

THE BAS SPEAKER

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Letter From the Editor

We are hoping to speed up the publication of the *BAS Speaker*, and therefore we will not hold publication for promised articles. The May and July meeting summaries, and David Weinberg's report on his CES THX experience appear in this issue while Al's review of his spectrum analyzer and the Desktop loudspeaker meeting summary do not.

May 1990 BAS Meeting

A Visit to Boston Acoustics

This joint meeting with the Boston Chapter of the Audio Engineering Society was a tour of Boston Acoustics' new manufacturing facility, located in Lynnfield on Route 1, next to the Ship restaurant.

The group gathered in the canteen to partake of a generous selection of crackers, bread, cheeses, other appetizers and drinks. Along one wall there was a pair of Boston's old T1000s, powered by NAD electronics. Brad Meyer brought a DAT machine and two versions of the David Griesinger recording of the *Missa Solemnis*, so that those who had heard the original (dry) version could compare that recording with the final one with the reverb added. The difference was subtle, and those seated far from the speakers had trouble distinguishing between the two over the ambient noise of the canteen, but those close up felt the recording with the reverb had achieved a more satisfying feeling of distance as well as improved ambience. Apart from this demonstration there was none of the usual Open Forum activity.

Andy Petite, president and co-founder of Boston Acoustics, gave us an overview of the history of the company. He stressed their philosophy of maintaining excellent matching between any pair of speakers they sell; even in the cheapest model, all units sold must be within ± 1 dB of their reference. The company's success comes from producing very good-sounding speakers at extraordinarily low prices, which is made possible through cost-effective engineering designs and efficient and consistent production (i.e., low rejection rates).

At the conclusion of his speech, we split into three groups. My group visited the showroom first, where we heard Boston's automotive and in-wall speakers. We next visited the laboratory, then the production area, where the new woofer production line was the highlight.

Automotive Speakers

Boston Acoustics' latest line of automotive speakers is the Pro Series. They are the most gorgeous-looking new drivers I have seen, with very strong cast-aluminum chassis, huge magnets, and extremely high power hand-

ling. The Pro Series features neodymium magnets in the tweeters. These magnets are extremely small—not much larger than the diaphragm. The resulting low profile permits flush mounting on many surfaces, and one way or another the speaker will fit in almost any location. The tweeter comes with three mounting options: flush, surface, and swivel. Their 4", 5.25" and 6.5" drivers are also very shallow, permitting easy flush-mounting on door panels, for example. Andy says that flush-mounting improves the sound significantly. A 10" woofer with "unlimited power handling" rounds off the series. We heard a bi-amped system, comprising a 5.2 (the 5.25" unit with the tweeter) and a 10" woofer, in a large room. This system played very loudly. Since the acoustics are so dramatically different from the actual environment in which the speakers will work, no valid judgement could be made on the frequency balance.

In-Wall Speakers

The next speaker we heard was an in-wall speaker, the model 380. It's a two-way system with an 8" woofer and a 1" dome tweeter with a ferrite magnet. Crossover frequency (electrical) is 3,700Hz. It sounded very smooth and uncolored. In-wall speakers are a fast-growing market, especially with the advent of video surround systems—it's the most unobtrusive way of adding surround speakers to a home system. Boston Acoustics has some very innovative and flexible means of attaching the speakers to the studs in the wall, permitting easy installations in many locations.

The Laboratory

This room is the territory of longtime BAS member Gerald Sheeto. We listened to two home speakers—the SubSat Six, and the T1030, the latter a successor to the T1000. Like the T1000, the T1030 uses two 8" woofers, a 6" midrange, and a 1" dome tweeter. The crossover between the woofers and the midrange is 400Hz. It sounded very good, with excellent imaging, a very good sense of effortless dynamics, and depth. The SubSat Six, while impressive for its size, was (not surprisingly) no match for the bigger system, sounding strained at high levels and with less depth to the image.

[I recently had a pair of T1030s to audition at home. It is one of the best-sounding dynamic loudspeakers I have heard. Midrange clarity and imaging are outstanding. The only shortcoming is deep bass extension (a problem I also find with this speaker's competitors). It is in every way superior to its predecessor, the T1000, vastly so in some areas. Strongly recommended.—PSH] [The SS6 is among the very best three-piece systems I have tested.—DRM]

Production Facilities

Petite himself conducted this section of the tour. This new woofer production line is his pride and joy, and cost \$1 million. The equipment came from Japan, and was set up by the Japanese. The production line handles woofers up to 10" in diameter. (Boston's 12" woofers are made on the old line.) The new line takes only 14 people to oper-

ate; the maximum production rate is one driver every six seconds. It produces drivers with greater consistency than any other machine they had tried, thanks to ultra-precise metering of adhesives.

