

THE B.A.S. SPEAKER

EDITOR-IN-CHIEF: E. Brad Meyer

STAFF: Robert Borden, Alvin Foster, John Schlafer,
Jack Stevens

PUBLISHER: Peter W. Mitchell, President, BAS

Subscriptions & Membership Information

THE BOSTON AUDIO SOCIETY
P.O. BOX 7
BOSTON, MASSACHUSETTS 02215

VOLUME 8, NUMBER 12
SEPTEMBER 1980

THE BOSTON AUDIO SOCIETY DOES NOT ENDORSE OR CRITICIZE PRODUCTS, DEALERS, OR SERVICES. OPINIONS EXPRESSED HEREIN REFLECT THE VIEWS OF THEIR AUTHORS AND ARE FOR THE INFORMATION OF THE MEMBERS. REPRODUCTION OF ANY PORTION OF THIS NEWSLETTER FOR ANY PURPOSE WHATSOEVER WITHOUT WRITTEN PERMISSION OF THE PUBLISHER IS STRICTLY PROHIBITED.

In This Issue

The Carver Sonic Hologram is back in these pages once again, in a very thorough evaluation by Les Leventhal of Manitoba. The report includes an exhaustive series of experiments on how to obtain the very best image from the hologram, and some inside information on the forthcoming update of the design from Carver.

There are also reviews of the Luxman Lab Series of electronic components by Gerald Larsen, and some interesting speaker project reports for those who like to roll their own.

The meeting summary is a "transcript" of a colloquium on records and recording with a panel of local experts. There's some surprising information on just what it's like to bring out a record, which may leave you with a little more sympathy for the lot of the small-scale producer, in addition to the expected back-and-forth about microphone technique.

"In the Literature" didn't make it in this time, but we will have a double dose of it next month for those of you who read and heed the following.

Renewal Time

Well, we made it through the year, somehow. Bloody but unbowed, we plunge ahead into Volume 9 filled with plans for schedule-tightening and expansion. We hope to bring forth a more professional, easier-to-read version of The Speaker starting sometime next year, but before we can commit ourselves to the higher cost per issue, we need to know that we have an expanded readership to pay for it. This means that we need your renewals soon. The October issue will have user's reports on some inexpensive audio instrumentation for all of you who want to make some measurements to go along with your listening tests. There'll be good reading and lively controversy from and for all, so send us your form and your check.

The B.A.S. Speaker (ISSN 0195-0908) is published monthly by The Boston Audio Society, Trapelo Road, Lincoln, MA 01773. Subscriptions are available to members of the Society. Membership dues are \$12 per year, October 1 through September 30 (\$25 U.S. currency overseas, including air mail). \$11.45 of the dues are a subscription to *The B.A.S. Speaker* including all issues of the applicable membership year. **For further information and application form, write to The Boston Audio Society, P.O. Box 7, Kenmore Square Station, Boston, MA 02215.** Second-class postage paid at Boston, MA. POSTMASTER: Send address changes to: The B.A.S. Speaker, P.O. Box 7, Boston, MA 02215.

For Sale

- *Sansui AU1100A integrated amplifier, matches TU9900, excellent construction and design, \$275; Toshiba T-15 digital synthesized micro-tuner, scanning, ten-station memory, \$175; Sony PSX7 turntable, quartz-locked drive, carbon fiber arm, \$175; Dyna 431 output transformers, 4,300 ohm, 100 watts, \$100/pair; Accrosound TO 300 output transformers, 6,600 ohm, 30 watts, \$50/pair. J. Johnson, (212) 628-2461.
- *Thorens TD-125 Mk II AB with SME Type II arm, \$350. Crawford Best, (504) 887-0215.
- *Pair KEF B139 transline subwoofers, \$400; pair Quad electrostatic speakers, \$1,000; pair Janis subwoofers, \$900; pair RTR ESL 6 tweeters, \$300; Dyna ST-70 amp, seen very little use, \$150; Series 20 crossover, \$450; Series 20 M-22 amp, \$400; two pairs B. J. Webb transmission line speakers with KEF and Celestion drivers, wool damped, in walnut formica enclosures. (617) 254-0697.
- *Revox B-77 1/4-track tape deck, 3 3/4 and 7 1/2 ips, used less than 20 hours, with all packing and instruction manual (good machine but wrong features), \$1,150. (617) 482-7735 (days).
- *AR turntable, refurbished by factory, \$50; Fisher XP55b speakers, \$85. Call Andy at (313) 683-2396 (evenings).
- *Acoustat Xs, mint, 18 months use, correct amp mods, new tubes, original boxes, three years left on warranty; Van Alstine Super PAS preamp; Fidelity Research FR III F, low hours with warranty card; Micro Seiki 505 arm, mint; Sony TC-355 tape deck, recently serviced, meets original specs. Reasonable prices. Paul, (912) 681-2943 before 10 PM EST.
- *Rappaport AMP-1, \$750; Kenwood KD-500 turntable with Grace 707 arm, \$250; all excellent. (617) 456-8642 after 6 PM EST.
- *Old Stereophiles: 1966, 1967, complete 1968 to present (26 issues), best offer. E. Berger, 5861 N College Avenue, Indianapolis, IN 46220, (317) 251-7023.
- *Conrad-Johnson vacuum-tube amplifier and Conrad-Johnson revised preamplifier, rack-mount versions with handles, includes Fulton interconnecting cables and 2" Boxer fans, \$1,250 or will sell separately; Conrad-Johnson moving-coil transformer, \$175; all previous items meticulously maintained, barely used, new in March 1980, warranties fully transferrable. Also DCM Time Window speakers, just back from factory update, new drivers, crossovers, grilles, with fresh five-year warranty, including Fulton "brown" speaker cables. Will pay UPS shipping and insurance on above items. John R. Kelley, (313) 973-7271.
- *Linn Sondek LP-12 turntable with KMAL M9BA Mk. III improved damped unipivot tonearm, includes two cartridge carriers with effective masses of 6 and 10 grams, value at current retail is \$1,260, \$650; pair Cizek Model One loudspeakers with factory crossover and woofer modifications for smoother sound, \$235; Koss Pro-4AA headphones, \$20; original packing for all items. Call Michael Riggs, (617) 536-7780 (days) or (617) 661-1037 (evenings).
- *Audio Pulse Model One, perfect, unused, \$474; Soundcraftsmen RP-2212, new, \$244; Grace G-704, new, \$134; SME 3009 S/2 Improved, with FD-200, both new, \$124; Audio Research D-51, SP-3A-1, plus new rack mount panel, knobs, both for \$1,000. (519) 945-8486.
- *JVC HSW1101-01A Dyna Flat ribbon tweeters, brand new, in box, cost \$125/pair, \$80/pair; Denneson metal cartridge alignment protractor, professional model, in box, new, with accessories, cost \$100, \$65. Mike Lulejian, (404) 320-1555 (days).
- *Classic tube preamp, Dyna PAS-3X, with spare parts (Telefunken tubes, gold anodized faceplate and knobs, etc.), \$100 including shipping via UPS. Dan Shanefield, 119 Jefferson Road, Princeton, NJ 08540, (609) 639-2572 (days).
- *Connoisseur BD-103 armless belt drive turntable with latest one-piece platter, black finish, and spare drive belt, new; Stanton 881S, including brand new replacement stylus; Burwen DNF-1201 noise reduction unit, mint; Russound TMS1 tape monitor switch box; Shure VN3G replacement stylus (spherical) for V15-IIIG; Switchcraft Dolby FM compensator, new; Discwasher D'Stat II platter mat. (215) 623-0752 (evenings, Fridays, weekends).
- *Dynaco PAT-4 preamp, with walnut case and manual, \$75; KLH Model 40 open reel tape deck, needs R/P heads, \$100; two SWTPC Universal Tiger power amps, one stock, \$100; one heavily modified, \$150. For details call Harry Kane, (617) 822-4978 (evenings).
- *Audio Pulse Model One digital time delay system, #04327, \$300. Alex Kosmala, 315 Bacon Street, Waltham, MA 02154, (617) 661-1840 (days), (617) 899-9658 (evenings).
- *Sony TC-5550-2 portable open reel recorder, same as TC510-2, records half track stereo, weighs 15 lbs., takes 5-inch reels, current model but not sold in U. S., runs on 8 D cells or AC, with carrying case and service manual, \$600; Heathkit AD-1013 Audioscope, triggered oscilloscope plus sine wave generator, \$150. (617) 926-0319.

Wanted

- *Old issues of the following audiophile publications: Audio Forum, Stereopus, Sound Advice, I. A. R., and Mr. Audio's Bi-Monthly. Please indicate issue number and price for each issue. George Mileon, 14 Border Street, Lynn, MA 01905.
- *Marantz Model 2 in excellent shape; will exchange Model 5 plus cash if desired. Charles W. Pachner, 7 Putnam Road, Scarsdale, NY 10583, (212) 267-2200.
- *Gale GS-401As with Gale chrome stands or Infinity 4.5s and 2.5s; Carver C-4000; Carver M-400; Series 20 crossover; JVC LX-3000 cabinet. (519) 945-8486.
- *Schematics for Hadley 621 preamp. Leo Oxley, (203) 429-7331 (evenings, call collect).

FM Dipole Antennas

The simple dipole antenna included in the box with most receivers and FM tuners is much maligned. A good roof antenna is usually far superior, but roof antennas cost money and take time (or more money) to install and require rotors (still more money) in most locations. If you have several hi-fi systems, there is the further problem of wiring a distribution system.

If you live in a strong signal area and you are going to use the dipole, at least use it properly; don't throw it behind the radiator. Taping it to the wall is better, so the arms of the dipole are stretched out, but it is hard to rotate the wall to reorient the antenna. The best way is to take the arms of the dipole and tie them to a long wood stick. Get a sturdy hinge from a hardware store and attach the hinge to the wood stick and the wall (wood moldings near the ceiling are ideal). It is usually simpler to make a new antenna instead of using the one that came with the set, because you can cut the lead-in wire to the correct length -- the factory packed lead-in is almost always too short.

