

THE B.A.S. SPEAKER

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In This Issue

The previous two issues of the Speaker were bulked out by lengthy pieces written by the editor and publisher. We can't go on like this. And we shouldn't. And we won't. This time we have lots of interesting items from all over: "Jersey Dan" Shanefield on ear protection and a good cheap microphone, "Pennsylvania Chuck" DiGiorgio on an inexpensive parametric equalizer, "Minnesota Bob" Williams on a modification for the Superscope EC-1, "California Gerald" Larsen (this is getting ridiculous) on the Audiopulse Model 1 and some recommended recordings, Cary Lu on learning electronics, Lohr Gonzalez on subwoofers for the Quad ESL, and a lovely piece of nostalgia from David Klein.

In a more technical vein, we have an amusing clarification and an even more amusing complication concerning speaker wires from Elbert Drazy, a test report of some devices to prevent vibration from reaching your phono cartridge from Messrs. Ward, Thompson, and Harling in Colorado, and what should be the final round of discussion on loudspeaker Q, this time with a reply from McIntosh.

If all goes well the September issue will be out hard on the heels of this one. This will be true even if it's very skinny; in any case we will definitely exhaust our current supply of material, so this is the crucial time to send in more stuff. The situation is tightest right now, when we are playing a serious game of Catch-Up; the actual rate of input from all of you has nearly kept pace with a normal one-issue-per-month schedule. So don't lose heart; just write for us a bit faster for a couple of weeks and we'll be back on the track again.

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- *AR receiver, with classic intermittent channel problem; Davis-Brinton phono preamp, used very little. \$110 each, or both for \$200 (includes shipping). Rich Akell, (617) 890-1106 (days), (617) 583-8278 (evenings).
- *Conrad-Johnson vacuum-tube amplifier and Conrad-Johnson revised preamplifier, rack-mount version with handles, includes Fulton interconnecting cables and two Boxer fans, \$1,250 or will sell separately; Conrad-Johnson transformer, \$175; all three items new in March, 1980, meticulously maintained and barely used, warranties fully transferable; DCM time window speakers, just back from factory update (new drivers, crossovers, and grilles) with new five-year warranty, Fulton "brown" speaker cable included, make offer. All sales include UPS shipping and insurance. John R. Kelly, (313) 973-7271.
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- *Grace F-9E, unopened, \$125; JR 149s, rosewood, \$300; Soundcraftsmen PE-2217, \$300; Dynaco PAS-3x, dented case, stock, \$60; ADC XLM Mk II improved, \$25. Karl, (201) 932-4089 until 4:30 PM EDT weekdays, (201) 249-9519 at other times (keep trying).
- *Levinson ML-1 preamp with latest A3 cards (for MM cartridges), power supply, and oak case, \$1,100; Levinson LNC-2 crossover (7 kHz) with oak case, \$1,100; Audionics CC-2 power amp, power supply and signal paths "tiered" with styrene caps, \$355; Cotter MkII MC step-up transformer, modified with Camac connectors but can replace original RCA phonos, \$320; Crown OC-150A meter/switching console, \$175; Cotter NFB-2 noise filter/buffer and PW2 power supply, \$470; all equipment approximately one year old and factory mint. Robb Wolov, (215) 642-9114 (evenings).

Wanted

- *Rack mount assembly for stock Revox A77 MkIII, or information on who can fabricate one. Help! Russ Button, P.O. Box 27643, San Francisco, CA 94127.
- *Current addresses of the audiophile publications StereOpus and Audio Forum, and information about whether these publications are still operating. George Mileon, 14 Border Street, Lynn, MA 01905, (617) 598-2487.
- *Marantz Model 2, must be in excellent shape. Will exchange Model 5 plus cash if desired. Charles W. Pachner, 7 Putnam Road, Scarsdale, NY 10583, (212) 267-2200 (days).

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Corrections From Alan Fierstein

I very much enjoyed John Schlafer's comprehensive review of my talk at the April meeting, and I would like to correct a few misimpressions I might have left. First of all, my portable equipment package consists not of one custom control panel, but of three separate, commercially available units: an Acoustilog 232A Reverberation Timer with a built-in Impulser, a Tektronix 5115 plug-in Scope, and an Acoustilog Calibrator Interface. Most of the test signals originate from the 232A, which contains the pink noise and impulse generators. However, the TDS system consists of a Tektronix 5L4N spectrum analyzer and an Acoustilog VCO-2 TDS Controller, which are both plug-ins for the scope.

Second, achieving 60 dB signal/noise in a T_{60} measurement is only difficult at low frequencies, where not only is room ambient higher, but producing loud test signals is dangerous to a loudspeaker's health. Mid and high frequencies are easier to deal with. Regarding the validity of T_{60} measurements in a direct field, I make a point of stressing that this is an "apparent" T_{60} , and I feel this relates to what we would actually hear when listening at that position. I would not call an apparent T_{60} "erroneous" for this reason. In such a case, it is helpful to see the oscilloscope display of the reverberation characteristic.

If I said that 3 to 8 millisecond early reflections are important, let me amend that by saying that reflections less than 1 ms are also extremely significant. A typographical error regarding the Altec 604 should be changed to 0.8 ms. I don't think that the 604 was purposely designed to have a time offset between its woofer and tweeter; I gather it was just a byproduct of the 604's physical construction.

Finally, Figure 3 shows dips at 3.4 kHz and 8.2 kHz, not 2.4 kHz and 7.2 kHz. This yields better correlation with the 1/3 octave spectra. BAS members wishing information on Acoustilog products may write to me c/o Acoustilog, Inc., 19 Mercer Street, New York, NY 10013.

-- Alan Fierstein, President, Acoustilog, Inc.

Ear Protection

We audiophiles should really be careful about protecting our precious ears against the permanent hearing loss which can be inflicted on us by power lawnmowers, buzz saws, and other such noisy machines. For example, I've read that a once-a-week usage of some types of lawn machines can measurably affect one's hearing.

Unfortunately, the SLM or other instrument that the manufacturer probably uses to rate his machine is not necessarily an accurate indicator of true danger to our ears. The reason is that very low or very high frequency sound is not strongly registered on a typical A-weighted SLM, and yet these extreme ends of the spectrum can still be damaging. My own Toro "Home Pro" model power lawnmower measures 90 dB with a Radio Shack SLM held at ear-level, which is borderline dangerous. But my neighbor's Sears power leaf-vacuum measures 105 dB, which is definitely a menace.

This is just an opinion, but I think we should all use ear protection in such noisy situations. I use ear plugs when I mow the grass at home. These plugs can be purchased in almost any drug-store. They are made by Flents in Norwich, CT (evidently the most popular one), 3M in St. Paul, MN, and EAR Co. in Westwood, MA, among others. I prefer the latter brand, because it is easy to insert and wash off, and it seems (subjectively) to be very effective.

If commercial ear plugs are not available, you can make a good substitute. Fold a single sheet of toilet paper three times, and roll that up tightly into a little cylinder. While continuously turning it the direction that keeps it tightly rolled, put it in the ear opening. When you let go, it will expand and fill the ear canal snugly.

I can't prove that this actually is of any value without living two separate lives, one with and one without ear plugs, so I guess I'll never know if I'm wasting my time with them. But it does seem like a reasonable idea for an audiophile.

-- Dan Shanefield (New Jersey)

Cheap Microphones

The EC-1, Modified

The Superscope EC-1 mike can be modified to extend its off-axis high frequency response by removing the black screen and damping foam from in front of the diaphragm. My measurements show grazing incidence response flat to above 10 kHz. Recordings made in a live environment have a smooth, extended high end. The on-axis response then has a peak of about 8 dB at 12 kHz but this has not been noticeable when recording choir and organ. Incidentally, the EC-1 is a good mike for organ recording. Its low end response is great. Some samples are flat to 18 Hz! I have used it to make organ recordings which compare favorably with those of the same organ made with a \$2,000 AKG stereo mike!

I would be interested in hearing from anyone who tries this mod, or has any ideas concerning it. You may write to me at 5279 Sunnyside Road, St. Paul, MN 55112.

-- Robert C. Williams (Minnesota)

And an Even Cheaper Alternative

A real bargain is hiding amongst the patch cords and other doo-dads hanging on the wall of your neighborhood Radio Shack store. (It does seem as if every neighborhood has a Radio Shack outlet these days. There are three of them within a four mile radius of my house.) I'm referring to the Realistic Catalog Number 270-092A electret condenser microphone, which is priced at \$2.99 and is specified at 30 Hz to 16 kHz.

It comes with a printed response curve, which I checked against a factory calibrated AKG 202E mike, and the Radio Shack curve appears to be accurate to within around ± 3 dB. Both mikes were tested 8 feet up on a ladder out-of-doors, which is my somewhat folksy, "homestyle" anechoic chamber.

By the way, if you think this is just a little too folksy, you ought to see curves taken on one mike tested in two different anechoic chambers, both being in professional laboratories and not a bit folksy. For example, I saw two such curves, and they differed by about 3 dB also. The reason is that even the most classy "anechoic" chambers are all somewhat imperfect, and there is no real standard that everyone will accept. In view of that, it's remarkable that I got the agreement that occurred between the Radio Shack and the AKG.

At any rate, the sound of the recordings made with the Radio Shack mike was superb. I've also used some very expensive microphones but never gotten better results than these. In live-versus-recorded comparisons, this cheap little demon gave a very good account of itself, even with human voices.