Adhesives, and how they are applied, are the keys to driver consistency and reliability. Petite uses a special adhesive to glue the cone apex to the spider and voice coil former (the so-called "neck joint"). It cures at 95°C (200°F). The Japanese normally use adhesives that cure at 50°C, but the cure takes too long. The high-temperature adhesive is a great success; Andy claims they have not seen a single neck-joint failure. This is all the more remarkable when one considers how difficult it is to stick anything to polypropylene. The epoxy for gluing the ferrite to the pole pieces is also impressive: it hardens in only 10 seconds! Woofers produced by Boston Acoustics are so consistent that other manufacturers want Boston Acoustics to make woofers for them.

We next went to the tweeter production line. Boston Acoustics found that even the Japanese could not produce tweeters to sufficiently close tolerances to come within ± 1 dB. The amounts of adhesive and ferrofluid are both very critical. Boston Acoustics controls the concentricity so precisely that they can use very narrow gaps to achieve high efficiency. High efficiency means less input for the same loudness, which in turn implies much higher reliability. The result is the most efficient 1" dome tweeter Andy knows of that does not use semi-horn loading. He does not believe in metal domes because they ring and are less efficient above 10kHz.

Boston Acoustics tests its crossovers to very close tolerances—within 1/2dB—even on their least expensive speakers, to achieve the desired consistency. To see how, we next visited the QC facility. Woofers are tested for buzzes with a swept sine wave. The woofers are consistent enough not to need checking for frequency response.

With tweeters, it's a different story. They are compared with a reference unit whose characteristics are stored on a computer. The computer runs the check and displays the diagnostic on the screen, showing whether the speaker passes or fails, along with the reason for rejection. Finally, completed systems are checked for buzzes and frequency response, which must be within ± 1 dB of the reference.

Conclusion

We had a very interesting and insightful visit. Andy has loudspeaker production down to a fine art. The result: While other New England speaker companies flounder, Boston Acoustics flourishes. This is impressive indeed, and our visit helped explain why.

— Poh Ser Hsu (Massachusetts)

July 1990 Meeting

Open Forum

Upcoming Meetings

Mark Fishman announced that David Weinberg is arranging for Tom Holman to speak on the THX system for an upcoming BAS meeting. Since the local chapter of the AES is also interested in this subject, it will be a joint AES/BAS meeting. Martin Polon noted that the Boston section of the AES will be having a swap meet in February. After some discussion, we decided that the BAS will join them. The meeting will be on a Saturday, from 10 to 2; the date will be announced later.

Items for Sale

Ira Leonard has a Dolby A-301 and a dbx type II for sale for \$35 each. He also has some Sony SLO-1400s for sale for \$250 each. These are heavy-duty industrial-grade Beta VCRs. Les Klein offered a pair of KLH Nines for sale, and gave his phone number: (617) 862-5572. Mark Fishman informed us that Sumner Bennett has a like-new pair of Allison IC-20s in black lacquer for sale (\$2,000).

David Moran knows someone who is selling original Infinity Betas for around \$6000. Anyone interested should call Moran at (617) 259-9343.

CDs in Cars

Someone asked why manufacturers charge \$500–600 for car in-dash single-disc CD players. Reasons offered include monopoly (only CD players made by the same manufacturer will fit into a pre-existing mount) and the cost of the extra environmental and shock resistance. Everyone agreed that none of these reasons justifies the price. Brad suggested using a portable with an adaptor that plugs into the cassette unit. Brad personally put a mini-phone jack on the front panel of his equalizer. Ira noted that 50% of portable CD players are used at least some of the time in a car. However, it is difficult to change CDs on a portable while driving, especially if you use a home-style portable.

New Products Not at the CES

ADC has four or five new speakers, of genuine dbx Soundfield parentage, all made in Taiwan. Moran heard the top model and was extremely impressed.

New 18-bit dbx Ultra Analog A/D converters have now been used to record some CDs. Moran heard a Tony Faulkner recording of Russell Sherman performing Liszt's *Transcendental Etudes* made with these converters that sounded amazingly good. Moran pointed out that most CDs to date are mastered on the Sony 1610 or 1630, which have terrible phase characteristics.