Now you have a stretched out and easily oriented dipole. This will, incidentally, perform better than the BIC Beam Box, which throws away a lot of signal. It is also much cheaper. Using the hinge, you can null interfering stations or peak weak stations. It may not look so neat, poking into the space above your head, but if you are concerned about interior decoration, there probably wouldn't be a hi-fi system in the room to begin with.

-- Cary Lu (Massachusetts)

Information Please

Until recently my time has been devoted to running the stereo service department for a large shop (one which services all stereo equipment for the Boston area's two largest department store chains, and numerous other clients). This has been instructive, to understate, but so exhausting that I have knocked off to produce a manuscript for a "How to" book on buying stereo equipment.

My target reader for this book is the neophyte stereo shopper, and it has been so long since hi-fi buying scared me that I am out of touch. New members of the BAS -- those for whom much of the technical information discussed in the Speaker is difficult to understand -- could get a chance to communicate, and be of inestimable help to me, by answering a few questions. If the book is published, you will certainly receive a printed credit for your help.

1. If you have recently bought your first good stereo, what was the most difficult choice you had to make? Were there choices you did make that, now, you would change -- and, if so, what would the change(s) be?
2. What about your dealer's treatment of you, as a customer, did you find helpful -- and what, if anything, misleading?
3. Among the many sources of buying information you consulted in making your choices of equipment, which did you find the most reliable, and why? Which do you think "steered you wrong," and for what reasons?
4. If your equipment breaks down, where would you go to have it serviced; what, if any, repairs would you try to make yourself? If you have had your equipment serviced, what was the nature of the complaint, and how well do you think it was resolved? What did the service cost, and how long did it take to be completed?
5. What components did you buy in your initial purchase? Were they all bought at once, as a system, or gradually, as you built your system's capabilities? What equipment do you now own, and what do you think will be your next few acquisitions? Would you consider only brand-new units, or are you attracted by used components? What new technologies related to the stereo system (digital recording, interface with video recording, stereo AM, etc.) interest you, and why?
6. What would be your advice to the beginning stereo buyer? What, if anything -- types of equipment, brand names, sorts of dealerships, countries of origin, formats, proprietary designs, etc. -- would you recommend to a beginning buyer? Would you advise him or her to avoid? Why?

Any information BAS members are kind enough to offer will be welcome. Of course, information that could be construed as libelous, while helpful in determining buyer impressions, will not be attributed to its source in print.

I hope a publisher not associated with the stereo industry can be made interested in this project, and my goal is to present a fair assessment of the stereo market without stepping on anybody's toes. If, with the help of BAS members, I can put together a book that new stereo buffs will find genuinely useful, many people will be grateful, and our mutual avocation ought to benefit from it. The Society, naturally, will receive due credit along with individual contributors. Replies should be sent to me at 107 Sheridan Street, Boston, MA 02130.

-- George Androvette (Massachusetts)

America on the March

Musicologists and aficionados surely know this, but I stumbled over the fact only today, by chance. Did you know that the march is one of the most important types of music to humanity since time immemorial? It is readily identifiable with a wide range of emotions, and will probably exist for as long as we can imagine. One Richard Strunsky describes the march as one of society's most powerful catalytic agents. The Israelites marched out of Egyptian bondage to the sound of martial trumpets, the Greeks and Romans used the march on the way to mutual war, and this musical form has inspired emotions throughout history.

Many great composers have used the march, including Verdi, Mozart, Beethoven, Berlioz, Wagner, Glinka, Borodin, Barber, J. Strauss, Sousa, Mancini, etc. Today, the most casual listener might regard the march as something patriotic or military. But this genre probably embraces a greater range of emotions than any other. If you love music, you owe it to yourself to savor some marches. Really. Try Telarc's "Macho Marches" #DG-10043, and also "USA: Anthems and Marches" on Angel's 45 RPM disc #SS45016. I have both, and will vouch for their rousing music and audio quality. Both are truly thrilling over wide-range, low-distortion speakers at loud levels. But garden-variety speakers will probably wilt over them (especially mid-ranges and tweeters).

Both recordings have positive and negative audio characteristics. The Telarc captures the bass drum much better than the Angel's, which is almost anemic. Both have an excellent sense of ambience and instrument localization. The Angel is recorded from a slightly closer perspective, conveying a more satisfying immediacy to the sound. Angel's brass and woodwinds sound more true-to-life (I used to play in a band) on my system. On balance, I'd give the sonic edge to the Angel disc, but be warned: it has heavy energy in the midrange and treble. Excellent drivers are a must.

The musical arrangements and interpretations on both discs are in the same vein; they let the music speak for itself, stirringly so. But why has nobody come up with an updated version of "America on the March" with Bob Sharples and his Military Band (London SP-44033)? Frederick Fennel, Felix Slatkin, and similar conductors sound in their respective recordings as if they were having tea and lady-fingers while tapping their toes. But this guy Sharples: he knows marches; he knows musical arrangements! I'll go out on a limb and state that there has never existed a recording of marches as viscerally stirring as this one.

I carefully take it out of storage every few months, listen to it once (loudly), and turn off the audio system immediately afterward. Anything else would be an anti-climax. The adrenalin charge is good for a few months; the blood is renewed; the house plants grow greener; the air is cleared. If you want to hear a stirring arrangement of marches, this is it. Sure, it's Phase Four sound, but what the heck! Forget about Blumlein and lady fingers, this is blood-churning music!

Perhaps London will make an updated version of the Sharples disc but that's just wishful thinking. In the meantime, if you want but one recording of marches, try to get your hands on an old copy; there may still be a few around. Fennel and Slatkin are alright, but Sharples is unique.

-- Carlos E. Bauza (Puerto Rico)

Speaker Reviews Wanted

I enjoyed the "subjective" review of the AR-9 which appeared recently, and would like to see further reports of this kind, especially about long-established products (say, the Quad ESL) which current intending purchasers certainly might want an update on. I know too many people who have rushed out and been persuaded by their dealer (or friends, or themselves) to acquire some "state-of-the-art" component which utterly failed to give satisfaction after only a short period of use. In the area of speakers, some logical candidates might be the larger Infinity systems, the better B&W/KEF models, IMF, Fried, etc. (Okay, fellas. Let's hear from you. -- Ed.)

-- Steven Paradis (New York)

Luxman Laboratory Reference Series Equipment

For the past two years, I've had the pleasure of using four pieces of Luxman high-end audio equipment -- the Laboratory Reference Series. The components in question are the 5C50 real time process DC preamplifier, the 5T50 frequency synthesized FM tuner, the 5E24 peak level indicator, and the 5G12 graphic frequency equalizer. This is, to be sure, high-end equipment.

To those members considering the purchase of this gear or other equipment of a similar kind, let me share my pleasures and problems with you, in the hope that when you make your own equipment choices, you can obtain all (and more) of the pleasures and avoid most (if not all) of the pitfalls. First, some general statements:

1. For those who haven't seen this equipment, its physical design is outstanding. The units are coordinated, they stack properly together, they look beautiful in a group setting, and they are obviously done with significant attention to visual and tactile design (this is also true, I've noticed, of other Luxman products).

2. In general, I am extremely pleased and satisfied with the equipment. Except as noted, all the units perform beautifully and their sonic capabilities and features are outstanding. When all is said and done and all the specification booklets have been put away, many of us still get pleasure simply looking at and listening to our equipment. In this regard, the IRS Series is a delight.

3. Sadly, I've been told that Lux has decided to discontinue the IRS Series. This is tragic since it means, among other things, that even in a city like Los Angeles I'll have trouble finding parts, knowledgeable repair personnel, and adequate service for my units. Contrast this with other manufacturers (McIntosh for example) who, once they develop a line, keep it in the marketplace for many years. The LRS Series simply hasn't been around that long. There isn't enough happening in the audio industry to justify a model change every couple years, and I think that manufacturers who do this show a customer-be-damned attitude.

4. While in most ways the LRS components function beautifully, the knife switches and multi-position switches on the units tend to become dysfunctional very rapidly. To restore their function, you must rapidly move and wiggle the switches up and down to clean the contact points. I might be willing to do this after three or four years of use, but in a high-end unit less than a year old it is unacceptable. It reflects an avoidable design error and I caution all BAS members to watch for similar potential problems in any equipment you buy.

5. On several occasions (as noted below), I've had a need for service on the LRS components. I feel fortunate that Lux has its own repair facility here in Los Angeles (good but not great) and my dealer has outstanding technical capabilities of his own. I caution any purchaser of audio equipment to seriously consider servicing requirements before he makes a purchase. No matter how attractive a particular component may be, if you can't get it serviced by people you can trust and who are local and knowledgeable, don't buy the unit! I realize that this may limit the kinds of purchases that those of you in smaller towns distant from a major metropolitan area can make. But believe me, you are better off unless you find packing and shipping and weeks without equipment a fun thing. I've said it in a prior article, but I'll say it again: you are better off paying more for your equipment and buying from a dealer who can provide good service than looking for a bargain price.

Finally, some comments on the specific LRS units:

1. The 5T50 Frequency Synthesized FM Tuner. This little marvel is a completely digital tuner with seven preset stations, built-in automatic scanning, manual scanning, and many other features. I love the unit dearly since apart from being an outstanding FM tuner it is convenience itself. As with the other pieces in the line, its physical design is superb. It was one of the early digital tuners and therefore has both a digital display of the tuned frequency and two LEDs which show relative position on a normal looking scale. I had several problems with the first unit I received and after Lux floundered hopelessly trying to fix them, they finally replaced the unit. This was very nice on their part but it took three different visits to their repair facility to discover that they not only hadn't fixed the unit, but couldn't. My present unit has been working flawlessly for about a year although it, too, required some initial adjustments in order to get its digital signal strength meter reading correctly. I'll never go back to rotate-the-knob tuning again, primarily because I can store several stations that I normally listen to and have them available instantly at the push of a button. This tuner is a gem and I commend it to you highly.

2. The 5E24 Peak Level Indicator. This is a slim unit which contains a horizontal row of 24 LEDs (12 per channel), a peak-hold button, and a set of four selectable ranges within which

the LEDs can be used. This unit is designed to sample preamplifier output and amplifier output, and has performed flawlessly since I bought it. Most of the time, it just sits there blinking its LEDs and you wonder why in the world you have such a device. However, when you wish to accurately measure the relative or absolute output of two channels, either from the preamplifier or from the power amplifier, this unit is just the ticket. I've used it on many occasions, and it can help locate problems in various parts of your system, help adjust amplifier gain and give information concerning the proper performance of the system. I wouldn't be without it.

