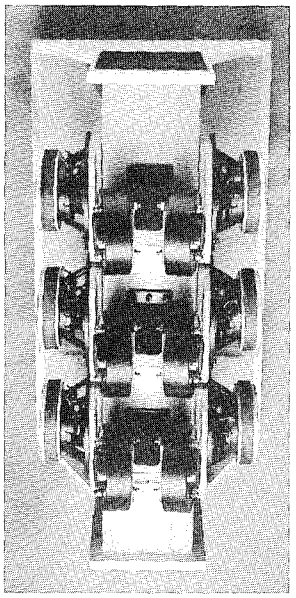
SYNERGETIC AUDIO CONCEPTS

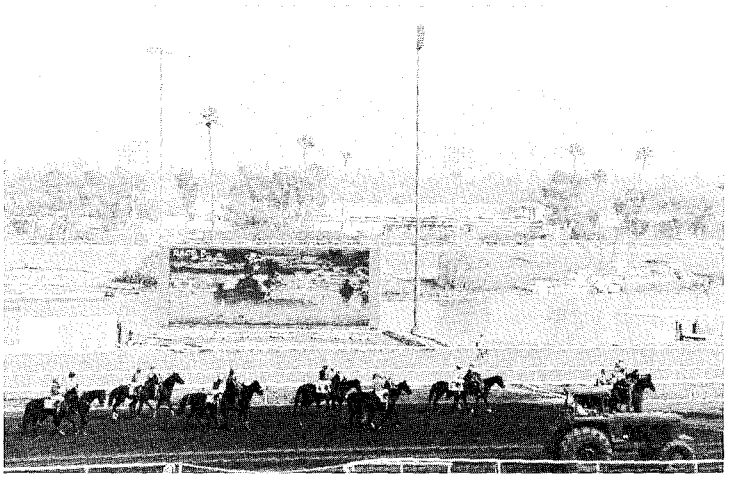
SYN AUD CON

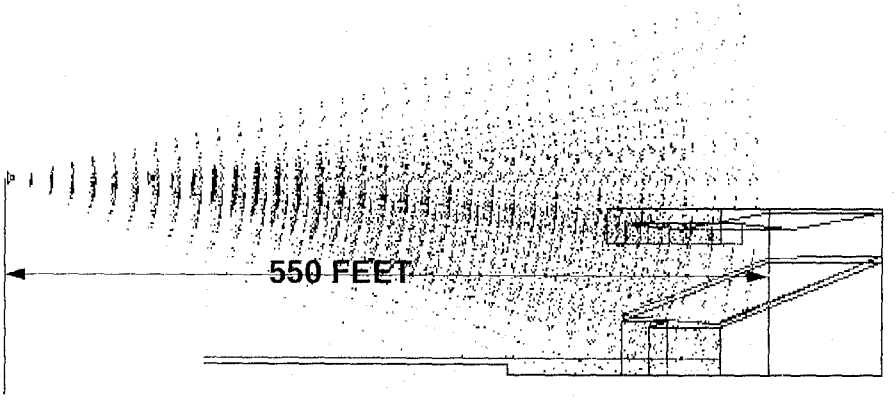
newsletter

Volume 21, Number 3
Spring 1994

Renkus-Heinz CoEntrant Waveguide Technology







RENKUS-HEINZ
PROFESSIONAL SOUND PRODUCTS

Space constraints required the new installation be mounted on a row of three 75 feet high poles facing the Grandstand across the racetrack. Precise directional coverage into the Grandstand was vital to avoid startling the horses with a stipulated 102 dB maximum level from the sound system

SYNERGETIC

SYN AUD CON

AUDIO CONCEPTS

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

Synergetic: Working together; cooperating, cooperative

Synergism: Cooperative action of discrete agencies such that the total effect is greater than the sum of the two effects taken independently.

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Special Supplements to Newsletter Vol. 21, No. 3:

No. 1-Elementary System Theory by Eugene Patronis, PhD

No. 2-Concert Sound Reinforcement Workshop V January 1994

When Do I Renew?—You can check to see when your subscription will expire by checking the mailing label on the envelope in which your newsletter was mailed. In the upper righthand corner, beside the name, a date will appear (i.e., 4-94). This means that you will receive this issue and it will be the last issue sent unless you renew. Renewal notices will be sent at this time. you must renew before the next quarter's newsletter is mailed or your subscription will become inactive.

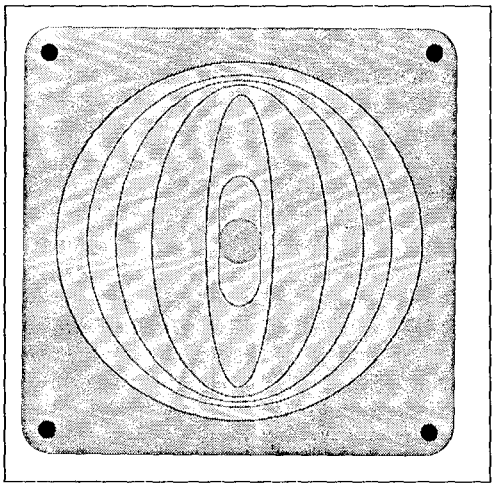
POSTMASTER: Send address changes to Synergetic Audio Concepts, 12370 W. CR 100 N, Norman, IN 47264

RENKUS-HEINZ
PROFESSIONAL SOUND PRODUCTS

One of the perspectives a little age has allowed me is the realization that the Divine Programmer truly does have infinite variations available. Harro and Ralph Heinz, father and son, manifest the good results that come from allowing the exercise of each man's talents to form in their own unique individual manner.

