SYNERGETIC
SYN AUD CON
AUDIO CONCEPTS

newsletter

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SPRING 1982

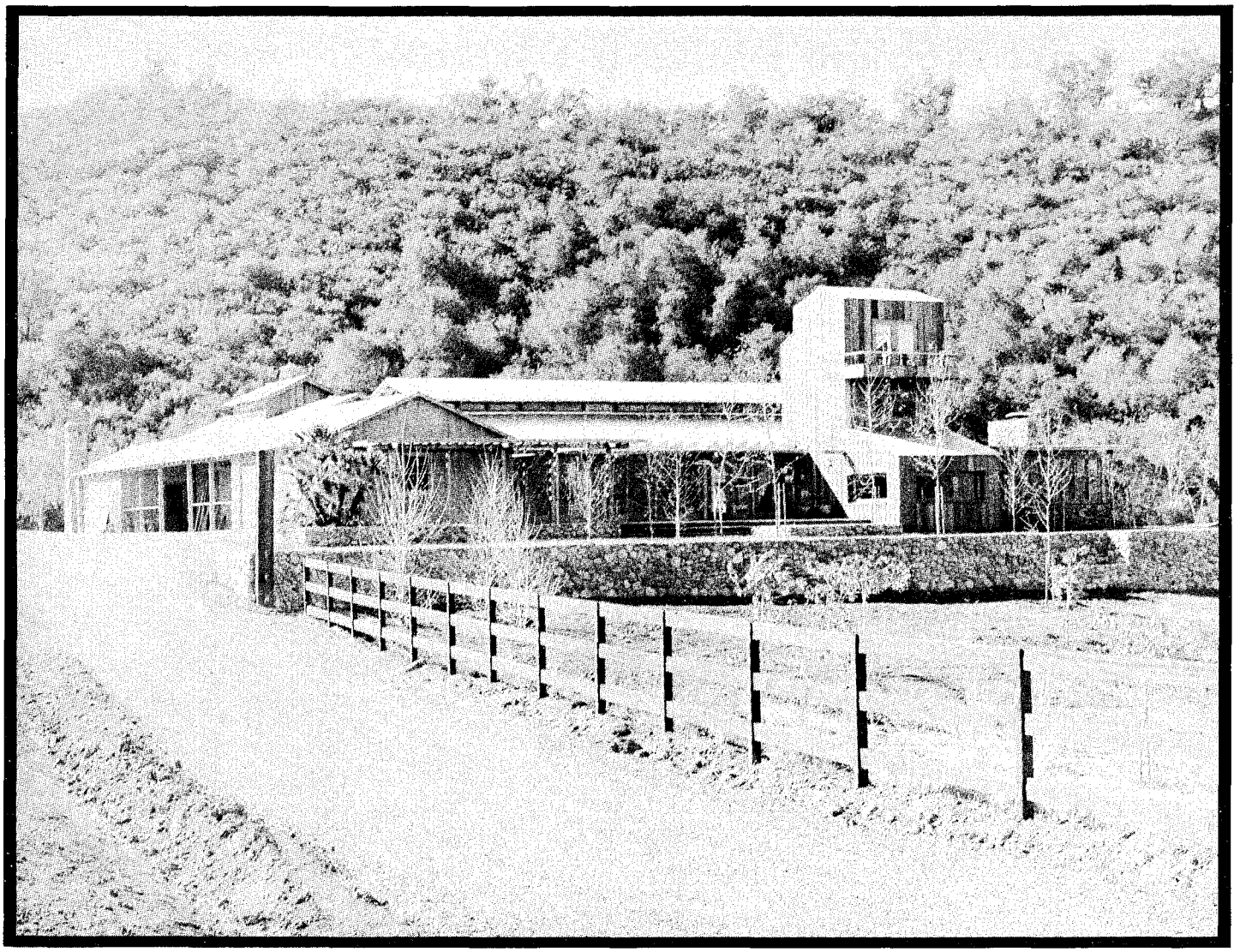
SYNERGETIC
Working together; co-operating, co-operative

SYNERGISM
Co-operative action of discrete agencies such that the total effect is greater than the sum of the two effects taken independently.

EXCHANGE OF IDEAS

I met a man with a dollar
We exchanged dollars
I still had a dollar

I met a man with an idea
We exchanged ideas
Now we each had two ideas



SYN-AUD-CON AUDIO INDUSTRY SEMINAR CENTER

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TECH TOPIC: VOLUME 9, No. 5 - THE SPECIAL LEDE™ WORKSHOP - JANUARY 19-21, 1982

KEEPING THE RECORD STRAIGHT – Editorial

March 1982 seemed to be the month for attacking Syn-Aud-Con and all that it stands for. Syn-Aud-Con is not surprised at such attacks, as they indicate that we are accomplishing much and that such accomplishments stir thought. We do regret that the facts elude the grasp of many who are either ill informed, or ill intentioned, but we cannot accept responsibility for their misbehavior. We do appreciate many of our graduates letting us know who is attacking us and what misstatements have been made. Forewarned is forearmed. We particularly appreciate those of you who help correct such misstatements by a simple recital of the facts. A few of the *facts* are listed below.

1. Don published the first acoustic gain formulas to appear in print.

2. Don was the first to write the NOM equation.

3. Don designed and co-patented the first 1/3 octave equalizer.

4. Don was the first user of 1/3 octave real time analyzers in the audio industry.

5. Don was the first person in the audio industry to *write* and *share* computer programs in sound system design literally a decade ahead of its popular use.

6. The first use of Directivity Factor, "Q", in specifications by a manufacturer of audio products was the direct result of research by Don and its implementation by Bob Beavers when both were at Altec in the 1960s.

7. The late Mel Sprinkle and Don were the first to derive the Critical Distance (D_C) equation from the Hopkins-Stryker equation and to publish it in peer journals.

Continued next page.....

The Syn-Aud-Con Newsletters and Tech Topics are published quarterly by Synergetic Audio Concepts, P. O. Box 669, San Juan Capistrano, CA 92693. Telephone: (714) 496-9599. The subscription rate for graduates of Syn-Aud-Con seminars is $30 per year in the United States ($35 in other countries). Newsletter subscriptions are available to non-graduates for $50 per year in the United States ($55 in other countries). Non-graduate subscribers may credit the $50 subscription rate to the registration fee for a Syn-Aud-Con Sound Engineering Seminar should they register during the year of the subscription.

**Syn-Aud-Con graduates are capitalized throughout Newsletter*

8. The PZM™ was conceived by Ken Wahrenbrock after he read a Syn-Aud-Con Tech Topic and Newsletter and attended a Syn-Aud-Con graduate meeting in which Don attempted to duplicate a microphone technique that he thought Ron Wickersham and Ed Long were using in their exceptional PRP™ recordings.

9. Syn-Aud-Con has clearly and without equivocation acknowledged Dick Heyser's seminal role as the inventor of TDS-ETC (TEF™). Syn-Aud-Con is proud of its key role in bringing this valuable technology to the attention of a majority of today's users.

10. LEDE™ control room design was developed by Don. Its first application was by Chips Davis.

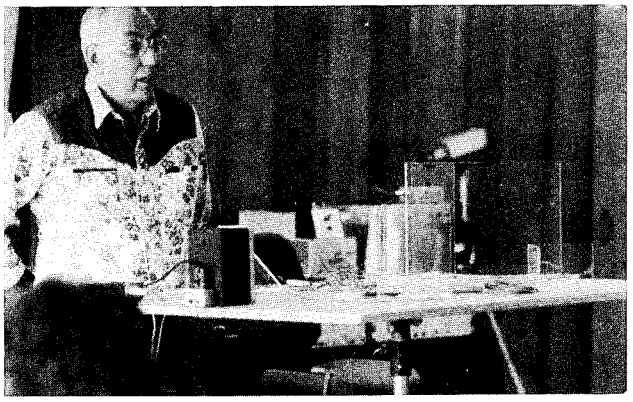
Consider with us for a moment the uniqueness of Syn-Aud-Con. We are in our tenth year of service to the audio industry. What else do you know of in the audio industry that after ten years still has no imitator or competition? Several would-be competitors have tried. Their problem is a fundamental one. They have to prove they know as much about the subject as already *taught* in our classes. We work very hard to meet the needs of those with whom we share ideas and out of our 4,000 graduates we have attracted the other hard workers into a synergetic relationship that enhances their opportunities for growth and recognition by their peers.

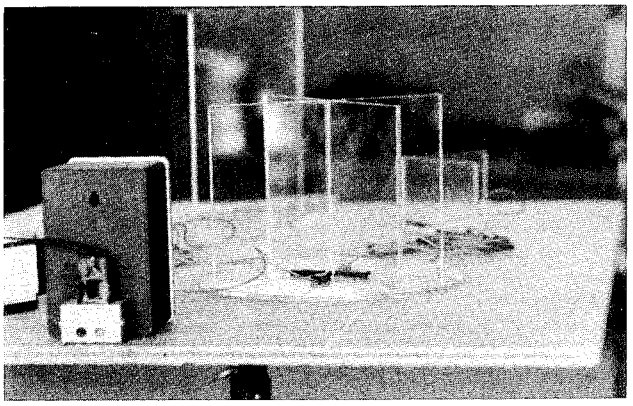
It has been written that "it's better to be stolen from than to have to steal" and we agree with the underlying philosophy expressed in that statement. It doesn't preclude our taking legal action whenever such detractors cross the line of libel. Until then, we continue to exercise patience. One would have to be a necrophile to concentrate on the negative when so much progress is being made.

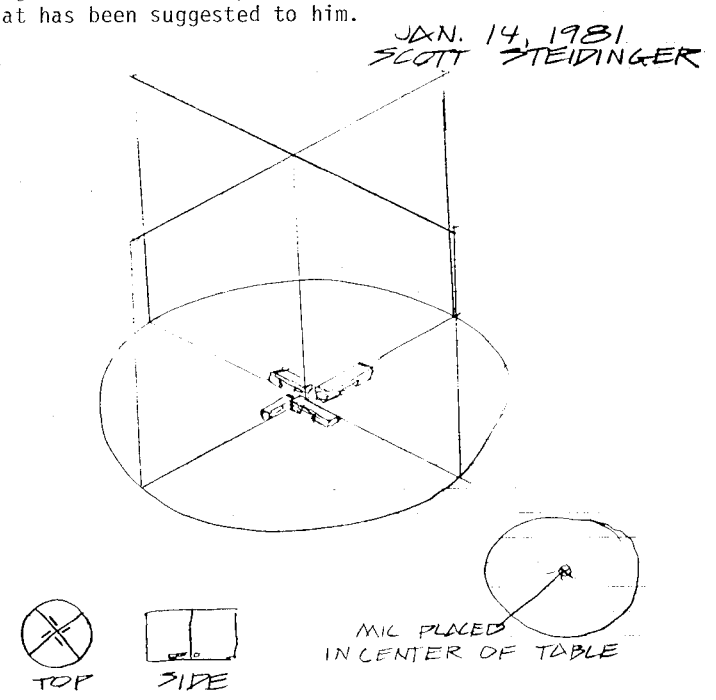
Much has been accomplished but we sense that we're on an asymptotic curve, not because we're so smart, but because there are over 4,000 Syn-Aud-Con grads sharing, giving, and vectoring their intelligence and energy on solving the problems that have made audio a backward industry for so many years. We're just beginning to improve on the work of the giants of the 1920's and 30's.

4-DIRECTION PZM™

KEN WAHRENBROCK brings to every Syn-Aud-Con seminar something new for us to try out in class. Many times it is a new prototype of the PZM™ that he has thought of or that has been suggested to him.



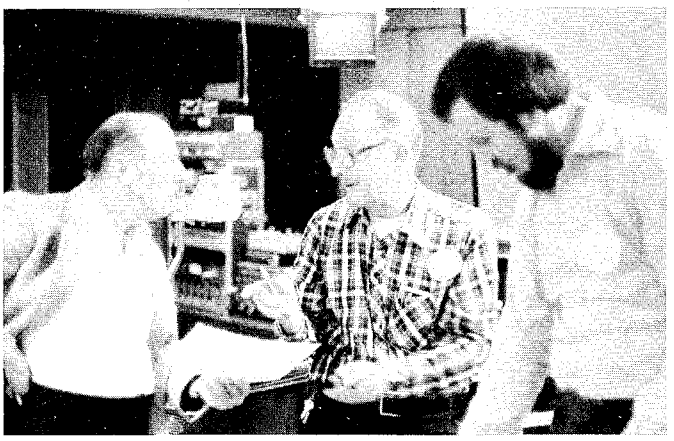




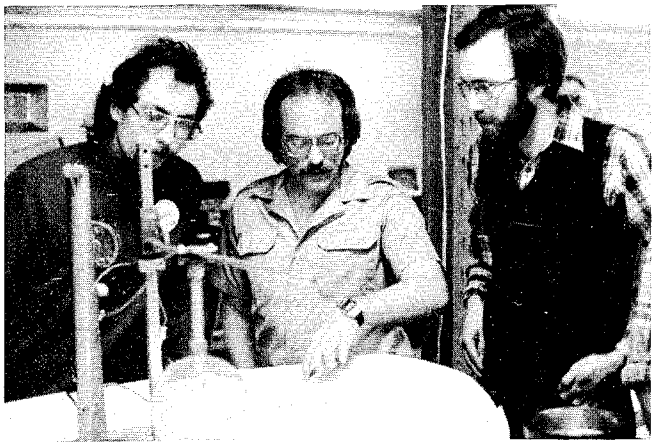
Scott Steidinger gave Ken a sketch of a 4-direction PZM™. In a few months, Ken brought one to class to listen to and measure. It worked and measured beautifully.