The Radio Shack response curve indicates a 5 dB "presence peak" centered around 5 kHz (I measured it at only 3 dB), but quite surprisingly, it's not at all bothersome, at least on my particular playback system.

I have no idea how this microphone will stand up to temperature and humidity over the long term, so it would seem prudent to store it in a cool place like a downstairs closet, but not one in which the airspace is sometimes shared with wet raincoats.

In the circuit diagram that comes with the mike, the capacitor in series with the output seems to be unnecessary, unless you have a dc-sensitive preamp. I skipped the capacitor. Also, I

attached the negative terminal of the 9 V battery to "ground," which is not specified in the instructions but seems to be what is intended.

-- Dan Shanefield (New Jersey)

(Editor's Note: The data supplied by Radio Shack show a capsule with an outside diameter of just over 3/8"; nominal supply is 4.5 volts, with a permitted range of 2.0 to 10 volts; current drain is 1.0 mA max; sensitivity is -65 dB \pm 4 dB re 1 V/ubar; output impedance is 1 kOhm. The sensitivity is relatively low, which may limit the effective noise floor of the unit for distant pickup of large ensembles, and the unbalanced output and relatively high output impedance may not be compatible with modern low impedance balanced inputs.)

Cheap Parametric EQ

In response to R. N. Wisan's inquiries in the March 1980 Speaker regarding the \$99.00 parametric equalizer kit, I would like to let him know that I have built the unit with very good results. However, I used all 2% metal film resistors of my own purchase to build my unit; therefore I cannot comment on the stock kit. I would guess, from prior experience, that using carbon film resistors would give quite good results, also. A couple of other changes I applied to my unit were to install a fuse holder instead of using the pig-tail fuse idea, which has the fuse soldered into the circuit board. And, finally, I did not use the polarized coupling capacitors originally specified for the unit (2 input, 2 output). Instead, I experimented a bit, and found that replacing each one (originally, a 1 μ f unit) with 2.47 μ f polypropylene film capacitors in parallel made a significant improvement in the high end.

With these changes, the equalizer is very good indeed. I have had no problems whatever with it -- it has worked exactly as claimed, from the start. If I had to find a complaint, I would say it was poorly calibrated, particularly the frequency control. When the pointer on the knob is set to read correctly at the 10 kHz mark on the front panel, the unit gives maximum boost at 1 kHz with the knob set to about 3 kHz. This is of no real consequence to the audiophile, except that it is deceptive --don't rely on the markings for your settings; instead, use your ear only! One other suggestion I have is to calibrate the level controls (boost/cut) so that they are pointing straight up for flat response. This is not too difficult to do and really helps you to use the equalizer.

When set for flat response, and switching the unit in and out of the audio circuit, there is very little (if any) difference to be heard. I cannot yet comment on really long term "listenability," but I can say that on an A-B switch test, there is no audible difference. I have done a lot for the high end of many poorly recorded records using my parametric, and I would recommend it to fellow do-it-yourselfers with little reservation.

Oh, by the way, if you decide to use the film coupling capacitors instead of the polarized ones, as previously suggested, be prepared to struggle a bit with squeezing them into place, or even mounting them somewhere off the main circuit board; they are much larger than the stock capacitors, but can be used. I hope this info is of use to Mr. Wisan and others; my feeling, as a user, is that John Roberts (the author of the construction article) did a fine job designing the unit.

-- Chuck DiGiorgio (Pennsylvania)

Recent Recordings

It has been many moons since the BAS Speaker carried information about recordings. To the contrary however, almost all of the underground audio publications are now bursting at the seams with comments about the latest direct disc this, digital that, etc. It seems a little pointless to re-explore that territory in the Speaker. Further, since the general state of record quality stinks and is not getting any better, let's let that issue slide also. What I've included in this comment is a list of some records whose artist or music I find particularly enjoyable. My hope is that in

reading this, some of you will be tempted to explore these records and find yourselves some new and interesting musical experiences. After all, that's why we got the equipment in the first place.

I probably purchase at least 15 records per month. The list that follows are those few that are musically much better than the average bear. In some cases, you will find me praising a particular artist for their past as well as their recent achievement. I encourage you to try some of these records because they really are good:

1. John Stewart - Dream Babies Go Hollywood RSO Records RS-1-3074. John Stewart is one of my all-time favorite people. His roots go back to the Kingston Trio and he has been active ever since composing and playing music that can best be described as a combination of folk, rock, country and western, and just plain patriotic music. Two records ago (Bombs Away, Dream Babies) John apparently discovered mixing. On that album, he participated in the final mix-downs and was aided by various Fleetwood Mac personnel. Since then, he re-released an in-concert album (from his Phoenix concerts) which he mixed himself. He did an excellent job. On this latest release, there are ten new songs, at least six or seven of which you will thoroughly enjoy. If you enjoy music, John's material is simply great, and if you enjoy lyrics, you've got the right album. All of John's albums need a couple listenings in order for you to appreciate the combination of lyrics and music which this unique and listenable artist lays down on a record. John has been around for quite a while and keeps getting better. Give him a listen. After you try this first record, try his older two-record Phoenix Concert set -- it's marvelous.
2. Maddy Prior - Changing Winds Chrysalis Records (Holland) 511203. This record is generally found only in the import stacks, but is a definite prize worth having in your collection. Maddy Prior comes from the Steeleye Span Group, well known for their incredible recapturing of original English folk songs and their own compositions in a similar vein. On this particular album, Maddy acts as a soloist and has composed all of the pieces. The album represents her brilliant compositional variety, and the songs will delight you. The mixing on this particular album isn't the greatest and occasionally Maddy's voice is over-shadowed by the instruments; nonetheless the material is so exceptionally good that I commend it highly. P.S. If you haven't become familiar with Steeleye Span, you should.
3. The Beatles - Abbey Road Mobile Fidelity Sound Lab MXSL1-023. This is one of Mobile Fidelity's "original master" recordings. If you enjoyed the Abbey Road album, you will find this version of it significantly better than the American pressing and even better than any imported version you may have come across. Obviously, the original mastering on this was good and Mobile Fidelity has captured it. If you are a Beatles fan, this one is worth adding to your collection.
4. Neil Diamond - Hot August Night Mobile Fidelity Sound Lab MXSL2-024. This album is a disaster. It's obvious that the master was not worth reproducing on a two-record expensive recording. The recording only emphasizes the original poor quality of the live master, and even if you are a Neil Diamond fan, forget it. Stick with the less expensive pressing.
5. Ry Cooder - Bop Till You Drop Warner Brothers Records RSK3358. The fifties are back, and thanks to Ry Cooder and his absolutely incredible sidemen, much better, I'm afraid than the fifties were themselves. This record is a must for your collection. It was digitally mastered, so over and above the magnificent performances and music on this record, the recording quality is exceptional. The performers on this album are simply the best in the business and Ry Cooder, as usual, is spectacular. Don't be put off by the record jacket -- you'll love the music.
6. Jane Olivor - The Best Side of Goodbye Columbia JC36335. This is Jane's third or fourth recording and, once again, she comes across as an outstanding performer. None of the songs on this album are her own compositions but she is one of the best female vocalists you will find anywhere. The songs are well chosen and the style is basic MOR. All of Jane's albums are good, and if you haven't given her a try, this is a good time.
7. Nick Drake - Fruit Tree (The Complete Recorded Works) Island Records NDST100. I came across my first Nick Drake recording a couple Years ago quite by accident. It turns out that this young English composer (folk/modern) eventually wound up committing suicide. He has left us a legacy of three albums which are now available in the set mentioned above. All of Drake's compositions have an extremely haunted quality about them, both through their musical

quality as well as through his own voice. Nick Drake is a rather unique musical experience -- I've never heard anyone like him. His songs have a way of capturing a certain part of your soul and holding on. The songs aren't happy, and it's obvious that Nick Drake tried to communicate his own sense of frustration and pain through his music. While none of us is likely to feel the full intensity of his feelings, we've all experienced some of his frustrations. He is a distinct musical experience and this set is a collector's item. Listen to Drake and I'm sure there will be times in your life when you won't want to play anyone else.

8. John Williams and Friends Columbia M35108. John Williams is a virtuoso classical guitarist and is I'm sure well known by those of you who enjoy classical guitar (for those of you who have not yet experienced it you might try some of his classical albums). This particular album features two guitars, two marimbas and a bass. The sonics are excellent and the instrumental combination is extremely enjoyable. For those of you who are basically popular music fans and looking for a potential path to bridge your way over into classical, this record could well be it. For you classical music fans, the pieces and performances on this album couldn't be more interesting.

9. Johannes Ockeghem - Missa Prolationem: Motets Musical Heritage Society MHF4026. As the album indicates, Ockeghem was the greatest musician of the late 15th century. In this particular album, performed by the Cappella Nova, you will find one of the most exciting examples of pure vocal music (sans instruments) that it has ever been my pleasure to experience. For those of you who have not gotten into this type of music, you couldn't find a better place to begin. The record is published by the Musical Heritage Society, a subscription type record club whose records and selections are, in general, well worth your attention. The quality of their pressings is good, the records are almost never warped, their selection is extremely wide, and their prices are extremely reasonable. This particular recording, more than anything, got me into serious listening to similar types of vocal music. It's a wonderful way to spend a Sunday, so give it a try.