3. The 5C50 Real Time Process DC Preamplifier. This is an outstanding unit with virtually all of the switching bells and whistles you could ask for. It has two phono inputs, a built-in moving coil adapter, two tape decks with dubbing and enough features to allow you to control a complex system. There are several features such as the balance control, high cut and low cut filters, and a linear equalizer (a substitute for a base/treble control) which I never use. Others might find them very useful. The only problems I've had with this unit are the switches (which I mentioned earlier) and its off/on indicator light. This little devil serves several functions. First, it blinks rapidly when the unit is initially turned on, indicating the activation of a delay circuit which prevents turn-on transients from escaping the preamplifier. Once the turn-on delay has elapsed, it turns to solid white. Should a DC offset occur, this lamp turns red to indicate it. The preamp has celebrated its first two anniversaries in my house by burning out this bulb. There are two aggravating things about this. First, with a little care and intelligence, Lux could have designed the light circuit to operate at a voltage below the rated lamp capacity, thereby substantially prolonging the life of the lamp. One burn-out a year is pretty crappy. Second, when the lamp burns out, it is replaceable only by dismantling the unit and soldering in a new lamp (another customer-be-damned feature). This type of flaw would be barely acceptable in a peripheral device. In a preamplifier, however, where one has to dismantle the entire system in order to change a bulb, it is inexcusably thoughtless. Those of you considering an equipment purchase should look carefully at things like lights and fuses, and what must be done to replace them. If it looks like a major overhaul then unless you believe it won't be needed for at least several years, consider another unit.

4. The 5G12 Graphic Frequency Equalizer. Except for its switches, this unit has performed flawlessly since I got it. Lux opted for a 12-band equalizer which simultaneously adjusts both channels. It has two selectable ranges, ± 2 dB or ± 10 dB. Each of the 12 channels has a switch below it which allows its response curve to be set either narrow or wide depending on your equalization requirements. The equalizer has a true straight wire bypass; when it is in this mode you can shut the unit off without affecting the signal. I've never seen a convincing argument for separate equalization of the two channels, and so I think Lux did a proper job on this particular unit.

There are several important lessons to be gained from my experiences with the LRS equipment. Among these are:

1. Before you buy equipment, look at the manufacturer's habits with respect to his products' life cycle. On the one hand, manufacturers who refuse to change when new technology offers meaningful improvements can be discouraging, particularly if you buy in at the end of a lengthy product life cycle. On the other hand, frequent model changes can often mean poor design or a thoughtless manufacturer; so beware.

2. Unless you are an electronic engineer and intend to do your own servicing, be sure you buy only from a dealer with the technical capabilities necessary to support your product. Find out how warranty work will be done, how long your unit will be out of service, whether your dealer will loan you a substitute, etc. In connection with this, while I am truly thrilled by small businesses (and am part of one myself), be careful; your manufacturer may go out of business and leave you with no visible means of support. Since many small manufacturers use custom parts and assemblies, a bankrupt manufacturer may mean that the parts necessary to keep your unit working are completely inaccessible. Caveat emptor.

3. Consider not only from whom your maintenance will be obtained but also what type of maintenance is likely to be required. Look for soldered fuses, soldered lightbulbs, potentially noisy switches, etc. This does not mean that manufacturers who produce units devoid of switches, lights and fuses, etc. are always to be preferred. But the market is reasonably big so whatever

your tastes may be, look for the best combination of specification, functionality and maintainability you can find.

-- Gerald H. Larsen (California)

Trivia Department

ADS (Analog & Digital Systems) has its headquarters on Progress Way. Fundamental Research (the subwoofer company) is situated on Success Street. BAS President Peter Mitchell lives on Circuit Street, while Tom Holman (formerly of Advent and now of Apt) resides on Kenwood Street. Garrard's U. S. offices are on Sherwood Avenue, while Sherwood has to make do with a Carson Plaza address. Aiwa and Pioneer are adjacent on Oxford Drive, while KLH hangs out on University Avenue (miles from the nearest university), McKay-Dymek resides on College Avenue, and Acoustic Research is presemably proud to be on American Drive. Bertagni is on Fisher Street, Advance Speaker Korp (sic) is on Lafayette Road, while Lafayette Radio has closed 60 stores and is hardly anywhere. Bose looks down from its perch on The Mountain Road, Allison Acoustics is on Tech Circle, B. I. C. lives on Service Road, DBX's services take place on Chapel Street, and Conrad-Johnson preamps are emerging from Pathfinder Lane (in McLean, VA, a stone's throw from CIA headquarters). Only Panasonic has real clout: its HQ is on Panasonic Way.

-- Peter Mitchell (Massachusetts)

Speaker Builders' Corner

Speaker Project - The Daline Three-Way System

I recently constructed a pair of the "Daline+B-110" speaker systems, designed by Robert Fris in England. The plans, speakers, and crossovers are supplied by Falcon Acoustics, or Badger Sound Services in England. Instructions are clear and explicit. You supply the wood and labor, and you do not have to be an experienced carpenter to do a good job. This is one of the easier speaker projects around. Of course, you have to cut the wood, but assembly is mostly done with nails and glue (a significant simplification). I laminated mine with Formica, for cosmetic appeal, and the finished job is truly beautiful (all of my friends agree).

The system is a three-way, using the 5" KEF B-110 woofer/midrange, the very popular Peerless KO 10-DT tweeter, and the Coles 4001 G super tweeter. The finished cabinet measures 34 1/2" tall, 12" wide, and 6" deep, so what you see is a small, slim tower. They are light enough to be wall hung, and shallow enough not to protrude from a bookshelf, although a bit tall for shelf mounting. They go better on the floor or the wall.

There are two other versions of this design, using a single tweeter each (the KEF T-27, or the Peerless KO 10-DT alone) but the three-way version, which I built, is probably better in both dispersion at the upper treble and power-handling ability.

We frequently read that loudspeaker system design involves tradeoffs among such factors as cabinet size, efficiency, bass extension, etc. The tradeoff here is moderate inefficiency, and slightly compromised dynamic range in the deepest bass.

The design objectives for this system appear to have been flat response from below 30 Hz to 20 kHz, with exceptional transient behavior throughout this range, in a relatively small cabinet. In order to attain these very ambitious goals using "garden variety" drivers, a unique enclosure design was developed. Its designer calls it the Decoupled Anti-Resonance Line (Daline).

So, how do they sound? In a word, impressive. The design criteria have been successfully executed, and the result is a system with exceptional transparency and definition, outstanding transient response, and effective response down to 30 Hz with no subjectively noticeable distortion. It may have a slightly stressed response perhaps a half octave lower.

The Dalines need at least 40 watts per channel, with 75 watts recommended for full performance. They will fill an average room with over 100 dB sound. However, playing the Telarc digital records required a special precaution. The woofer would bottom when playing the bass drums at high volume levels, producing a frighteningly loud "click." However, with this limitation taken into consideration, the consensus of friends auditioning these speakers, as well as my own opinion, is that these speakers are something very special. The sound is extremely coherent, smooth and seamless from 30 Hz to over 20 kHz. The tweeters are slightly too loud for my taste, but none of my friends found this objectionable. At the other extreme of the sound spectrum, audiophiles owning subwoofers felt that although they heard the deep bass, it lacked the dynamic range and visceral impact which they are accustomed to. On the other hand, owners of 10" bookshelf units were unanimously astounded by such deep bass, and preferred the Dalines to their own.

One thing is for sure, there is no substitute for truly deep bass once you've heard it, and all this for \$115.00 each! That was my cost for drivers, damping materials, crossovers, wood, Formica, and hardware, including transportation charges! This is almost irresistible if you want to graduate to something distinctly better than bookshelf speakers.

And why go to all this trouble to get deep bass response? The answer is superior transient response, in a small enclosure. A larger, heavier cone would require a larger enclosure, and should not likely have such excellent transient behavior. On the basis of performance in this system, I have but one reaction to this little giant of a woofer, and that is respect. Congratulations, KEF.

Summing up, the Daline+B-110 delivers big-league sound for an irresistible price. They are at home in moderate-sized rooms, need no subwoofers, and the cabinets are unobtrusive. I find them free of mid-bass hump, eminently musical, and good in imaging. They are a match for my Webb speakers, except for the very deepest bass, power-handling, and certain imaging qualities. One owner of LS3/5a's described them as LS3/5a's with bass. Interestingly, this same design was produced commercially for a couple of years by Innotech under their model number D-22. I did not purchase a pair because the claims made for them at the time seemed incredible. Now I know better.

-- Carlos E. Bauza (Puerto Rico)

Another Listener's View of the Daline

The most striking feature of the speakers is the very large sound field and image they project, especially in view of the size of the drivers, the largest of which seems to be about five or six inches in diameter. The cabinet itself is 35" high, by 6" deep, which is not small. The question would seem to be: is it worth the amount of work to obtain the remarkable response from such a small woofer, as compared with what might be obtained from a larger bass driver and simpler cabinet at perhaps a similar total cost?

The bass response is indeed remarkable. My spectrum analyzer showed that there was more than a little useful response at 30 Hz. Almost never did the speakers seem to be strained, even at loud levels, which I would estimate at over 90 dB at some moments.

If the stated aim of the designer was to produce a speaker with exceptional transient response and fast attack, then the design would seem to be very successful in that respect. The high frequency response seems very crisp and detailed. The smoothness of the crossover points seems nicely handled. No seams or phasing problems seem to be in evidence. A variety of musical instruments were faithfully reproduced, and voices seem quite natural.

To obtain any greater degree of realism would no doubt require a considerably larger sum of money, just to obtain a very subtle additional richness or reduced thinness at some occasional moments. By comparison, the larger Webb speakers have a bit fuller body and slightly less strained sound during loud complex passages. The sound is just a bit more mellow with the Webbs.