THE LOUDSPEAKER ARRAY DESIGN WORKSHOPS

The Loudspeaker Array Design Workshop on February 23rd through 25th was an exceptional experience for all who were involved. Those fortunate enough to attend received a fantastic basic primer from Dr. Patronis on the mathematical modeling of the fundamental physical parameters underlying loudspeaker performance.



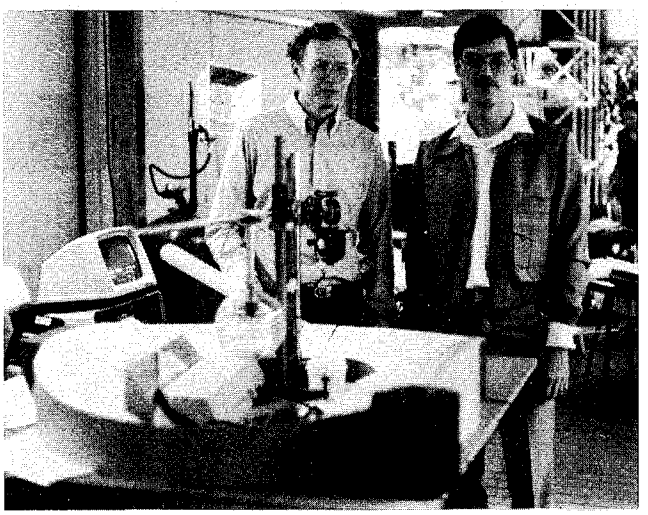
In our experience, we have not encountered a similarly exhaustive step-by-step explanation as carefully tailored to eventual usage in real-life applications. Dr. Patronis' over 100 pages of notes outline the derivation of the general case sets of equations necessary to a full theoretical analysis of any complex array.



DAVE KLEPPER contributed generously from his unbelievably versatile background in array design covering a 30 year span that evidenced continual growth in understanding combined with completely innovative creative new designs such as the latest complex systems in South Africa. Dave Klepper is that unusual combination of being a possessor of valuable proprietary information but willing to freely share it with those ready to appreciate it.

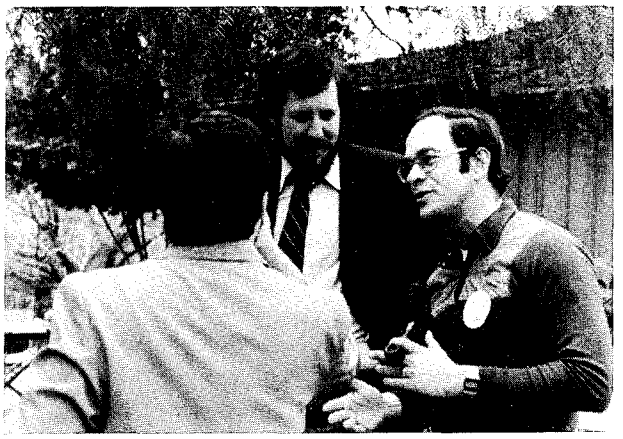
TED UZZLE, FARREL BECKER and JOHN PROHS. Information shared here was so unique that the receivers of it had to sign special patent disclosures before witnessing the new devices. We have no hesitation in declaring that loudspeaker coverage layouts will become very scientific in the next few years.

As always, a major benefit of Syn-Aud-Con workshops is the quality of those attending vectoring in phase with an inspired staff, and this workshop was no exception. The attendance list reads like a "who's who" of professional audio. Perhaps the most interesting statement we can make about this workshop is that enough people tried to get in to allow a second one to be scheduled for April 20-22, 1982.



OBSERVATIONS ON THE FEBRUARY ARRAY WORKSHOP

Dr. Patronis' genius in developing a coherent general case set of equations well-suited to array analyses made most of us uncomfortably aware of our conceptual and mathematical shortcomings. The good news is that it shouldn't be that hard to catch up.



BILL SPRINKLE, the son of the late MEL SPRINKLE, is also an audio and acoustical engineer well-trained by an illustrious father. Bill, on the right in the above right photograph, is sharing an idea with MIKE HOOVER (middle) and TED UZZLE (back turned).

Do we have fun at these workshops? You betcha! Here's Ted Uzzle and DAVE KLEPPER enjoying one of the lighter moments during the steak cookout on the third day.

That happy man in the center of the above photograph is Dr. Eugene Patronis. As you can see, he is the antithesis of the unapproachable academician.

One observation we have been able to make about these special workshops is that they leave many participants in a state of healthy confusion. This, of course, is natural if the workshop is accomplishing its goals. Confusion results from having the rug pulled out from under assumptions one has reclined on comfortably for many years followed by a series of new ideas we haven't done our homework on. F. Alton Everest expressed it well at one of the workshops when he said:

I had an idea. I met with 30 men who had ideas. I found out my idea was wrong.

One distressing factor in attending audio and acoustical conventions is the number of people entrenched, entranced, and in ignorance of the erroneous ideas they clutch to their breasts. It's not the fact that they don't know what they're talking about but rather the evidence that only if "forced" will they even temporarily shift their thought and immediately run back to the trough as soon as the peer pressure is off.

That's what makes a Syn-Aud-Con workshop so unique. Participants may have engrained errors in their mental inventory but nowhere else have we ever witnessed such willingness, yes, even evangelical fervor to shed the sham for the facts. The motivation expressed by those workshop participants is their genius.

HOW MANY DECIBELS IN A BEL?

The power ratio of one decibel is given as: $10^{(0.1)}$. So that: 10 LOG $10^{(0.1)}$ = 1 dB. If we then multiply this decibel value by ten, 1 dB x 10 = 10 dB, and reconvert it into a power ratio:

$$10^{\left(\frac{10}{10}\right)} = 10^{(1)}$$

and then use the formula for the bel: LOG $10^{(1)}$ = 1 bel, we can conclude that there are 10 dB in 1 bel. Note, however, that the power ratios varied as: $\frac{10^{(1)}}{10^{(0.1)}} = \frac{7.94}{1}$ and that: 10 LOG 7.94 = 9 dB, which is the change in level in going from 1 dB (0.1 bel) to 10 dB (1 bel).

A NEW WAY
TO MEASURE FREQUENCY TIME CURVES

A paper of interest at the AES Convention in Montreux, Switzerland was *"Time-Frequency Distributions of Loudspeakers: The Application of the Wigner Distribution"* by Cornelis P. Janse and Arie V. M. Kaizer of the Philips Research Laboratories in Eindhoven, The Netherlands. The paper is 72 pages long and in two parts. Part A discusses the theory and Part B discusses the application of the Wigner distribution to loudspeakers.

The illustrations at the rear of the paper show complex contour plots of time (vertical scale) versus frequency (horizontal scale) for real life devices contrasted to idealized networks. These amount to very sophisticated FTC (frequency time curves) and the "Kernals" used spring directly from work in quantum mechanics and living with Heisenberg's uncertainty principle. By choosing the desired Kernal from the correct Cohen class, they are able to discriminate among a series of mathematical parameters useful to the measurement of loudspeakers.

The paper is not easy reading and a series of good reference books is helpful. Any practical devices likely to emanate from the work? We doubt it, as Philips personnel usually do such detailed analyses for exercise only. Can it be programmed into some future TEF™ analyzer? We hope so! We have reproduced three of the 35 illustrations. The interesting point of this paper is that they have accessed TEF™ measurements totally via software and, indeed, "if one is sufficiently clever," Why not!

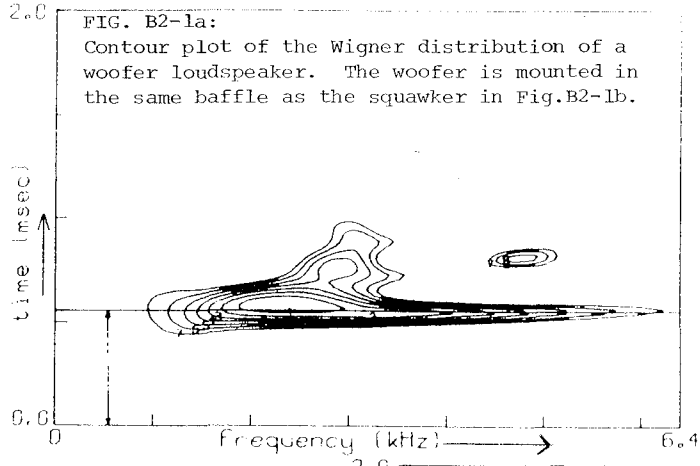


FIG. B2-1a:
Contour plot of the Wigner distribution of a woofer loudspeaker. The woofer is mounted in the same baffle as the squawker in Fig.B2-1b.

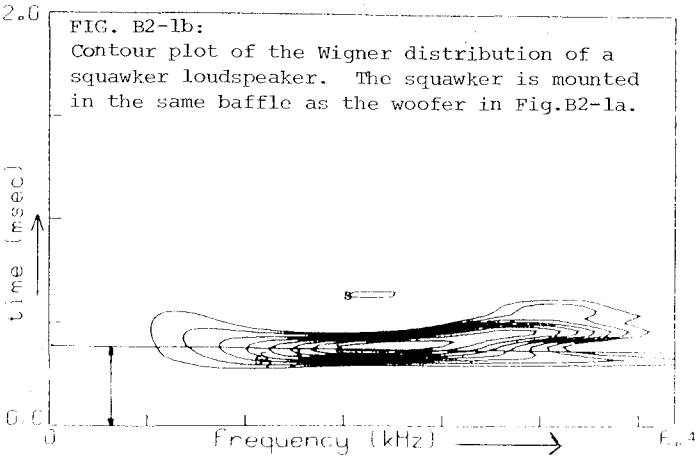
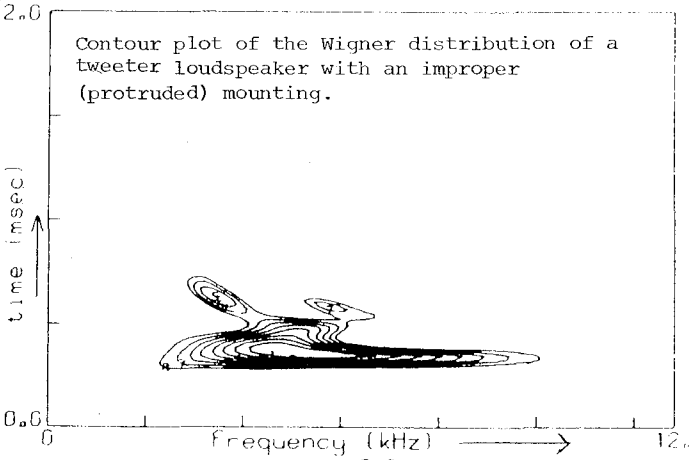
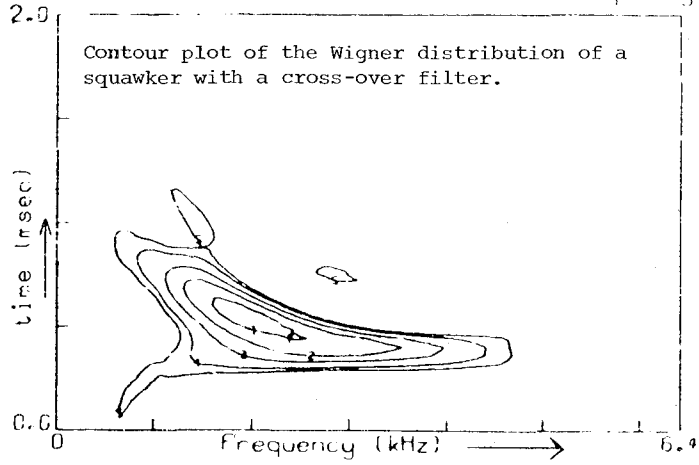


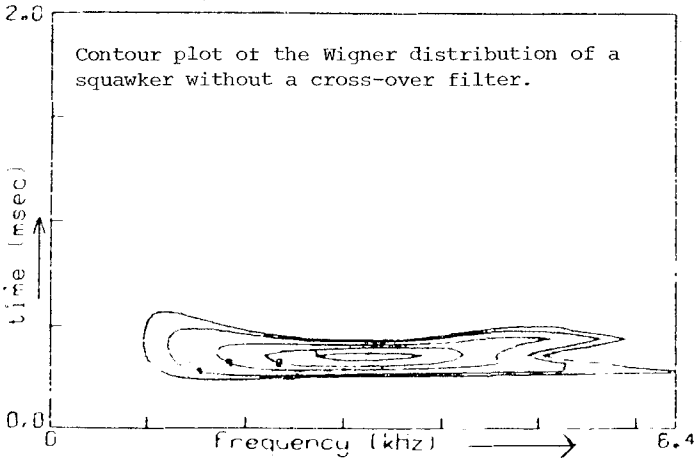
FIG. B2-1b:
Contour plot of the Wigner distribution of a squawker loudspeaker. The squawker is mounted in the same baffle as the woofer in Fig.B2-1a.