-- Gerald H. Larsen (California)

An audio engineer of my acquaintance recommended a fine rock album last year. I agree with his opinion. The album is Treason by Gryphon Harvest, EMI SHSP 4063 (import). Also, for their interesting use of effects and echo to achieve depth in their recordings, the last two Charlie records are personal favorites (especially on my 5C50 Lux preamp): Lines (Janus JXS-7036) and No Second Chance (Janus JXS-7032).

-- Norm Relich (Illinois)

Those Were the Days

Dwight David Eisenhower was in the White House and I was an engineering student at Northeastern University. A year before I had gone to a long forgotten shop on Huntington Avenue and purchased some 78 RPM records -- Glen Miller and Benny Goodman mostly -- to play on my father's Admiral record player. Then I found out about the new LP record and I decided to buy a hi-fi. I took the train from Clifton Station in Marblehead to Central Square in Lynn and then walked down toward the post office and the Olympic theatre. Covert's TV was my destination; it was a medium sized place filled with Magnavox TV's and hi-fi's.

Mr. Covert waited on me personally. He assured me that the Magnavox hi-fi was the very best you could buy. He brought me over to a mahogany cabinet about three feet high, fitted with a lid. Lifting the lid revealed a three-speed record changer occupying about two-thirds of the space available, with the remainder devoted to storage space for records and a narrow control box, vertically oriented, which had controls for volume and tone. Below the electronics were a massive 12-inch woofer and a 5-inch tweeter. Mr. Covert told me that the amplifier put out 20 watts of power, and that that was enough for anyone. He showed me the other console model, identical to the one heretofore described, except that it included an AM and FM radio. It looked beautiful, but I could not afford it.

I bought the first model he had shown me, and, looking back on it, I'm glad I did. It provided more enjoyment than any other purchase I have ever made. In the summer of 1955 I set out on a

project of reading the six volumes of Winston Churchill's Second World War; accompanying my reading was listening to the only three classical records I owned then, purchased from the Chamber Music Society, works by Debussy, Mozart, and Bartok. I can't think of Churchill without thinking of the music that went with him. Later, more and more of the money I earned while at cooperative jobs went toward records: Dave Brubeck, Louis Armstrong, Ella Fitzgerald, and Arturo Toscanini. I joined several record clubs, some more than once. (Now the record clubs offer fare which is unpalatable to me.)

In those days I did not know anyone who had a better sounding hi-fi than I had. I was completely satisfied, almost smug in the knowledge that I need not ever buy anything better. It is difficult to describe why the Magnavox sounded so good. Perhaps it was having lower expectations than I have now. When Frank Sinatra sang "In the Wee Small Hours," it was the sadness of his singing which provided an effective counterpart to my own sadness, rather than an analysis of dynamic range, ticks and pops, and wow and flutter. The music was the important thing, rather than the medium of reception. I was poorer then, and could not afford to play games. Having the music, warts and all, was better than not having any music at all.

I became the first president of the Northeastern University Jazz Society in my senior year and sometime during that year I went to a hotel in Boston where something called stereo was being demonstrated. It looked strange to me -- the pickup had two styli -- but the sound was surprisingly good. I remember being somewhat disturbed and vaguely dissatisfied. (This marks the onset of the disease. -- Ed.) Still, the Magnavox was serviceable. I went into the Army and brought it with me to my B.O.Q. at Ft. Monmouth. Later, after I married, it was carried to Dallas, Nashua, Ft. Stewart, GA (the Berlin crisis), State College, PA, and Bethpage, NY. It was only then that I decided to "upgrade" my system with an Eico kit, a stereo preamp/amplifier. The reason I bought it was to listen to stereo records. Looking back on it now, I consider it a mistake, because the sound was not so much better than the Magnavox, it was unreliable, and it ran very hot. The record collection kept growing, and the Magnavox was kept in limited service.

It was surprising what good service the Magnavox gave me. I had to replace the record player after about five years; I bought a VM, which worked pretty well. Late in its life I bought a little add-on FM tuner which I wired in. I never had any trouble with the electronics except for replacing a couple of tubes which registered "?" on the tube meter at the Radio Shack located near the corner of Corn Hill and Washington Streets. After a while I could not justify holding on to the Magnavox, and it was discarded in a large trash pickup. I don't remember my feelings at the time.

Sometimes I bring out my old jazz records from the fifties, listen to them on my present equipment, and muse about the past. They bring back memories of playing the same records on the Magnavox, and sometimes the thought emerges that the Magnavox was more satisfying. Thomas Wolfe said, "You Can't Go Home Again," and it's like that for stereo equipment. A sheen covers the past which allows the good things to peek through, but not the bad. I think I remember the wonderful sounds that I once heard, but now, with twenty-five years of listening behind me, I could not bear to listen to the rumble of the turntable, the hiss from the tube cathodes, and the clipping of the amplifier.

A couple of years ago, while visiting my parents in Ft. Lauderdale, I was waiting for a vulture to finish installing an alternator on my Citroen. While walking near the garage I came upon a TV store. Guess what was in the window? A replica of the Magnavox hi-fi, except that this one was in walnut, while mine had been in mahogany. I could have bought it for \$75.00 or less, but there was no room to bring it back to Massachusetts, and really, with what I think I know now, what would I do with it?

-- David Klein (Massachusetts)

And Yet Again, Q

Carlos Bauza is quite rightly confused about McIntosh's claims of "perfect" transient response for their woofers. Mac is partly right, but they are over-simplifying a technically complex matter.

From a mathematical point of view, no practical loudspeaker can have "perfect" transient response, as this would require response to DC. All practical speakers are high-pass filters. From this point, we will only consider 2nd-order (two-pole) systems, exemplified by the typical sealed-box woofer. What will a high-pass filter do to a musical signal? The output of a bass drum is, to a first approximation, a step function. Passed through a high-pass filter, it will decay more rapidly than it should. And if the Q of the filter is high enough, there will be "ringing" at or near the filter's corner frequency.

How high a Q is required to cause ringing? Simple math tells us that for Q greater than $1/2$, the poles of the transfer function will be imaginary, and ringing will occur. For Q less than or equal to $1/2$, the poles are real. The step function will still decay too quickly, but there will be no oscillatory components in the signal. For Q greater than $1/2$, it is not intuitively obvious just how much ringing would be audible or disturbing. If the speaker rang at, say, 10 Hz, it probably wouldn't be audible at all. But these things can only be determined by listening tests. In High-Performance Loudspeakers, Martin Colloms comments that a high cut-off frequency combined with a slow roll-off is usually subjectively preferable to a low cut-off with a rapid slope. He also says that critical listeners prefer a Q of $1/2$ to $.707$ on real speakers, in real rooms.

All this suggests that for the home constructor, a low- Q system may be very desirable, especially since he is not confronted with the problems of cost and practicality which concern a company like McIntosh. These considerations greatly alter the weight given the interacting factors in a design. For example, if our low- Q design causes too much of a roll-off of the lowest frequencies, we can't just shove the speaker into a corner to restore the response. Corner placement excites the room modes most intensely, creating the greatest acoustic ringing -- exactly the opposite of what we are trying to do.

As perfectionists, we want the cabinet out in the room, for the smoothest and cleanest response. This means that, unless the enclosure is enormous, we will need some equalization. The required boost cannot continue downward indefinitely in frequency, as it would become infinite at DC. We have to introduce second-order filtering to flatten out the boost.

But what type of roll-off? If we have a Q of $1/2$, then the desired transient response will have been preserved, at the expense of reduced power-handling capacity and a larger amplifier. And since low- Q filters show a broad, slow roll-off, we may need to put the cut-off at a very low frequency, so as to maintain flat response below 20 Hz. This means that large amounts of boost may be required. The McIntosh equalizer has 15 dB (over 30 times the power!) at 20 Hz. This would give over 20 dB of boost at significant warp frequencies, even with the required roll-off below 20 Hz, wasting a great deal of amplifier power. But once we introduce a flatter, sharper-cutting filter to prevent this, we have lost the advantage of low- Q design! (All low-pass filters are described by the same mathematics; the ear can't tell the difference between an electronic circuit and a loudspeaker with the same cut-off frequency and Q .) I can draw two conclusions from this reasoning:

1. If you're going for a low- Q design, forget about equalization. Build a big enough enclosure to get the desired response. (Those who have heard the Watson 10's know that it is possible to get substantial response below 20 Hz from a 4 cubic foot enclosure, using SF₆ gas bags. Maybe ... ?)
2. For a maximally-flat design, keep the cut-off frequency as low as possible.

As a parting shot, I have to throw a polypropylene wrench into this carefully erected machinery. The Infinity 4.5's have the clearest, cleanest, most garbage-free low end of any speaker I've ever heard. The little 0.1's (Infinitesimals), with a much higher cut-off, show a similar cleanliness, which inclines me to think it is the cone material which is responsible for the improvement. Perhaps polypropylene cones can tolerate a higher-frequency cut-off or faster slope than paper or Bextrene drivers.

-- William Sommerwerck (Pennsylvania)

And, Finally, McIntosh Replies

Our literature states "such a speaker (overdamped) produces the most accurate transient response." I agree with you that anyone claiming perfect transient response is not living in the real world. The inference here is that overdamped is better than underdamped.

