UK (Garfinkle)
 - N: Preamplifier Testing and Evaluation (see also 6/76, Pub.) (Mitchell)
 - N: Another Case for Room Equalization (see also 8/76, Pub. ; 12/76, p. 7; 5/77, pp. 9-10) (Puccio)
 - N: Sound Guard Revisited (see also 4/76, p. 4; 5/76, p. 4; 8/76, pp. 7-8; 10/76, pp. 3-4; 5/77, p. 5) (Sherwood)
 - N: Various Observations -- Bryston Pro 3, Grace 707, and AudioScene (Foster)
 - N: Sonex Loudspeaker (Puccio)
 - R: Record Reviews -- Jazz (Feinstein)
 - R: Record Reviews -- Classical (Sherwood, Mitchell)
 - R: Still More on the PCM Disc (see also 12/75, p. 5; 4/76, pp. 5-6; 7/76, p. 3; 8/76, p. 16; 5/77, p. 15) (Garfinkle, Kent)
 - S: Harold Beveridge: Design of the Beveridge Electrostatic Loudspeaker
 - S: Matti Ojala, Mark Davis, et al: TIM Debate
 - P: A Survey of Speaker Drivers, Jim Nichol
 - P: The Grace 704 Damped Unipivot Tonearm, H. Gallegos
- Dec. 1976 No. 3
- N: Victor Brociner (Brinton)
 - N: Inflationary Dues and Don'ts
 - N: Berlin Audio (see also 2/76, p. 6; 4/76, p. 3; 6/76, p. 5; 7/76, pp. 203) (Brinton)
 - N: Dynaco Correction (see also 11/76, p. 17; 1/77, p. 2) (Riggs)
 - N: Dokorder 8020 Dub-a-Tape Deck (McCarthy)
 - N: An Improved Version of the KMAL Tone Arm (see also 3/76, Pub.; 4/76, pp. 11-12) (Riggs)
 - N: A Second Look at the Heil Headphones (see also 10/76, pp. 11-12) (Graham)
 - N: Old Colony Electronic Crossovers (see also 3/77, p. 3) (Sanders)

- N: B&W and Beveridge Speakers (see also 3/77, pp. 405) (Puccio)
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 N: ABC's of Weighting (Kent)
 N: The Cheapest Ambience System in Town (Shanefield)
 S: A1 Groh, Roger Anderson, and Gary Rogers, of Shure Brothers: Phono Cartridge Design
 P: The McIntosh MC2205 and 2125 Power Amplifiers, Bob Graham
- Jan. 1977
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- N: Dynaco Correction Correction (see also 11/76, p. 17; 12/76, p. 4) (Stevens)
 N: Pygmalion -- the new Avery Fisher Hall (Riggs)
 N: Identity Crisis -- unsigned manuscript
 N: Bargain Moving Coils? (Riggs)
 N: Build Your Own Time Delay (Craig)
 N: Setting the (Biggs) Record Straight (see also 11/76, p. 17) (Sampson)
 N: Richmond Audio Society (Beagle),
 R: Sheffield Produces a Winner -- "The King James Version" (Foster)
 N: The More Compleat Acoustic Suspension (see also 11/76, p. 4; 3/77, pp. 3-4) (Tyson, Allison)
 N: Comments on the Modified PAT-5 (see also 10/76, Pub. ; 2/77, p. 10) (Van Alstine, Tucker, Riggs)
 N: Periodicals: Good News and Bad -- Euro-Disc Gazette. Leach Amplifier Newsletter, Audio-File
 N: Parle Vous Hi-Fi? -- a reviewing style, with samples (Satz)
 S: Peter Mitchell: The 25th Japan Audio Fair
 P: A 16-Channel Programmed Delay Network, Robert Berkovitz and David McIntosh
 P: Reviewing the Reviewers: A Comparison in Subjective Listening, John Puccio
- Feb. 1977
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- N: Ojala vs. Davis -- tape of the meeting offered (see 11/76, pp. 18-21)
 N: Fulton's Ark (7/77, p. 3)
 N: Afka Records (see also 4/77, p. 2) (Kent)
 N: Advent Shows a Profit (Zwicker)
 N: BAS Finances: Fiscal Year 1975 and the Current Year to Date (Zwicker)
 N: Q Query (see also 12/76, p. 21) (Martin)
 N: Another Modification to the 814 Mike Preamp (see also 8/75, Pub. ; 9/75, pp. 4-7) (White)
 N: Information Swapping on Electrostatic Loudspeakers (White)
 N: Three Mail-Order Firms Recommended (Sellman)
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 N: Whatever Became of Coboloy (Petite)
 N: Five Brands of Tape Compared (see also 9/77, p. 9) (Sellman)
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 N: Phono Capacitance and Component Variations in the PAT-5 (Tucker)
 N: Other Dyna-notes (see also 10/76, Pub. ; 1/77, pp. 6-7) (Riggs)
 N: A Reply to Comments on Tone Arm Damping (see also 10/76, pp. 5-7) (Shreve)
 S: David Hadaway: Design of the DB Systems Preamp
 P: Modifying the Rabco SL-8E, Dean Slindee
- Mar. 1977
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- N: Update ... Old Colony Crossovers (see also 12/76, p. 5) (Subka)
 N: Ortofon MC-20 "Grand Prix" at Japan Audio Fair (see also 1/77, p. 15) (Hafler)
 N: Still More on Acoustic Suspension (see also 11/76, p. 4; 1/77, pp. 4-5) (Graham)
 N: B&W Backtalk (see also 12/76, pp. 5-6) (Sherwood, Borden, Martin)
 N: UDXL/II Rising; Avilyn Declining? (Mitchell)
 N: Atlanta Audio Project (see also 7/77, p. 4) (Sellman)
 N: The Viennese Light Music Society (Woolard)
 N: Accutrac and the Betamax PCM Adapter (Mitchell)
 N: Zerostat (Sellman)
 N: Beyer DT-48 Headphones (Sellman)