Contour plot of the Wigner distribution of a tweeter loudspeaker with an improper (protruded) mounting.



Contour plot of the Wigner distribution of a squawker with a cross-over filter.



Contour plot of the Wigner distribution of a squawker without a cross-over filter.

PZM™ AT THE ACADEMY AWARDS

If you watched the Academy Awards this year, you "saw" the PZMs in use. Or rather, you didn't see any microphones on the beautiful podium that LARRY ESTRIN of Best Audio made for the Academy Awards. As Johnny Carson said, "How do you like our new invisible microphones on the podium?" And the audience applauded. (The gain riding you heard on the ABC-TV mix had nothing to do with the PZMs.)

We rejoiced with ED LONG and RON WICKERSHAM who patented the Pressure Response Process™, albeit with a $1,000 capsule in mind; KEN WAHRENBROCK who developed an inexpensive, practical version and named it PZM; and Crown International who has worked hard to bring it to the marketplace and to produce just a few of the prototype models that Ken makes in his garage. And we remember with gratitude that Larry Estrin has figured strongly in the promotion of the new idea.

It was in February of 1978 that Ron Wickersham and Ed Long came into our San Francisco class one evening to address the class - as they have many times. We asked how they were making their very fine recordings, as we had done many times in the past, and as usual we just got a smile but no explanation. This time Ron or Ed said something during their talk that gave us an idea. We contacted Shure brothers and asked if we could use a couple of free field calibrated microphones for a special demonstration that we were planning for our April 30 graduate meeting. And we drew a picture in our April 1978 Tech Topic showing what we thought Ed and Ron might be using for a microphone configuration to make their recordings.

What we had planned for a demonstration in the evening of April 30 blew up about 2-3 days before the meeting. We had planned a large orchestra recording on a movie sound stage. That is not an easy act to replace in a couple of days, especially when you are just finishing a Syn-Aud-Con seminar and starting an AES convention.

Then we remembered Larry Estrin. Larry has a reputation for doing the impossible. If you ask Larry if he can perform a miracle, he says "sure" and then he moves mountains to accomplish what he has promised. I'm sure that out of this process comes some real lows as well as some real highs, and it was a real high that he accomplished for us. He arranged for us to use Studio B at the recently purchased RCA studios in Hollywood, brought in live entertainment to record, and a full recording staff.

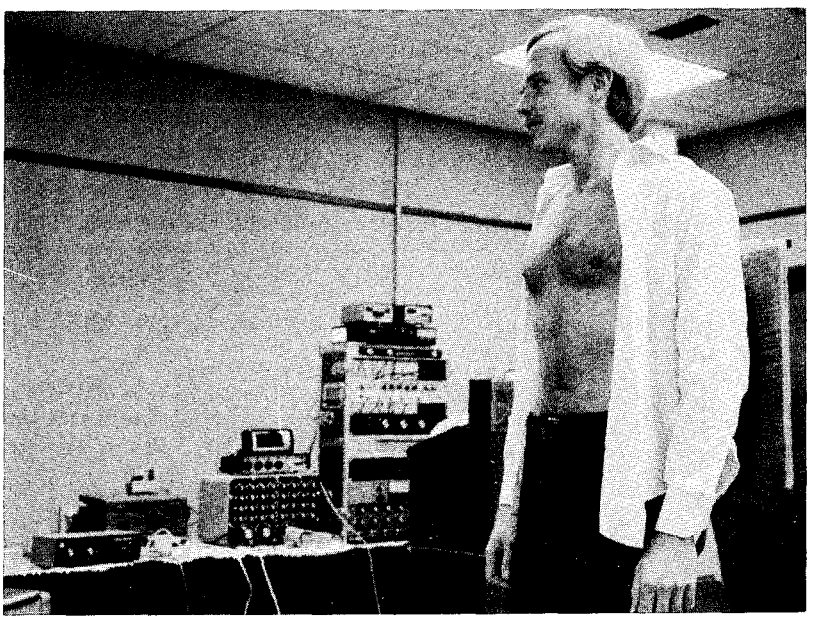
Larry was able to equalize the free field calibrated microphones so that our demonstration was sufficiently impressive and thought provoking that Ken Wahrenbrock, who attended the graduate meeting, re-read the April Tech Topic plus an April Newsletter item about an electret pressure calibrated capsule that we had been making available in our classes. Ken had a couple on hand. Ten days later Ken delivered a prototype to our May class. And so began the development of the PZM. I am sure that if Ken had not seen the demonstration at Larry's studio that reading the Tech Topic and Newsletter items would have meant little.

Larry was the first to use the PZM in recordings, and I am sure that his PZM lectern will undergo many changes and improvements, but it will mark the beginning of the use of PZMs on lecterns in broadcast.

"IN SITU" ABSORPTION MEASUREMENTS

TEF™ measurements allow "in situ" evaluation of the absorption of materials not normally listed in the absorption coefficient tables.

Remembering that a famous west coast senior acoustical consultant had studied "the variation in absorption for audiences in contemporary clothing" (hot pants to be exact), we decided to check the difference in absorption of a clothed and semi-clothed sample. Believe it or not, bare flesh is surprisingly reflective.



Checking the absorption coefficient of a slim barechested male.
Photograph courtesy Robert Vitale

We are hopeful some graduate will forward us a suitable sample of the opposite sex for testing -- say a Dolly Parton so we can look at both absorption and diffusion.

ART OR SCIENCE?

Chips Davis and Russ Berger

We've often said that the design of recording studios is both art and science. We'll not attempt to explain the deeper meanings of this photograph but it's definitely not scientific.

Maybe Chips and Russ take being LEDE™ gurus too seriously.

RIGHT AND LEFT HEMISPHERE

Russ Berger and Hellmuth Kolbe

After three days of LEDE™ technology, RUSS BERGER finds himself feeling divided between right and left hemisphere as he talks with HELLMUTH KOLBE of Zurich, Switzerland.

Since the LEDE™ control room design workshop in January, Russ has affiliated with a consulting firm in Dallas - Joiner, Pelton and Rose - as an associate in architectural acoustics and is head of recording studio design. Russ already has five LEDE™ projects in the design stage.

SENSITIVITY RATINGS CURRENTLY IN USE

1. NdB at 4 ft from 1.0 watt input
2. NdB at 10 ft from 1.0 watt input
3. NdB at 30 ft from 0.001 watt input
4. NdB at 1.0 meter from 1.0 watt input
5. NdB at 30 ft from full power input
6. N watts needed to produce 1.0 pa. at 1.0 meter
7. NdB at 4 ft from full power input
8. NdB at 10 ft from full power input

If any readers know of any other ratings (used by manufacturers) we'd be pleased to hear from you.

EUROPEAN SENSITIVITY RATING

While in Europe (March 1982) we were told that they are rating loudspeaker sensitivity as:

"Watts needed for a sound pressure of one pascal at one meter"

i.e. : W/pA/M

Example

If we have a loudspeaker rated at 99 dB at four feet for an electric power input of one watt, then:

$$10^{\left(\frac{94 - \left[99 + 20 \text{ LOG } \left[\frac{4}{3.28^*}\right]\right]}{10}\right)} = 0.21 \text{ W/pA/M}$$

** There are 3.280839895 ft/M*

That is, a power of 0.21 watt will produce a sound pressure of 1.0 pA** at one meter.

*** One pascal is a sound pressure level of 94 dB.*

BLINDNESS VS DEAFNESS

In a conversation with V.M.A. Peutz with regard to hearing loss and particularly those born without hearing, he made the following statement.

"It's better to be born blind than to be born deaf."

Initially, this startled me but upon reflection I am tending toward agreement with him. Peutz further remarked that one born deaf rarely achieves a very high intellectual level. When asked, *"What about Helen Keller?"* he pointed out that she had initially been able to hear and see but lost both faculties as a child through illness.

Another researcher pointed out that *seeing and hearing occur in the brain,* not in the transducers. Thus, in considering the relative effect of attempting to perceive the world around us bereft of either of these two senses, a most important factor in the "programming" of the brain appears. It is language.

There is increasing evidence that the language we are taught causes specific "programming" of our brain, literally changing our perception of reality. Most importantly, *the intellect requires language.* Think for a moment. It's not possible to *think* without *language.* Perhaps this is why television is so devastating to intellect. Cover over the screen sometime and listen to the dialogue and sound effects. Mind stimulating? I think not.

It has been our personal observation over many years that the clearest thinkers we encounter are also active *readers.*

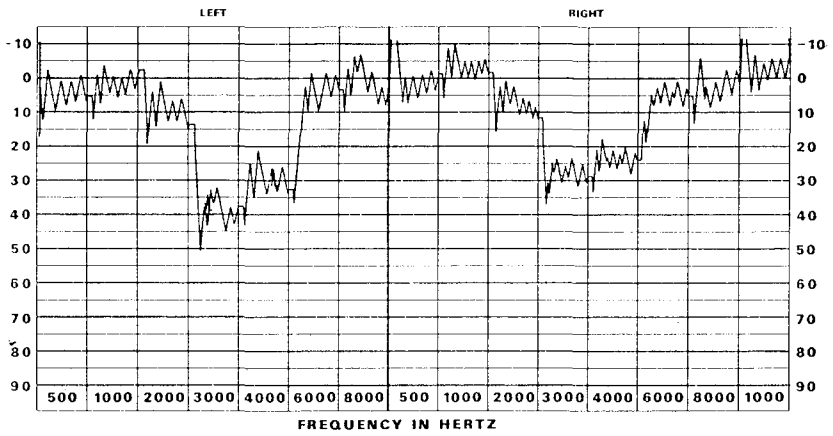
J.B.S. Haldane made the suggestion that mind might be "a resonance phenomenon" probably reflecting Niels Bohr's inspired idea that the wave function of matter represents its mental aspect. Guy Murchie jumped from these quotations to "perhaps the electro-magnetic rhythms of the nerve cells could be produced by 'tuning in' from some unknown source, perhaps in a dimension still unknowable, to this phase of existence," and he concludes further on with, "The essential difference between body and mind is that the body is bound by space and time (as the manifestation of a series of events) while the mind is not, and that therefore the body is finite while the mind is free to transcend toward the infinite."

Perhaps reading, study, mathematics, and other language expanding, hence thought provoking, exercises are more precious than we realize and that TV exposure, be it called programs or games, is in actual fact a mind numbing drug.

There's a story told of two men who make a bet between them for a fortune that one of them cannot live without any human society for ten years. The one who accepts the challenge is enclosed in a large chateau and given all the books, food and other necessities he desires but no contact with humans. He is, however, free to leave the voluntary isolation anytime he desires but if he does so, he loses the bet.

As the ten years draw to a close, the man on the outside plans to kill the man on the inside rather than lose his fortune. The man on the inside (I'll call him the Insider) has gained so much wisdom from his reading and thinking without interruption that he realizes such would be the case, and he also realizes the wisdom he has gained is even more valuable than the fortune he is about to win. When the Outsider comes to slay him, he finds the Insider gone. The Insider has left a note telling the Outsider he realizes what he planned to do and why the Insider left a wealthier man than any material fortune could have made him.

HEARING CHECK



In the winter issue of the Newsletter, Vol. 9, #2, page 30, we quoted from a book review in the *Journal of the Acoustical Society:* "Effects of Impulse Noise on Hearing...."

The statement was made that, "Several speakers made the point that impulse noise tended to produce a loss centered at 6 kHz while steady noise resulted in the greatest loss at 4 kHz."

We conduct hearing checks during our classes at the Seminar Center. The hearing check reproduced here is of a young man in his early thirties who has worked for a number of years in a chemical plant which has a high steady state noise.

This hearing check would suggest that the "several speakers" might be right.

FEBRUARY 1982 CLASS

DESIGNING LOUDSPEAKER ARRAYS

Defining Terms

LSA — Loudspeaker array. This may consist of a simple device (*i.e.*, horns and driver) or be a pew back system with hundreds of small cone type loudspeakers.

$Q_{min(ss)}$ — The minimum Q (directivity factor - dimensionless) that will allow the desired $\%AL_{cons}$ at the desired D_2 when a single source is used.

$C_{\angle}(-6)$ — The coverage angles of the loudspeakers in degrees (may indicate actual level variation at quoted angle - if not indicated, assume -6 dB).

N — The ratio of the acoustic power radiated by the device or devices providing direct sound level to a listener to the total acoustic power radiated by the LSA.

$S\bar{a}$ — The acoustic absorption in sabins (dimensions ft^2 or M^2).

$$S\bar{a} = \frac{.049*V}{RT_{60}} \qquad (*metric\ .161)$$

D_1 — The distance in feet or meters from the open microphone to the nearest loudspeaker.

D_2 — The distance in feet or meters from the nearest loudspeaker to the furthest listener (may also be a selected listener position).

D_s — The distance in feet or meters from the talker to the microphone.

ΔdB — The change in level, expressed in dB, for a change in D_X of 2/1 (for $D_X > D_C$).