There is a relationship between Q and ringing. See E. J. Jordan, "Loudspeakers," Focal Press, New York and London, pp. 41-55. "The critically damped case ... is the maximum value for a non-oscillatory condition ... $Q = .5$." A normal approach to lowering Q is to decrease moving mass or raise the BL product. If the B (the flux density) is increased, the BL product increases and the θ decreases. A common way of increasing B is to increase the magnet size. This increases the cost. It also raises the efficiency of the speaker in the upper range but causes a wider spread between output at 20 Hz and, say, 500 Hz. Of course, stating a rising response above 20 Hz or a roll-off below 150 Hz could be said to indicate whether you are an optimist or a pessimist.

To compensate for the speaker response, a McIntosh MQ 104 Equalizer is used. The MQ 104 could be said to be "Magic" if you are not aware of what it is and what it can do for you. By using the MQ 104 with a McIntosh speaker, the low frequency response can be restored. The contour of the equalizer is exactly the opposite to the woofer. The combination of the two provides flat response right down to 20 Hz. No longer are we restricted by system resonance as a low frequency limit in response. You can have all this and still have a Q of 0.5. This is what our patented system is all about. Of course, the MQ 104 is an added expense but it also has even further benefits. There are eight programmable filters in it which can be custom adjusted to compensate for possible irregularities in the response at your listening position due to room resonances. Using a McIntosh AA2 Acoustic Analyzer, your McIntosh dealer can measure and adjust your MQ 104 for the unique response caused by your listening room.

Although ideally no benefit occurs by lowering the Q below the critical damping of 0.5, our woofer is slightly overdamped. This allows for other factors such as hook-up wire resistance, terminal contact resistance, amplifier source resistance, and crossover coil resistance, all of which contribute to some degree to increasing the system Q. For practical application in the typical home system this leaves our net system Q at approximately critical damping. It requires the minimum boost at 20 Hz yet satisfies conditions for a non-oscillatory condition. This is just where we want to be.

The traditional "flat-responding" woofer is limited at the low end by system resonance, etc. (see Audio, March 1971, Vol. 55, No. 3 "Hofmann's Iron Law" by Henry Kloss). Using the conventional approach this would seem to be as far as a speaker could ever be designed -- until thinking is expanded to greater possibilities.

You have asked the question, "is there a relationship between Q and ringing?" Yes, Carlos, it is true. Can you hear it? Whether or not you can hear it may be up to you. Like many other listening situations, some people are better listeners than others. Some people claim to hear very minute differences in depth, phasing, response, transients, and under the right conditions, even speaker connecting cable, etc. If you are unable to hear the difference between a critically damped woofer and an underdamped woofer, then this may not be for you. When you use a McIntosh speaker system not only do you get the assurance of a low Q, but you also get the capability of flat response to 20 Hz and all the other design benefits throughout the frequency range.

-- R. H. Russell, Director of Acoustic Research,
McIntosh Laboratory, Inc.

(Editor's Note: The key question regarding McIntosh's position on this issue is, do they claim that the advantages of a low Q loudspeaker are maintained even though the response is electrically corrected with an equalizer? This reply from a McIntosh engineer leaves no doubt that they do in fact make this claim. As we have seen from the other treatments of the subject in these pages, the claim is misleading; their electrical correction changes the system resonance from 150 Hz ($Q < 0.5$) to 20 Hz (Q unspecified, probably about 0.7).

All of this says nothing one way or the other about the actual performance of the McIntosh speakers. Certainly the tunable filters in the equalizer could be of substantial benefit in many listening rooms. We seem to have treated the subject of Q from a technical standpoint at least as thoroughly as is appropriate. BAS members who have actual listening experience with these speakers are urged to report them.)

Educational Opportunities

At Home

In the May 1980 Speaker David Satz describes the Heath general electronics courses (not the Ham radio courses) as "overpriced (\$45 to \$60 each), as good as they are" and suggests they could sell for \$5 to \$10 less by leaving out the phonograph records. David also discourages use of the Experimenter/Trainer (\$75) which employs the electronic parts included with the courses.

What David apparently likes is the textbooks -- and they are much better than most electronics books for many people. Fortunately, the texts are available alone for much less than the cost of the course. Heath also sells the courses in pieces (for classroom use); these are available at the local Heathkit stores, but not as prominently displayed as the complete course packages. All you need to do is buy the text, for \$18 to \$25, depending on the course. The other pieces are the Workbook (\$7 to \$11, not really necessary), Instructor's Guide (unnecessary), Parts (only if you are using the Experimenter/Trainer), and Cassettes (same as the records David doesn't like; they are useless).

One thing you don't get buying in pieces is a Continuing Education Certificate if you pass the examination at the end of the course. This hardly matters unless you work for a company with a tuition reimbursement policy; if your company pays for the courses, you will need the certificate as evidence of completion.

As for the Experimenter/Trainer (E/T), it is a breadboarding system, complete with dual regulated 15 volt power supplies, 200 to 20k Hz sine and square wave generator, and isolated low voltage AC, plus a breadboard socket assembly with a capacity of about three ICs. Its value depends on you; if you like to get your hands right into a circuit, this is the way to do it. If you are mainly interested in theory and are unlikely to go inside some piece of electronics, then building circuits is less useful. As a teaching tool, you will need a multimeter as well -- which most people probably already have or will buy -- but you also really need an oscilloscope to see what is going on. So I don't recommend the E/T unless you have access to a scope. If you already have your own scope, most likely you can skip the first two or three courses. I have found the E/T very handy for testing my own circuits built from scratch. I will need to add a larger breadboard area soon, but I will continue to use the power supplies and generators built into the E/T.

If you want the rock-bottom cheapest introduction to electronics, look into the texts prepared by the U.S. Navy for training their technicians. These books are published by Dover in paperback. They are excellent, covering much more detail than the Heath courses -- maybe too much detail for people who will not work on equipment. A lot of trouble-shooting advice is included. The books cover mostly solid state electronics but there is some tube circuitry (principles are generally the same anyway). The circuits discussed in detail are nearly all of general interest, while illustrations tend towards a "representative Navy radio direction finder indicator unit." The most useful book is "Basic Electronics;" it assumes no prior knowledge and covers more or less the same subjects as the first five Heath courses and then some, and it sells for the princely sum of \$4.

-- Cary Lu (Massachusetts)

Member David Satz struck a responsive chord in me regarding knowledge about hi-fi (Speaker, May 1980, p. 5). There is a wonderful book called The Science of Hi-Fi which is actually used in some colleges as the text for a course on this subject. The authors are Kenneth Johnson and Willard Walker. It is published by Kendall/Hunt Publishing Company, 2460 Kerper Boulevard, Dubuque, Iowa 52001. It is a large, soft-bound book, 519 pages long, and costs around \$30.00.

The contents are about systems, waves and sound, decibels, waves and interference, loudspeakers, electricity, amplifiers, heat, tuners, electromagnetism, disc playing, tape decks, etc. These subjects are explained, saying "why" and "how" in terms which can be easily understood if studied conscientiously.

This book provides an eminently interesting way of learning the physics and electronics involved in our hobby. You will not be a hi-fi engineer after devouring this book, but you will certainly be more knowledgeable. Give it a try. You will truly get out of the "product fetish mentality" mentioned by Dave Satz. If the cost is too steep, get a couple of friends to chip in. I'd bet this is one of the best consumer-education books written on any subject.

-- Carlos E. Bauza (Puerto Rico)

And At School

Brandeis University's Office of Continuing Studies will offer a course entitled Music in the Electronic Age, taught by Harold Shapero, Professor of Music. Designed for today's music listeners, this course offers an introduction to high fidelity, audio equipment, and modern recording processes on records and tape. Discussion of problems in understanding contemporary music will be included, with keyboard demonstrations by the instructor and recorded examples.

Class members will have available to them the use of the Brandeis Electronic Music Studios, with laboratory sessions in microphone techniques, tape recording, and related audio procedures. Instructions in the use of music synthesizers will be offered to those interested. Instrumental proficiency is not required, only a healthy interest in music.

This course, which is one of nearly fifty being offered in the Brandeis University Fall 1980 Adult Education Program, starts on Tuesday evening, September 23, and runs for a total of eight Tuesday evenings. For complete information on all courses and registration material, please call or write: Office of Continuing Studies, Brandeis University, Waltham, MA 02254, (617) 647-2796.

-- Sanford Lottor (Massachusetts)

(We regret that this notice did not reach our readers before this course began. Notice of future offerings that may be of interest to BAS members will be more timely. In the meantime, Mr. Lottor is interested in hearing from BAS members whether they are interested in this course, or a similar offering with slightly different emphasis; he may be reached at the above telephone number or address. -- Ed.)

Feedback Isolation

There is general agreement among audiophiles that acoustical and mechanical feedback in the disc playback chain should be kept to a minimum. This not only prevents "howling" when the feedback is severe, but also minimizes the more subtle time smearing distortion that feedback can produce. Not so well understood are the paths by which acoustical energy can be reintroduced into the disc playing system. Feedback enters the system in three ways.