Brad said the Sonys have good phase response up to 4kHz, and that Preis and Bloom's study, published in the *AES Journal*, found phase shifts above 4kHz to have little or no effect on perceived sound. Microphone positioning

is much more critical: shifting the mikes a few inches will alter the sound much more, he claimed, than the differences between A/D converters. As supporting evidence he cited his experiences in making one of his recent piano recordings.

Moran noted that while it is easy to make good D/A low-bit converters, good low bit A/D encoders are not so simple. He found a \$250-list Technics CD changer that uses low-bit MASH D/As to sound "amazingly good."

Phyllis Eliasberg reported that Hitachi was developing a new floppy-disk digital recorder. This news was greeted with some skepticism by those familiar with the Compusonics debacle of a few years back. At any rate no one else had heard of the system, but Brad and Ira said they would try to obtain more information.

Audio Industry Status

Martin Polon said there are more bankruptcies in both consumer and pro audio in the last ten months than in the preceding ten years. Banks are very cautious now about "high-tech" loans.

Martin Polon also noted that the SCMS bill (mandating the one-copy system for DAT recorders) fell apart. "There is no sense of direction" about the issue, he said. "Each side wants what they want." Various parties involved in the issue "had a secret meeting" at which manufacturers agreed to produce a chip that would prevent making more than one copy of an initialized recording. The bill didn't make it to Congress intact. Songwriters are still convinced that DAT would destroy the value of all their copyrights, and both the RIAA and the songwriters want royalties.

Once again, Sony is in the position of defending a new technology. After their victory in the Betamax case, they are confident that they can win this battle, though the lawsuit will lock out many companies for the moment. Of course, a loss by Sony would mean royalties slapped on everything. Martin said that "Congress knows that they are confused, and that they tend to make mistakes when they are confused," so they are reluctant to act on this bill.

Local audio manufacturer and writer Philip Greenspun (of IsoSonics) played a role in the SCMS debate, testifying before Congress that the SCMS chip is easy to defeat, and that it will prevent small companies from competing with the big ones. He has some experience with Congressional matters. The headline he wrote was "If the DAT bill passes, Americans will be unemployed; consumers will be bled; copying will be unaffected; musicians will suffer; lawyers will rejoice; and Americans will get a cold fish in the face. Who's behind the DAT Bill?"

Polon further noted that Congress made a good point when they asked why there had been no objection to the analog cassette. People who buy pirate copies do not care so much about quality. The bottom line is the royalties; the problem is not in the technology. However, it is very difficult to distribute any such royalty equitably.

Ken Rudnick thought that it was just a question of pricing: Columbia started the hi-fi industry by coming out with affordable music on the LP. Piracy is a problem only because of pricing; if the original is cheap enough, there will be no piracy. Martin Polon felt that the fight could kill the industry. "If we don't get anything new out, the industry will stagnate."

New DAT Machines

Alvin Foster noted that Lechmere has the Sony DTC-700 DAT machine that lists for \$900 and sells for \$800. It has two speeds, and three sampling frequencies: half speed with a 32kHz sampling rate and nonlinear 12-bit encoding, and full speed with 48 or 44.1kHz sampling rates (the latter only for playback or when recording from the digital input only). The 12-bit low-speed option uses an EBU (European Broadcasting Union) standard. The machine has both optical and coaxial digital connections. Al thought it looked good. Brad had been in the store, and tried one of his tapes in the machine. He reported that the new deck both writes and reads absolute-time information in a form compatible the professional Panasonic 3500, as well as the small Aiwa Strasser and the fancy Nakamichi deck. With this feature, when you put in a tape in the middle the correct time pops up. [Brad has since bought a DTC-700 as a second DAT recorder and is very happy with it. The SCMS circuitry has proven no impediment at all to copying between the Sony and the professional Panasonic 3500.—PSH]

Poh Ser has a brochure for the Technics SVDA-10 that has MASH encoding *and* decoding. The list price is, according to the August issue of *Stereo Review*, \$1,200.

Bill Wolk compared the playback of the Sony with the Panasonic 3500 professional deck and noted a slight difference. Since it was not a controlled test, the differences could be due to a slight mismatch in playback level.

Sales of the Sony unit greatly exceeded Lechmere's expectations. Brad, on the other hand, was not surprised; many Boston-area professionals probably are buying the unit, as he did, to be a backup for professional models costing more than twice as much. JVC also has a similar unit. All the new models have an automatic digital fade feature.

Miscellaneous Items

David Moran has been asked to do some tests of various kinds of goop intended to treat CDs. He would like to hear from anyone with opinions and/or experience. This led to another discussion of the possible causes of the reported effects from these concoctions. Most of the literature suggests that the effect of scattered light is similar to clock jitter. Some manufacturers reduce clock jitter effects by measuring the voltage in the middle of the pulse; with these machines the goop should have little or no effect.