Harro's background in electronics is a distinguished one and Ralph's is rapidly entering the same status in loudspeaker designs. Ralph has generated genuinely unique approaches to keeping multiple driver path lengths synchronized in a manner that ensures wide area coverage with simultaneous arrivals. Ralph's ideas are of the sort we have all learned to admire—namely when explained you say "of course" while realizing that the particular "obvious solution" simply had not occurred before.

While we were at the factory, Ralph showed us an entirely new concept in loudspeaker design. We were shaking our heads over the originality of the design and Ralph said, "If Don Keele, Cliff Henricksen and Earl Geddes had breakfast together, I'd like to think that this is the horn they would design." Ralph's training in mechanical engineering and his work experience have given him insight into what will and will not work. This background, production manager in a machine shop in the San Francisco Bay area where CNC (computer numerically controlled) routers were used was an enormous help with the design of the CoEntrant horns.



E A S E and EARS alone would give Renkus-Heinz a firm hold in our audio industry. Their inventive new approaches to loudspeakers bring equal prestige to their primary product area of loudspeaker systems.

Harro, Ralph, and Ron Sauro all came in on a Saturday to spend time with us at their plant. These are three men who have participated with Syn-Aud-Con in many different efforts to train sound contractors. We enjoy their enthusiasm for our industry and salute their growth in it.

AfterShocks From the 6.6 Earthquake in Los Angeles in January

The earthquake may have faded from the memories of those who don't live in Los Angeles, but the aftershocks will be with the residents for their lifetime.

Planning for the Earthquake

People who don't live in earthquake country wonder why residents don't carry earthquake insurance. We didn't when we lived in California. We do now because it is inexpensive, even though the most devastating earthquake ever recorded in the U.S. occurred in Illinois over 150 years ago (thought to be over 8.0 on the Richter Scale). California earthquake insurance is not only expensive but the deductible is such that one would collect little insurance unless there was total destruction of the structure.

I have to admit that when the January 17 earthquake occurred, my first thought was for our personal safety (we were in a hotel in Anaheim) and the second thought was about the Workshop due to take place only a few hours later at Chapman University with over 100 people attending.

We had been through a 6.4 earthquake approximately the same distance from the epicenter, about 30 miles, so we had some knowledge of the 30-45 second duration of an earthquake and knew that since the building was not coming down after 15 seconds that we would survive.

Damage to Sports Facilities

The Anaheim Stadium just a few blocks from our hotel suffered damage to 3,000 seats when the high-tech scoreboard/giant screen cluster holding the sound system, among other things, collapsed.

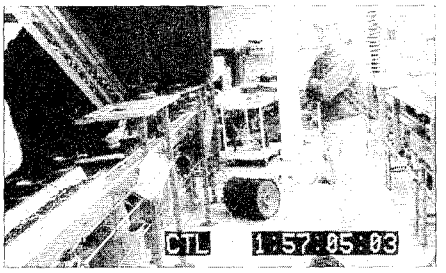
JBL & Family

Our heart goes out to JBL whose facility in Northridge sat so close to the epicenter. It has taken Herculean efforts on the part of everyone in the company to be back in production. We received the following letter from a friend at Harman Applied Technologies:

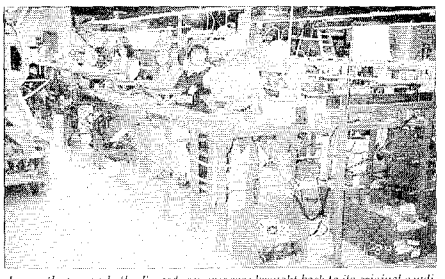
"Here is the special report which was published shortly after the earthquake. As you can see, we had a mess here. We are all proud of the way our employees responded and the resulting rapid return to normal manufacturing operations. There are still plants all around us which are still not operational." (3 months after the quake.)

The "special report" from Harman Northridge stated, "The earthquake hit at 4:31a.m. What if it had hit at 4:31p.m.? There were many heroes at Harman Industries and Sidney Harman was clearly their leader.