-- Lohr Gonzalez (Puerto Rico)

Homegrown "AR" Speakers

About six years ago, a friend of mine purchased an odd pair of used AR speakers -- one AR-1 and one AR-1W. He soon came to the realization that he had no use whatsoever for them, and sold them to my father for \$60. My father and I had good intentions of somehow turning the old relics into a pair of top-flight three-way bookshelf speakers.

Well, we all know what they say about the best of intentions, and so the speakers sat untouched in my parents' basement for five years. One day after listening to them and examining the woofers, I decided that if the project was ever going to get off the ground, the woofers would need to be replaced. AR will only sell their drivers on an exchange basis, so I took the woofers and went to the service department at the AR factory in Norwood. The service manager was amazed to see the old woofers and told me they were from one of the original production runs around 1955.

After we bought new woofers for \$58 each, several problems still remained. We had to choose the midrange and tweeter drive units and obtain a suitable crossover. But the biggest obstacle was the repair work required by one of the cabinets. The AR-1 was a two-way system employing an Altec 8" full-range driver for the midrange and highs. Removing the high-frequency driver left a gaping hole in the baffle board. Filling this took some fancy carpentry, but the results were excellent.

After looking into most of the available drivers, the decision was made to go with the familiar 1" Peerless dome tweeter and 4" Peerless cone midrange. Admittedly, there are more exotic units around, but nevertheless, the Peerless drivers are well-made, good-sounding speakers. Another important consideration was their widespread availability and moderate cost, should a blown or defective driver ever need replacement.

Now came the most critical part of the design, the crossover. We were faced with an especially difficult situation since the AR 12" woofer is a 4 ohm unit, while the Peerless drivers are 8 ohms. Speakerlab offered a crossover kit in which the different driver sections could be made either 4, 8, or 16 ohms, but with a woofer-midrange crossover point of 700 Hz and lazy 6 dB/octave slopes, this crossover didn't seem to fulfill the requirements. However, another friend of mine, the manager of a local hi-fi shop, mentioned that he had all the necessary test equipment and experience to design the crossover. Supplying him with the drivers and the enclosure volume information, a network with crossovers at 500 Hz and 5000 Hz was produced. System Q came out to around 0.8, right in the ballpark for an acoustic suspension system. For level controls, massive 200-watt capacity potentiometers were used.

The baffle board surrounding the midrange and tweeter was covered with felt to absorb reflections, as was the inside of the grille cloth frame.

Finally the speakers were finished and ready to go. The original design aim was not to break any new ground, but rather to produce a solid speaker in the AR-3a tradition. We waited with nervous anticipation as the first record was placed on the turntable.

A brief note on the associated equipment used in the rest of my father's system: a Dual 522 with ULM tonearm, Shure VI5/IV cartridge, and a Sanyo JCX 2900k receiver. The Sanyo is a massive battleship of a receiver, a twin-powered, over-heatsinked, 120 watt-per-channel behemoth. In both quality of construction and ability to exceed advertised specifications, the 2900 is far superior to Sanyo's new so-called "Plus Series," which might be more aptly called the "Minus Series."

So how did the speakers sound? In a word, great. Bass was deep and tight, midrange and highs were smooth and extended. By the way, bottom-line cost per speaker was around \$160, pretty reasonable for this level of performance.

There is a unique satisfaction that comes with the completion of a successful homemade speaker system. To draw upon one's own knowledge, likes, and tastes and mold them into a highly personalized product defines, to my mind, what the hobby of high fidelity is all about. This is fun stuff.

-- Steve Feinstein (Connecticut)

August BAS Meeting

Business Meeting

The August 17, 1980 BAS meeting was called to order at 6:22 PM by Peter Mitchell. In the absence of a quorum, the discussion of the proposed amendments to the BAS Constitution and By-laws, which was scheduled for this meeting, was not held.

Elections for officers of the society will be held in four or five weeks; the president, secretary and corresponding secretary are standing for their respective offices. Treasurer Henry Belot, however, will be stepping down when his term ends. He cites pressure of his full-time job, and notes that the post of treasurer now takes about 20 hours each month. There is no salary for officers, but the society pays an honorarium which, for treasurer, runs into multiple hundreds. There being no nominations forthcoming, ominous warnings of behind-the-scenes armtwisting were voiced, and open forum was declared.

Someone raised the general question of why this summer's Tanglewood broadcasts sounded so bad. There was at least a 6 dB channel imbalance at times, and obvious trouble with the microwave link.

The new Chalfont digital recording of the score for "North by Northwest" has a large ambient character, different from that of the "King's Row" recording (also Chalfont, also digital). Does anyone know whether it was recorded with the Calrec Sound Field Microphone?

Sound Concepts has overcome the remote control assembly problem on the IR2100 "image restoration" processor, and they are being shipped to dealers.

Meeting Feature: A Colloquium on Records and Recording

At about 6:45 the panelists for the evening's discussion began assembling on stage. What follows is not a literal transcript of the proceedings, but a summary in conversation form. Each person's comments are properly attributed, but they have been (for the most part) paraphrased and edited to make up for the lack of visual and auditory aids. There is a glossary of terms at the end.

The evening was enlivened by occasional demonstrations and examples of various records on Titanic, Telarc and Sine Qua Non. Equipment used was a Holman preamp and two Apt model One power amps, two Boston Acoustics A-200 loudspeakers, a Revox A77 tape deck, a Revox B795 turntable, a dbx type II noise reduction unit and the KLH Burwen RE3000 wide range remote equalizer.

The final demonstration was a comparison between the master tape and a test lacquer of an organ recording noticeably noisier than the tape during very quiet passages, and distorted audibly at high levels, but most of the time the sound was transparent and open, a remarkably good copy of the original tape. (If all goes normally, the final pressings will be less transparent. -- Ed.)

Participating in this panel discussion were:

Richard Burwen, record producer and equipment designer (both for his own company and for others, such as Mark Levinson); Burwen's basement hi-fi system, which has been featured on the cover of Audio, is famous for its ability to exercise leg-hairs with organ pedal notes;

Ralph Dopmeyer, founder, producer, engineer, etc. of Titanic Records;

David Griesinger, musician, physicist, electronic designer, recording engineer, and producer (for Titanic, Nonesuch, Sine Qua Non, and various broadcasts);

Tomlinson Holman, equipment designer, recording engineer and producer (for Advent, Sine Qua Non, various broadcasts and films);

Scott Kent, equipment designer, recording engineer and producer (AFKA);

E. Brad Meyer, audio consultant, recording engineer, and co-producer (with Peter Mitchell) of Ashmont records; and
Peter Mitchell, audio consultant, equipment designer, recording engineer, and moderator of the discussion.

(The first question to be discussed was microphone technique: how do you decide how many microphones to use, where to put them, what types are best ...)

Griesinger: My labnotes tell me that you really can't do it right. Some of the dichotomies just can't be resolved. For example, the ratio of direct sound to reverberant sound is a vital parameter. How these should be balanced is really a function of the room used for playback, and how loud the recording will be played. Ideally a record will be made for playback in a specific location. Also, the preferences of the listener matter.

Another choice is between "imaging" and "spaciousness." In some cases this is the same as choosing between coincident technique and spaced omnis. The Sheffield discs of the L. A. Philharmonic have excellent imaging, but their overall sound is poor. I think that recorded imaging is an acquired taste, anyway.

Other problems are that recording engineers affect the performance itself, sometimes just by being there. Acoustics are almost never very good -- good halls are rare. This makes getting a decent balance difficult. The exception is a place like Jordan Hall, where, if you can get in in the first place, you can put any kind of mikes in the right places and get a good recording.

How do you vary the direct-to-reverberant ratio? Move the mikes, or move the performers.

Meyer: You have to consider the difference in frequency response of mikes with different pickup patterns. In recordings where I have used both cardioids and omnis I often wind up with one balance that is ideal for imaging and another that is best for frequency response.

Kent: Omnidirectional mikes, especially spaced omnis, produce uncuttable tapes. There's too much out-of-phase bass (and hence, too much vertical modulation on the record -- Ed.).

Griesinger: Okay. What makes bad acoustics? Volume and shape of the room. Since recordings made in a room get played back in a room, if the two rooms are close in size there is a kind of room-squared effect. It isn't an Absolute Sound sort of "veiling;" it's more a mud curtain. It is caused by too much pickup of reflections from close boundaries.

You can get used to it: English "image" freaks accept the bathroom effect. The stage at the Longy School is one place you get this. If you have a choice, don't use a small stage area for recordings intended for the average living room; move the performers out into the hall. Or mike closely. If you have only two mikes, and the acoustics are poor, get back far enough, back far enough, put up with the mud and go British (i. e., use coincident mikes -- Ed.): you'll like it better. With more mikes, you could stay on stage, fairly cramped and close in, then mix in some reverb from omnis placed 'way back in the hall.

Mitchell: Tom, tell us about recording Messiah for Advent.

Holman: We wasted a whole day's taping because the room we were using for monitoring was so wet (reverberant) that we made a tape that was too dry. The dry tape sounded fine in the live room, but I discovered the problem when I took it home to my normal listening set-up that night.

The soloists sound like they were recorded in a much more spacious acoustic than the chorus and orchestra; they weren't. They were members of the chorus and were recorded using the chorus mikes, so the direct-to-reverberant ratio was lower than if they had had their own mikes. You can hear the hall more when the soloists are singing because the rest of the music is so much quieter then. This has the effect of making them sound farther away from the mikes than the chorus, just the opposite of what you want. Tom Dunn, the conductor, asked for specific ambient effects in this recording; they are his choices.

Griesinger: That direct-to-reverb ratio is the most important thing.

Meyer: And it's the hardest one to hear on headphones; you really need monitor speakers to tell what you are getting.

Griesinger: There are always time constraints on getting a satisfying recording. The trouble with closely spaced mikes is that they image too well; the recording has the image of the recording site. Spaced omnis don't image the room because they smear those reflected images.

Meyer: This is what is meant by the statement that omnis have more immediacy; the performers are taken out of the room they were in and can seem to be in the listening room.

Griesinger: You can stabilize the image from a pair of omnis by using them as a main pair and

then close miking each instrument, using panpots to place the mixed image in normal perspective.

Burwen: I do most of my recording in my basement, which is extremely live; I use 14 cardioid microphones, with two for room sound, mix to a four channel master and then to two for the record. The original release of my East Bay City Jazz record had less of a blended sound than is common today, so I remixed the two channel tape from the original four to bring it up to date.