Moran gave us a quotation from an ex-dbx engineer: "The 'nice' thing about pro audio is that it's like tweak audio, in that it takes something that comes out of science—optics, lasers—and then proposes to analyze it

randomly. 'Now that we've got it, how do we make it sound good?'"

Dave Moran has reviewed the Atlantic Pattern and the Cambridge Soundworks suitcase system for *CD Review*. The suitcase system is much nicer than the CSW Ensemble, he feels. The Atlantic system is too beamy for his taste. The suitcase is now \$749, not \$500; Moran especially loved its satellites.

CES

The count of attendees at the show was down this time to 55,353, a low total even in this new era of honest counting. There were two major news items. One was that manufacturers really are going to bring in DATs, and the other was the introduction of home THX theater sound. Of course, people are still building new speakers. That is always interesting, because everyone can always hear differences among them.

Surround Sound Systems

Onkyo has one of the best values in surround sound. Their system derives the surround signals from elementary L-R techniques, similar to the Dynaco system of years ago. Their goal is to get in at the bottom end, so they are competing with the Atlantic Technology system. For \$1150 Onkyo, assuming that you have two main speakers with amplification, gives you two satellites, a center channel, and a base containing a subwoofer.

Atlantic Technology's system, shown to the BAS in April, will be going for \$1500, which includes true Dolby Pro Logic decoding and all amplifiers and connecting wires. This appears to be an even better value than the Onkyo system.

Tom Holman's goal is to establish standards for the complete system including decoder design, crossover design, crossover frequency and slope, and speaker performance. Theoretically, a home theater system with a THX logo on it will be within a certain tolerance of the system that was used to monitor the film when they mixed the sound track. In this way he hopes to close the loop between the maker and the listener. It's a very ambitious undertaking.

There were two home THX systems at the show: a Technics system, and one with Snell speakers and a new Lexicon decoder. Before the show, Tom held a demo at the McClurg Theater using the theatrical THX system. The reaction was generally mixed, but it was obvious that Lucasfilm put lots of effort into the development of the systems and into demonstrating them at the show.

Brad heard both consumer systems, and found both somewhat loud, harsh, and bright, though surprisingly similar given their sources. The side speakers in a home THX system are dipoles, with different front and rear response. They have a specified radiation pattern, power and frequency response. The listener sits in the null of the side speakers. From the varying reports that came in from different people known to have good ears, it seemed that in at least some of the demonstrations the

Technics system was quite distorted. Both are very expensive; the Snell is \$6,000, and the Technics is \$12,000, or \$7,000 without the amplifiers. The difference is quite surprising, as it means they are charging \$5,000 for five channels of amplification. The new Lexicon box is an upgraded version of the CP-1 called the CP-3, with more sophisticated hardware and software, lower noise, and better A/D and D/A converters, and sells separately for \$2,800. Lucasfilm had a special laser video disc made for the demo, much of which was made by going back to their original negatives. Mark Fishman liked both home systems a lot, and was impressed how close they sounded to the theater. But "both are too loud."

John Allen liked the Shure HTS display much better than any of the others at the show. Not only did film sound good, but other material (from *Saturday Night Live* and a Rolling Stones concert) was all very enjoyable. The Shure is a turnkey system whose initial price was about \$10,000, since reduced to nearer \$5,000.

Speakers and Headphones

By a unanimous vote, the worst sounding speaker at the show was by Physiks. It had a honky, shrill sound.

One of the best sounding speakers at the show came from Sci-Fi (Scientific Fidelity). It measures 8"x13"x50", and is exquisitely beautiful. It sells for \$1500 a pair. It achieves a low cutoff by using two small woofers in a large box. It has an effortless, airy sound, with excellent imaging. It has to be the winner of the show for price/performance ratio, looks, and sound. Mike Maloney, owner of Sci-Fi, also makes a very spectacular looking pre-amp and power amp, products of an earlier, failed effort at the high-end electronics market. He brought them to the show to power his new speakers, and an Asian dealer placed a large order.

Another excellent speaker is the Essence Amethyst Gem. Much smaller than the Sci-Fi, and lacking the latter's bass extension, the Essence is nevertheless very beautifully finished. It uses Dynaudio drivers and costs \$1000 a pair. Essence also make a subwoofer with a 14' transmission line that seemed much less exciting to this writer (PSH), who tried the infamous Peter Hurford Hindemith organ recording (Argo 417159-2) and no deep bass came out of it.