- N: Yamaha v. Advent -- preamps compared (Best)
 N: The SAE Pop Suppressor: Not What We've Been Waiting For (see also 5/77, pp. 8-9; 6/77, p. 4) (Satz, Stevenson)
 N: Ariston RD-11S Turntable (Thompson)
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 N: Impressions of Two Sony Cassette Recorders -- TC-152SD and TC-177SD (Sellman)
 N: A Biamp Suggestion (Best)
 N: A Wire Guide to Cure Hi-Fi Rats Nests (Fulton)
 S: Bruce Maier: Discwasher Products (see also 7/77, pp. 6-8)
 P: The Audio Research SP-4 Preamp, Collins Beagle
 P: Listening With Your Eyes: Hi-Fi Specifications (see also 7/77, p. 11), Alvin Foster
- Apr. 1977 No. 7
- N: Mea Culpa -- errata (see 2/77, pp. 3-4; 3/77, pp. 16-20)
 N: BAS Telephone Directory -- announcement
 N: New England Conservatory Summer Workshops
 N: Washington, D. C., Hi-Fi Show (Uhryk)
 N: Old Colony Pink-Noise Filter (see also 7/77, p. 13) (Berger)
 N: Sound Concepts on the AR Delay System (see also 1/77, Pub.) (Cohen)
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 N: Decca Mk. VI/Formula 4 (Curley)
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 R: Richardson Records (Riggs)
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 N: "The Audio Critic" Debuts (Stevenson)
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 P: Measured Input Impedances of Twenty-Six Phono Preamplifiers (see also 11/75, Pub.), Tomlinson Holman
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 P: Why You Need a High-Pass Filter, Tomlinson Holman
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- N: Elections -- announcement
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 N: For Your Library ... (see also 4/77, p. 14) (Tooley)
 N: And for Your SME -- damping adaptor
 N: The Record Sleeve Habit (Berger)
 N: Chemistry Lesson -- Sound Guard (see also 10/76, pp. 3-4; 11/76, p. 8) (Grant)
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 N: SAE 5000: Snap, Crackle and Pop (see also 3/77, pp. 7-8; 6/77, p. 4) (Campos)
 N: Equalization: A Debate with Three Sides (see also 8/76, Pub. ; 11/76, pp. 7-8; 12/76, p. 7) (Puesan, Beagle)
 N: Audio Systems More Perfect Than Live Music ? (see also 12/76, p. 6) (Beagle)
 N: Is a Pre-Pre-Preamp for You? (Vincent)
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 N: Two Views of the Snell Loudspeaker (Disend, Rancourt)
 N: Beveridge Speakers: A Minority Report (Beagle)
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 R: Review of Two Four-Channel Tapes (DiCamillo)