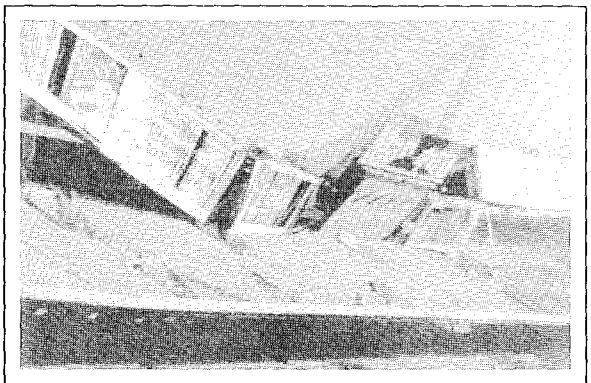
Below are examples of two areas that were heavily damaged in the earthquake. At first glance it looked as if we had to start all over, an effort that would take a minimum of four months. Dr. Harman did his own assessment of the damage and challenged us to be back in production within one week. And so it came to pass.



The Transducer Line was heavily damaged by debris falling from the ceiling



In exactly one week, the Transducer area was brought back to its original condition. The photo above shows the clean up crew on Monday, January 24, making the final adjustments to the line.



Sponsorship Brochure

We have updated our Sponsorship brochure and wanted you to have a copy. Please let us know if you would like extra copies for people with whom you work. It is a very special group of audio manufacturers that support Syn-Aud-Con and we have a very special appreciation for them.

Mega, Mega Dittos to Bob Pabst at EV

When we heard Rush Limbaugh tell about his Gold Plated Electro-Voice RE20 microphone, we immediately called EV and said we'd put it on the cover of the newsletter. Our timing was bad, we had already committed to a cover for this newsletter, and we just can't wait to share this news.

That's Bob Pabst with Rush and let me say we envy him the experience. Obviously, neither Bob Pabst nor Electro-Voice are asleep at the switch when they recognized this customer's needs. We happen to listen to some of Rush everyday and it is a delight to know he's talking over a Syn-Aud-Con sponsor's microphone.

Gold Rush! Mark IV Audio President Bob Pabst recently stopped by the ABC/Capital Cities studios in New York to present Rush Limbaugh, host of America's highest-rated syndicated radio show, with a gold-plated Electro-Voice RE20 microphone. Limbaugh is a long-time user of the RE20 and has referred to it in the past as his "golden microphone." Now it truly is!

The Orlando Class- A Landmark Experience

Those of you who have attended a farm class where Pat Brown has been an assistant instructor (I say "has been" because in the future he will be a co-instructor, not an assistant) would not believe what took place at Orlando. Pat taught the entire class except for about two hours. It was not a copy of Don Davis. It was Pat's class, Pat's demos, and Pat's manual. Don watched and listened and learned!

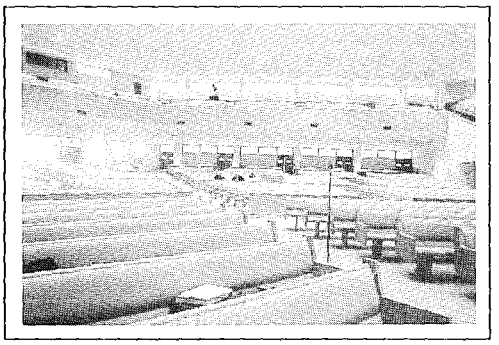
Pat Brown (L) talking with Gary Schmitt

We purchased an LCD panel, thanks to the help of Ron Steinberg at RentCom in Chicago. Pat has a lot of the overheads on the computer. The class was fun for Don and I. We met old friends who came to learn from Pat. I don't think there has been any class where four women attended, women totally professional. These women handle responsible jobs and have experience with difficult audio problems and their solutions. A father/son combination came all the way from Bogota, Columbia.

Don writes about the class,

"That Pat Brown is exceptionally well equipped was evident in my pleasure, along with the class, of seeing new and better ways to present the fundamentals of audio and acoustics. Pat's improvements over our old demonstrations exemplified by Pat's dynamic demonstration of Communication Co's Voice Processor in place of the video we normally show was just one example of what Pat's energy brings to these classes. It gave me extraordinary pleasure to watch Pat teach a subject that I have taught for 21 years and see him, in many ways, do a better job than I have done! But then, he did have a good teacher.

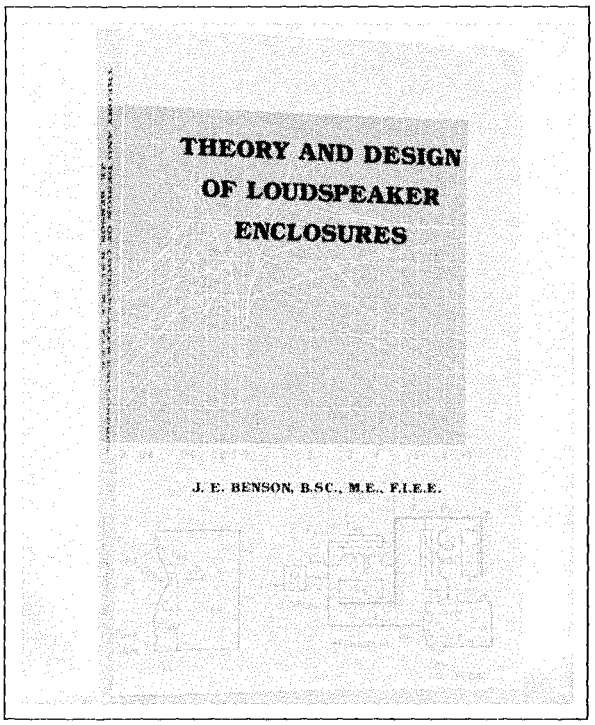
"The success of this class insures that Pat will be offering others. Most likely areas are New York, Los Angeles, and Seattle during the 1994/95 fall/winter season."