D_X — The distance in feet from the source to where L_T is established.

D_c — The critical distance (*i.e.*, distance at which the Hopkins-Stryker equation makes $L_D = L_R$.

L_T — The total sound pressure level (in dB) in the listening area.

V — Room volume in ft^3 or M^3.

RT_{60} — The *apparent* reverberation time in seconds for 60 dB of decay.

Beginning the Array Design

All LSA design begins with an analysis of the relevant room parameters. These are volume, RT_{60} and D_2 and may be either measured or calculated. These same parameters are those required to calculate the $Q_{min(ss)}$ from the Peutz equation.

Once $Q_{min(ss)}$ is available the inventory of devices is reviewed and one is chosen that has a $Q \geq Q_{min(ss)}$. Ascertain the $C_{\angle}$s that are associated with this device and using one of the available coverage programs determine acceptability of coverage uniformity. The "range" in dB when converted into a *relative* level in dB, compared to the on axis level of the device (*i.e.*, a position + 6 dB closer to the sound source than the position at which the axis is pointed) algebraically added to the $C_{\angle}$ level in dB, can then be converted into the relative Q or $\%AL_{cons}$ for a given location.

Determine % AL_{cons}

Suppose that we have a $Q_{min(ss)}$ of 25 on axis from an AL_{cons} of 15%. If we find that our -6 dB $C_{\angle}$ falls across a position with a range +5 dB closer to the source than the "on axis" position then the relative $\%AL_{cons}$ for the new position is:

$$\text{relative } \%AL_{cons} = \frac{15\%}{10^{\frac{(-6+5)}{10}}} = 18.88\%$$

$$\text{relative } Q = 25\left[\frac{(-6+5)}{10^{10}}\right] = 19.86$$

This is why we recommend that all *ranges* be specified as plus levels for closer to the source and minus levels for further from the source. Thus, this allows direct algebraic addition of the traditional $C_{\angle}$ negative levels in the calculation of relative Q's and $\%AL_{cons}$. (Newsletter Vol. 8, No. 4, Summer 1981, page 20 contains the original discussion.)

Continued next page.....

Obtaining Coverage

At this point, by having a reference Q or $\%AL_{cons}$ to work from, the problem of uniform coverage can be addressed in sequential steps. If C_Ls are not adequate:

1. See if increasing absorption ($S\bar{a}$) is feasible (at the drawing board stage this is usually the most cost effective approach)
2. Increase N (*i.e.*, use two or more sources at a single point)
3. Shorten D_2. (This also means increasing N in most cases)

Important in these determinations are the relationship of

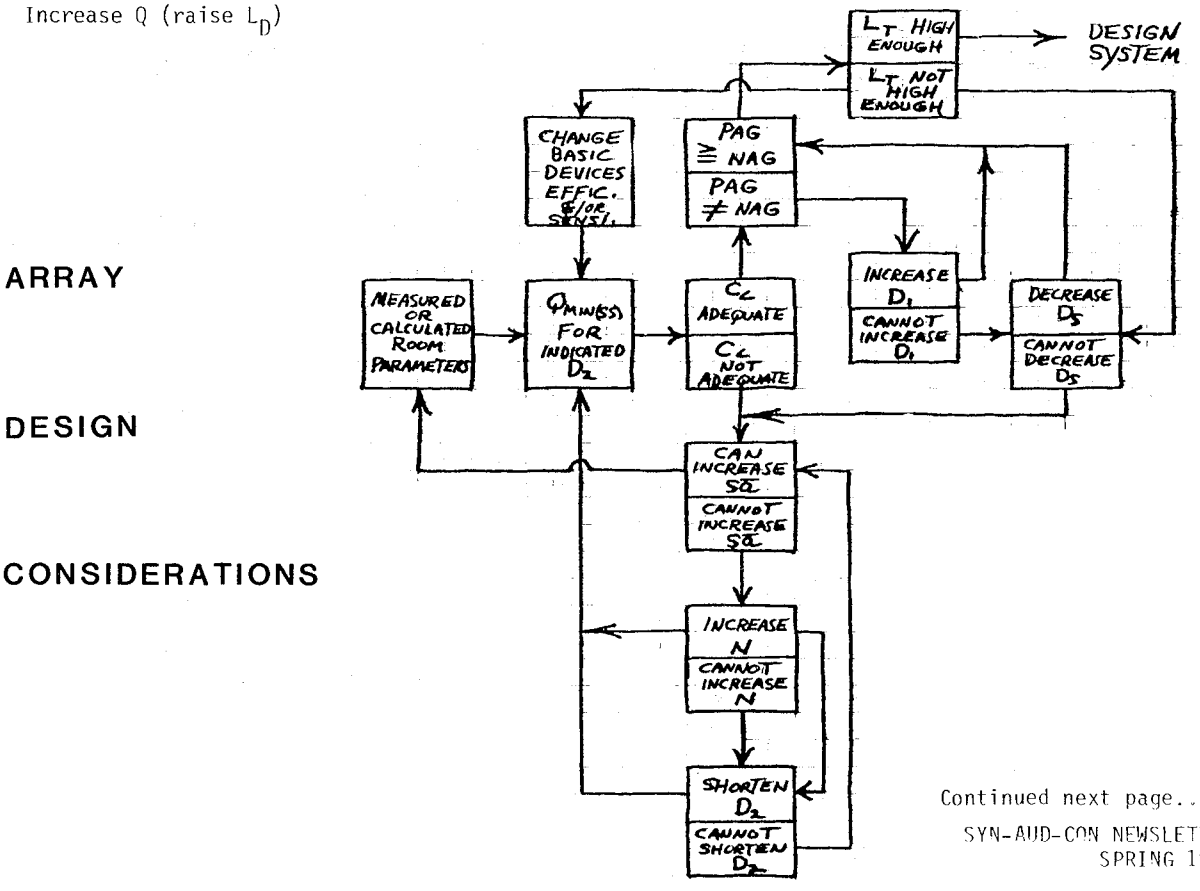
$$N = \frac{Q_{min(ss)}}{Q\ avail} \qquad \text{and} \qquad D_{2(max)} = \frac{D_{2(ss)}}{N}$$

Once adequate coverage and required articulation are achieved by means of:

1. Single source
2. Multiple sources at a single point
3. An "in line" overhead array
4. Overhead distribution
5. Pew back type system

then we advance to the consideration of acoustic gain. When PAG ≠ NAG we have the following alternatives:

1. Increase D_1 (must be the acoustic, not the physical D_1, that is increased)
2. Decrease D_s
3. Increase $S\bar{a}$ (this allows a greater D_c, hence a larger D_1)
4. Increase N (by placing sources closer to listener)
5. Shorten D_2
6. Increase Q (raise L_D)



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Once PAG $\geq$ NAG, a final inspection of the desired program level is necessary in terms of:

1. Adequate S/N (25 dB at 2,000 Hz)
2. Level desired for esthetic purposes (*i.e.*, musical impact)
3. Required dynamic range at chosen NAG.

Common problems here are:

(A) Power handling rating inadequate

(B) Efficiency and/or sensitivity inadequate

(C) Shorter D_S is used

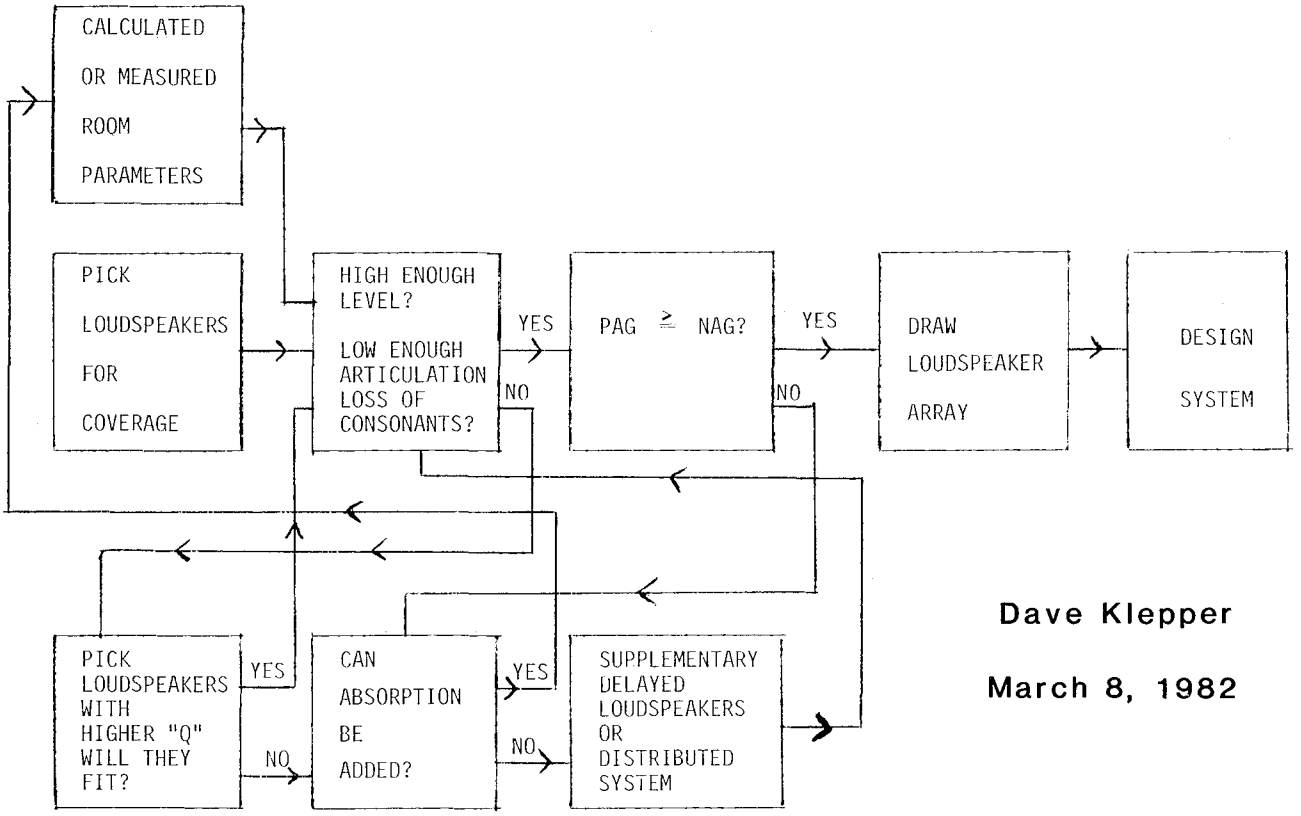
(D) D_2 shortened for level purposes rather than $\%AL_{cons}$ purposes.

Conclusion

This "flow chart" provides a basic overview of orderly functional approach to the design of LSA. Outdoor systems merely "pass through" room parameter boxes but still are subject to variations of Q, C_L, N, D_2, D_1, D_S, PAG, NAG, L_T, efficiency and sensitivity.

Another Approach

A second approach, wherein coverage is the beginning of the program is shown in the flow chart DAVE KLEPPER sent in. It is our feeling that these two flow charts can serve as major aids in insuring that none of the interlocking key parameters are overlooked in the more complex arrays.



SYN-AUD-CON IN EUROPE

In March, Don, Carolyn and Ken traveled to Europe to attend the AES Convention in Montreux, Switzerland, and to conduct a special class, "A Day With Syn-Aud-Con."

HIGHLIGHTS OF THE TRIP

V.M.A.Peutz Receives AES Fellowship

When Victor Peutz was here in 1978 for our special graduate meeting April 30th, he enjoyed a bit of "Americana" at Swensen's Ice Cream Factory in Tustin.

V. M. A. PEUTZ received an AES fellowship at the Montreux meeting. Our congratulations to the AES awards committee for recognizing Mr. Peutz's remarkable contributions to our understanding of how to achieve intelligibility in every type of acoustic environment. The hardest choice the committee had was probably choosing which of the myriad of major accomplishments Mr. Peutz has made to honor. His work at IRCAM is truly a "once in a lifetime" accomplishment done with integrity and exceptional creativity.

AES Convention

During the four days in our booth at the AES Convention, we were truly surprised by the avalanche of interest in LEDE™ projects in Europe. We suspect that Europeans will soon outstrip the United States in the construction of these control rooms. The Bruel & Kjaer TDS equipment being demonstrated in Europe by POUL LADEGAARD of B & K has done much to alert designers to the measurement and sounds of energy misplaced in time. Syn-Aud-Con triple graduate (regular class, TEF™ class with Heyser, and LEDE™ workshop, all in one year), HELLMUTH KOLBE of Zurich, Switzerland, has the complete B & K TDS measurement chain. Even more importantly, he has a thorough knowledge of basic small room as well as the classic large room acoustics plus a truly gifted set of ears trained by years of major recording projects in Europe with some of the world's greatest musicians and groups.

Poul Ladegaard during a class at Syn-Aud-Con's Seminar Center.

Hellmuth Kolbe in a discussion with Don Davis at Syn-Aud-Con's Seminar Center.

Not to our liking was the discovery that there are quite a number of individuals in Europe claiming to be LEDE™ experts (many publishing articles) who do not know what they are doing and, worst of all, we suspect don't even know they don't know what they're doing.