- (a) Structure-borne feedback. Acoustical energy is transmitted back to the turntable system through the floor, shelves, cabinets, or walls on which the turntable is mounted. This type of feedback enters the turntable through its base and is transmitted upwards to the tonearm and platter and eventually to the stylus.
- (b) Airborne feedback. Acoustical energy is transmitted directly from the speakers to the turntable base, dustcover, platter, record, tonearm, etc.
- (c) Stylus chatter feedback. This is the result of vibrations generated in the record by the moving stylus. These vibrations travel around the record and eventually come back to the stylus generating electrical output from the cartridge that bears no relationship to the groove being played at that instant.

The first two types of feedback are minimized by belt-drive turntables that employ a common subassembly, carrying the platter and tonearm, which is isolated from the rest of the base by springs (Linn-Sondek, Ariston, Dunlop Systemdek, STD, AR and Thorens). Direct-drive (and some belt-drive) turntables are particularly susceptible to these forms of feedback since any energy added anywhere in the turntable ultimately finds its way to the stylus. Some manufacturers have attempted to isolate the feedback from the platter and tonearm by using compliant tonearm mounts and compliant bearing thrust plates. Unfortunately, adding compliance in these areas can cause more problems than it solves by allowing the tonearm and platter to move asynchronously with respect to each other. The third type of feedback, stylus chatter, can be minimized by tightly coupling the record to the relatively more massive platter.

We tested three products designed to minimize feedback of the sorts mentioned above: the Isobase, the Spectra mat, and the Eon Pod record clamp. The Isobase is a two-piece platform separated by four or six springs, the number depending on the mass of the turntable to be placed atop it. The Isobase is designed to trap structure-borne feedback before it can reach the turntable base.

Our test of the unit consisted of placing a Rega 3 turntable with a MM cartridge on the Isobase. (The Rega 3 is a belt-drive turntable, but like most direct-drive units it uses compliant feet for feedback isolation.) The cartridge was placed in contact with a stationary record on the platter. A broad band speaker was placed so that it fired directly at the shelf on which the turntable was mounted. Pink noise which was low-pass filtered at 1 kHz was fed to the speaker and the output of the cartridge was viewed on a spectrum analyzer. The results are shown in Table 1.

Table 1. Base Isolation Test

Condition	Cartridge Output at Each Frequency (dB)		
	32 Hz	63 Hz	125 Hz
Without Isobase	-18	-6	-21
With Isobase	-21	-12	-24
Background (noise source off)	-24	-12	-30

The relatively high background levels make the results a little uncertain, especially at 63 Hz, but the data show reductions in feedthrough of at least 3 dB at 32 Hz, 6 dB at 63 Hz, and 3 dB at 125 Hz. Products such as the Isobase obviously offer worthwhile reductions in structure-borne feedback when used with turntables lacking an adequate suspension system.

The Spectra mat and the Eon Pod were tested to see if they offered any reductions in stylus chatter feedback. The Spectra mat is a dense, tacky mat constructed of three layers of elastomer. It forms an efficient seal with the record, often requiring the user to peel the record from the mat. The Pod is a three-legged device that clamps onto the spindle and presses the record to the mat. This increases the coupling of the record to the platter. (The Pod is also advertised as being effective at flattening record warps. It will cure some types of warp problems, but must be carefully positioned to do so. Also, some tonearms will catch the legs of the Pod when the arm is in the locked groove at the record's end.)

The turntable assembly previously described was used for these tests. The stylus was placed on a stationary record and a small weight was dropped on the record opposite the stylus. The results of this test were repeatable to within ± 1 dB. The output from the cartridge was monitored on a sound pressure level meter. It should be mentioned that the mat supplied with the Rega 3 is of the wool felt type. These mats offer little coupling of the record to the platter. The results of these tests are shown in Table 2.

Table 2. Mat Isolation Test

Condition	Cartridge Output (dB)	
	Background	Tap
Rega mat	-12	+3
Rega mat + Pod	-12	+3
Spectra mat	-12	0
Spectra mat + Pod	-12	-1

The figures in Table 2 indicate that the Spectra mat offers a 3 dB reduction over the regular mat in the feedback reaching the stylus through the record. The addition of the Pod record clamp increased the isolation (with the Spectra mat) by an additional 1 dB.

In summary, acoustical and mechanical feedback can be minimized by the following procedures.

- (a) Keep the turntable as far from the speakers as possible. Moving it to a separate room would be ideal.
- (b) Mount the turntable on a sturdy counter or shelf that is damped by loading it with records, books, amplifiers, etc.
- (c) Do not mount the turntable in a corner. Bass reinforcement is usually the strongest there.
- (d) Use a compliant base (or feet) between the turntable and shelf.
- (e) Couple the record tightly to the platter. Use a smooth mat, not one with ridges. Use a record clamp or weight. A clamp is preferred since it places little additional strain on the turntable bearing and suspension system.

Isolation devices, like the ones tested in this report, can produce audible improvements in most turntable systems. Before buying a new turntable (which may not incorporate solutions to your problems), audition these isolation devices on your present unit.

-- Charles R. Ward, James E. Thompson, and
Mallory T. Harling (Colorado)

The Audiopulse Model 1 at 50,000 Miles

I've had my Audio Pulse Model 1 for about three years now. After several months of initial use, I wrote a glowing piece for the BAS Speaker extolling the concept in general and the Audio Pulse in particular. The unit is not without its flaws (noisy switches, turn-on thumps), but its effect is marvelous and durable. Unfortunately, my Audio Pulse got sick about a year ago and it took several visits to the factory (now in California) to get it working correctly. That lasted for about six months (maybe less, I'm not sure). Its latest symptom is that changes in the delay time cause dramatic changes in both level and left/right balance in the secondary channel outputs. I compensated for this for several months by adjusting the amplifier gain controls, because I was too tired to have another two- or three-trip go-round with the factory. But I guess I'll try again. Those of you with an Audio Pulse Model 1 might do some checking on your own to see if your unit exhibits this phenomenon. It can be most easily demonstrated by connecting the secondary outputs to an amplifier with a meter display and then sending simple tone signals through the system. If the outputs look screwy as you change the delay control, you have a sick unit. For those of you considering buying a used unit, you should check this phenomenon very carefully and be sure that the unit is working correctly before you purchase it. With the factory now located in Southern California (and I think this is the only place where repairs are made), a sick unit can be a frustrating experience.

-- Gerald H. Larsen (California)

Speaker Cables Clarified

Anent "Speaker Cables Compared" by Ward, Thompson, and Harling in the April Speaker: the authors omitted the "j" from their equation (2). The correct form is $Z_0=(R/j\omega C)^{0.5}$ which means that the characteristic impedance of a cable with the assumed parameters has equal resistive and reactive components.

The statement "A lossless line is one in which all frequencies travel through the cable at the same velocity" should be modified to read "In a lossless line all frequencies travel through the cable at the same velocity." They also all travel at the same velocity in a lossy line in which $R/L=G/C$, where G is the shunt conductance per unit length, and R, L and C are as defined in the article. The attenuation constant of such a line is $(RG)^{1/2}$. Interestingly, the characteristic impedance is resistive and has the value (L/C)

The statement that "The frequency (f_m) above which a cable begins to act as a lossless line can be calculated from $f_m=R/2\pi L$ " should be applied with caution. In no case does a transmission line begin to act like a lossless line as frequency increases; in fact, the losses invariably increase with frequency (except in the very special case of a hollow waveguide). All that equation (3) represents is the frequency above which the formula $Z=(L/C)^{0.5}$ can be used to calculate the characteristic impedance with reasonable accuracy, and even at this frequency the value obtained will be in error by 18.7 percent in magnitude and 22.5 degrees in phase. At $5f_m$ the error will have diminished to less than 1 percent and 8.2 degrees.

The editorial comment that, in order for a cable to act as a transmission line it must be many wavelengths long at the lowest frequency of interest is a bit heavy. Actually, some funny things will start to happen if it is more than a tenth-wavelength long at the highest frequency of interest. At a quarter-wavelength, $Z_{in}=Z_o^2/Z_{load}$, so that a 100 ohm line (lossless!) terminated in an 8-ohm tweeter would present a 1250 ohm load to an amplifier! (This will be true at 20 kHz for a 100 ohm speaker lead about 48,000 feet long. -- Ed.)

To return to more immediately practical considerations, the ohmic resistance of the voice coil of an electrodynamic speaker is a series element of the speaker's equivalent circuit. In most speakers its value is about sixty percent of the rated "impedance" of the speaker, although somewhat higher values are common in the currently popular long-throw woofers. Taking the 60% value as typical, the DC resistance of an 8-ohm speaker will be about 5 ohms.

The temperature coefficient of resistance of annealed copper is .00393 ohms/ohm/degree C. ² Therefore a one-degree Celsius temperature rise of the voice coil results in an increase of voice coil ohmic resistance of .01965 ohms. This is equivalent to adding 6.2 feet of No. 12 copper speaker cable, or 1.539 feet of No. 18 cable. (Loop resistances .00318 and .0128 ohms/foot, respectively. ²) Moral: If you are looking for "effects" from speaker cables be sure to maintain the test environment to well within one degree Celsius!

The situation is actually much worse than indicated above, however. As soon as a loudspeaker receives a high-level music input, the voice-coil temperature will vary in accordance with the envelope of the audio signal, and will, to some extent, "follow" low frequency signals, especially in the case of currently popular low-efficiency units. (Yes, Virginia, those kilowatts have to go somewhere!) My guess is that long-term temperature rises might often reach 75 to 100 degrees C. The result is much the same as if the speaker cables were "tromboned" by something like one to several hundred feet! Compression? Yes! Harmonic distortion? Yes! Intermodulation? Yes! Maybe someone will soon introduce a superconducting cryogenic speaker to cope with this; meanwhile it appears that a little series resistance in the cables might actually help to "swamp" these effects!