Orlando Class—February 24-25, 1994

Chris Hinkle of First Baptist in Orlando invited the class for an evening demonstration of the sound system there. Once again he overawed us with his sound system and overall facility. Just before leaving for home we had lunch with Chris, his wife, Kathleen and daughter, Rachel. Chris is an outstanding "mixer" and I'm amazed that some major network or large recording facility hasn't spirited him away.

Benson Corner



The introduction of the Benson book to the audio community is already inspiring new work in the field of design and modelling of loudspeaker systems. A computer program based on the Benson algorithms is being developed by G.R. Koonce.

G.R. Koonce purchased a copy of Dr. Benson's book, *The Theory and Design of Loudspeaker Enclosures*. He wrote us in December and I immediately called him. I discovered a very interesting and talented man. Mr. Koonce sent us a disk and he would like us to make it available to anyone interested.

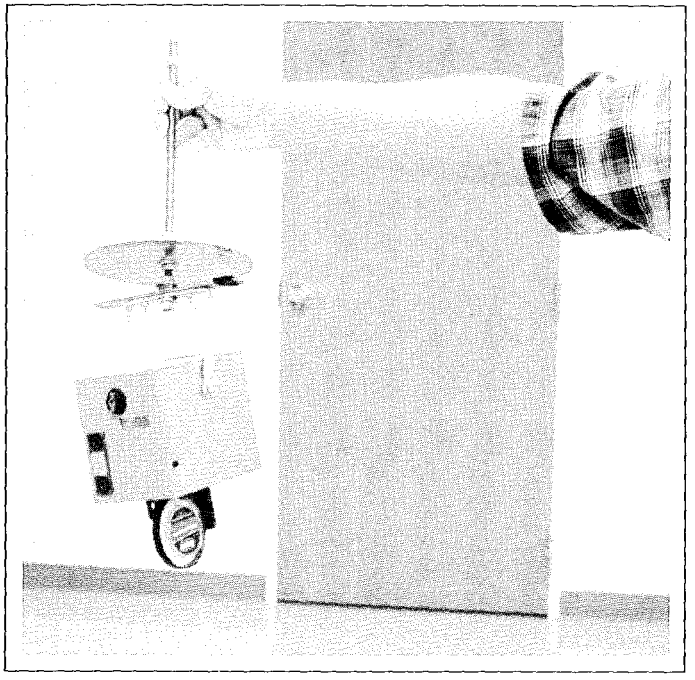
The program, Benson.exe, plots the small signal response for existing systems of closed box, vented box or passive radiator systems. While this developmental program is not for designing boxes, it should prove to be a useful tool for the analysis and refinement of existing loudspeaker systems, and a useful complement to the array of existing programs based on the fine work of Theile and Small.

Benson.exe runs on IBM compatible computers and requires VGA color graphics. Graphs may be printed by using a print screen utility. Due to the complexity of the Benson equations, a fast computer with a coprocessor is recommended.

Benson.exe is available from Syn-Aud-Con for a $10 charge.

Specification for the PoGO Laser™

Bill Thrasher, a consultant in Kennesaw, GA, uses this specification in each of his sound system designs. It is a spec of the future. Techron will manufacture the PoGO Laser and plans to show it at the upcoming NSCA convention in Las Vegas April 7-9. The PoGO Laser is a product of the combined efforts of Phil Allison, Jim Carey and Bill Thrasher, but Phil Allison of Thrasher & Co. is the principle designer.



Prototype of the PoGO Laser

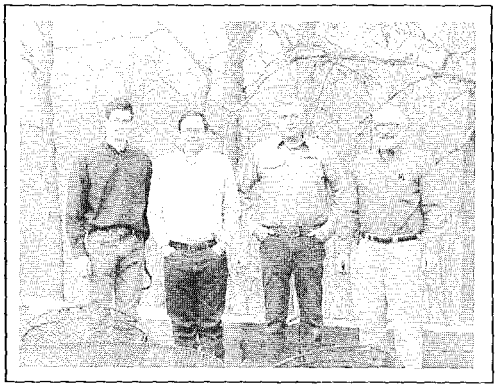
Specification

Horns and Low-Frequency enclosures shall be arranged as shown in the drawings. Contractor shall install the devices using a Techron PoGO Laser to insure that the components in the cluster are arranged in a geometrically correct manner, with the individual device axis line congruent with the aiming line for that device, and each device equidistant from the point of geometric origin.