- N: Tips, Quibbles, and Queries -- Soundcraftsmen phono overload, power needs, low-cap cable, and record rumble (Valzaquez, Bauza, Kalil, Graham, Riggs)
- S: John Naab: Genesis Loudspeakers
- S: Henning Moller: Phase Distortion
- P: The Audio/Pulse 1 Digital Delay System (see also 8/76, pp. 20-23; 8/77, p. 11), Gerald Larsen
- P: Shure M615AS Equalization Analyzer, David Glasser
- P: Musical Frequencies, David Ranada
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- N: Elections, Constitution and Bylaws
- N: A Warning on Sound Affair (see also 9/77, p. 4)
- N: Ampex Stereotape Rises Again (Mitchell)
- N: The Other Side of the Story -- CrO₂ tape (Mitchell)
- N: The Other Side of Phonograph Disc Error (see also 4/77, pp. 18-21) (Kent)
- N: The Limits of Slew Rate (see also 11/76, pp. 18-21; 7/77, Pub.) (Kent)
- N: User Equipment Reports --- SAE 5000 (see also 3/77, pp. 7-8; 5/77, pp. 8-9), Denon, Supex, and Sonus cartridges compared (see also 9/77, pp. 9-11), Magnepan MG-U, dbx 157 (Grant, Feldman, McCoy, Sanders)
- N: More Equipment Observations -- Superscope EC-1 mike, cassette recorders compared (see also 9/77, p. 9), AR and Pioneer TX-6500 tuners compared, preamp sound (see also 7/77, pp. 8-9; 9/77, p. 12) (Griesinger)
- R: Record Reviews -- Sheffield Lab 5, and others (Hill, Foster, McCoy)
- S: Victor Campos and Max Wilcox: AR Live vs. Recorded Demonstration; Making Recordings
- P: A New Technique for Phonograph Reproduction, Discwasher, Inc.
- July 1977 No. 10
- N: Renewals for 1977-78 -- announcement (Zwicker)
- N: Ark Record Sales (see also 2/77, pp. 2-3) (Zwicker)
- N: New Boston Area Transportation Coordinator
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- N: FCC-CB-Congress ... and YOU (see also 3/76, pp. 3-4; 8/76, pp. 12-14) (Berger)
- N: Shop Talk Bicycle is Rolling (see also 5/77, pp. 2-3) (Slindee)
- N: Dixie Hi-Fi/Custom Hi-Fi Now Circuit City (Boyer)
- N: Update: Atlanta Audio Project/Michael Humphries (see also 3/77, p. 5) (Sellman)
- N: Incredible Breakthrough? -- Barcus-Berry AudioPlate (Berger)
- N: Star Wars and Sound Concepts (Brinton)
- N: Pioneer Bids for Audiophile Market (Mitchell)
- N: Speculation -- Quad servo-ESL (Lipshitz)
- N: Ball Brothers Reply to Maier (see also 3/77, pp. 17-18; 7/77, pp. 7-8) (Friebel)
- N: And a Response from Maier (see also 3/77, pp. 17-18; 7/77, pp. 7-9) (Maier)
- N: And Finally, a Response from the Author of the Meeting Summary (see also 3/77, pp. 17-18; 7/77, pp. 7-9) (Zwicker)
- N: Controlling Test Parameters (see also 6/76, Pub. ; 6/77, p. 10; 9/77, p. 12) (Foster)
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- N: Looking for a "Best Buy" in Audiophile Magazines? (Mitchell)
- N: Quality Control? -- Sony TC-355 (Berger)
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- N: Old Colony Pink-noise Filter -- Update (see also 4/77, pp. 4-5) (Berger)
- N: Open Reel (!) Crolyn (see also 9/77, p. 8) (Sellman)
- S: Richard Levine: Interface Sound-Reinforcement Loudspeakers
- P: A Comparison of Eight Low-Priced Receivers, Alvin Foster and Wally Swanbon
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- N: Errata (see also 6/77, pp. 3-4, 11; 7/77, Pub.)
- N: BAS Elections -- announcement
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- N: Many Negative Thoughts on Rolling Your Own Speakers (Nichol)
- N: Western Technologies Reference 2S Loudspeaker (Fretz)
- N: Harman/Kardon ST-7 (see also 4/77, p. 11) (McCoy)

- N: Fergus Fons and Formula 4 (see also 5/76, Pub.; 8/76, pp. 10-11) (Borden)
- N: More on the Formula 4 (see also 4/77, p. 20; 5/77, pp. 6-8) (Williams)
- N: Damping the Black Widow (Miller)
- N: Discraker and the Phoenix/Graham Damper (see also 3/77, pp. 19-20) (Mallory, Graham)
- N: Effects of Spatiality on Musical Tones (Lilley)
- N: More on Audio/Pulse (see also 5/77, Pub.) (Gallegos)
- N: Soundcraftsmen Equalizer with Sound Concepts Delay Unit (Hardin)
- S: Frank Van Alstine: Modifications for Better Sound
- S: Peter Mitchell, Bob Berkovitz, and Mark Davis: Linear-Phase Loudspeakers (see also 9/77, Pub.)