Enjoy the can of worms!

-- Elbert Drazy (Massachusetts)

References: ¹ Elements of Acoustical Engineering, H. F. Olson, D. Van Nostrand Co., Inc.

²Reference Data for Radio Engineers, Fourth Edition, IT&T Corp.

Experiences With Permostat

Since October '79 several of my records have been treated with Stanton's anti-static spray, Permostat. From that moment these record show no static charge, and do not attract dust. After eleven months this effect is as good as it was originally.

For two years previous to that I had been using Sound Guard, and of the two products I favor the Permostat. The Sound Guard initially reduced friction and static on my records, but these effects disappeared after about two months. No other ill effects were noticed, not even noise. But the protection was short-lived. Based on this experience of eleven months, I believe that Permostat is truly significant in preserving record life.

-- Carlos E. Bauza (Puerto Rico)

Quad Pro Quo

This is in response to Peter V. K. Brown's question about whether to use a 100 Hz or 50 Hz crossover with Quads and a subwoofer.

I have been using Quads crossed over to a Janis W-1 at 100 Hz. I have the DeCoursey crossover Janis was supplying some years back. I have only one W-1, so it is connected in a summed configuration, although the DeCoursey also provides discrete subwoofer connections.

The Quads are said to drop off pretty rapidly below 80 Hz. This was no doubt one consideration in the choice of the 100 Hz crossover point.

I happen to have engaged in some personal correspondence with John Marovskis, the designer of the Janis system. He uses Quads himself and is enthusiastic about them. I think it is quite possible that the Janis W-1 might have been developed originally in connection with his own Quad set-up. I don't know this for a fact, but he did mention that he had been using Quads for quite some time. Since he has solved the problem of the combination so well, we might take advantage of his technical expertise in selecting the 100 Hz crossover point.

In my own system I have felt that the excellent reproduction of voices was among the most endearing qualities of the speakers. I certainly have not been aware of any voice distortion caused by the 100 Hz crossover even though I have the old 18 dB/octave unit and I believe a 36 dB/octave device is now available. When I have occasionally turned off the Quads while the subwoofer continued to play, I have noticed that the voice content coming out of the Janis was pretty subtle, even when the vocalist was J. D. Sumner. The Janis, of course, can rattle the windows all you want, but my experience has been that the longer you use a subwoofer the lower the correct setting seems to be for a good musical balance. The DeCoursey is handy in this respect, because it provides for a unity gain for the system once you have adjusted the relative loudness you prefer for the subwoofer.

Janis currently supplies a clever test tape and instructions for balancing a subwoofer system accurately. This can be purchased separately even if your subwoofer is another brand. The DeCoursey also provides a bypass switch which is handy for A-B comparisons. I have also found this switch convenient to shut down the subwoofer on a few popular recordings that have a considerable bass boost.

My own experience is an inversion of Mr. Brown's in that I used my subwoofer for a number of years with a variety of dynamic speakers before I got my Quads. I would certainly say not to worry about any coloration on vocals.

-- Lohr H. Gonzalez (Puerto Rico)

In the Literature

Audio, August 1980

- *Audioclinic (p. 6): Questions and answers
- *Audio ETC (p. 8): Pop vs. classical, multitrack vs. simple miking.
- *Tape Guide (p. 16): Q & A about recorders.
- *Behind the Scenes (p. 18): Digital and other equipment seen at the May AES convention.
- *Paul Klipsch (p. 27): Interview with the horn master.
- *Alternative Speaker Technologies (p. 32): How various kinds of speakers operate.
- *Energy Storage Bank (p. 38): Procedure for assembling and hooking up big capacitors to beef up your amplifier's power supply. Own your own Farad!
- *Equipment Reviews (p. 50): Mitsubishi DA-R20 receiver (excellent FM tuner, fine amplifier, good dynamic headroom, preamp fine but phono S/N measures better than the theoretical limit, sounds good). Shure SM-81 cardioid condenser microphone (electret, phantom-powered, rugged, extremely flat response over the frontal hemisphere, very low internal noise, accepts high sound levels, an outstanding professional mike).

Audio Engineering Society Journal, July/August 1980

- *Minidisk (p. 510): Details on Teldec's proposed digital disc record.
- *Digital Audio Disk Standardization (p. 525): The considerations which are being applied in international conferences to select a standard disc format.

Electronic Design, August 2, 1980

- *MOSFETs Simplify Amplifier Design (p. 75): Details on how Hitachi's MOSFETs enable the design of a simple high-performance amp, exemplified by the Hafler.
- *Bipolar Transistors for All Loads (p. 83): Tom Holman describes why Motorola's new complementary bipolar output transistors are even better than MOSFETs, with twice as much current capacity.

Gramophone (England), July 1980

- *The Art of Culshaw (p. 123): A reminiscence of the great producer.
- *Equipment Reviews (p. 172): Rogers A100 integrated amplifier (excellent performance, good with low-impedance or electrostatic speakers). Tensai TD530D turntable (a pretty good budget unit). Empire EDR. 9 cartridge (quite good at its price, flat response except for 2 dB bump at 10 kHz). Boots SM-1 stereo microphone (cheap and effective).

Gramophone, August 1980

- *Equipment Reviews (p. 289): Quad 44 preamp (unusual but highly effective tone controls, flexible input modules, optional m. c. head amp very quiet, RIAA eq. very accurate but follows IEC curve with rolloff below 50 Hz, overall performance excellent). Eagle C-7800 cassette deck (budget price, good performance).

Hi-Fi News & Record Review, July 1980

- *The Record Business (p. 41): Some background on boom-and-bust economics.
- *Subjective Sounds (p. 51): In which Paul Messenger says good things about The Audio Amateur, The Absolute Sound, and refers to the BAS Speaker as "required reading."
- *High Fidelity 80 (p. 52): A glance at new products.
- *The Nonesuch Saga (p. 67): How that fine record label was sabotaged by its corporate owners; reprinted from The Absolute Sound.
- *Creative Tape Recording (p. 77): Ten pages on venturing forth with mikes and tape to capture live sound, from birds to music; including a couple of pages on binaural technique.
- *Quality Monitor (p. 99): Re-assessing the sound of the best recent discs. Getting pickier and pickier about their idea that coincident-mike stereo is the only true stereo.
- *Equipment Reviews (p. 125): A comparative review of three open-reel tape decks (Philips

N4520 best, Tandberg TCS20A next, Teac X10 last, though all three are generally good). Three microphone mixers (Teac/Tascam 2A best, followed by Sony MX-650 and Bandive Prokit 62). QED PPI-2 peak program indicator (well designed, with an effective procedure for calibrating it to one's recorder).

Hi-Fi News & Record Review, August 1980

- *Another Purist Technique (p. 55): About the virtues of M-S miking.
- *Subjective Sounds (p. 59): Comments on the Koetsu and Grado Signature cartridges and the NAD 3020 amp.
- *Positive Feedback (p. 65): Updates on previous discussions of equalizers, holography of speaker cones, and viscous tonearm damping, with the interesting notice that in paddle dampers the shape and orientation of the paddle have no effect on the amount of damping exerted in the vertical and horizontal planes!
- *The Record Business (p. 69): Part 2 of a discussion of the continuing self-destruction of the major record manufacturers by carelessness and greed.
- *Improving Groove Contact (p. 75): Presenting the theory behind the Van den Hul true "line-contact" stylus, looking much like a cutter stylus.
- *10 Pickup Cartridges (p. 117): A comparative review with elaborate lab tests and a listening-panel evaluation, arriving at this approximate ranking: Goldring G900IGC and Glanz MFG-71E liked best, followed by Fidelity Research FR-1 Mk3F, Ortofon LM30, Westrak 501PH, then Nakaoka MP50, Coral MC81, Empire EDR. 9, M97HE, and Satin M117S liked least. Many interesting details in the review, well worth reading.
- *Five Floorstanding Speakers (p. 131): Acoustic Research AR91 and 92 (sound good but not great, overpriced in England, not enough difference in performance between 91 and 92 to justify the, 91's higher price). Monitor Audio MA2 ("remarkably open and neutral" with excellent transient response, though a trifle hard at very high volume levels). Tannoy Cheviot II (treble peaky on-axis, sound somewhat boomy and brittle, but imaging is good and they play loud). Wharfedale TSR110 (pretty smooth and well-balanced, good bass, plays loud, a good buy).