When we recorded the organ in the Hammond Castle in Gloucester, we used two omnis for the bass; they were about six inches off the floor and six or seven feet apart. We also had to do some equalization in the upper midrange.

In Jordan Hall, and in Longy, I use six omnis: three across both front and rear, with the centers mixed in at -4 dB to make a four channel master. I have never been able to get the slightest idea, on headphones, what it will sound like at home.

You can reproduce the sound of a small group in your home -- you cannot have the Symphony. The point has to be simply to make an entertaining recording, since realism might be impossible.

I also want to comment that, listening from the center aisle four rows from the back in Jordan Hall, the imaging is not very good. And, while it is possible to record 20 to 25 instruments on the stage at Longy if the hall is empty, an audience makes it too dry. An ORTF pair in the fifth row with artificial reverb for playback through rear channels is nice, though.

Mitchell: I heard a 132 dB playback of the cannon on Telarc's 1812 recording at Dick's once; it's fun.

If you are recording the same group in the same place for the third or fourth time, it gets easier. I think omnis are easier to use (than other patterns) in typically bad acoustics. I disagree with Dave's recommendation of directional mikes under difficult conditions.

Meyer: Rooms that are nice to listen in are often not so nice to record in because of early reflections.

(Next, the panel moved to what extra considerations arise when you intend to cut a disc from the tape you are making ...)

Mitchell: To limit vertical modulation so the cutter or cartridge doesn't leave the disc altogether, you could use a coincident pair, or blend the bass to mostly mono and center it. What else?

Kent: You'll only run into the problem with a tape that isn't phase coherent. If the bass phase is the same in the two channels there's no trouble. Using omnis, I prefer three for both imaging and cutting. Three omnis give a good image. Bell Labs tried it in the thirties; Blumlein did 45/45-degree cutting in 1931, using matrixing to reduce vertical information. It's not new.

Should you roll off or blend the bass? Why not just reduce the overall level? Given a tape which is incoherent, the average cutting engineer will blend the bass because of his time constraints, lack of metering facility and other pressures. Too low a level creates signal-to-noise ratio problems. I don't want equalization or compression applied to my tapes, so I prepare my tapes before cutting, by doing selective phase shifting and other things.

As far as poor acoustics are concerned, I would just say, "Look, we've got to get another hall." You can multimike in a poor room and it will sound okay, but I think adding ambience mikes sounds bogus. A stereo pair in a good room sounds better and there's no out-of-phase problem. It's all a compromise, anyway.

Griesinger: What's your favorite hall?

Kent: Sage Hall, in Northampton. I use Smith College for small chamber groups.

Dopmeyer: Since I need to carry everything on my back, I use crossed figure-8's and a Nagra. My problem seems to be getting the artists far enough apart.

Audience comment: If the artists are too far apart in a large hall, their performing ability will be compromised.

Kent: A hall musicians like is generally good to record in; look at Jordan.

Griesinger: I disagree. Good musicians are busy, and they often choose recording locations for reasons other than acoustics. The stage at Sanders Theater has no roof, for example, so musicians don't like recording there because they can't hear each other well. But on the recording it sounds nice.

Mitchell: In the Busch-Reisinger Museum, to record the organ, we used an ORTF pair about twelve feet out from the front pipes for imaging, and a pair of rearward-facing omnis for ambience.

Audience comment: What about the effects available for later adjustment with the M-S technique?

Kent: A crossed pair of hypercardioids at an angle of about 105 degrees sounds almost the same as an M-S pair.

Griesinger: The mode control on the Apt preamp will only vary the apparent image from a recording made by coincident technique, and not from spaced mikes.

Kent: The big difference between crossed figure-8's and hypercardioids is the flatness of the frequency response (crossed figure-8's are flatter).

Mitchell: If you want to alter direct-to-reverb balance later, you can try recording a L+R/L-R matrix from three omnis ...

Griesinger: ... or buy the Calrec Sound Field microphone for real flexibility. It only costs \$8,000 and requires four channels of tape. Otherwise you should record in a format as close as possible to the final one.

(Front-to-back depth perception or depth imaging is one touted advantage of simple microphoning. The panel was asked what needs to be controlled to affect this ...)

Mitchell: You can't, consciously. The room has too big an effect.

Meyer: Different discs change in this regard when you play them in different rooms.

Burwen: I have found that frequency balance changes can alter apparent depth.

Griesinger: If you get a good balance overall, everyone comes out okay. Multimiking has a special problem: quiet sources can seem close by because there's good pickup of direct sound, while a loud source will "leak" into other mikes and so seem to be farther away, more "reverberant." This is the opposite of the desired effect.

Audience comment: On the Proprius disc, "Jazz at the Pawnshop," the xylophone seems angled back from the center on a system with good imaging.

Griesinger: It probably was angled; I find this annoying, and it is something you can control with multimiking.

Mitchell: Remember that omnis exaggerate relative distances.

Holman: Whatever you do, be consistent. For "Messiah," we had several sessions; we couldn't change anything from day to day or it wouldn't blend. I must say, though I disagree with Dave Griesinger about imaging, I do use the same techniques. You need a proper balance between image and warmth.

Griesinger: We are conditioned to expect less reverberation on soloists. It's a question of taste and of what's appropriate.

Meyer: When you record through two channels you throw away a tremendous amount of information, and you have to compensate somehow to achieve clarity comparable to what you get in the hall using your ability to focus on the source.

Audience comment: Is there a sonic difference between ORTF and true coincident techniques?

Mitchell: ... if the recording environment is good, yes ...

Griesinger: ... but it's subtle.

Meyer: You have to stay on the center line between the speakers to hear the advantages of coincident techniques. (British audiophiles tend to prefer coincident recordings, being more willing to restrict themselves to the center line than us restless Americans. -- Ed.)

(So you've got your tape. Where do you go to get it cut and pressed?)

Echoed by all: Not Columbia Special Products !

Dopmeyer: I've been using Wakefield; they do the whole job in-house, and they are very careful. They also have a special high-quality service for only two cents more per record.

Kent: I stopped using Wakefield because there was a five-month delay on my previous jobs. They claimed they couldn't get adequate plating done. And I prepaid those jobs, too.

Dopmeyer: Ah. I don't prepay ... (laughter)

Kent: Two years ago, the independent vinyl manufacturers quit because of the OSHA requirements on the use of lead stabilizers and PVC oxides. Canadian vinyl prices are exorbitant; Kaiser and Tenneco have us over a barrel, and they know it.

The newer cutters can exceed playback limits over the full band from 20 Hz to 20 kHz; at 10 kHz, they can cut up to 200 cm/sec velocity. The cutter is not the problem. Responsibility is the problem. At Columbia, the cutting engineer probably never hears the test pressing, whereas in Germany the "tonmeister" is involved in every step of approvals. At Wakefield, when it worked, they talked to each other.

The fellow at the cutter should be a mechanical engineer; the plater should have a back-

ground in chemical engineering. Audio Matrix in New York used to look like a dyehouse; now it looks like a film lab.

Holman: I think this is an apocryphal story: a long time ago, at RCA in Indianapolis, a cheese sandwich was dropped into the plating bath, and the records came out quieter ... so, for years now, they've added cheese to the plating bath.

Kent: As Steve Temmer said, "Nickel and dime ..." Very few places care about quality. Windsor records in New Jersey is good, but they only do the pressing.

Holman: Cutting problems have not all been solved, either. I listened to one lacquer; it had been cut on a mono lathe fitted with a stereo cutter head. There was severe midband vertical rumble, and a whistle which turned out to be caused by the vacuum system intended for lacquer-chip removal.

Griesinger: Yes, Westrex heads on old Scully lathes ... I want to cut records that anyone can play. Robert Ludwig (formerly with Sterling Sound, now at Masterdisk) cuts unplayable records. Of course, I send him unplayable tapes ... (laughter)

But my point is, you give those tapes to a purist and he'll cut them; you give them to Gladys at Masterton (New York) and she'll do what you tell her: vertical limiting, acceleration limiting ... There's a lot to be said for someone who knows how to screw up a record so it plays. Ludwig uses a \$500 cartridge to check his test lacquer, and anything else will splatter. Dammit, you can't hear 5 dB of compression on peaks !!

Burwen: I take my tape, my own 3:1 compander and special equalization to Bob Ludwig. Together we remove any extraneous noise, mix the bass below 40 Hz (so that it will come out of the speakers in phase) and so on.

We've measured the distortion through both disc and tape: a disc with 12 cm/sec at 1 kHz has 2.7% at the outside, going up to 6.8% inside. That's mostly second harmonic. Tape, at +9 dB relative to 320 nWb/m, on Agfa 450, is 2.5% for the first generation, 4.5% for the second and 6.5% for the third.

Kent: That's a very high recording level, +13 dB relative to 185 nWb/m (Dolby level).

Burwen: The Telarc 1812 cannons are cut at +20 dB re 5 cm/sec. My dixieland hits +12, and the organ one goes to +10. The Burwen recording system has less distortion on the tapes for +11 dB peaks than is on the discs.

Electroplating is still a crude process. There are unknown changes in the chemical concentrations from batch to batch; this is, as Ralph Dopmeyer says, a black art. Wakefield claims they make up their own solutions. My dixieland record is pressed by Teldec in Germany; the organ one by Windsor in New Jersey.

As far as Dave Griesinger's comments about Gladys: I think anything goes that makes it sound better.

(Comments on high cutting levels.)

Griesinger: It would be interesting to know the difference in peak-to-average ratio before and after analog versus digital recording; digital recorders may put out higher (i.e., harder to cut and play) peaks.

Mitchell: George Alexandrovich (Stanton Magnetics) showed us pictures of cuts so extreme that they folded back on themselves (see the Speaker, October 1978).

(Costs ... and why classical recording seems to be feeling the brunt of the slowdown in pop/rock sales ...)

Meyer: To cut and press 1,000 records, with jackets and inner sleeves, comes to about \$1,700, assuming you supply camera-ready cover art and jacket notes. Insertion and the jackets themselves come to about \$600 of that. After you pay for cutting and set-up, the unit cost per disc doesn't go down much.