- Sept. N: Audio Dimensions Preamp (Rogers)
- 1977 N: Audio Forum Offer (Bertoglio)
- No. 12 N: Old Sound Museum (Akell)
- N: Legal Matters -- Mr. Audio and The Sound Affair (see also 6/77, p. 2) (Belot)
- N: DiscTraker: In the Groove (see also 6/77, Pub.) (Kilmanas, Martin, Puccio)
- N: Add a Line-Level Input to Your Portable Cassette Recorder (Leonard)
- N: Tape Topics -- chrome tape (see also 7/77, pp. 13-14), DAK tape (see also 2/77, p. 7), cassette decks (see also 6/77, p. 9) (Sellman)
- N: Equipment Reviews -- Denon and Grado cartridges (see also 6/77, p. 5), Linn Sondek, McIntosh C-28 (see also 6/77, p. 10; 7/77, pp. 8-9), Fried B vs. LS3/5A, Sequerra tuner, dbx 124, Aiwa 1250, Nakamichi 350, KEF 139 transmission-line woofer (Feldman, Juch, Freeman, Reiter, Seto, Sommerwerck, Sellman, Shuster)
- R: Down the Street with Philips (Schroeger)
- R: Kriptic Kritique (Bauza)
- S: Mark Davis: Audibility of Phase Shift (see also 8/77, pp. 18-26)
- P: Commentary on Peter Mitchell's Time Synchrony Presentation (see also 8/77, pp. 18-26), Mark Davis
- P: Guide to the BAS Speaker, Volume 4

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A Publication of the BAS

Notes on the Atlanta IHF Show

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I attended the IHF Show at the Georgia World Congress Center and at the Hyatt Regency in Atlanta on its last two days and would like to comment on the exhibits that I found interesting prior to my running out of time. I missed quite a few of the over 250 exhibits, but may be able to fill in some of the blanks in another member's report.

Bear in mind that any subjective judgments by me are just as biased or unfair "due to circumstances beyond the manufacturer's control" as anyone else's. "Most commonly used" components are mentioned for those who believe the manufacturer uses the best, as opposed to whatever he gets handed to him at the door.

The best systems that I have heard have all been the result of prolonged matching of components, combined with careful room tuning, so I was not surprised to find that nobody achieved S.O.T.A. sound. Attendance seemed rather low, compared to the CES shows for example, possibly because of people adopting a wait-and-see attitude toward this first IHF attempt, and partly because of the imminent Chicago show. If true, it's a shame, because most of the manufacturers came off as typically friendly, rabid audiophiles, who just happened to be banging out equipment on the side. There was little intrusion by the Boom/Screech, disco, fast-buck, and ear-bleeding-loud elements. And, thank God, no CB.

Apt was A/B'ing its new Holman-designed preamp against the Levinson (ML-2's, JC-2's and LNP-2's were the most common choices among high-end manufacturers not in the preamp business) on a "typical home type" system: Shure V15-III/Grace 707/Kenwood KD-500/Dyna ST-400/Snell Type A's. (Snells and Dahlquists seemed about evenly popular with the non-speaker manufacturers.) A small majority of the roughly 5 percent who could tell the preamps apart preferred the Apt. Given the carefully designed features, I believe Apt has succeeded in its goal of offering a practical (i.e., useful at a fair price) alternative to some of the more esoteric (blood curdlingly expensive wires with gain) designs.

Acoustat demonstrated the "Monitor," which seemed to fulfill its claims of offering improved horizontal and vertical dispersion, higher SPL, more dynamic range, less cabinet coloration, and less "wall proximity effect" as opposed to the "X." Your "X's" can be upgraded for around \$700. Supporting equipment was Denon 103/Grace 707 (the Grace arms were edging out the Formula 4's for most popular arm)/Linn Sondek table or Van Alstine modified Sonus Blue/JH Audiolab arm (not a JH Formula 4)/Denon table into a Levinson JC-2 (Acoustat recommended -- "I got one at home" -- not a gift). Thaedra was on site as was a loaner, and an Apt was still being tuned for appraisal as of the last day.