A Visit to the Planet Pluto

Richard Clark (2nd from Left) and his friend Patrick Poovey drove up from the Carolinas' the week between Christmas and New Years to see the farm, Dr. Patronis, and to talk about the use of the ITE microphone. They came in their Carolina clothing and when we met them at their motel for breakfast they asked, "Is this the planet Pluto?" and the cold weather hadn't even arrived yet—though it did just weeks later when it dropped to -30 degrees Fahrenheit along with enough snow to immobilize most traffic. They both made a quick stop at Wal-Mart and came out looking like Eskimos setting up house. By the time this picture was taken it had warmed enough for a quick picture in the sun.

Richard is distinguished by being the new owner of "In-the-Ear" microphones and we expect some remarkable results to ensue.



From left to right—Patrick Poovey, Richard Clark, Don Davis, Eugene Patronis

Otoacoustic Emissions

The sounds emitted by the human ear (i.e., when it acts as a loudspeaker instead of a microphone) are called otoacoustic emissions. They have been found to be of two distinct types — spontaneous and evoked.

Evoked emissions are those triggered by a stimulus sound but are not echoes. Significantly evoked responses disappear a few minutes after death. This evidence leads scientists to believe that evoked otoacoustic responses are the result of active sound production, not just a passive echo of external sound.

Syn-Aud-Con experiences with our "in-the-ear" microphones, where the probes are at the surface of the eardrum, is that greater realism in terms of spatial perception of the surrounding environment is achieved compared to classic binaural, dummy head, and other two-channel approaches. It is our belief that the acoustic environment at the surface of the eardrum contains "clues" not available at the concha or at a non living recreation of the eardrum. Both the possibilities of the constantly varying eardrum impedance and the possibility of generated clues in the received signal caused by evoked otoacoustic emissions needs to be examined.

Jont Allen's work with the detection of deaf infants via evoked otoacoustic emission distortion tests (Hearing babies have a different distortion than deaf babies) would suggest that such emissions might play a role in adult hearing perception especially when the clues involved, such as spaciousness, are themselves as subtle as the emissions.

Information taken from an article from *The New York Times* sent to us by Fritz Zuhl.

Wisdom of Tolstoy

Dr. Sidney Bertram called my attention to a quote from Tolstoy included in the book *Chaos* by James Gleick.

"I know that most men, including those at ease with problems of the greatest complexity, can seldom accept even the simplest and most obvious truth if it be such as would oblige them to admit the falsity of conclusions which they have delighted in explaining to colleagues, which they have proudly taught to others, and which they have woven, thread by thread, into the fabric of their lives."

Tolstoy's explanation is as succinct as any I've read as to why freshly discovered truths are so hard to digest for so many.

We're not talking about the blind followers of leaders here but of individuals who can't think their way clear of programmed prejudices.

Is there a greater thrill than a flash of understanding followed by an altered perspective of what was thought to be a clearly understood concept? Who can truly be embarrassed by the truth? Only the unthinking who are programmed with a series of memorized data can be devastated by a truth that destroys that data.

Specification For Spaceship Earth

We live on a spaceship that is traveling through space at a speed of 64,800 miles per hour (18 miles per second) and cornering at that.

The circumference of this ship (at the equator) is 24,903 miles and its diameter (again at the equator) is 7,927 miles.

The surface area of this spaceship is 196,940,000 square miles which to a southern Indiana farmer is approximately 126,041,600,000 acres. There are some irregularities in the surface with the biggest bump being 29,028 ft. (Mt. Everest) and the lowest pit 1,290 ft. (the Dead Sea).

The entire mass is 6,595,000,000,000,000,000,000 tons. Like other projectiles, it rotates as it travels revolving approximately once every 24 hours. (0.289 mi/sec)

A unique feature of this spaceship is that it came minus an instruction manual and its occupants—not knowing who's operating it—are attempting to guess at what maintenance it might require.

This ship contains at its core a thermonuclear furnace, though just why is not clearly understood, at a temperature of 342,478 degrees Fahrenheit, if the temperature gradient 118.4 degrees per mile near the surface holds at lower depths.

When the flight started is uncertain and where it ends is unknown.

On board entertainment is hyper and the only long term records are of violent events other than recent events.

So enjoy your flight on this totally automated crewless spaceship and don't worry about a thing-a thing-thing-a thing - - - - - - - - - - - - -

A Highly Qualified Listener

Richard Clark has won world renown for his work in highly accurate imaging of sound in custom automobile installations. So, it was with genuine interest we watched his reaction to our "In-the-Ear" recordings at the farm. It's said, "A picture is worth a thousand words" and we agree.

These People Vote and Drive

Jack Brown sent us a clipping from December 1993 *TV Technology* saying, "Maybe it is just the phase of the moon or something."

Quoting,

"What I am about to present is taken verbatim from *Cable Design Theory Versus Empirical Reality,* a recent publication of AudioQuest, a manufacturer of audio cables. I'm pretty sure you can get your own copy of the 12-page fact-filled guide by calling them in San Clemente, CA at 714-498-2770.

"Fact: Like all audio components, all audio cables require a break-in period. . .