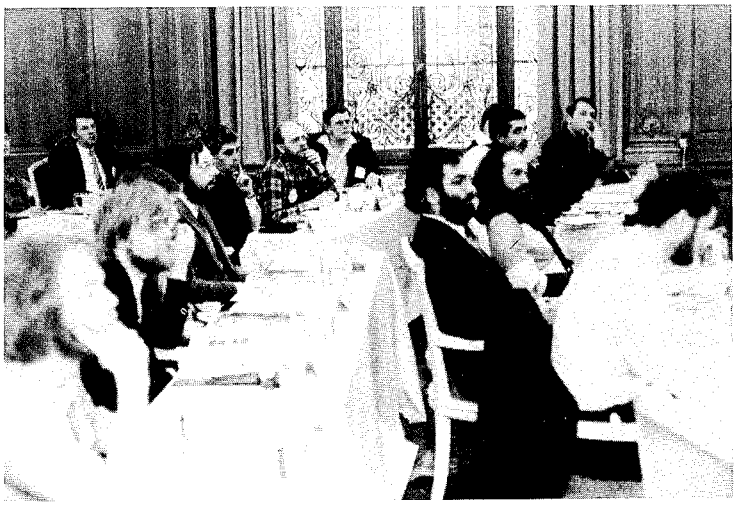
INGEMAR OHLSSON, from our May 1981 class, brought us pictures of the first LEDE™ control room completed in Europe.

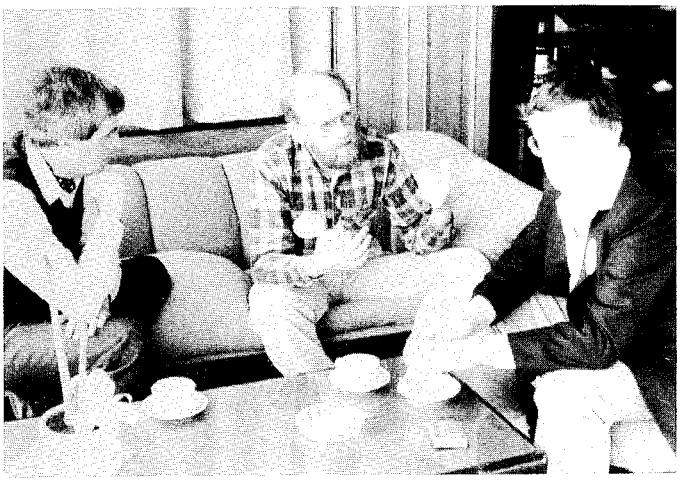
Continued next page.....

JARO JANDA, who is active in the recording industry in Switzerland, has attended four classes in one year: 2 regular Syn-Aud-Con classes, a Heyser TDS-ETC workshop, and the LEDE™ workshop.

"A Day With Syn-Aud-Con"

"A Day With Syn-Aud-Con" on March 6th (the day after the AES Convention) had a capacity registration and the high level of capabilities possessed by those attending led to some excellent discussions of typical Syn-Aud-Con subjects. Hellmuth Kolbe brought his B & K TDS equipment to Montreux for the meeting and we were able to demonstrate all the basic TEF™ measurements including a good introduction to PZM™'s. We envy the professionals in Europe, most of whom can handle two or three languages minimum with ease.





Skiing at Zermatt

Skiing at Zermatt can be distracting. You're staring at the Matterhorn instead of the ski slope. Skiing on a glacier can lead to a morning ski report like "300 meter base with a meter of new snow." The weekend after we left Switzerland it was reported that 43 skiers perished in avalanches during a storm.

Driving in Europe

185 km/hr translates into BMW on Autobahn = 114.7 mph cruising. Driving in Europe continues to hold a special charm for those of us weaned on Porsches.

Continued next page....

Paris!

We flew from Zurich to Paris to again meet with Mr. Peutz who took us to dinner at a real French restuarant, ages old. Mr. Peutz is an incomparable guide to the city and we learned more about Paris in our few hours with him than we had in many previous trips on our own. *IRCAM!* All we had hoped it to be and a large measure more. Mr. Peutz's work here is monumental. The working tool he has constructed is matched by some unbelievable artistic and engineering talent (really scientific talent) using the facilities.

IRCAM in the United States would probably have become a vast hole for academia to pour federal funds in. Believe it or not, the French are producing fantastic practical products that will really revolutionize musical composition, to say nothing of the basic contributions they are in the process of making in our understanding of artificial intelligence relative to the right hemisphere of the brain. They have designed a computer-synthesizer, utilizing Hilbert transforms, that allows the operator to move controls that continuously revise the internal algorithms to match the controls' position. They can quickly construct a tone with any 300 plus harmonics desired and sit back and listen to it. This new computer-synthesizer is approximately 100 times more powerful than the $30,000 Synclavier.

Most Pleasant Surprise of All

The United States customs and immigration personnel at New York's Kennedy Airport were efficient, courteous and, all in all, projected an image of competence that gave us hope for the country. Twenty years ago, yea, even ten years ago an interface with these officials rarely left one feeling like a cherished citizen of the republic. Twenty years ago the immigration officials put us in a hospital on Ellis Island to "observe" us when returning from a three-month trip to Russia. This time we felt welcomed home.

Jet Lag

A twelve-day trip to Europe takes eighteen days minimum. Jet lag of nine hours requires the better part of the first week home to truly recalibrate the internal clockwork.

Conclusions

First, Europe is going to take the lead away from us in control room design and equipment. They are serious and using their heads. Their personnel are professional and in their right minds. We predict the next ten years will see them take the LEDE™ ball and run away with it.

Second, we believe that those United States manufacturers who seek out and train competent *installers* of sound equipment will find that professional consultants will use them effectively to challenge the "turn key manufacturer" concept so long used by Philips, et al. Importers are fine for the high fidelity market. They're not what's needed for professional products.

Finally, for a great number of us, Europe touches memories of our ancestral past in surprising ways and always leaves us with increased admiration of those ancestors who uprooted themselves to come to the waste and howling wilderness called America. What the waste and howling wilderness had, and has, is incomparable freedom. I quote Churchill, "The United States has the worst form of government except for all the rest."

THE OERSTED EXPERIMENT

During the loudspeaker array design workshop, Dr. Patronis told the following story about J. C. Oersted.

> *In the early 1800's, Oersted was conducting a class at the university where he taught when one of the students asked the following question.*
>
> *"Professor Oerstead, is there any connection between magnetism and electricity?" The good professor instantly answered, "None!" and continued, "Let me prove it to you."*
>
> *He then obtained a compass from the laboratory and brought it near to an electric circuit set up in the classroom. As the compass approached the wire, he said, "You can see there is no ——— oops!" as he observed the current in the circuit deflect the compass needle.*

Dr. Patronis pointed out to us that as a result the electro magnetic unit of magnetic field strength was named the Oersted (OE) in honor of this experiment. The name of the student who asked the question "is known only to God."

Oersted published his data on July 21, 1820, but it was Andre Marie Ampere who meaningfully extended it. All this occurred in what has been called "The Current Period," 1799-1831.

BEL AND DECIBEL DEFINED

I. DEFINITION OF A POWER RATIO AS AN EXPONENT

$$(\text{power ratio})\ a/c = b^N \ (\text{base raised to exponent})$$

II. CONVERSION TO LOGARITHMIC FORM

$$\text{LOG}_b\ a/c = \text{LOG}_b b\ (N)$$

$$\text{LOG}_b\ b = 1.0$$

$$\text{LOG}_b\ a/c = N \quad (\text{when } a/c = 10/1 \text{ and } b = 10 \text{ then } N = 1.0 \text{ Bel})$$

III. DEFINITION OF A SPECIFIC POWER RATIO AS THE DECIBEL

$$\frac{P_1}{P_2} = 10^{(0.1)} = 1.0 \text{ decibel } \textit{power} \text{ ratio}$$

And: $$\frac{P_1}{P_2} = 10^{(0.1)(dB)} \text{ or } \text{LOG}_{10}\frac{P_1}{P_2} = \text{LOG}_{10}10(0.1)(dB)$$

Since: $$\text{LOG}_{10}10 = 1.0$$

Then: $$\text{LOG}\ \frac{P_1}{P_2} = (0.1)(dB) = \frac{\text{LOG}_{10}\frac{P_1}{P_2}}{0.1} = dB$$

And: $$10\ \text{LOG}_{10}\frac{P_1}{P_2} = dB$$

IV. ILLUSTRATIONS AND GENERAL CASE EQUATIONS

$$10\ \text{LOG}_{10}\ 2 = 3.01\ dB$$

$$\text{LOG}_{10}\ 2^{(10)} = 3.01\ dB$$

$$2 = 10^{(0.1)(3.01dB)}$$

$$2 = 10^{\left(\frac{3.01\ dB}{10}\right)}$$

$$10\left(\frac{\text{LOG}_e\ 2}{\text{LOG}_e\ 10}\right) = 3.01\ dB$$

$$2 = e^{((3.01/10)(\text{LOG}_e\ 10))}$$

$$M\ \text{LOG}_b\ a/c = MN$$

$$\text{LOG}_b(a/c)^M = MN$$

$$a/c = b^{((1/M)(MN))}$$

$$a/c = b^{\left(\frac{MN}{M}\right)}$$

$$M\left(\frac{\text{LOG}_e\ a/c}{\text{LOG}_e\ b}\right) = MN$$

$$a/c = e^{((dB/M)(\text{LOG}_e\ b))}$$

$$M = \frac{MN}{\text{LOG}_b\ a/c}$$

$$b = e^{\left(\frac{\text{LOG}_e\ (a/c)}{(MN/M)}\right)}$$

HP 41C INTERFACE LOOP

Hewlett Packard has recently introduced a series of new devices for their HP41 series of calculators. To utilize these new devices requires the HP 82160 HP-IL module. You then can, "it says here", *control* the new digital cassette (one cassette tape will hold *all* the programs in HP's 21 HP41 solution books), the new thermal printer that does *bar code from your programs*, voltmeters, etc.

When you rush to your nearest HP calculator outlet, who is sometimes not too well informed about the operation of the new accessory, and lay out roughly $1200 for the new goodies, you *then* find out that, "oh, you need an extended function/memory module, an extended memory module", which you then purchase.

After you get the new printer, cassette recorder, and all the modules home and try to find out how to do bar code on the new printer, you then discover by calling HP's magic 800 number that "oh yes, you need an extended I/O module but that won't be out until mid-summer."

Also planned, we are told, is a video interface to your television or a video monitor -- also later in the year. In fact, the voice at the other end of the line gleefully informed me that they are preparing endless modules for me to spend my money on.

It looks like the perfect correspondence course of the future will be to buy a computer, receive cassettes or floppies that contain text, and use the computer to measure and solve audio problems. Oh yes, we forgot to tell you there will be an endless choice of modules for this computer correspondence program and the software will "eat" all wrong programming you may have put in earlier.

MUSICAL MATHEMATICS

Mathematically speaking the interval between two notes A (in Hz) and B (in Hz) expressed in cents is:

$$1200\left\{\frac{\text{Log}_{10}\ A/B}{\text{Log}_{10}\ 2}\right\} = \text{Difference in Cents}$$

Octave = 1200 Cents. The Semitone Interval = $2^{(1/12)}$ = 1.059463094 = 100 Cents

		JUST INTERVALS			EQUAL-TEMPERED INTERVALS		
Components	*Name of interval from C*	*Frequency ratio to C*	*Interval from C (to nearest cent)*	*Frequency*	*Frequency of nearest equal-tempered note*	*Cents*	*Note*
Unison		1:1	0	264	261.6	0	C
1 semitone	*Semitone*	16:15	112	281.6	277.2	100	C♯
1 minor tone	*Minor tone*	10:9	182	293.3	293.6	200	D
1 major tone	*Major tone*	9:8	204	297.0			
1 minor tone + 1 semitone		32:27	294	312.8	311.1	300	D♯
1 major tone + 1 semitone	*Minor third*	6:5	316	316.8			
1 major tone + 1 minor tone	*Major third*	5:4	386	330.0	329.6	400	E
1 major tone + 1 minor tone + semitone	*Perfect fourth*	4:3	498	352.0	349.2	500	F
2 major tones + 1 minor tone	*Augmented fourth*	45:32	590	371.2	370.0	600	F♯
1 major tone + 1 minor tone + 2 semitones	*Diminished fifth*	64:45	610	375.4			
2 major tones + 1 minor tone + 1 semitone	*Perfect fifth*	3:2	702	396.0	392.0	700	G
2 major tones + 1 minor tone + 2 semitones	*Minor sixth*	8:5	814	422.4	415.3	800	G♯
2 major tones + 2 minor tones 1 semitone	*Major sixth*	5:3	884	440.0	440.0	900	A
Occurs only as the seventh harmonic of the base note	*Harmonic minor seventh*	7:4	969	462.0			
2 major tones + 2 minor tones + 2 semitones	*Grave minor seventh*	16:9	996	469.3	466.2	1000	A♯
3 major tones + 1 minor tone 2 semitones	*Minor seventh*	9:5	1018	475.2			
3 major tones + 2 minor tones + 1 semitone	*Major seventh*	15:8	1088	495.0	493.88	1100	B
3 major tones + 2 minor tones + 2 semitones	*Octave*	2:1	1200	528.0	523.25	1200	C′