The Energy 22.3 is another very good speaker, albeit very expensive. Tar Su, Poh Ser's brother, was particularly impressed by it. It has excellent imaging and sounded very effortless. Most members also listened to the ATCs, primarily because Peter Mitchell loved it so much. They play very loudly cleanly, but are also very expensive.

Bob Graham introduced a \$3-4000 Swiss speaker, which many on the *Stereophile* staff loved. Al will get a pair for review. Brad listened to it and liked it a lot.

Henry Kloss has designed a new line of speakers (called, appropriately enough, the Founder Series) for KLH. It is similar to the KEF and the Boston Acoustics' SubSat Six in that the back of the woofer loads into a sealed box, while the front loads into a vented box.

There were three of these systems; at least one (and maybe more) sounded terrible. Al found them "one-note-ish."

Koss has several new phones, including the Pro 4XL, a sealed model that sounded pretty good, though not quite as open as Ira Leonard would have liked. The highlight of their presentation is a new electrostatic headphone, with very good bass, much better than most. The price, however, is expected to be a staggering \$2000! The Koss party, held at the Chicago Broadcast Museum, was great.

Tube Amplifiers

Al noted that tube amplifiers are the "in" thing. Many high-end amplifier companies (Jadis, VTL, Beard, Unison Research, Sci-Fi, and Audio Research, to name a few) make tube units. Al feels that US-made products can compete successfully only in the exotic market; at lower price levels, the competition is too stiff. Poh Ser noted that at the *Stereophile* show in New York last April, the proliferation of tube amplifiers was also the most notable feature.

Changes in the Industry

Dynaco has returned, offering an L-R box and a new version of the ST-70, now with chrome-plated transformer caps and a somewhat higher price of \$995.

International Jensen has bought NHT. Ken Kantor is still there, and plans to remain as the new parent company wants the old staff to continue to work independently.

Video

There is a new laserdisc association, with 13 member companies. There are currently about 4500 titles in the laserdisc library. Many people see laserdiscs in large-screen TV demos without realizing it. One of the goals of the new group is to provide a little sign saying, "You are watching a laserdisc," to make the point that laserdiscs are much better than tapes or broadcasts. Lechmere now has an LV unit for \$300, which they expect to account for 40% of their LV sales.

The Pioneer Laserdisc player used in the Lexicon/Snell demo has a built-in video noise reducer and costs \$3500; Pioneer plans to incorporate a version of this new chroma noise-reduction system in an upcoming \$1000 unit.

John F. Allen liked the new Pulsar projection system, whose quality he felt was in the same range as the Vidikron for half the latter's price.

Toshiba has a very good-looking 30" HDTV. It has very large dots for HDTV, which gave it more brightness and snap. It's called Hi-vision. They showed a tape with outdoor scenes of Boston, Canada, and Seattle. They had a larger set (about 37") that looked even better.

Ira thought the second-generation JBL video projection TV is the best under-\$10,000 system he has seen—an opinion that met with widespread agreement. The set uses a plastic/glass composite lens and represents a

substantial improvement over previous systems. It is bright and sharp.

A Cambridge product called "In-the-Picture" allows you to make videos of yourself. You fasten a small infrared transmitter to yourself, and the camera pans to follow you. It's great for analyzing your tennis game. In a similar vein, a consumer version of the Steadicam (called the Steadicam JR) is now available. It has a separate LCD monitor. Phyllis Eliasberg reported that this type of product takes a long time to learn to use.

Al noted with some regret that there were no adult videos at the show this year. The makers have a separate convention now, and are probably gone from the CES for good.

— Poh Ser Hsu (Massachusetts)

Lucasfilm's Home THX System

David J. Weinberg

[Lucasfilm Ltd. reviewed this article before publication to ensure factual accuracy; to give them an opportunity to respond to certain of my perceptions; to help me learn the causes of my perceptions; and to ensure I am not misrepresenting the products or the presentations discussed. The comments interjected were most graciously provided by Tomlinson Holman (TH).—DJW]

When I attend a summer Consumer Electronics Show in Chicago, my goal is to find those concepts and products that represent progress and rationality in audio and video. When I learned of the planned introduction of Lucasfilm's Home THX Audio System, and that Tomlinson Holman, Corporate Technical Director of Lucasfilm Ltd., would be giving a presentation at a THX-equipped theater, I felt I had found such a concept.