Audio Research Corporation. None of the reviews I've read of the 1976 CES show mention ARC, which is odd, for their T-IIIa/tri-amped D-150 set-up was stunning. I don't consider it subjective to call it "best display of '76," since they had the only display with listeners wandering around in an obvious state of shock. Equipment displayed in Atlanta was too extensive to list. Highlights were the D-350 (everybody seemed to be using different amps, so there's no "most popular amp," but the D-350 seemed to go over very well), the D-110 (several folks we trust consider this ARC's current best sounding amp, by a hair), MCP-2 head amp (tentatively due out in October) and, the most drooled-on device at the show, the SP-6 tube (Amperex 12AX7A's) pre-amp. Bandwidth claimed to extend from below 1 Hz to beyond 100 kHz, with the usual minute distortion up to 62 Volts out. Extensive attention paid to high-quality parts, multiple regulated power supplies, etc., plus looks you'd like to take to your senior prom. ARC used T-1D's and Fulton

J-Mod-PAH's, plus Fulton cable and EMT cartridges. I was too busy gawking at the SP-6 to really notice the rest of the chain. Yes, your SP3-anything can be upgraded (option "available in July," check with factory) to an SP-3B, although there is some question whether a 3B is sonically identical to a 6.

Audionics had equipment damaged in shipment (I missed the sound demo). They displayed their new LK-1 turntable, which is designed to provide the best possible sound for about \$329. These folks are familiar with the Sondek (Sondeks, Denons, and Micro Seikis seemed to dominate the show) and Thorens 126 tables, and seem to be pretty confident. Yes, they know all about overhang, VTA, capacitance effects, mats and using the same arm/cartridge for listening tests. I've been promised delivery of one in late July and will send in a comment.

They were using a Berning EA2-150 amp and had a faceplate for their BA2-150, which is the same thing with a stiffer power supply and a much faster digital biasing circuit for the tubes in this hybrid design. They consider the Berning superior to their own CC-2, which just received a very good review in The Audio Critic. Incidentally, my own Berning is much more "liquid" (as opposed to the "dry" sound Holt mentioned in Stereophile) after having the power supply electrolytics paralleled with .25 μ F mylars and 10,000 pF polystyrenes. Mine is one of two amps with hand-made boards as opposed to the other twenty-eight with "real" boards, and is prone to act up in ways the others don't. Berning has tried the mylars only and remains skeptical.

Beveridge was using a GAS Sleeping Beauty (by far the most popular cartridge with the high end groups)/ADC arm/Micro Seiki/HAPI-1 preamp. They seemed unhappy with the room -- most manufacturers at the Hyatt found their rooms atrocious -- and I heard nothing to contradict Holt's summation that these can be pretty poor: if mis-installed.

DB. Ortofon MC-20/Shreve Rabco/Sony 2251/and their own electronics into a set of Dahlquists. DB now offers a cartridge loading kit for \$18 that has Y-connectors and color coded RCA plugs with a variety of polystyrene capacitors and a loading resistor for certain moving-coils. Until preamp manufacturers consistently provide a way to insure proper loading, something like this seems to be a necessity for most of us.

Dahlquist. Ortofon SL-15E/Black Widow/Linn Sondek/and their own preamp and crossover into Luxman 3045's. They also had the Kenwood L-07M's and the Van Alstine amps, but seemed happiest with the 3045's "when the damn things work right." These were running non-mirror-imaged DQ-10's with their sub-woofers. I've heard several DQ-10 (mirror imaging is well worth the effort)/3045 combinations and liked them a lot. The 3045's seemed to have more than enough power for me, but I'm not big on TTS. They're a bargain used, but are a pain to bias and tend to run hot. If they need biasing more than three or four times a year, the predriver tubes may need changing.

Dayton-Wright has a new, cheaper model out that I missed until the last minute. All I remember is a Bryston amp and one of the better sounds at the show. These looked like full range electrostats (no piezos), and I didn't see anything unusual, such as gas bags. Sorry I didn't have longer.