"Sounds of Music" by Charles Taylor

If the musical note "C" has a frequency of 261.6 Hz (equal tempered intervals), then the semitone interval above "C", which is C#, has a frequency of:

$$261.6\ \text{Hz}\ (2^{(1/12)}) = 277.16\ \text{Hz}$$

and:

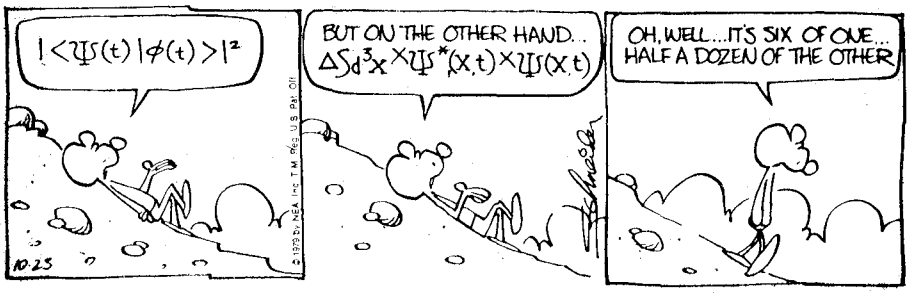
$$1200\left\{\frac{\text{Log}_{10}\left\{\frac{277.16\ \text{Hz}}{261.6\ \text{Hz}}\right\}}{\text{Log}_{10}\ 2}\right\} = 100\ \text{Cents}$$

also:

$$1200\left\{\frac{\text{Log}_{10}\left\{\frac{2000\ \text{Hz}}{1000\ \text{Hz}}\right\}}{\text{Log}_{10}\ 2}\right\} = 1200\ \text{Cents}$$

SMILE

EEK & MEEK



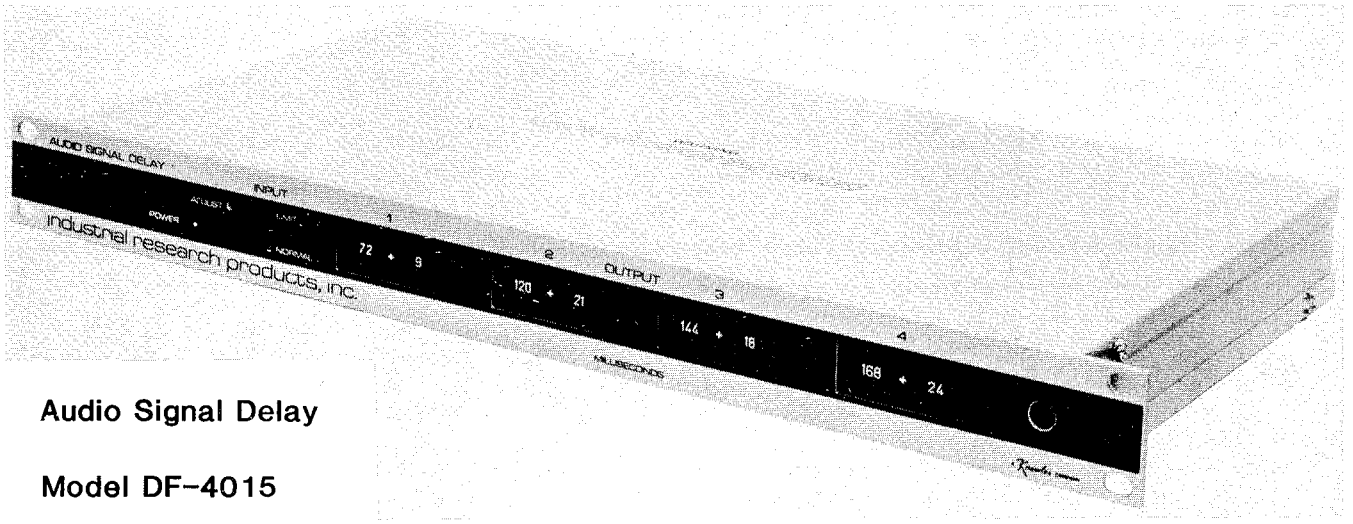
"Following a TDS workshop lecture." Ken Wahrenbrock

NEW PRODUCTS

Normally, Syn-Aud-Con is not product oriented and unless a specific component has a special systems application we assume most of you are well served by your usual component information sources such as reps, manufacturers, etc.

DF-4015 Audio Signal Delay from IRPI

Since the vast majority of important projects already use "digital time delay devices" from Industrial Research Products, it is of major interest when they update their offerings. IRPI specifications are accurate and the people measuring them and writing them up know what a dBv and a dBm is. (You'd be surprised how many manufacturers don't.)



Audio Signal Delay

Model DF-4015

SPECIFICATIONS:

DELAY:

Capacity:	192 ms max; 3 ms min.
Controls:	Thumbwheel switches, 3 ms steps; quiet switching
Frequency Response:	±1 dB, 20 Hz - 12 kHz; ±2 dB, 12 Hz - 15 kHz; at 0 dBm output level
Dynamic Range:	90 dB; 20 kHz bandwidth unweighted
Pre/De-emphasis:	Equivalent to 40 usec; headroom loss: none below 4 kHz, 12 dB at 10 kHz

INPUT:

Number:	One
Level:	20 dBv (10V rms) max; 0 dBv (1V rms) nominal
Gain/Sensitivity:	Adjustable; 28 dB max/.32V rms for full output
Controls:	Input level adjust via screwdriver through front panel
Monitors:	Two LED indicators; green on at 14 dB below clipping; red on at clipping; equalized to indicate slow rate limiting
Impedance:	15K ohm transformer coupled

OUTPUT:

Number:	One, two, three or four; each independently adjustable over full delay range
Level:	+18 dBm (6.2V rms) maximum on 600 ohms, +4 dBm nominal +18 dBv (8.0V rms) maximum unloaded
Noise:	-72 dBm; 20 kHz bandwidth unweighted
Impedance:	Less than 150 ohms, intended for 600 ohms or higher; transformer coupled
Thd + Noise:	Less than 0.2% at 1 kHz and +4 dBm; less than 0.3% at 1 kHz and levels between +18 dBm and -10 dBm

ENVIRONMENTAL:

Temperature:	Operating 45°C (113°F) max. ambient for long component life
Humidity:	95%, condensation free

INDUSTRIAL RESEARCH PRODUCTS, INC., 321 Bond Street, Elk Grove Village, IL 60007 (312) 439-3600

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HME 150E Series Wireless Intercom System

HM Electronics, Inc., has found a large gap in the market place and filled it with a professional challenge. A close look at this specification sheet shows a superior solution to almost any intercom problem:

Continued next page....

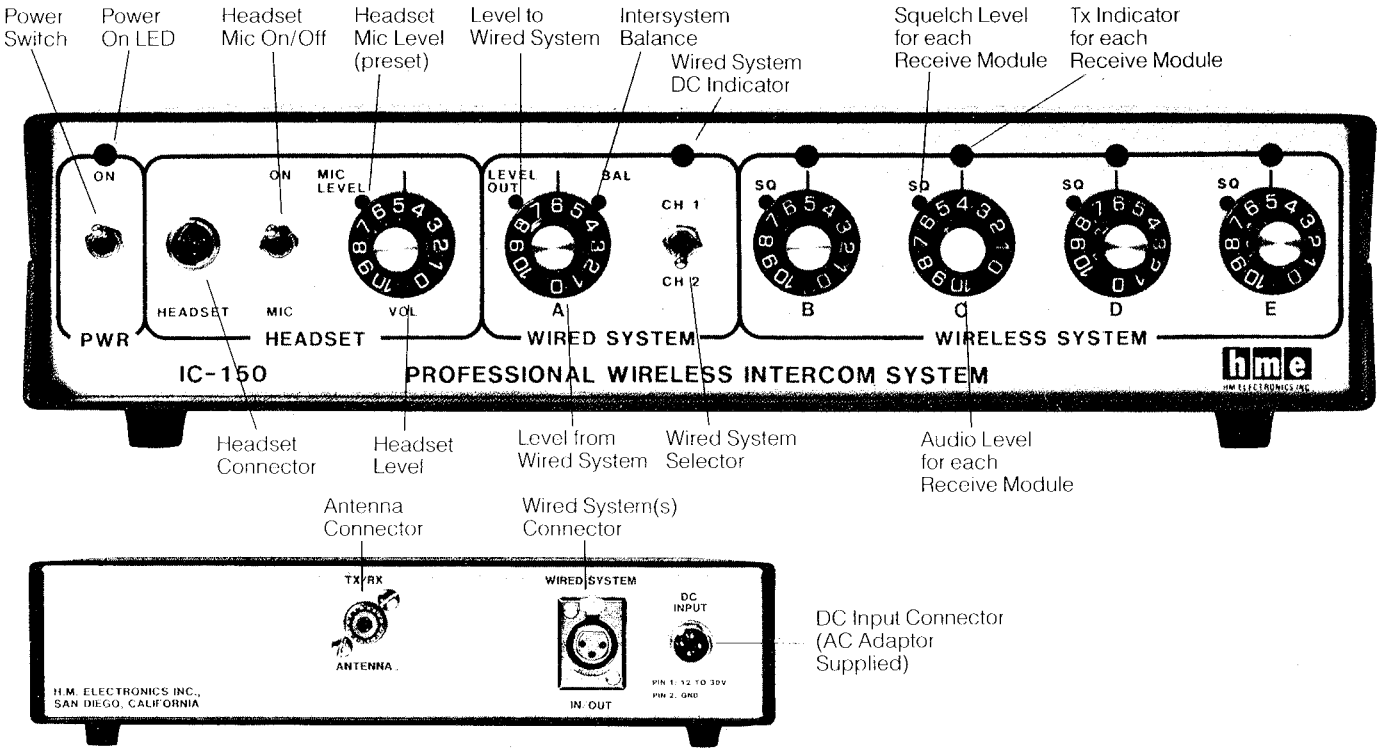
IC-150 Base Station

IC-150 Specifications

Audio Frequency Response: 300 Hz-3 KHz
Operating Frequencies:
Transmit: 150-174 MHz* (One channel)
Receive: 26 1-26 48, 30-35 or 72-76 MHz* (up to four channels in any one band)

Dynamic Range: > 80 db
Distortion: < 3%
Transmit Power: 100 mW
Receiver Sensitivity: 1 uV for 20 db quieting
Wired System Interface:
Level: ~ 3 volts (adjustable)
Impedance: 200 ohms

Power Requirement: 115V/50-60 Hz or Ext 12-30 VDC
Size: 11 x 6 x 2½
Weight: 3½ lbs
*See Ordering Information back page



H.M. ELECTRONICS, INC., 6151 Fairmount Avenue, San Diego, CA 92120 (714) 280-6050

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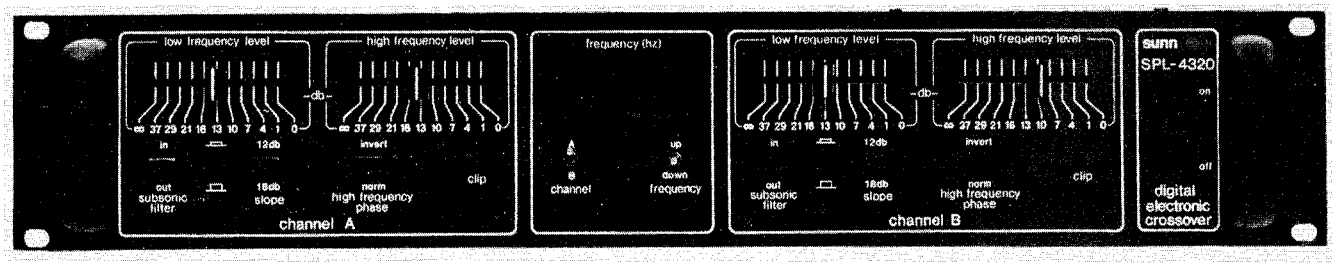
Sunn SPL-4320 Digital Crossover

The SPL-4320 is one of those extremely versatile handy tools that ends up as one of your test instruments rather than in the system it was originally intended for.



Sunn Digital Crossover SPL-4320

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Features:

Digital technology has been applied by the specialists at Sunn to create an electronic crossover that sets new standards in state-of-the-art performance. The Sunn SPL 4320 actually displays the frequency selected in bit bright LED's and retains it in a non-volatile memory when the power is off. Employing stable state-variable filters controlled by digital-to-analog converters, this unique unit allows precise selection of 248 different frequencies between 80 and 9960 HZ — all in accurate 40 HZ increments. Tuning in crossovers has never been faster or easier. The 4320 also offers a built in rumble filter, a pop supression circuit, balanced line inputs and outputs, stereo 2-way or mono 3-way operation, true Butterworth response and many more professional features that set it apart from the crowd.