After Holman's presentation of theatrical THX in the McClurg Court Theater, at 330 East Ohio Street, on the night before the show opened, Lexicon and Snell Acoustics jointly presented their Home THX Audio System components at the Hotel Intercontinental, outside the official CES venue. Technics presented their version of the Home THX Audio System in a semi-isolation room right in the middle of the main floor of McCormick East (formerly McCormick Place). These were the only Lucasfilm licensees of the Home THX Audio System with a product (almost) ready for distribution. With a little good fortune, I experienced all three THX presentations in less than 30 hours.

Since I became aware of Holman more than a decade ago, through his outstanding work at Apt Corporation and his presentations at BAS meetings, I have held him and his work in the highest regard. Holman has the knowledge and ability to identify a problem, analyze it thoroughly, and create a rational and holistically-sound solution; and—by the way—he just happens to have a product available incorporating the solution, usually at a

fairly reasonable price. From his position at Lucasfilm, Tom has had a marked impact on the quality of film sound throughout the industry. He has made available a digitally-recorded library of sound effects, created under Ben Burtt's direction. And there are THX sound systems in over 500 theaters worldwide. Lucasfilm's establishment of the THX certification program, which requires compliance testing and recertification every six months for a theater to retain use of the trademark, is a creditable effort to minimize variables and improve consistency in film presentation.

Now Holman is attempting to bring the film sound experience into the home. The goal of the Home THX Audio System is to give the home listener the opportunity to hear a replica of the sound experienced by the director on the sound-mixing stage. The philosophy is that since the director controls the sound mix there, that is what he wants the listener to hear in volume level, intelligibility, tonal balance, and surround level. Lucasfilm is working with the film/video industry to standardize the sound levels on all video discs, which would make calibration of the Home THX Audio System more useful. Those who find film sound in theaters too loud can always turn it down at home, but they will be aware of the director's intentions (or perhaps the effect of his growing deafness).

The audience raised this issue at Holman's theater presentation. Temporary threshold shift (listening fatigue) is a possible cause of the high "standard" level, but may be avoided by mixing in shorter sessions over many days rather than in one long one. In addition, Tom has played a few experimental tricks on some of his sound mixers, using controls they can't see to change levels secretly overnight or while they were out of the room. The sound engineers noticed the difference and readjusted the volume by ear to within tenths of a decibel of the previous level.

As with the theater THX Sound System, Lucasfilm has established the performance specifications for the Home THX Audio System, and licenses companies to manufacture and sell part or all of the system. These specifications include not only the number of channels and type of decoding and equalization to be used, but also dispersion patterns for all speakers, to reduce reflections from room boundaries and to create a relatively uniform coverage of the listening area.

The two home systems shown at CES include three main audio channels (left, center, right), two subwoofers driven by one channel, and two surround speakers, which are bidirectional radiators intended for placement along the side walls near the ceiling, with the "null" pointed at the listener. The processing includes Dolby Pro Logic and a special decorrelator circuit, developed by Lucasfilm, that reduces localization of the two surround speakers and helps envelop the listener. Lucasfilm's applied psychoacoustic research led to the decorrelator circuitry and special equalization that they feel compensate for acoustic limitations due to living rooms being smaller than a theater or mixing stage. *[It is not*

acoustic limitations that cause the perceived differences, but the X-curve large-room response compared with the nearly flat high-frequency response in home listening rooms. We determined the need for the "re-equalizer" by listening to high-quality loudspeakers at home and finding the program material too bright, then comparing the video copy with the original print master and finding it identical. That left only the differences between the two environments—the dubbing stage and the home—to account for the difference. Lucasfilm used a mannequin to develop the actual difference curve, which was then verified by the original production personnel in a home-sized room.—TH]

The seven-piece Snell Acoustics speaker system costs just under \$5000, and can be purchased incrementally. This hotel presentation used four subwoofers instead of two because of traffic, air-handler noise, and the room acoustics. The Lexicon CP-3 processor includes essentially the same functions and algorithms as the CP-1, adding new circuitry and firmware as well as the Home THX Audio System circuitry, and is projected to retail for \$2800. One must still add six amplifier channels with enough power to deliver the required SPL without clipping. Lexicon's intention is to provide dealers with a THX laserdisc and a sound-level meter to help them explain, demonstrate, and calibrate the system during installation. The Technics system retails for about \$12,000, and includes seven speakers and amplifiers.

All three THX presentations used the Lucasfilm THX trailer and scenes from many Lucasfilm movies, including *Star Wars—A New Hope*. In the theater, the source seemed to be 35mm film. In the two Home THX Audio System presentations, the source was a Lucasfilm-produced laserdisc created for the purpose. In all three presentations, the screen and the images were of Cinemascope aspect ratio.