Mitchell: The oddity is that, including all costs, the jackets can cost more than the discs until you do more than 1,000 copies.

Holman: Classical divisions have had their cash flow supported by pop sales; in the current recession, payment of royalties is falling behind.

Dopmeyer: I don't know; for me things look good. I don't have a pop division. (laughter)

Meyer: Classical sales have not fallen off much; the cutbacks are due to losses by the popular end, and the resulting lack of cash. How much overhead is there in a big company? Why are their costs so high?

Audience comment: I sell the stuff and I can't see the distributors doing anything except getting

paid. Besides, in Germany a record costs \$15, and over here it sells for \$9.98. And what about artists' fees ... ?

Mitchell: Marketing is a strange business. Japanese cameras are cheaper in New York than they are in Japan.

Dopmeyer: A quality product costs only a few cents more: Angel Digitals, pressed by Wakefield, costs 62 cents a copy to press.

Holman: I have an old Angel record whose sound improved markedly when I got a cartridge with a line-contact stylus to replace my old elliptical. The new stylus played a part of the groove wall that was untouched by the old one.

Meyer, Mitchell: Yes; the test pressings of our organ record had a noticeably higher grunge content when we played them with an elliptical stylus.

Holman: Styrene starts off being quieter than vinyl, but it wears out more quickly. No one has yet come up with a satisfactory, cheap substitute for increasingly expensive, and scarce, vinyl.

Mitchell: What are the costs of recording in the first place ?

Dopmeyer: I only pay royalties, no initial fees, to my artists.

Griesinger: Ralph pays four times the royalty a big company pays.

Kent: On a \$9.98 list price let's see: no retailer pays more than \$5 to his distributor; the distributor wants 20 to 25%, so he will not pay more than \$3.75 to the manufacturer. Including freight charges, those 1,000 discs will cost you about \$2 each. When you add in the costs of the hall, the recording engineer, the artist, the design of the artwork and the typesetting, you should break even somewhere between one and two thousand discs, if you don't pay yourself.

Angel orders only 1,000 to 2,000 copies of an opera set per run from Wakefield, for national distribution. How do they cover their costs?

Griesinger: I've heard that the sales would be there if there was product ...

Kent: And that's another problem for the small label: distribution. You can't get distribution until you have a catalog and stock. Really, you have to plan on losses for fifteen years; and you ought to sink every dime you've got into the business and also work at something else to live on.

Holman: What about advertising, or direct mail sales?

Kent: Costs, again. The extra sales do not pay for the ads. Of course, mail order sales are at full list ...

Mitchell: MHS is successful at mail order because they have a large mailing list and a subscriber gimmick.

Dopmeyer: ... and their cover art is cheap.

Burwen: Arthur Fiedler sold 50 million records, definitely an exception.

Audience comment: Truly a pop mentality in the classical business.

-- Mark Fishman

A Brief Glossary of Recording Terms

Spaced Omnis - Two or three omnidirectional (pressure type) microphones, usually used with a total spread of 8 to 16 feet. This technique produces both time and intensity differences between the two channels. Liked by its fans for the warmth and immediacy that seem to be characteristic of omni mikes, with their extended low frequency response; damned by its critics for imprecise imaging and lack of focus of individual sources.

ORTE - A pair of cardioid (unidirectional; velocity type) microphones placed with their capsules 17 cm apart, angled outward at 110° from each other. A modified version uses hypercardioids at 90°. Produces mostly intensity differences, with time differences between channels approximately equal to those found at the ears. Some experiments suggest that this system images better than any other.

Coincident Techniques - A family of arrangements in which the microphones are placed as close together as possible; usually the capsules are one above the other, yielding almost no interchannel time differences. For this reason, the result is known as intensity stereo. Held by some to be the only way to record genuine stereo information. There are three basic types of coincident recording:

Crossed Cardioids - Like ORTF, only without the 17 cm separation. As with ORTF, hypercardioids at 90° may also be used.

XY - Two bidirectional (figure-8) capsules at 90°. Picks up more hall sound than crossed cardioids because the backs of the mikes are sensitive as well as the fronts.

MS - One cardioid (or hypercardioid) facing frontwards, plus a sideways bidirectional element. Outputs of the two capsules are recorded on two channels of tape, and later re-mixed in such a way as to produce left and right channels. Proportions of the two original signals may be varied to alter the perspective of the recording after the fact, which is one reason MS is gaining popularity among filmmakers.

The Boston Audio Society does not endorse or criticize products, dealers, or services. Opinions expressed herein reflect the view of their author and are for the information of the members.

A Publication of the BAS

Loving and Hating the Carver C 4000
Preamplifier

Les Leventhal
Winnipeg, Canada

After living with my C 4000 (#0784) for six months, I am just beginning to feel that I can write a review. The multitude of features and controls on the C 4000, the fiddling with speaker placement and tone balance, the use of alternative speakers, amps, cables, and program sources -- all tested in various combinations -- have ruined my summer. I spent the last six months evaluating equipment, rather than enjoying the music. That is why I hate the C 4000. As I was finishing this evaluation, I learned that a revised C 4000 is going to be available soon. And that is why I hate Bob Carver. Now I will tell you why I love the C 4000.

I will get right to the point. The holographic circuit is, as Bob Carver says, spectacular. Not only is the sound stage enlarged, as is claimed in the Carver ads, but, even more important to me, there is usually an increase in clarity and aliveness that must be heard to be believed. The reverberant field is greatly enlarged, often covering the forward half of the room -- and this occurs without the delay line. Best of all, and for me the real shocker, the C 4000 transforms many previously unlistenable records and tapes into highly acceptable and sometimes stunning sound. Now the details.

Equipment

Most of the listening was done with B&W 801 speakers, both with and without the foam absorbent cover which is designed to reduce side and rear radiation from the tweeter and midrange. (The foam absorbent cover is an extra-cost option which should not be confused with the decorative top cover shown in the B&W ads.) Besides the 801s, I used a pair of Fulton Js. Three amplifiers were used to drive these speakers: the original Ampzilla, a Mission 772, and Bob Carver's new M 400 Magnetic Field Amplifier. Speaker cables were Fulton Golds, except for a brief period when I used about 30 feet of 16 gauge wire. Discwasher Gold-ens connected the amplifier to the C 4000, and standard cables were used between a Sony TC 755 open reel tape deck, a Sony NR 335 Dolby B unit, and the C 4000. The turntable was a Sony PS 2251, with the original Black Widow arm and a Shure V 15 type IV (elliptical) cartridge. No switchboxes were used to switch speakers or amplifiers; switching was done the hard way. In general, long term rather than short term comparisons were made among amplifiers, speakers, and cables.

Program Sources

Most of the listening was to pre-recorded open reel tapes (quarter track, Dolby B, 7 1/2 ips, on low noise, high output tape stock). These tapes are produced by Barclay-Crocker in New York and the Reel Society in California. They are derived from master tapes belonging to major and minor record companies. I also used some records, primarily to see whether the holographic circuit was picky about program sources (it wasn't). Most of the tapes and records were classical; a few were popular.

Room

The room is rectangular, with stairs running along one of the long walls. It is 23 feet long, 15 1/2 feet wide to the near side of the stairs, and 18 1/2 feet wide to the far side of the stairs. The front and left walls are covered with cork. A heavy wool area rug (6 1/2' x 10') is located in the middle of the suspended wood floor. The C 4000 manual suggests that the area around the speakers be acoustically dead. Because this area was somewhat live, the foam absorbent covers for the 801s were used for the tests.

The speakers were finally located facing one of the short walls. There is about 4 feet between the right speaker and the right wall, 4 1/2 feet between the left speaker and the close side of the stairs, and 4 1/2 feet between the speakers and the wall behind them. The speakers are about 4 feet apart, toed in so that they aim directly at the listener. The listener sits on the perpendicular bisector of the speakers, 13 feet from the front of the speakers and 4 feet from the rear wall. The listening area is relatively live, as recommended in the C 4000 manual.

Listening Tests

The Sonic Hologram. The effectiveness of the holographic circuit did not depend on which amplifiers, speakers, or speaker cables were used. Nor did it matter whether the source was records or tapes. The foam absorbent cover did seem to make a small difference; with the cover, the imaging seemed a touch more solid. But I would not bet I could hear the difference in a double-blind test. (The covers clearly made the sound balance "drier," with or without the holographic circuit. But that is another matter.) The holographic circuit was very sensitive to speaker and listener location, and to sound-reflecting objects or pieces of furniture too near the speakers.

The speakers should be exactly the same distance from the listener. If the right speaker is moved two inches farther away than the left speaker, the listening sweet spot or window will move a foot or so to the right, and certain holographic effects will be lost. The C 4000 manual suggests using string to make sure the speakers are equidistant. But this is for the birds; most string is too elastic when stretched over such distances. Use a metal tape measure and match the distances to within 1/8 inch. (Yes 1) In my room, the effect of the hologram on spectral balance and clarity can be heard in a listening window that extends at least 2 1/2 feet to each side of the perpendicular bisector of a line that connects the speakers. But the holographic sound stage can be heard at its best only from a much smaller window. Moving my nose more than two inches off the bisector can produce a noticeable constriction of the stage. The jews harp in German Music of the Middle Ages and Renaissance (Desmar tape DSM E 1015, side one) appears several feet to the right of and behind the right speaker when my nose is on the bisector. If I move my head two inches to the left or right, the harp abruptly moves to the right speaker. But clarity and spectral balance seem mostly unaffected. Listening to that jews harp, I was able to hear the sweet spot move 1 or 2 inches when I corrected an error in which one speaker was 1/4 inch farther from me than the other. Honest! While you may find such a small sweet spot to be a problem, I can live with it. My serious listening is always done alone in a chair which orients me appropriately. If Bob Carver's new C 4000 provides us with a bigger sweet spot, but at the cost of some other virtue such as stage width, I'll keep my old C 4000, thank you.