Discwasher. Some other manufacturers I spoke with mentioned that they considered the Smog-Lifter Cables pretty good performers for the money. Discwasher also makes the Goldapters, which are in-line male/female gold-plated RCA jacks containing various capacitive and resistive networks, which, like the DB, are to be used for cartridge loading.

Dynaco demonstrated the Dynasty Silver Anniversary line. They now have a model A-100 speaker (\$250 each) that, given a very loud, clean drum solo and the benefit of that oddly bright, clear solid-state sound, had a most "in the room" quality. Using ADC-ZLM/Dual 721/PAT5 BIFE T/416-C100.

Electro Research Audioptics, Inc. mated the Matsushita strain gauge cartridge to the "Kinetic Preamplifier," an approximately \$1500 combo that has nine factory-set adjustments to give an optimal amplitude/phase characteristic. Each cantilever is matched to the preamp. If yours breaks, they say they can provide an exact replacement without resetting the preamp. They used their A75V1 Class A amp (the Navy gun-turret radar/computer interface job) into a mysterious

pair of "7-year-old things" with several normal looking dynamic drivers in what looked like a homemade 7 to 9 cubic foot plywood box. Whatever all this stuff was, it worked very well.

ESS now carries the full Dynavector line. The main system was a Dynavector 20B and DV-505 arm into Accuphase electronics driving the TRANSAR/atd system. The HF Heil element was doing a remarkable job on the mostly jazz recordings I heard on three visits. The main point to the Heil woofer, as I understand it, is to provide improved driver blending with the Heil tweeter. Aside from looking like a cutaway model of the Leaning Tower of Pisa, the Heil woofer wasn't blending in any better than an AR-3a woofer, which is what it sounded like. Actually, AR woofers are okay with me, especially since they don't cost \$3500, so I hope ESS was just having a rotten weekend. (Peter Mitchell has noted that the ESS woofer is not an Air Motion Transformer, just multiple cones resonating in free air. This is a peculiar approach with no obvious advantage. I hope AR was just having a rotten weekend. -- MR)

FMI. Fulton MC cartridge/headshell leads/Technics arm and table/Entre head amp/Bravura J/ARC-350/line cord/cables/J-Mod-PAH. This and the PAH set-up at ARC were the favorite systems for me and the three people I compared notes with. We all own J's, so assume personal preference weighed heavily with us here. This system wasn't as convincing as other J's (including PAH's) we've heard, but no other system at the show seemed to come close. The cartridge is a conical MC running around \$200+. All Fulton leads (headshell/line/speaker) are designed (a) to minimize distortion, and (b) to minimize information loss. Most people acknowledge the aural superiority of Goldens over El Cheapo's. The older Fulton line cord is so much better at (a) that the difference is obvious even with ear plugs in on the numerous tube/transistor permutations I've tried it on. The new stuff (still \$23.50) is subtly (to me) better than the old at (a) and significantly better at (b). If \$23.50 sounds like a lot for a piece of wire, all I can say is that I consider it by far the best bargain at the show. By the way, this wire vindicates Julian Hirsch, who has been comparing amps and preamps to (pre-Fulton) "straight wires with gain" for years. I've heard some of that stuff and agree: it's pretty cruddy-sounding.

Tone arm leads are in the works, but not yet available. The Bravura "J" preamp was this season's model (now sold with a cartridge-matched input stage); a further revised model with a different name is anticipated. I've used several on different systems and find it hard to trust anything that gets itself mugged by a ratty PAS-2 on otherwise decent systems. Anything used by Fulton can be considered highly recommended in the context of the J system. (Note the rave Stereophile review on the Verion. FMI definitely used the Entre for a reason.) Results with speaker leads depend on the amp and speaker characteristics; FMI now has eight models priced from \$45 to \$235. The new ARK recording "Tricia" was highly praised here and at the Hyatt.

Hafler. If you've been waiting for your DH-101 to slowly turn sour after reading issue 5 of The Audio Critic, relax. Hafler claims the sample tested had a bad solder connection and is now back up to par. Their integral head amp is due out fall of '78 for \$75. Gain is 20 dB at 120 Ohms input impedance or 34 dB at 30 Ohms. Soldering seven wires is required for the DH-101. You can use it elsewhere if you have a "well filtered" ± 15 to 18 Volt DC at 25 mA power supply. Despite an erratic RIAA response and tacky mechanical problems, the DH-101 does indeed sound better than the umpteen preamps I've compared it to, except for the Berning FET/tube hybrid, which may (or may not) come out in the next year at three times Hailer's kit price. Check out the reviews in Absolute Sound, Stereophile, Audio Critic, et al. The DH-101 is a consistent killer.