The film Holman used at the McClurg Theater presentation looked a bit worn. The age of the original *Star Wars* film (it was released in 1977; the title *A New Hope* was added later) may account for distortion during some excerpts that was higher than would be acceptable in today's movies. The technology of film sound production and reproduction has improved greatly over the past 13 years, and our expectations for cleaner sound have risen with repeated exposure to the results. *[I think Dave is dead right here. When making the video software, the salient difference that I noticed was that the Star Wars music seemed cleaner than it ever had. I asked the post production mixer Gary Summers what he had done, and he told me that he had gone back and dubbed the film music elements directly from the 8-track 1" original recording of the music from 1977. It sounded wonderfully cleaner to me, using all the developments that 13 years have brought. THX became the well-known manifestation of the developments in film sound that have occurred at Lucasfilm over the past 10 years, but there were many, many others as well, which would be a whole article in itself.—TH]*

The surround channels seemed lower in level than I remember, particularly on the overhead chase of the ambassador's ship by the Imperial cruiser in the open-

ing. My recollection from 1977 is that the Imperial cruiser came from above and behind me, overhead, and through the screen. I checked with several others, without first giving them my impression, and each had the same recollection; one person remembers ducking when that action occurred in her first viewing of the movie, 13 years ago. In this McClurg Theater presentation, the sound came almost entirely from the screen, with little surround effects. I was sitting not quite half way back in the hall, just left of center.

[Modern calibration procedures are very exacting when it comes to matching what film makers heard during mixing. I have sat with Ben Burt, who was sound designer on Star Wars, in a well-calibrated room: well-calibrated for loudness, spectral balance, localization, surround level, etc. He liked the presentation, finding it matching his memory except for the known enhancements. For example, we now have about two octaves greater frequency range, one at the bottom, and one at the top, than during the original dubbing. The root of Dave's experience may be attributed to theaters, especially in those days, turning up the surround and subwoofer levels to make the experience even bigger than it ever was. This goes against the whole nature of film sound, which has more successfully promulgated standards throughout the industry than in any other part of audio recording. Where else is the level set to a known sound-pressure level or spectrum response so that the recorded experience can translate across as many spaces as possible?—TH]

Male voices seemed to lack the deep resonance I recall, and have heard even in cable broadcast of the movies. James Earl Jones's voice lacked the baritone strength that helped make it so threatening. Even Luke's voice was a bit thin. The whole soundtrack seemed to lack this upper bass strength, as though suffering the Allison effect. This is not possible in a THX theater installation, where flush mounting of the five front speakers eliminate this effect. Perhaps faults in theater sound systems and setup until recently have led to errant presentation of the director's choices. *[I agree. I have checked the bass level, tracing it back to the original mix by asking people who were there. I think what Dave heard in the two demonstrations more faithfully reproduces the filmmaker's intention than what he heard previously in theaters or on television.—TH]*

The Lexicon/Snell presentation was in a heavily curtained room, about the size of a large living room. I listened from a left-of-center location toward the back of the room. I was able to move around during the presentation to hear how the sound might change with position. The Lexicon/Snell presentation sounded surprisingly similar to the McClurg Theater presentation. The volume level of the surround channels still seemed too low. The distortion of the *Star Wars* movie excerpts seemed lower here than in the theater presentation (see first TH comment in the previous paragraph). I did not have my Ivie to determine how close the levels were to those of the theater presentation, but I perceived them to be reasonably well matched. The upper bass/lower male voice frequencies were absent to about the same degree I

perceived in the McClurg Theater. Again, since the McClurg theater presentation and this one agreed fairly closely, inadequate (or incorrectly adjusted) sound systems in theaters in the past may have provided us with an incorrect reference.

The THX trailer was used in all three presentations. The theater presentation used a different audio track, so it is difficult to draw valid conclusions. At the very end of the THX trailer, there are several pianissimo chimes. Hearing the trailer on the Snell speakers, the very top end seemed a bit rolled off compared to the theater sound. *[The theater used the 70mm trailer while the home systems used the 35mm trailer. This was an oversight that occurred because all the films were in their 6-track formats. Although probably not intentional, I think there may be a difference in the two film masters.—TH]* I do not know if the level of the very low frequencies was the same, but the bass seemed to have slightly less physical impact than in the theater. There was very little variation in sound quality as I moved forward and back, and even when I tried to put my ear as close as possible to the axis of the surround speaker (it was about seven feet above the floor), I could not identify a specific sound coming from it.