What is the overall effect of the hologram? It affects imaging, clarity, air, stage size, spectral balance, aliveness, loudness, and reverberance. Many changes are unpredictable and, even within a selection, are not uniform. For example, on a single selection, some instruments become louder and others softer, some are brighter and others less bright. Even when the sound changes radically, the changes usually seem natural, as though the tape should have originally sounded that way. Some changes are predictable: typically, the stage size is enlarged, the imaging is more precise, the clarity, air, reverberance, and aliveness are improved. I would say that 90 to 95% of my records and tapes sound better with the hologram, and in perhaps half of these, the improvement is enormous, even breathtaking. Everyone, including non-audiophiles (e.g., my wife, my parents, etc.), hears it and instantly prefers the holographic sound.

In 5 to 10% of my records and tapes, the holographic circuit either makes no noticeable difference or makes the sound worse. It can make the speakers sound out of phase when reproducing one instrument in an ensemble, while the other instruments sound fine. If that one instrument

is part of a full orchestra, you may never notice it. But if you are listening to a duet, and both instruments are afflicted, you have a problem. For example, listen to The Art of Richard Stoltzman (Desmar tape DSM E 1014). The clarinet has no location and the piano seems built so each note stretches from the left wall to the right wall of the listening room. To be fair to the C 4000, spatial localization is not a great strength of this tape and the C 4000 may simply be exaggerating an existing problem which, with speakers relatively close together (necessary for the hologram) and the hologram off, is not very noticeable. A good test would be to compare localization (a) with hologram on and the speakers positioned close together for optimum holography, and (b) with hologram off and speakers positioned farther apart for optimum stereo. But I have not yet had time to do this. In any case, the practical solution to wall-to-wall instruments is simply to turn off the hologram, which I do with 5 to 10% of my tapes and records.

In my room, instruments are usually precisely localized on a stage much as Carver advertises: a symphony orchestra will extend from the left wall to the right wall (sometimes narrower or wider) and from the speakers to the wall behind them (sometimes behind that wall). Smaller groups, like quartets, will occupy less space than an orchestra, but more space than when I switch the hologram off. Rarely does anything appear in front of the speakers, and when it does, the location is always off to the side. What interests me about this sound stage is that it is the sort described by The Absolute Sound in their best systems and, according to them, should not be obtainable with equipment such as the Shure IV cartridge, the original Ampzilla amplifier, Fulton J speakers, or my aging turntable and tonearm.

Can one obtain a hologram-like sound stage in normal stereo if the loudspeakers are moved to the sides of the room? The stage width can be approximated, but not the depth. In addition, the set-up may develop a hole in the middle or sound bass-heavy with speakers so near the floor-wall junctions. Lastly, the other benefits of the holographic circuit will not be obtained.

For me, the other benefits are the most important ones, even more important than the size of the sound stage. They are: added clarity and aliveness, and the transformation of many previously unacceptable records and tapes. By added clarity and aliveness I mean that the violin section becomes less strident and more silky, that the attack transients on drums and pianos become more distinct, that you suddenly become aware, after turning on the holographic circuit, of more instruments in the orchestra than you heard in normal stereo, etc. While I had expected great things from the hologram in improving the clarity of massed instruments (because of previous reviews), I was totally unprepared for what it often did to the character of voices and instruments, whether massed or solo. For example, listen to Joan Baez, Noel (Vanguard tape VAN D 79230). With the hologram off, some selections show a nasal, hollow, and resonant quality to her voice. The voice seems colored with the tone you get when you blow across the mouth of a 10-ounce soda bottle. This is what I think The Absolute Sound had in mind when they said certain components give Cat Stevens a cold. Sounds like these made me want to sell my speakers (until I heard the same sounds on other speakers). I had visions of sections of my midrange speaker cone resonating here and there, doing little dances independent of the overall cone motion. I cursed speaker designers for being too dumb to know that these resonances are inherent in cones; I cursed myself for buying speakers with a cone midrange. Then I turned on the hologram and, for some selections, horrible resonant colorations vanished utterly. Listen, for instance, to "Silent Night" on the Baez tape. The hologram removes the coloration. (When I listen to the same selection in normal stereo from 2 1/2 feet off the center line, it seems less colored; it is difficult to be sure.) (Ed. note: The hologram attenuates the center of the mix, where Ms. Baez' voice is located. This probably improves a midrange resonance that has a maximum in the center of the listening room.)

In retrospect, it seems that some stridency and harshness that I previously attributed to overmodulated master tapes, high stylus velocities, etc., as well as resonant colorations that I previously attributed to speaker deficiencies, really arise elsewhere -- perhaps in microphone placement unsuitable for normal stereo playback. The hologram cures at least half of such problems, and that is why some previously unlistenable records and tapes have been transformed. To me, this is a greater audio triumph than the expanded sound stage which receives most of the attention given to the C 4000. Long ago I used the Dynaco Quadaptor, which also reduced some resonant colorations. But the Quadaptor made the imaging more vague and sometimes moved instruments to the back of the room, which I found annoying.

Four more comments on the hologram:

1. It produces changes in spectral balance. Usually, the bass increases. But the increase is not like what you get with an equalizer or with typical preamp bass controls. It is an airy, relaxed, blooming bass, with rich reverberant low frequency room sounds. I sometimes think the bass is too heavy, but it is so rich, warm, and seductive that I often resist the temptation to reduce it with the bass controls. I am in constant fear some TRUE AUDIOPHILE will walk in on me and ask how I can stand that booming bass. Like masturbation, the C 4000 bass should be enjoyed in private.

The C 4000 manual attributes this bass increase to an interaction between the hologram and the listening room. Sometimes the increase really is too much. The C 4000 has special bass trim controls that usually do a good job of restoring spectral balance. Usually the treble sounds slightly increased although occasionally I notice the opposite effect. This may be more psycho-acoustic illusion than fact, arising from reductions in harshness and increases in air around the instruments. The net effect of the spectral changes, coupled with careful use of the tone controls, is usually enhanced realism.

2. Traffic noises! The hologram has informed me that many of my tapes are afflicted with traffic noise in the background. Most of the Marriner tapes on Argo (conducting the Academy of St. Martin-in-the-Fields) that were recorded in England are infected. Also listen to the accelerating car in the reverberant fade out at the end of the 5th movement (Rondo) of Lalo's Symphonie Espagnole (Telefunken tape TEL E 641027). I have always heard unidentifiable low frequency noises on tapes and records. With the acquisition of the C 4000, many of these noises were resolved by the hologram into trucks, subway trains, motorcycles, etc. Is it due to the bass boost or to the added clarity of the holographic circuit? I think it is the added clarity, but I am not sure.

3. Pressure on the ears. With the holographic circuit on, I am sometimes aware of very subtle pressures on my ears, something like a very mild version of what you feel when you change altitude. The pressure is always on the ear facing away from the sound: if the trumpet is on the left, the right ear will feel the pressure, and the pressure will vary with the loudness of the trumpet. This happens only rarely to me, and no one else who has heard my system has had a similar experience. (Others have reported it. -- Ed.) Is it real, or is it an illusion based on my knowledge of how the hologram generates correction signals? I do not know. But I do know that six months of continuous component testing can do strange things to you.

4. All the preceding comments on the hologram apply whether the holographic injection ratio is set on "Theoretical" or "Normal." While I did not test other settings of the listening angle, I did test both settings of the injection ratio. It took two weeks of getting used to holographic sound before I could hear a difference. In the "Theoretical" setting, holographic effects were a bit more pronounced. But the difference was miniscule.

Peak unlimiter. This circuit attempts to restore part of the dynamic range reduced during the disc-making process. It adds punch and clarity to the music. In addition, because the loud parts are now louder, I use slightly lower volume settings than before. This reduces surface noise, tape hiss, traffic noise and what have you. On soft passages, I hear no effects of the circuit. On loud passages, the effects are clearly present. The most obvious effect is that the loud parts are louder. But I also hear more detail and air. Surprisingly, on some middle level passages, the effect of the circuit on clarity and air can still be heard, and often in solo passages. It seems that short term differences in loudness on a solo instrument partly determine its clarity and air. The circuit will noticeably increase those differences on all loud and many moderate passages. I hear no untoward side effects, the threshold adjustment is not critical, and I never turn it off. Together with the hologram, it transformed Solti's Beethoven Symphonies No. 5 and 6 (London tape CSPO 9-5) from mushy to exciting.

Autocorrelator. This circuit is supposed to reduce background noise without affecting the music. But no matter how I fool with the manual threshold adjustment, I produce one of three results: (a) knob turned too far clockwise leads to no noise reduction; (b) knob turned too far counterclockwise leads to a loss of high frequency transients; (c) knob carefully located between the previous two extremes leads to a reduction of noise without affecting the music, but at a cost.

The cost is that the music will modulate the noise. That is, the noise is low between musical passages but it returns when the music begins -- and the amount of noise varies with the loudness of the music. I find the changing noise level to be the worst case of all and do not use the autocorrelator. There is an automatic adjustment mode for the autocorrelator; I find that it simply produces result (b), a loss of high frequency transients. Now the C 4000 manual guarantees that the loss of high frequencies is really a psychoacoustic illusion; background hiss seems to make the music a bit brighter. Dolby makes the same point when people claim to hear a high frequency loss along with the loss of tape hiss. Maybe. But several times I unknowingly left the autocorrelator on from the previous day's listening. The next day the music sounded dull and lifeless until I discovered my mistake and turned the autocorrelator off. Here, there were no quick A/B comparisons where a sudden loss of hiss might produce the illusion of a sudden loss of high frequencies. When I turned on the system, it simply sounded dull.

Delay line. I used three Realistic Minimus 7 speakers to assess the delay line. One speaker was center-front on the floor and the other two were about 6 1/2 feet high, on the back wall. They were about 4 feet apart, like the main speakers. I do not know if this is Carver's recommended set-up because someone failed to include the drawing in the manual! (I wrote Carver Corp. for a copy of a revised manual when it is completed but never received a reply.) Sometimes there is a mild improvement in the sound (less constriction, more spaciousness), but the side effects often intrude. The worst of these is hiss from the rear speakers, which sometimes varies with the loudness of the music. If I turn the delay line volume control down far enough to make the hiss become unnoticeable, the sonic benefits of the delay line tend to vanish too. Sometimes, however, the benefits are noticeable and the hiss is not; then the improvement is mildly worthwhile. Perhaps I need to experiment with the delay line a bit more; different speaker locations, different extension speakers, etc. You know how it goes.