Infinity demonstrated the QRS system, supported by Bascom King's exotic hybrid electronics, and the air bearing turntable. Infinity had a huge, well-isolated room for this system. Everybody I talked to seemed disappointed in the ORS. Overall resolution wasn't that good, but we could detect none of the characteristics we associate with intrusive electronics in the signal chain. Our criticisms were different from those voiced in the review in Stereophile, and we suspect that the QRS can deliver several varieties of lousy sound if set up incorrectly. Given the room and supporting chain, if the factory gets results this mediocre after three days, good luck to the consumer.

The table was very wide, with an L-shaped arm tracking tangentially. The short (less than 3") part of the L contained the cartridge head, with the larger part of the L mounted in a plexiglas tube (with an air bearing) stretching away from the platter along the rear of the base. Quoted price was around \$650, which seems awfully low for a device with the claimed low mass, friction, resonance, and tracking error that this has.

JVC had a CES-type booth. One of their representatives mentioned that the MC-1 direct-coupled moving-coil reviewed in The Audio Critic would not be imported by them, at least until Shure's patents have expired.

Plasmatronics. Dr. Alan Hill demonstrated his Type-1 Plasma Speakers with a Sleeping Beauty/Formula 4-3/Micro Seiki/LWP-2 into his Class A Electronic Interface permitting bi- or tri-amping. These were bi-amped with a G.A.S. Ampzilla. The Plasma drivers have built-in tube amps, including five metered bias adjustments, clipping indicators, gas flow meters, circuit breakers, LED SPL monitors, electrode monitors, and Lord only knows what else. At \$6,000 a pair, these, unlike some of the competition, at least look like a good value in terms of features and construction. Hill had one of the worst rooms at the Hyatt (tiny and resonant), plus some inexplicable veiling (possibly a cable problem?). Still, one could detect a fairly wide, even bandwidth, excellent dispersion, decent driver blending (12" Gauss to 100 Hz, 5" Chartwell 100 Hz - 700 Hz) and excellent imaging. Given the best components in a good room, these could well turn out S.O. T.A.

Rappaport. Sleeping Beauty/SAEC/Strathclyde/Pre-1b/AMP-1/Snells. AMP-1 is a massive black cube liberally iced with heat sinks containing two essentially mono (the lower stages share a carefully decoupled power supply that is left on to avoid a two-hour warm-up period, while the power switch controls a separate power supply for the output stage in each channel) solid-state Class A amplifiers. No feedback is used and, like Audionics, Rappaport seems justly proud of his rotten HD specs. AMP-1 stays at or under 1% HD even into grossly reactive loads or dead shorts. (Audionics has him beat here -- their BA2-150 can achieve a stunning 2.5% HD in the 0-feedback mode.) Slew rate is rated over 300 Volts per microsecond. AMP-1 runs quite hot to insure circuit stability. Rated at 90 Watts per channel at 8 Ohms, this is a high-current design without output protection circuitry (inputs have a 100 kHz low-pass filter); prototypes have plugged away into a dead short for 24 hours.

Threshold was using a Sony MC cartridge with a 12" arm, mainly for the sake of being different. They displayed several amps, including the CAS-1, which operates in cascode mode for reduced nonlinearities in transistor operation. They were using stacked Dayton-Wright XG-8 Mk. III's powered by prototypes of the new Stasis 1 amplifier, which uses a feedforward error nulling amplifier in parallel with a current source. This differs considerably in execution from the conceptionally similar Quad current-dumping design. The amps (due out in early 1979) are rated at 175 Watts at 8 Ohms and 300 Watts into 4 Ohms, at an expected cost of \$2500 per channel. These were being used with their NS-10 preamp, which has a speeded frequency response of 1.5 Hz to 1.5 MHz, slew rate above 100 V/microsecond, and distortion characteristics claimed to be better than those of a three-foot length of wire. I should explain here that I've heard several different DW gas-bag designs, most of which were supposedly operating correctly, and they have all, up to now, made me barf. So, though Threshold's system wasn't my idea of perfection, it was so good as to make me suspect that the speakers are very demanding of the electronics and that these were by far the best electronics I had heard on them. This is despite the excellent specifications.

This was quite a show. I hope you're kicking yourself if you missed it. If you saw it, I hope you will share your observations on the 85% of the gear I missed.