High Fidelity, August 1980

- *CrossTalk (p. 18): Questions and answers.
- *Equipment Reports (p. 23): dbx 224 tape noise reduction system (excellent encode/decode tracking, aggressive noise reduction, recommended for use with open-reel decks). Sanyo N-55 "Super D" tape noise-reduction system (also marketed under the Fisher name; works well, particularly recommended for use with cassette decks). Nakamichi High-Com II tape noise reduction system (switches from encode to decode, you'll need two -- \$960 -- if you want to monitor; the companding is not decibel-linear, which minimizes breathing but requires level calibration like Dolby; excellent encode/decode tracking, exemplary response, will work nicely with cassettes as well as open reel). Lux 5K50 cassette deck (price \$2000, three heads, bias trimmer, Dolby rec cal controls on bottom panel, good performance when adjusted flat by ear). Dual C-830 cassette deck (unusually flexible six-way tape selector but no bias trimmer; equalized peak-reading LED meters; three heads but one set of Dolby circuits only, thus off-tape monitoring is not decoded; performance very good except for some bass rolloff). Harman-Kardon hk-705 cassette deck (unusual low-profile design, cassette goes into a drawer, making head-cleaning difficult; mediocre wow and flutter; excellent response; employs Dolby HX for improved high-frequency headroom). Incidentally, the curves don't fully document the improvement HX makes, since they compare the response with Dolby NR off against that with Dolby NR and HX on; of course, nobody uses a cassette deck with Dolby NR off, and using Dolby NR aggravates high-frequency saturation losses, making the improvement provided by HX that much more worthwhile.
- *Noise Reduction Systems (p. 40): A further detailed comparison of the dbx 224, Sanyo Super D, and Nakamichi High-Com companders, plus a Dolby B unit for reference. Each has pros and cons, none is ideal and none is fatally flawed. An insightful analysis.
- *Buying a Budget-Priced System (p. 46): Mike Riggs gives good, practical, down-to-earth shopping advice for the novice.

HiFi Stereophonie (Germany), July 1980

- *The musical section of this issue contains several articles dealing with humor in music (pp. 790, 792, 795).
- *Kagel's Making Jokes and the Exhaustion Thereof (p. 797).
- *The Unknown Zauberflöte (p. 802): Ruth Berghaus' production at the Frankfurt Opera.
- *Jazz Portrait - Louis Armstrong (p. 804): Including discography.
- *Test Reports (p. 850): The Mitsubishi LT-5V turntable (belt drive, tangential tonearm, vertical only, works okay). The Technics SL-10 turntable (simple and foolproof handling, performance is excellent). The Amcron (Crown) Straight Line One/Power Line One, the Sharp Optonica SO-9100H/SX-9100H and the Tandberg TCA 3002/TPA 3003 preamplifiers/power amplifiers (ranked in a reverse order, the mediocre result of the Amcron due to poor S/N and distortion). The Arcus TM 75 and the KS Linea B 530 loudspeakers (both excellent vented bookshelf speakers).
- *The Speaker Cable (p. 872): Hints for selecting the right cable type and length, accompanied by a test of several commercial and home-made samples. There are only two important parameters of the cable, i. e., its resistance and inductance, but the impedance characteristic of the loudspeaker and the load tolerance of the power amplifier have to be considered first.

HiFi Stereophonie, August 1980

- *Chances and Cogencies of a Resumption - Music in the Fifties (p. 902).
- *The Great Inertia in the Post- Fifties: The Darmstadt Holiday Lectures on New Music (p. 906).
- *Toscanini, Furtwängler, Kleiber ... The Musical Testaments of the Old (p. 909).
- *Jazz and Pop Music in the Fifties - The Grey Decade (p. 912).
- *Rock 'n' Roll in the Fifties and the Public View (p. 916).
- *Test Reports (p. 951): The Shure M97HE cartridge (a rave review). The Sharp Optonica ST-9100H tuner (measured well, less so in actual use). A composite test of the Grundig Serie 5000, the Mitsubishi E-Serie and the Wega Modul 1 tuner/amplifier combos (good, the Grundig best in the group). The Nordmende RP 1400 turntable, TU 1400 tuner, PA 1400 integrated amplifier and CD 1400 cassette recorder (good). The Technics SB7 and SB10 loudspeakers (three-way, using flat honeycomb membranes for the bass and middle units and a ribbon tweeter, both very good, neutral and detailed).

Modern Recording & Music, August 1980

- *Ambient Sound (p. 56): Len Feldman speculating about how low-feedback transistor amplifiers must have the tube sound that "we all crave," with much reduced TIM. (Rubbish. -- PWM)
- *Reviews (p. 58): Eumig FL-1000 cassette deck (elaborately microprocessor controlled, interfaces with computers for automated operation, performs well). AB Systems 1200A power amp (potent, plenty of output current, rugged, modular construction, quiet fan). Logical Systems 8801 Dynamic Noise Filter (reasonably effective for removing low-level hiss and also low-frequency rumble from recordings).
- *An Overview of Crossovers (p. 68): A basic intro to bi-amplification.

Popular Electronics, September 1979

Note the date; this issue was not included here when it was published a year ago, because it was borrowed.

- *Stereo Scene (p. 14): Some comments on speaker placement versus standing waves and boundary reflections.
- *Audio Reports (p. 23): Optonica SA-5901 receiver (superb FM tuner section, mediocre AM, preamp good except for shallow filters, power amp excellent at 8 ohms, current-limited to 5 amperes at 4 and 2 ohms). Aiwa AD-6900 cassette deck (three heads, solenoid control, bias trimmer and Dolby rec cal controls on front panel for each tape type, performance is outstanding). Ohm I loudspeaker (top-mounted drivers yield quasi-omnidirectional dispersion, bright sound; relatively inefficient, needs power and can handle it).
- *Close Look at Digital Audio (p. 39): An introduction to PCM, its virtues and problems, plus an inside look at the operation of the Sony PCM-1 audio-to-digital converter for VCRs, complete with a detailed block diagram.
- *Stereo Parametric Equalizer (p. 47): Details on a kit for a two-band parametric which should work rather well at modest cost.

*LED Spectrum Analyzer (p. 62): Details on the kit version of the Gold-Line analyzer, a poor man's version of the octave-band Ivie. While it lacks the 1 dB precision, 80 dB dynamic range, and calibrated microphone of the Ivie, it looks like a good value for the price.

Popular Electronics, August 1980

- *Entertainment Electronics (p. 14): New tape formulations are filling in the gap between conventional and metal formulations.
- *Reviews (p. 24): BIC TPR600 speaker (horizontally omnidirectional, broad and diffuse imaging, strong bass, bright highs). Rotel RP-9400 turntable (low-mass arm, good arm geometry, low rumble, above-average immunity to vibration, a good unit). Sanyo P55 power amplifier (MOS-FET outputs, liquid cooling, relatively compact and lightweight for its power, continuous output strong into 8 and 4 ohms).
- *Video Test (p. 32): Zenith System III color TV (includes mid-band and high-band cable TV tuning, SAW filter for maximum selectivity and resolution, flexible frequency-synthesis tuning, comb filter for maximum color detail, and superb color demodulation).
- *AM Stereo (p. 57): Details on the operation of the Magnavox system for AM Stereo that the FCC tentatively approved and then postponed deciding on.

Stereo Review, August 1980

- *Audio Q & A (p. 18): An essay on sonic illusions, the goal of hi-fi, and speaker directivity.
- *Audio Basics (p. 22): Straight-from-the-shoulder advice for the speaker shopper.
- *Tape Talk (p. 24): Q & A about tape recorders.
- *Technical Talk (p. 29): Reports on how B&W and KEF are using computers in speaker design, production, and development.
- *Test Reports (p. 32): Pioneer PL-400 turntable (medium-high arm mass, good geometry, significant levels of infrasonic rumble, mediocre isolation from vibration, otherwise superb). Audio/Pulse Model 1000 digital time-delay ambience reproducer (very low noise and distortion, wide dynamic range, 7 kHz bandwidth, elaborate reverberation circuitry, built-in dynamic expander ahead of the delay circuits, sounds very good, "one of the best of the breed" of delay units). Mitsubishi DA-R20 receiver (analog tuning, digital display, unconventional control layout, built-in MC head amp, Record Out selector independent of the Input Selector, good filters, amplifier is clean and quiet, good dynamic headroom at low impedances, FM tuner has wide/narrow Us and good performance). Nikko Alpha VI power amplifier (clean and powerful at 8 ohms, okay at 4 ohms, severely limited at 2; fan is annoyingly loud; elaborate protection circuits imply reliable operation). Nakamichi 680Z cassette deck (excellent performance at standard speed, amazing performance at half-speed of 15/16 ips; exceptionally accurate response, unusually precise Dolby tracking, remarkably flat bass; sounds great).
- *Loudspeaker Placement (p. 56): Peter Mitchell tells the whole story.
- *Loudspeaker Power Requirements (p. 63): Roy Allison surveys the problem and reports his discovery that small amplifiers overdriven into clipping do not burn out tweeters faster than high-powered amplifiers operating below clipping.

Studio Sound, July 1980

- *Distortion During Copying and Mastering (p. 60): A remarkable study by DG engineers of the distortions in the master tape, in second and third generation copies from the original master, and in discs made from these tapes. Conclusion: it really is true that discs made from original master tapes are cleaner than discs made from third-generation copies, as is the usual practice. To avoid cascading distortions, each successive tape copy should be about 3 dB lower in level than the preceding generation.

-- Peter Mitchell (Massachusetts) and Jiri Burdych (Czechoslovakia)

July BAS Meeting

The July meeting was held at the GTE Laboratories in Waltham; the main speaker was Larry Klein, Technical Editor of Stereo Review.