Specifications:

Gain:	Unity ± 1 db (All controls at 0 db position)	
Frequency Response	20 hz to 20k hz +0 —.5 db 2 hz to 170K hz +0. — 3 db	
Maximum Input Level	10 V RMS +22 dbm	
Input Impedance	47K ohms (unbalanced) 94K ohms (balanced) (optional 600 ohms)	
Maximum Output Level	Balanced 10 V RMS into 600 ohms, +22 dbm Unbalanced 8 V RMS into 2K ohms	
Distortion	THD less than .05% IMD less than .04% Measured at any frequency 20 hz-20K hz at any level, at any crossover frequency	
Slew Rate	Greater than 5 V/microsecond	
CMRR	—50 db @ 20K hz —70 db @ 1K hz	
Signal To Noise Ratio	HF Outputs Balanced: —110 db from full output HF Outputs Unbalanced: — 105 db from full output LF Outputs Balanced: —105 db from full output LF Outputs Unbalanced: —100 db from full output	ANSI A WTD
Power Requirements:	110-130 VAC 60 hz 15 W Maximum	
Frequency Accuracy:	±5% from displayed number	
Q Variation	±5% at any crossover frequency	
Subsonic Filter	30 hz ± 10% 12 db/oct	
Dimensions	3.5 x 9.3 x 19 in 8.9 x 23.6 x 48.3 cm	
Weight	11 lbs 5 kg	

SUNN MUSICAL EQUIPMENT COMPANY, Amburn Industrial Park, P. O. Box 429, Tualatin, OR 97062 (503) 638-6551

* * * * * * * * * * * * *

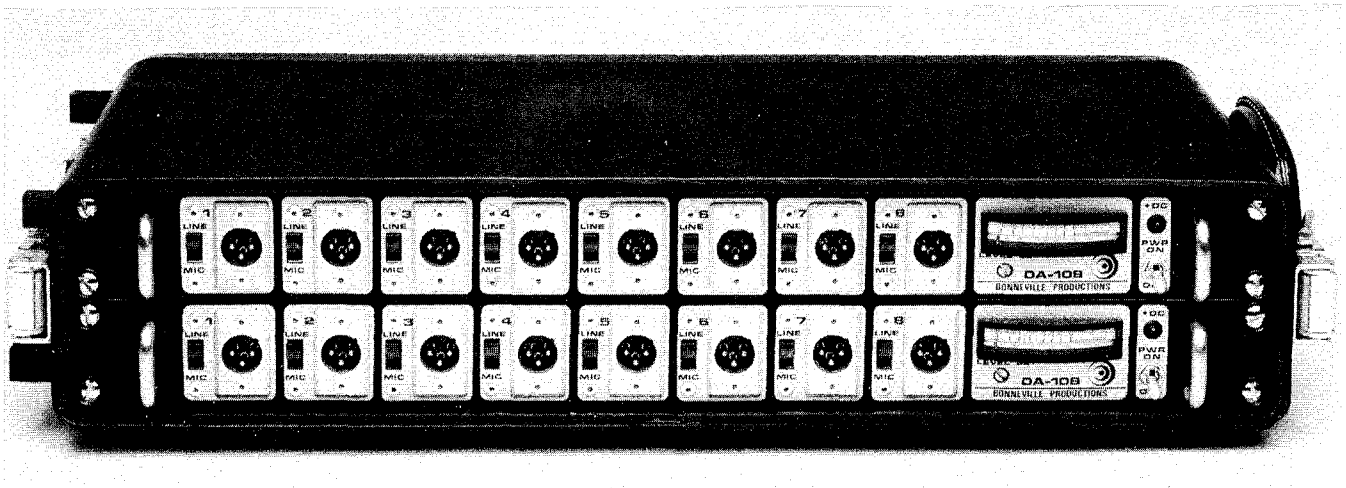
Bonneville DA-108 Audio Distribution System

The press release and photograph says it all. Bonneville Productions has a winner. When you need one of these, it better be good and this one certainly has the right components put together by an experienced company.

PRESS RELEASE - AUDIO DISTRIBUTION SYSTEM

Bonneville Productions' model DA-108 audio distribution system offers state-of-the-art electronic design featuring the 990 op-amp and Jensen transformers. This combination provides for exacting performance specifications with the flexibility of transformer isolation. Each of the eight XLR outputs is selectable to line or microphone level. The DA-108 is well suited for portable use for press conferences, media-covered events and any application where isolated feeds and immunity from A-C ground currents are desired.

For further information contact Mike Collett (801) 237-2619 or write: BONNEVILLE PRODUCTIONS, 130 Social Hall Avenue, Salt Lake City, Utah 84111.



MODEL DA-108 AUDIO DISTRIBUTION SYSTEM

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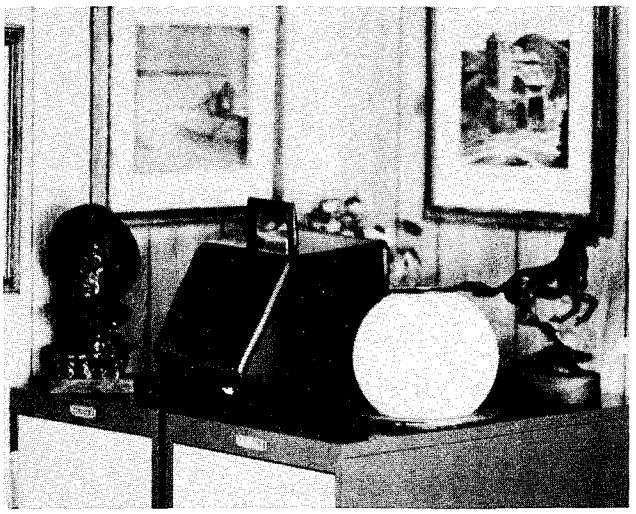
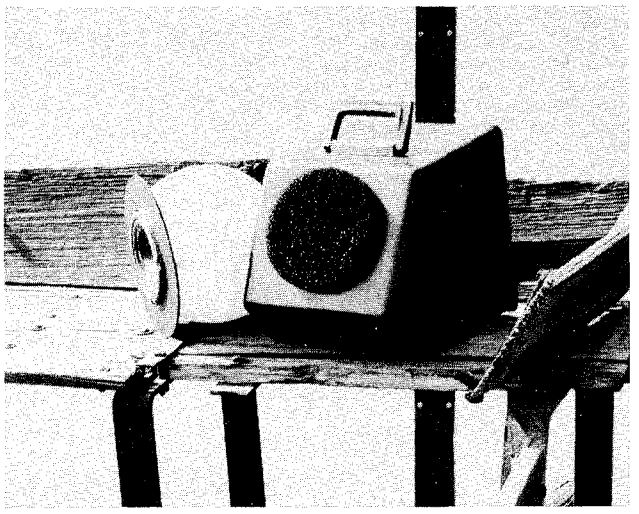
Davis "S" Speaker

In the last issue of the Newsletter we mentioned that the unusual truncated sphere loudspeaker that we have been demonstrating in classes for the past year or so is now available from J. W. Davis & Company for $29.90.

The truncated sphere is now available in a carrying case which sells for around $55-$60.

J. W. Davis & Company would like you to try the Davis "S" speaker. If for any reason it doesn't do what you want, just let them know the reason why and return the unit.





J. W. DAVIS & COMPANY, P. O. Box 26177, Dallas, TX 75226 (214) 651-7341

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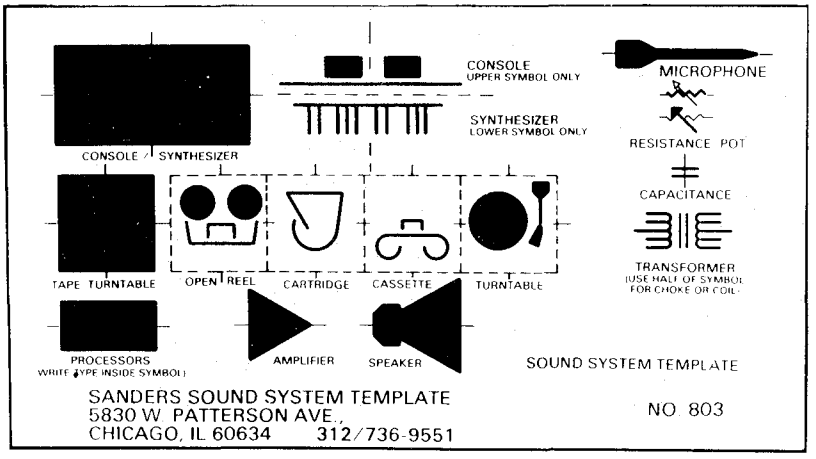
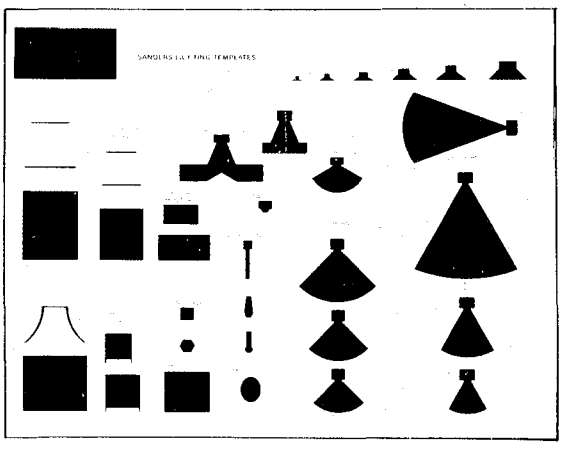
We suspect that, like us, most of you will want one of each of these units in your inventory as their use is frequent and the man with one "right now" gets the job. We wish every month brought this much good news.

TEMPLATES MADE TO ORDER

LEE RITTERBUSH of Raytronics in San Diego, California, originally asked us to check out the following template manufacturer.

Sanders Templates, 5830 W. Patterson Avenue, Chicago, Illinois 60634 will make plastic drafting templates for any audio (or other) need. All they ask is that you draw out what you need.





One way to get an architect or engineer to specify your favorite manufacturer's product is to see he has a handy template that symbolizes your unit rather than a competitor's. If you'd like to know more about how reasonable this can be, write Dick Sanders at the above address. We've found him to be an exceptionally helpful person and genuinely interested that sound professionals get the drafting tools they need at reasonable prices.

ANCHOR SELF-POWERED SPEAKER SYSTEM

TOM GRAHAM was in our February Sound Engineering class. Tom has taken over the manufacture and distribution of the self-powered "anchor" speaker systems. We have found these compact units very useful as "test" speakers as all we need to do is plug them into 110 volt AC and connect the output of our wave analyzer to their input. The multiple level inputs and the line level output coupled with smooth enough response for meaningful TEF™ test work makes its compact dimensions and low weight very attractive.

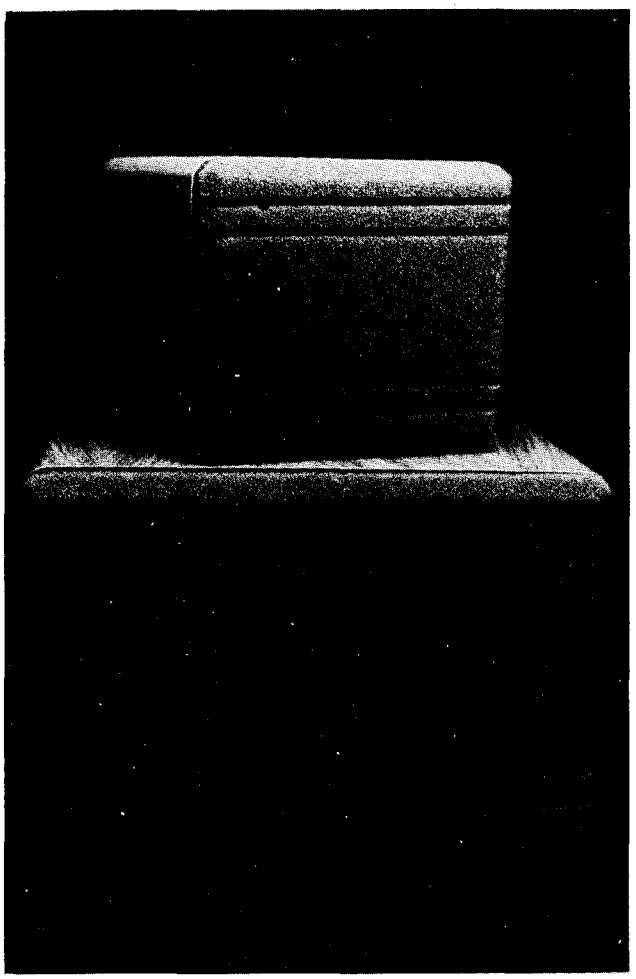
Our initial testing indicates these systems are free from spurious interferences and they appear to be rugged, reliable sound sources. We now have two of the Anchor 100's and two of the Anchor 200's. We'll be reporting on them in future issues.