"Fact: All cables are directional, from hardware store electrical cable to the finest pure silver cables. Some cables should be used with the writing going in the same direction as the music (toward the speakers), some should be used in the opposite direction. If you are missing the instructions as to which way to orient your cables, check with your dealer. If necessary you can determine which direction is best yourself, simply listen to the cables in one direction and then the other. *The difference will be clear; in the correct direction the music is more relaxed, pleasant and believable.* (italics mine) While cable directionality is not fully understood, it is clear that the molecular structure of drawn metal is unsymmetrical, which does provide a physical explanation for directionality."

Anyone want to explain that to me in technical terms. The writer does say that, "A test signal won't prove a BRR system?"

Syn-Aud-Con 1994 Seminar & Workshop Schedule

Workshops

All We Would Like to Know About Hearing

When: August 18-20, 1994

Where: Indiana University, Bloomington, IN

Fee: $600

Staff: Jont Allen, PhD, Bell Labatories
Mead Killion, PhD, Etymotic Research
Larry Humes, PhD, Indiana University
Dept. Speech & Hearing

Our outstanding staff have agreed to come together for this Workshop. We have meeting space reserved at Indiana University and we have sleeping rooms reserved at the Memorial Union. We are just waiting for a few details to be worked out. A brochure will be prepared and mailed soon.

Horns II-The Second in a Series of Syn-Aud-Con Workshops

When: When our staff decides

Where: Where our staff decides

Fee: $600

Staff: John Murray, Workshop Chairman
Jim Carey, Carey Associates
Kurt Graffy, Paoletti Associates
Dave Gunness, Electro-Voice
Mark Ureda, Mark IV Audio

When they decide, we will swing into action and let everyone know the details. I am sorry about the delay. We get lots of phone calls and faxes from US and abroad. This is an important workshop. I hope it will work out this year.

❖ 3—Day Seminars—$550 ❖

Farm—Norman, IN

Sound Engineering Seminars

May 18-20, 1994

Plan an extra day to attend Indy 500 Time Trials as a guest of John Royer

June 23-25, 1994

July 21-23, 1994

August 18-20, 1994

September 15-17, 1994

October 13-15, 1994

2-Day On-the-Road Seminars

October 19-20, 1994 —$550 New York area (Secaucus, NJ)

We were delighted with the terrific job that Pat Brown did conducting the Orlando class in Florida (February 24-25) and with the class response to Pat. We can send him to the On-the-Road classes with confidence.

Pat will be co-instructor in the Community sponsored seminar for their international distribution just before NSCA, April 4-5. He will be sole instructor at the dB Engineering sponsored Syn-Aud-Con seminar in the Atlanta area, April 18-19.

We, Don and Carolyn, will not be present at the On-the-Road classes, but will concentrate our energies on the much loved farm classes. For those unable to make the trip to "the farm" for the more detailed treatment of the same subjects, these special classes with Pat Brown represent a unique opportunity to participate in a Syn-Aud-Con class.

If you would like a Syn-Aud-Con seminar in your area, let us know and we will study the possibility.

Special Seminar on AutoSound

Richard Clark and his partner, David Navone, conducted 23 seminars last year on AutoSound in the United States and abroad. We would like to work with Richard Clark. He is a dynamo with a burning need to do it right. The AutoSound seminars are geared toward manufacturers and installers who specialize in high-end, after-market systems. They would like to hold a seminar that would mix engineers from the professional audio field and the OEM manufacturers with the after-market specialists. Car audio is one of the fastest growing segments of the audio industry, and should prove to be an interesting and challenging future for those involved. If you are interested in attending such a seminar, let us know.

❖ Schedule of Rigging Seminars, 1994 ❖

Evanston, IL —June 6-8, 1994

Minneapolis (1 day)—July 28, 1994

Specifically for Venue Managers as well as Technical Directors and company administrators

Installer's Corner

Use Your Ears

by Pat Brown

One of the greatest benefits of modern test equipment is the ability that it gives us to calibrate our ear/brain system. By calibrate, we mean that the audible characteristics of various system anomalies are stamped in our memory, allowing them to be easily identified when the computer is at home.

One of the best tools that a contractor can own is a pink noise source. A portable CD player with a test disk is an excellent source. The variable headphone output allows us to drive mic and line level inputs without overload. (Beware of phantom powered mic inputs!) Once the noise is into the system, the testing can begin.

Loudspeaker systems can be tested for crossover misalignment while still in the shop. Input the noise and listen while rotating the speaker on a turntable. Horn/woofer misalignments, while sometimes subtle with program material, are very audible during this test. If you are biamping and a delay is available (20μ/div), "move" the woofer with the delay until the on-axis response sounds smooth. Often the lobes caused by the misalignment can be "steered" to an area that won't cause problems. You have just synchronized the system at crossover.