I happened to attend the same Technics presentation of the Home THX Audio System as Tom Holman and Len Feldman. In contrast to the room used by Lexicon and Snell, the side wall acoustic treatment of this room included alternating panels of absorbent and reflecting material. I positioned myself as at the Lexicon/Snell presentation. The volume level might have been a little lower at the Technics booth, but I am not sure. The upper bass/lower male voice frequencies were much more prominent here than at the other two, and the surround channel level was noticeably louder. I could identify the surround speaker near me as a source when I stood near it, though it was at the same height as the Snell exhibit. The top end, as evaluated during the chimes on the THX trailer, seemed less rolled off here than on the Snells.

The major drawback of this system was objectionable sibilance, very pronounced on Luke's voice; this contrasted with the smoother voice sound in the theater and Snell presentations, and in recollections of my experiences in movie theaters. *[Show floor conditions rarely permit decent quality comparisons, largely due to variations in room acoustics of temporary spaces and crowds. I have listened to the licensed products in a double-blind listening test at the National Research Council of Canada, and although I did not compare the two systems, I did listen to each of them compared with other loudspeakers that were rated highly in both objective and subjective testing. All the licensed products must measure and sound as well as the best ones available. The differences Dave perceived should be minimal under more controlled listening conditions.—TH]*

I must also say that I found the choreography of the two automatic women employed by Technics to narrate this presentation intellectually insulting and superficial. It was not complimentary to the product, and I

infer from it that Technics has little respect for their prospective customers. [I agree completely.—PSH] [So do I, in spades. I even talked to one of them about it, but the conversation went nowhere.—EBM]

Overall, I thoroughly enjoyed Tom Holman's presentation at the McClurg Theater, even after having attended his BAS presentations on film sound, as this one had a slightly different perspective. I think Tom has conceived an interesting approach to home film sound, and has attempted to implement it appropriately. I would suggest that the demonstration material should include some identifiable, or switch-controllable, segments to enable the customer and the dealer to hear just the front speakers, just the surround speakers, and all channels together. Given that the surround effects are often subtle, this type of A-B comparison can make it much easier for the novice to understand the intent and the effect of, as well as the need to spend the extra money for, the surround channels. I believe most listeners will be skeptical of the need for surround channels unless their presence is sonically obvious.

Included with the materials provided by Lucasfilm was a reprint of Julian Hirsch's review of the theater and Home THX Audio Systems in the November 1989 *Stereo Review*. The THX sound in the theater Tom Holman designed and built for Lucasfilm impressed Hirsch.

Some people feel that movie sound in theaters is too loud, which I think is a legitimate argument. When combined with the generally soft visual focus and terrible ventilation in most of the theaters I've been in, the loudness gives some people such headaches that they almost never attend movies. There is also the argument that sound-mixing levels are high enough to damage the hearing of the decision-makers, compounding the problem. Furthermore, some people feel that to try to provide mixing-stage sound levels in the home is inappropriate in the first place. I believe that there is nothing wrong with offering this capability, since you can always turn it down; perhaps the system should include a Stevens-curve type of bass compensation.

Related Item

In the package of documentation provided by Lucasfilm I came across a note that under the Lucasfilm subsidiary called LucasArts is a division called Lucasfilm Learning, which "develops innovative media-based education products for schools, community education, business training and public space projects. The division recently completed design and production of an interactive videodisc product entitled *GTV: A Geographic Perspective on American History*, targeted toward middle school students. Lucasfilm collaborated with the National Geographic Society and the California State Department of Education in developing the project. Other multimedia projects have included design examples addressing environmental issues and scientific discovery." I am glad to see a successful business that employs a number of intelligent and creative people offering its resources to this kind of worthy pursuit. I hope they can be profitable enough to expand their educational impact on our youth of all ages.

Advertisements

Wanted

I am looking for old speakers and tube power amplifiers from the '60s or earlier. Speakers of interest include the Jensen G610, Altec 604, EV 15WK, EV 18WK, Lowther PM4, and Bozak B199A. Non-functioning tube amplifiers are also welcomed. Write or call Poh Ser Hsu, 2 Eden Street, Chelsea, MA 02150, (617) 884-8250.

For Sale

One Dolby A-301; one dbx type II, \$35 each. Sony SLO-1400s (heavy-duty industrial-grade Beta VCRs), \$250 each. Ira Leonard, (617) 731-5817 (eves.)

One pair of KLH Nines. Les Klein, (617) 862-5572 (eves.).