Tom is making the 100 available to Syn-Aud-Con graduates at 35% off $285 and the 200 at 35% off $405. If interested, write:

Audio Visual West, Inc.
4510 Federal Blvd.
San Diego, CA 92102
(714) 262-9901

ANCHOR 100 SPEAKER SYSTEM
SPECIFICATIONS

Speaker Type	4-1/2 in. high compliance full range speaker
Frequency Response	
Music	100 Hz to 15 kHz
Speech	150 Hz to 15 kHz
Rated Power	35 Watts
Maximum SPL at 1 m, Full Power	104 dB SPL
Input Impedance	
Microphone	780 ohms, balanced
Phono	51 kilohms, unbalanced
Line	≥ 35 kilohms, unbalanced
Connectors	
Microphone Input	Professional 3-pin audio connector (female)
Phono Input	Two RCA phono jacks
Line Input	1/4 in. phone jack
Line Output	1/4 in. phone jack
Controls	**Volume** **Mic/Phono/Line** input selector switch **Speech/Music** equalization switch
Indicator Lights	Two green LED's, one on front grille, one on back panel
Power Requirements	120 V ac, 60 Hz, 1 A
Cabinet	Walnut veneer plywood, foam grille
Dimensions	6 in. x 7 in. x 8 in.
(Height x width x depth)	15.2 cm x 17.8 cm x 20.3 cm
Net Weight	11 lb. 5.0 kg
Shipping Weight	12 lb. 5.4 kg



Anchor 100 Self-Powered Speaker System (also available as an unpowered system: Anchor1)

Optional Accessories
Swivel stand mount
Fixed stand mount
Swivel wall mount

OCTOBER WEST COAST AES CONVENTION

BOB DAVIS, AES West Coast Convention Chairman; GLEN BALLOU, Papers chairman; and TED UZZLE, assistant Papers chairman, can be counted on to put together an exceptional AES program.

The session that I would travel across the country to attend is the session on psychoacoustics chaired by Diana Deutsch.

Volume 8 # 2, the Winter 1981 issue of the Newsletter, page 30, "Articles of Interest". Take a minute to re-read the full page "review" of Ms Deutsch's work and you will want to plan to be in Anaheim for the Fall AES, October 22-25. Ted assures us that there will be no conflicting program material scheduled at the same time as Ms Deutsch's session.

KEN WAHRENBROCK is building the Deutsch switching box for us and we will have it in future classes.

THE FAMILY THAT SHOOTS TOGETHER.....

is very polite to each other

The day after the February Loudspeaker Array Design Workshop some very special Syn-Aud-Con graduates spent the day with us up at the ranch. In the great Southwest outdoors, when a man or woman is known to be a dependable partner in the face of unpleasantness or danger, it is said of them:

"They'll do to ride the river with."

DAVE ANDREWS, Big JOHN LABERDIE and FARREL and GINA BECKER certainly have earned this accolade so far as Syn-Aud-Con is concerned. We have never called on them for anything that we haven't received a 110% response: rewiring trailers late at night in a downpour; fixing stalled trucks on the freeway at midnight; working from 4:00 PM to midnight California time on the same day they flew from the East Coast; wading knee-deep in mud in a California drenching rain with but the mildest of remonstrances - all describes these remarkable people. They all showed signs of having contracted feverous firearms fervor from Don (a disease something like malaria because it constantly recurs after getting in the bloodstream and one has to continue regular treatment - namely, purchasing firearms in order to even partially control its effects).

Photograph #1

So when this quartet "twisted" Don's arm to go shooting, he reluctantly agreed. (Don has about as much reluctance to go shooting as he has to drawing his next breath, even if he was leaving the next day for an AES convention and class in Switzerland and hadn't packed yet).

The first two photographs are (1) Farrel Becker *getting ready* to shoot the Weatherby 460 magnum. This rifle has a muzzle energy of 8095 ft.lbs. and is the world's most powerful rifle.

The recoil is apparent in the second photograph (2) where Dave Andrews has just put one of the 510 grain solids into orbit. The 460 has 105 ft.lbs. of recoil and, believe it or not, Dave's posture mirrored Farrel's just about 3 msec earlier. Note too that Dave is slightly out of plumb, though sober. They both hit the target. Dave turned around after firing the 460 and said, "I think all the stories about its recoil are exaggerated." Dave and Farrel proved to themselves that if they had to, they can shoot accurately enough to stop charging elephants, Cape Buffalo, rhinos, or even D-9's.

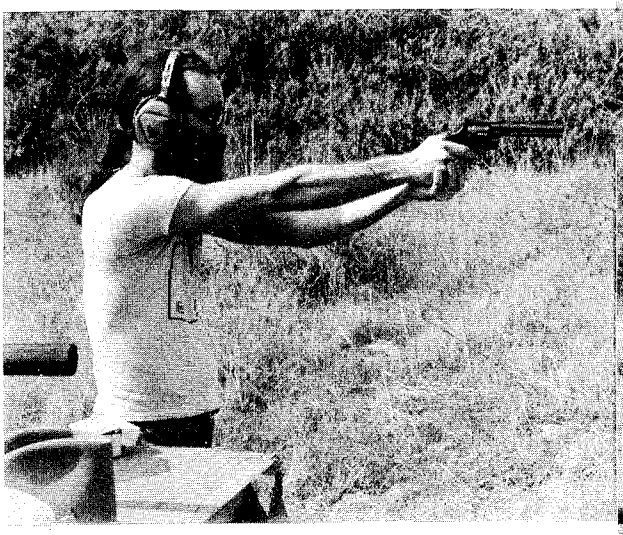
Photograph #2

Continued next page....

Photograph #3

Gina, who has shot the 458 magnum (recoil approximately 70 ft.lbs.), decided to stick to handguns and proceeded to punch the black out of the targets with a .357 magnum. In photograph #3 that's a Ruger security six she's shooting. Photograph #4

Photograph #4



Photograph #5

is Big John Laberdie shooting a Colt Python 357 magnum (the hand in the foreground is Farrel letting off the Ruger security six). Photograph #5 has Dave Andrews showing how to do it with the Python and photograph #6 illustrates the fact that the family that shoots together is very polite to each other.

Photograph #6

Whenever a self-defense situation crops up, Syn-Aud-Con recommends you run your assailant down with your automobile as it causes far less emotional turmoil in the media. In the meantime, those of us who enjoy firearms as a manifestation of man's tool making genius and their use as a chance to practice discipline, precision and persistence in the pursuit of consistent accuracy in the art of target shooting will continue to try to correct misunderstandings to the contrary.

For those interested in references, the M1 Garand of World War II recoiled a mere 20 ft.lbs. while delivering a muzzle energy of 2930 ft.lbs.

NEW TEF™ LICENSEE

We would like nothing better than to dispense with the listing of new TEF™ licensees, but Crown is still working on the first prototype and we won't speculate on when production models will be available.

Garrott Elghammer
230 E. Ontario #702
Chicago, IL 60611

Gary is a graduate of two Sound Engineering Seminars, a Heyser Workshop and the January 1982 LEDE™ Control Room Workshop.

AUDIO AND ACOUSTIC BASIC CLUB COMPUTER SOUND SYSTEM DESIGN PROGRAMS

Wahrenbrock Sound Associates will coordinate listing of available programs and facilitate seller-purchaser contacts. Membership will cost $15.00 for first year. Renewal subscriptions are tentatively set as $10.00 per year.

For this you will receive:

1. Quarterly: short newsletter, program listings, annotated, with address programmer
2. Assistance if you need it to make contact
3. Information on desired programs if you want to program
4. Assistance in reference to programs available
5. Membership on a calendar year basis.

To have a program listed, the following must be provided:

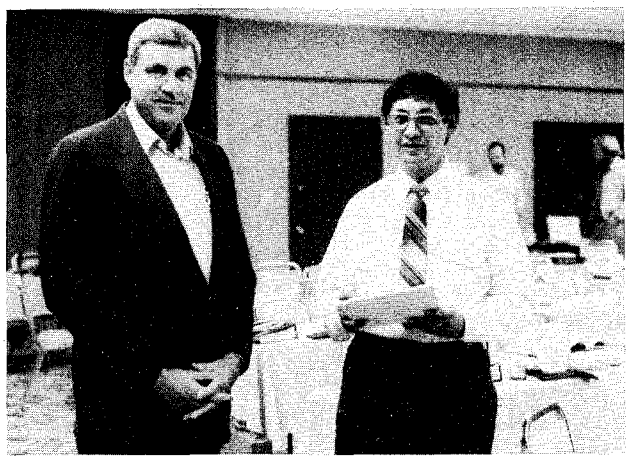
1. One copy for the files. Such material will not be copied or revealed without written authorization of the programmer
2. The program should be annotated as completely as possible, so as to facilitate use by the purchaser. This should include: formulas, registers used, types of language, machines for which discs or cassettes would be available, sample problem with solution and any cautions. Use 41C Club format as a guide. Standard forms available from WSA @ $1.00 per set.
3. Completed listing form is enclosed
4. Suggested costs or fees for programs.

Potential purchasers will be directed to the programmer for negotiations on transfer of the programs and successful use of the programs.

KEN WAHRENBROCK has 8 programs documented and available. If you are interested in joining AABC, contact Ken, Wahrenbrock Sound Assoc., 12115A Woodruff Ave, Downey, CA 90241. Ph (213) 861-0397

ADOLFO FIGEAC

ADOLFO FEGIAC of Orlando, Florida, is originally from San Salvador. He has many years' experience with the Hyatt Hotel in Orlando and has contributed much to our thinking about how to do successful hotel sound systems.



This year was Adolfo's second time through Syn-Aud-Con and he brought a wealth of new information with him.

ALAN PERRY

Many of the filmed stories done in Washington, D.C., for the TV networks and others rely on the audio talents of ALAN PERRY (on the left talking to GRADY). It seems that part of the professionalism required in such work is to be sure to record on film and audio all the event, even when the bullets are flying. Alan is a valuable source of who makes reliable portable equipment and how to most effectively use the better apparatus.

BOOKS OF INTEREST

The "Master" Handbook of Acoustics

THE MASTER HANDBOOK OF ACOUSTICS (Tab 1296), by F. Alton Everest, is a well written, useful volume. I would have entitled it "Basic Acoustics for the Recording Engineer." It is a basic book sans math. It is well written because it includes essential information that a recording engineer should know if he is to rise above the superstitious claptrap perpetuated so widely through the industry. It seems to us that Mr. Everest "feels in his bones" the correct path through the nonsense of using the classical statistical approach to control room and studios as he spends lengthy pages on comb filters, room modes, etc., and qualifies heavily the data on RT_{60}, etc.

The weakest chapter in the book is on instrumentation with most of the devices shown likely to seriously mislead a conscientious engineer and literally none of them recommended by Syn-Aud-Con for work in control rooms, though a few of them may be useful in larger, reverberant rooms.

Mr. Everest's bibliography contains many gems. Also included are the dregs by the usual list of the published but unproven. All gold mines have to have the gold separated from the tailings and bibliographies are no exceptions. It is to Mr. Everest's credit that he missed very few relevant references so he is to be forgiven the extraneous ones.

It is of interest to us that, in our opinion, this simple paperback is, to date, the best book on the subject we have seen. It has tools you need if you are trying to design either studios or control rooms. It is far ahead of Eargle, Worman, Borwick, et al., perhaps because Mr. Everest has vastly more experience than most of the contemporary writers on this subject. At the same time, Mr. Everest has avoided the major handicap of age and experience, namely, ossified mental sensitivity to current ideas.

Finally, the price is a pleasant surprise for so useful a volume. $12.95. We suggest you not hesitate to add this book to your collection. You'll refer to it more often than you would anticipate in advance of having it available.

Alton Everest (left) talking to Alan Manger

CLASSIFIED

OPPORTUNITY WANTED: Audio engineer wishes to apply enthusiasm and background (5 years EE tech, 3 years EE including stints at Disney and a major audio visual company, and simultaneous 1 year college instructor experience) towards designing either sound reinforcing systems or consumer/professional products. Though I'm mainly analog, I had much digital exposure in obtaining 1979 BSEE. I strongly prefer areas *outside* Los Angeles. Salary requirements are open. Contact: Kurt Wiley, Apt. 7, 3756 Hughes Avenue, Los Angeles, CA 90034 (213)599-1337.

FOR SALE: ARA 412B Communications Company Real Time Analyzer. 2 years old. $800 or make offer. Rodney Davis, 25 West Park Street, Weiser, Idaho 83675. (208) 549-2108.

FOR SALE: 1979 Crown M-600 mono power amplifier. Also, versatile TC board input module which will accept various circuit designs supplied in the manual and otherwise.

1980 Crown PSA-2 stereo power amp.

Both in excellent condition. Contact: Phil Klusendorf, 111 Broadmore Avenue, San Anselmo, CA 94960 (415) 454-0664.

WANTED: HP-10 printing calculator or HP-19C continuous printing calculator. Contact Rich Long, Richard Long & Associates, Inc., 452 Broadway, New York, NY 10013. (212) 431-3133 or 431-5379.

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SYN-AUD-CON SPONSORS

Syn-Aud-Con receives tangible support from the audio industry, and ten manufacturing firms presently help underwrite the expense of providing sound engineering seminars. Such support makes it possible to provide the very latest in audio technology while maintaining reasonable prices relative to today's economy and to provide all the materials and continuing support to all graduates of Syn-Aud-Con.

Personnel from these manufacturers receive Syn-Aud-Con training which provides still another link in the communications circuit between the ultimate user and the designer-manufacturer of audio equipment. They are "in-tune" with what a Syn-Aud-Con graduate needs.

Their presence on this list as a Syn-Aud-Con sponsor indicates their desire to work cooperatively with you in professional sound.

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