Installed loudspeaker systems can be evaluated in the same manner. Proceed as follows: Prepare a diagram of the auditorium seating to make notes on. With the pink noise brought up to a moderate listening level, stroll through the listening area with your seating diagram. In reverberant spaces, stay inside the critical distance. As you walk the seating area, listen for the following:

1. Sound coming from spots where there are no speakers. These are focused reflections. (Use cupped ears and turn your head and listen to the loudspeaker first and then the room to identify the source of the problem.)
2. A periodic "shooshing" sound as you move across the loudspeaker's coverage pattern. This typically indicates a misalignment in the loudspeaker system. It can also indicate an early reflection (≤ 5ms) from near the loudspeaker, such as a wall, ceiling, or cosmetic speaker cover.
3. A drastic reduction in level in the highs, lows, or both when standing equidistant from two devices. This can be caused by a polarity reversal between two horns, woofers, or both. Corrections can be made accordingly as each anomaly is identified.

Now take the pink noise source and plug it into a battery-powered loudspeaker (Radio Shack). Using headphones at the mixer location, listen to each mic as an assistant moves the noise source around the mic. Early reflections can easily be identified by the abrupt changes in tonality caused by phase cancellation.

To test mic polarity, if you don't have a polarity checker, hold the noise source equidistant from two mics. If the level drops instead of increases, the polarity of one of the mics is probably reversed.

In the sound business, problems that are not audible are usually not problems at all. The time spent in pursuing the ones that can be heard will pay large dividends in better sounding systems and a better reputation.

Interconnection Terminology

In order to intelligently interconnect audio components, you need to know:

1. Balanced or unbalanced circuits (in or out)
2. Transformer, or differential, or single ended (in or out)
3. Polarities (in and out)
4. Levels (in and out)
5. Impedances (in and out)

Circuit designers tend to view these parameters differently from system designers. The circuit designer is primarily interested in his component and may never have dreamed of what you need to connect to it. The system designer sees components as "black boxes" and wants universality of interconnection capability. Hence system designers like transformer coupled, balanced, low to medium impedance, line level inputs and outputs for all his inputs outputs for all his components whenever possible.

When you specify single ended, unbalanced, even high impedance equipment, it should be backed up by a clear knowledge of the possible consequences of it's inclusion in a system rather than as an isolated device.

The thought I am attempting to put forward is what a *systems designer* would like to see vs what's available from a components designer saddled with trying to provide universality of use for his component. Most sound contractors have to work with components. Large communication systems and single source suppliers are able to design and specify systems often exclusive to them and their needs.

"Oh King, Live Forever," Daniel 6:21

We love our Sponsors with all our hearts. And when a sponsor writes us expressing appreciation for Syn-Aud-Con we are happy. Our sponsors have made Syn-Aud-Con possible. How many 3-day seminars do you see advertised for $550? More like $800 or $900 with no meals, no year's subscription to a Newsletter, no invitations to call anytime you have a problem. Our sponsors make all this possible.

Jim Kogen, President of Shure Brothers (a sponsor for 20 years), wrote us a letter recently that made us especially happy, and we want to share it with you.

SHURE

MICROPHONES AND ELECTRONIC COMPONENTS

Shure Brothers
Incorporated
222 Hartrey Avenue
Evanston IL 60202-3696 • U.S.A.

office of the president

February 17, 1994

Mr. and Mrs. Donald Davis
Synergetic Audio Concepts
12370 W. Co. Road 100 N.
Norman, IN 47264

Dear Don and Carolyn:

I just finished reading the Winter Edition of the Syn-Aud-Con Newsletter and I just have to tell you how much I enjoy reading this publication. You have such a delightful mixture; historical things, philosophical things, and even technical matters that are helpful to a has been engineer like myself.

You have done so much for educating the sound reinforcement industry, and the best part of it is that you have made it enjoyable.

Thank you so much for what you have done. I hope you continue doing this forever.