Peter Mitchell opened the meeting with several announcements:

- (1) The dues will remain at \$12 for at least one more year.
- (2) We are going to make an effort to expand the membership in order to offset increased expenses.
- (3) Our treasurer is retiring soon and anyone who is qualified and interested in the position should let it be known so that he or she might be nominated at the next meeting.
- (4) We are once again short of meeting summary writers. Anyone interested should contact Brad Meyer.
- (5) Shop Talk, the local audiophile radio show, was abruptly cancelled for the summer by the station management. There seems to be no clear reason, only a great deal of speculation, as to why this occurred, but the station management is giving assurances that the show will be back on the air in the fall.
- (6) There are several proposed revisions to the BAS Constitution which must be voted on by the membership. These will be printed in the Speaker and then submitted to the membership for a vote at the subsequent monthly meeting.
- (7) The Ivie spectrum analyzer has arrived. It will be ready to loan to members as soon as Peter completes the construction of the pink noise generator and the writing of the instruction sheets explaining its use.

During the open forum, Al Foster announced that he had tested the ribbon tweeter currently being offered by B & F (Peabody, MA) for \$40 (marketed as the Aperture Ribbon Loudspeaker, it is made by JVC). It measured very well: ± 1 dB from 5 kHz to 20 kHz at one meter on axis. It had excellent lateral dispersion and good, but limited, vertical dispersion. Distortion was very low: typically 50 to 65 dB down.

Ira Leonard announced the existence of a federally-funded clearing house called the National Information Center for Quiet. They will provide free booklets on request to: P.O. Box 57171, Washington, DC 20037.

Peter introduced the main speaker with the observation that, in his view, Stereo Review has maintained the highest standards of technical information of any of the audio magazines and that this was in large measure due to the efforts of our guest, now in his eighteenth year with the magazine. Larry Klein began his career working as a technician at the White Sands proving grounds in the 1950s, authored a text on oscilloscopes, and has risen through the ranks at Stereo Review to his present position of Technical Editor in which he is now responsible for all technical material appearing in the magazine.

Klein began with a brief description of how a product is selected and tested for the Equipment Reports feature. Selection is made using several criteria: uniqueness of the product, the level of reader interest in the product, how recently a product of the same manufacturer was reviewed, what the product costs, etc.

Until recently, it was assumed that readers were not interested in reading reviews of very expensive "high-end" products and such units were therefore not tested. This policy is now changing in response to what appears to be substantial reader interest in products far too costly for most of them to buy, as reflected in the response the magazine received to a recent review of a power amp by Threshold. However, reader interest remains highest in the "middle-high" price bracket and thus most equipment is chosen from this group.

Due to the large number of manufacturers and the limited space allotted to equipment reviews, it is important to distribute that space carefully and no manufacturer, no matter how large, can expect to have a product reviewed more often than once every eleven months. After a brief account of the order in which various people at Stereo Review see the product or its review

(Larry, Julian Hirsch, Dave Ranada, etc.), Klein accepted questions from the floor. His responses are summarized by topic, with occasional quotes.

Magazine Economics

Stereo Review survives on its advertising revenues. The income from subscriptions and newsstand sales just about pays for the distribution of the magazine. One reason for this is that, from the magazine's point of view, so many subscriptions are giveaways. When Publisher's Clearing House or other such companies sell you a subscription to a magazine, it is common for them to keep every cent you pay them, rebating nothing to the magazine. Magazines do this because they want to build circulation so that their ABC figures (Audit Bureau of Circulation) rise and they can charge more money for ads. (Stereo Review's circulation is currently 540,000.)

You will notice that those bargain subscriptions almost never sell for less than half of the normal subscription price: that is because the ABC will only count subscriptions in the circulation figure if they have been sold for at least 50% of the regular price. "You can tell when a magazine is trying to build circulation by whether or not it appears in a Publisher's Clearing House mailer, because that is an expensive way to build circulation."

You may have noticed lately that the magazine is getting very thin; this is because the publisher must keep a 50% advertising/50% editorial space ratio in each issue. That seems to be the proper profit ratio, so if advertising is down, the editorial space therefore shrinks. Columns such as the "Installation of the Month" are fillers, i.e., they can be added or removed depending on the amount of editorial space available.

Pressure from Advertisers

The manufacturers usually do not see the reports before they are published. If a real anomaly is found, Klein will call him and get his reaction. This may be something like, "Ah, they all do that," or sometimes, "I'll have to send a Telex to Tokyo about this" (many importers have very little knowledge of what they are selling). But sometimes the product is okay and the review is run, and the manufacturer yells, "How could you say that about such and so," when Klein may not have thought it was a serious matter. Then the manufacturer contacts the advertising salesman who contacts the publisher, who contacts Klein, and so on. "Onkyo attacked us for claiming that DC amplification has only imagined virtues. They had us on the phone for a total of probably three hours over that one. We get a lot of that ..."

The Quality of the Equipment

Manufacturers sometimes have problems differentiating their products from those of their competitors, as well as from their own products of the previous year. To do this they develop a "gimmick," thereby claiming their product is unique. This is easy for someone like Carver. He has a gimmick but often all that Pioneer or Onkyo or Toshiba or Kenwood can do is go to things like Class A. Klein does not object to that as long as the gimmick does not add expense without giving value.

The problem that reviewers face is that the equipment today is so good. In the tube days 25% of the products Stereo Review tested came in with substantial defects; now, the units that come in are likely to perform as well as the test gear. Sometimes if a unit does not meet spec, it's hard to be sure whether the device under test or the test equipment is at fault.

SR also does listening tests; the comparative test of minispeakers a few issues ago is an example. What they found is that the panel could agree on the best and the worst but that they could not get complete agreement on how to rank the units in the middle.

"Julian listens to everything, particularly speakers. He doesn't believe that there is much difference to be heard with amplifiers which aren't the result of trivial factors... He reads all the publications where people claim to hear great differences but every time he gets involved in these listening tests he finds it a waste of time. Amplifiers do sound different if they are working into a funny load or are fed by a funny source, and so on, but if you get rid of these factors the

differences in sound disappear also, and many people whose tests I trust have come to the same conclusion."

Speakers are another matter. There are a lot of bad speakers on the market; but when you deal with good speakers the problem returns. A couple of weeks earlier Klein listened to the new KEF 105s, some Linn Isobariks, and a pair of Quads. It was an extended A, B, C test with the speakers driven by high-end gear. His conclusions: the Quads were directional and had a weak extreme top end and a weak low end, and the KEFs and the Linns sounded different but there was no way of choosing between them; one would sound better on some material, another would be preferable on something else. "I can understand the joy of ownership of a costly piece of equipment -- Julian and I both liked the quality of the Threshold power amp -- but it still does not sound better... Imaging characteristics are mostly due to phase anomalies; I cannot imagine how, for instance, electronics could influence the height of an image, as some people claim."

The "Underground" Magazines

"Stereo Review is not in the business of making mountains out of molehills, like many publications." The little magazines will set up tests with 15 uncontrolled variables, which Klein feels is irresponsible. "The vast majority of differences that we hear are trivial and I can't get excited about a difference that can be wiped out by a twitch of an equalizer . . ." As for The Absolute Sound. "I made the mistake of writing them a letter which I thought was rather friendly and witty and they came back, 'Kill!' Well, that was the end of that; I don't want to play straight man for them any more."

On "Easy" Reviews

"Our reviews are not all good; some of them are excellent." You are not going to find anything less than "good." There are many reasons for that aside from the awful power of advertising. One is the ignorance of the audiophile; it is easy to get a product forever damned by a bad review.

If Julian Hirsch has something negative to say, it will be in the report, but it will often be between the lines. SR is not going to do any more competitive tests, like the minispeaker tests, "because where there are winners, there are bound to be losers ... If someone loses in Stereo Review, they're hurt badly." After that test Klein got a call from a fellow at General Sound, who pointed out that as a result of that test they lost three reps and had a lot of units returned. "I felt awful, but then he went on to admit we were right, that the Braun L200 was the best of the group ..."

SR's reviews will probably get a little tougher in the next few months. Their new publisher came to them from "Popular Photography," which is known for its frank product reviews. Klein will also have greater freedom to review products that don't come from advertisers.

When Julian sends over a review he also includes a private note. Klein asked for this in order to be clearer about Hirsch's opinion. Here is an example; this is on the Mitsubishi DA-R20 receiver.

"... in my book a real winner. This is competitive with the Yamaha CR-840 but with the added features of a head amp and digital frequency readout. I like everything about it and then some. It is quiet on FM and phono, even with maximum gain with an mc cartridge, for example. I wouldn't be surprised if some of the explanatory BS (supplied by the manufacturer) is really valid. Incidentally, the bulletins Mitsubishi puts out on the technical features of their products are really unique. If only the others would do as well our lot would be easier. Anyway, this is not just another receiver as far as I am concerned."

"Manufacturers can of course, rest on their laurels after a good review. We gave an excellent review on the pair of Rectilinear Ills we received -- Julian still has them -- but the manufacturer let the product go downhill so the review wasn't really representative. A similar thing occurred with the Heil headphones. The prototype we received sounded terrific but they were never matched by the commercial product." (The perils of reviewing prototypes ... -- Ed.)

The Readership

According to reader surveys the new product listings are the most popular feature; second is the Q & A column (about 60% of the questions really do come in from readers), and the test reports are about fourth or fifth in popularity. The "top six," i. e., the most read features each month, are usually all technical pieces. The typical SR reader is 28 years old, likes rock music, has \$1600 in stereo equipment, has a family income of \$23,350, and is a second-time buyer of stereo equipment.

-- Dick Glidewell