Phono section. I do most of my listening with tapes; my turntable and tonearm are greying with age; and since there is reason to distrust A/B-ing of preamps without careful controls (which I cannot provide), I have reached no conclusions about the phono section of the C 4000.

Overall recommendation. The hologram together with the peak unlimiter, generally produces stunning results. Period. But a decision to buy the C 4000 is complicated by competing imaging devices now available and on the horizon, none of which I have heard. Keep the following in mind: (a) In my opinion, the peak unlimiter produces very worthwhile results. Do competing imaging devices include such a circuit? (b) If competing imaging devices produce spectral balance changes, do they offer the means to correct possible problems, as does the C 4000? (c) The revised Carver hologram is on the horizon. (d) Restrictions in speaker and listener placement may differ across brands. Get a home trial if possible. (e) Do you really want a preamp which, for optimum results, requires adjustments for each record, and sometimes for each selection on a record, such that the time required to adjust all the controls, thresholds, trims, etc. can often be longer than the musical selection, at least if you are picky like me.

Postscript

After sending off the above review, I finally had a chance to try out the Sonic Hologram Demonstration-Calibration Test Record. Produced by Alvin Foster of Foster's Supply, and available by mail from Carver Corp. for \$8.95, the record is intended as an aid in setting up systems that use the C 4000. While there are 12 bands devoted to a variety of purposes, for me the crucial one was band 10 which is designed to help determine optimum speaker and listener placement for the holographic circuit.

I can assure you that when I first plugged in my C 4000, I could have used all the hand-holding I could get. The holographic circuit required me to optimize speaker and listener placement for an effect I had never heard before. If I had had the record then, I would have saved many hours of anxious fiddling. (I suggest that Carver Corp. figure out some way of getting the record to the customer on day one when it will produce the greatest practical and therapeutic effect.)

Band 10 consists of one-third-octave noise bursts that are alternated between the left and right channels. With the holographic circuit switched on, the user adjusts speaker and listener location so that the right channel burst is as far to the right of the right speaker as possible, and

the location of the left burst is equally far to the left of the left speaker. Though the instructions do not say so, it is also important to fiddle until the bursts are precisely imaged at their extreme locations rather than stretched over a distance. While all this can be done listening to music instead of the test record, the record offers four large advantages, especially for someone without experience with the hologram. First, with the record, you know where the image is supposed to be when the system is properly set up. Second, the record repeats the signal over and over so you can listen, adjust, and listen again. Third, you know beforehand that the bursts are, indeed, localizable. Sometimes musical sources are not (due to microphone techniques). Finally, the record sends the same signal to each channel so the system can be balanced. The C 4000 should include a stereo reverse switch so that holographic balance can also be conveniently assessed on musical material. Bob Carver, are you listening?

While the record is a very useful tool, it does not guarantee that everything will go smoothly. And what a rocky road I traveled! I confirmed what I had vaguely suspected, that the center of my listening sweet spot was actually an inch or so to the right of the perpendicular bisector, and the above review was written with my nose slightly off center. Only a victim of audiopsychosis would go through what I did to track down why my ears preferred that my nose reside an inch or so out of joint.

First of all, note that the off-center sweet spot was the listener location where the jews harp was reported above to image behind and to the right of the right speaker. Moving my nose away from this off-center location produced the constriction of the sound stage. This was confirmed with noise bursts which seemed equally extreme on the left and right side only when my nose was off center. On the bisector, the right burst was about twice the distance from the right speaker that the left burst was from the left speaker.

Using the bursts, I discovered there are really two sweet spots! The right sweet spot was at the listener location where the right burst was farthest from the right speaker and the left sweet spot was the listener location where the left burst was farthest from the left speaker. Each sweet spot is shaped like a narrow corridor that radiates out from the midpoint of a line that connects the two speakers. Had God been smiling on me that day, She would have seen to it that both sweet spots superimposed. She did not and they did not! The two corridors barely overlapped. In the overlapping area, an area scarcely wide enough to contain my head, is where I have been doing my listening for the last six months. And the center of that overlapping area was an inch or so to the right of the perpendicular bisector. (The exact location of the perpendicular bisector has been checked and rechecked with a metal tape measure.) Now my goals were to enlarge the overlap between the right and left sweet spots as well as to move the overlap to the perpendicular bisector.

I spent hours discovering all this and more hours trying to figure it out. Hoping the test record was at fault, I reversed the inputs to the preamp from the cartridge. The record and cartridge were exonerated when the problem remained unaffected.

I reversed the inputs to the amp. No effect. I reversed the left and right inputs to the speakers. No effect. Then Al Foster suggested that the left and right sides of my listening room might have different acoustical properties and, since the holographic effect is frequency dependent, I should play with the level controls on the back of my speakers. Aha! My front and left walls are covered with cork and my right wall is bare. So I cut the midrange and treble of my right speaker. No effect. In desperation, I switched right and left speakers. No effect.

I then spent three to five hours moving my speakers an inch or a foot every which way, and the same with the listening chair. No effect. I moved furniture and objects farther away from my speakers and from the listener location in order to reduce reflections. No effect. (All this testing was done playing noise bursts at both 33 1/3 and 45 rpm to vary its pitch, which had no effect.) Tearing the last hairs out of my balding head, I moved all the furniture in my listening room around so I could set up the speakers along the long cork-covered wall normally on my left. This time, the cork walls were behind and to the right of the speakers. NO EFFECT!

I concluded that the auditory nerve for one of my ears is longer than the auditory nerve for the other, producing longer transit times for nerve impulses. Since the C 4000 manual does not cover this problem, I gave up. I returned the furniture and speakers to the original locations

except that I moved the left speaker about 3/8 inch farther from the listening chair than the right speaker. This shifted the right and left sweet spots, along with the overlapping area, to the left so that the overlap fell exactly on the original perpendicular bisector. This was done for purely aesthetic reasons since the original bisector looked and still looks to the unaided eye like the midline. In fact, moving the left speaker backward moved the actual perpendicular bisector to the left. So while my nose now sits on what looks like the bisector, it is still an inch or so to the right of the real bisector.

If you think I can forget that 3/8 inch asymmetry and enjoy the music, you do not know audio-psychosis.

Four closing notes: First, after discussing my review with Al Foster, it seems I may have been imprecise about my evaluation of the peak unlimiter. I meant to say that the improvement was moderate, not large. The benefit was much smaller than the hologram but, to me, larger than the delay line -- in all, definitely worthwhile but not groundshaking.

Second, my references to The Absolute Sound were made more to disagree with them about whether components such as the Shure V-15 IV cartridge restrict the sound stage than to praise them as audio pathfinders. Agreed, their evaluation of the cartridge, and of other components I referred to, was in the context of stereo, not holographic, reproduction. Nevertheless, my understanding of the hologram is that it reduces certain distortions of two-speakers-in-a-room playback; hence, the character of the components in the system should be better heard.

Third, while I fooled with speaker and listener location primarily in conjunction with the test record, I also listened to a number of selections I described in the review as being afflicted with resonant colorations. I found that speaker and listener location did affect the severity of these colorations. I suspect that these colorations are not simply positioning/room effects, but interactions between microphone techniques and positioning/room factors. Nevertheless, as long as positioning recommendations in the C 4000 manual or test record were more or less followed, speaker and listener location did not seem to affect the ability of the hologram to remove these colorations. Selections improved by the hologram were improved regardless of speaker or listener position. Selections whose colorations were unaffected by the hologram seemed unaffected regardless of speaker or listener position.

Fourth, the above review should be read with caution. Many of the effects reported above -- e. g., the tiny size of the sweet spot in which one can hear the largest holographic stage -- may vary greatly from listening room to listening room.

Post-postscript

I hope this post-postscript does not cause the editor to have a kitten. (Meow! -- Ed.) But, after sending off the above postscript, Al Foster conveyed information to me from Bob Carver that will be of interest to owners or potential buyers of the C 4000. As you read this, note that this information is second-hand to me and third-hand to you.

1. The new C 4000 holographic circuit will produce smaller spectral balance changes. In addition, the circuit will have a switch which, in one position, will produce an enlarged sweet spot for best listening to the holographic stage. The sweet spot will be wide enough for three listeners; but the cost will be a reduction in the size of the stage. The other position will produce the present narrow sweet spot with the present stage size. The switch will be located on the rear panel of the C 4000.

2. The new holographic circuit will not produce the pressure-on-the-ears effect. This was caused by imperfect cancellation of low frequencies at the ear. Refer to Alvin Foster's article (on how the hologram works) in the BAS Speaker, volume 7, no. 8 (May 1979). Thank God someone else heard this effect!

3. Owners of the original C 4000 can have the new holographic circuit installed, complete with two-position sweet spot switch, for \$65 in the U.S.

4. The delay line problem I complained about (music modulating the noise) is caused by excessive crossover distortion in the delay line amplifier that is built into the C 4000. The distortion, caused by the bias drifting over time, is corrected in the new C 4000. Owners of the original C 4000 can have the amplifier section updated at no charge.

5. The imbalance I noted, where the center of the sweet spot was an inch or so off the perpendicular bisector, will be user-correctable in the new C 4000 by adjusting the balance control. In the new circuit design, the balance control will be located before the hologram -- in the present C 4000, the balance control is located after it. To determine whether this change would solve my problem, I played the tape with the jews harp, turning the left or right output controls of my tape deck. These controls are of course located "before" the hologram. The location of the sweet spot didn't budge! Not one inch. As long as at least a moderate signal level was fed to each channel of the C 4000, it didn't matter one iota what left channel/right channel volume balance I selected with the output controls of the tape deck. In retrospect, this outcome does not surprise me. The off-center sweet spot seems to result from a timing imbalance, not a volume imbalance. This is suggested by my being able to move the sweet spot by moving one speaker 1/4 inch farther away from the listening position than the other speaker. While the 1/4-inch difference would have only a tiny effect on arrival times from the two speakers, it should have no measurable or audible effect on the loudness differences in a living room. In any event, old balance controls can be updated to new ones on request.

Bottom line for owners of old C 4000's: all units returned will be updated at no charge except for the hologram circuit board which will cost \$65. I think that is more than fair. Now what am I going to do while my C 4000 is in the mail?