Sincerely,

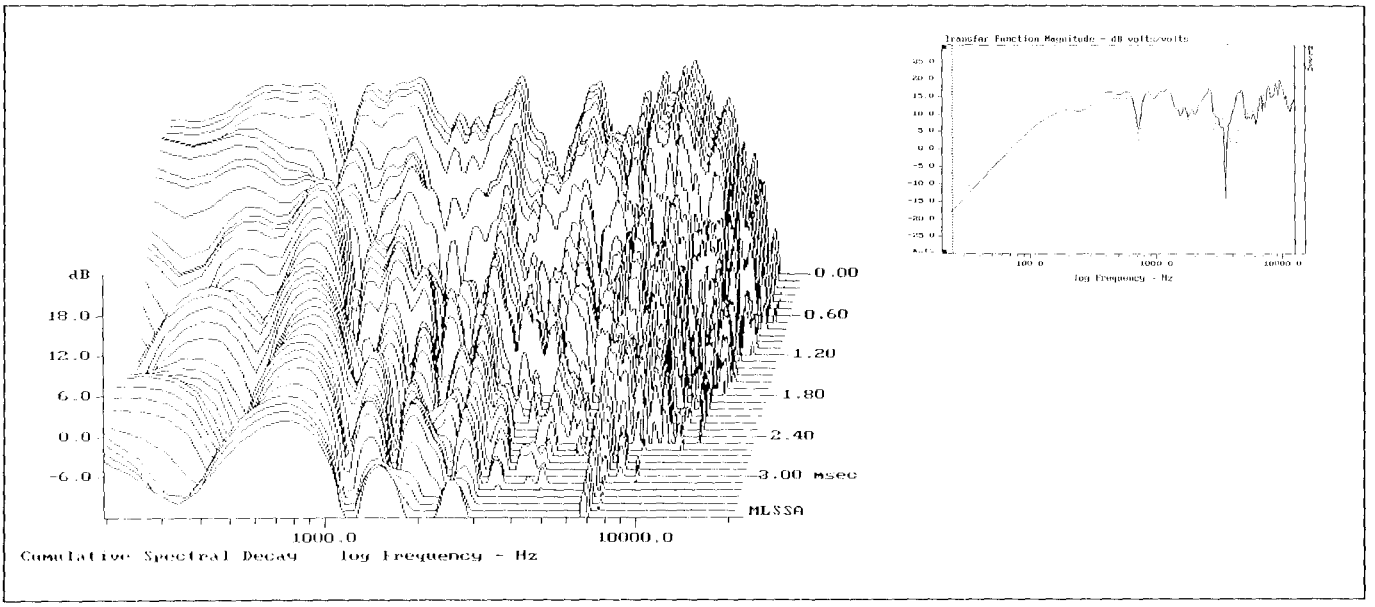
James H. Kogen

Ringing Caused by Steep Slopes

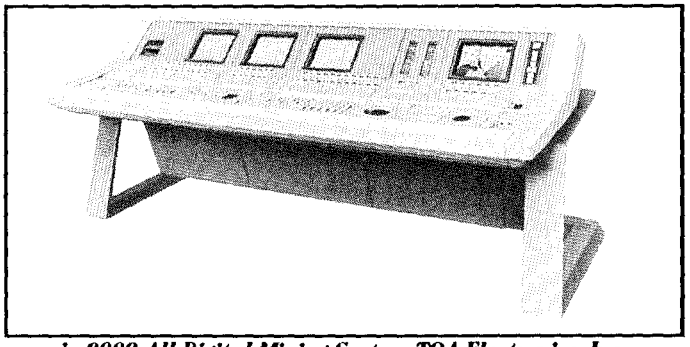
The frequency response and split-domain display of a well-known concert sound loudspeaker is quite revealing of the ringing caused by steep slopes in the frequency domain.

The slope rate that causes "ringing" is the dB/Hz slope, not the dB/octave slope, which explains why the "ringing" originates at the L.F. end of the deep notches observed here. This is typical behavior for the anomalies shown in the frequency domain.

These measurements appeared in a new German magazine on sound reinforcement, ProSound, which is fortunate to have the guiding hand of talented Deiter Michel.



TOA's Digital Consoles



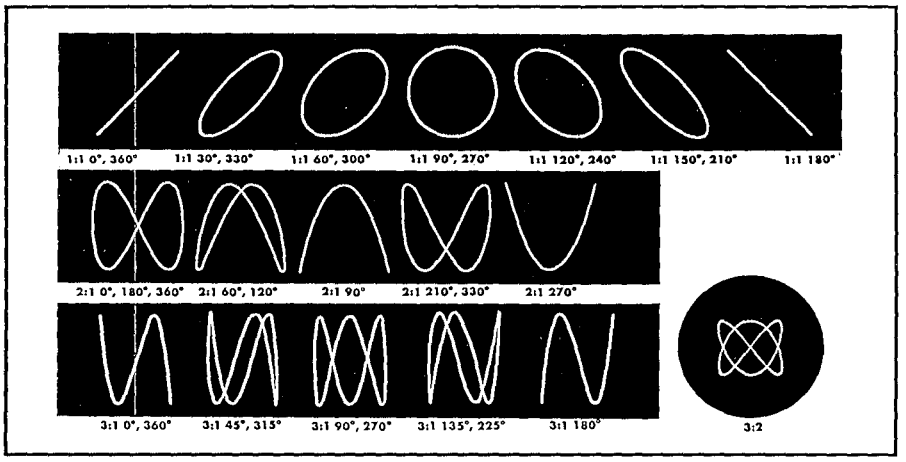
ix-9000 All-Digital Mixing System TOA Electronics, Inc.

The first ix-9000 fully digital mixing system, specially designed for live musical performance, recently finished its 4th successful season at the Vienna State Opera House in Austria.

The ix-9000 and the ix-11000 live TV/production version, are now available in the United States. The inputs and outputs can be analog or digital but the internal processing is all done in the digital domain. The operator's console feature high speed motorized faders and interactive touch-screen monitors. Full programming capability allows the units to store system configurations and mixing "scenes" for instant recall. The ix-11000 synchronizes to SMPTE time code for its recall. Manual override of all functions gives the ultimate control to the operator. Combining these consoles with the TOA SAORI provides a fully digital system capable of detailed customization for your specific needs by simple modular exchanges.

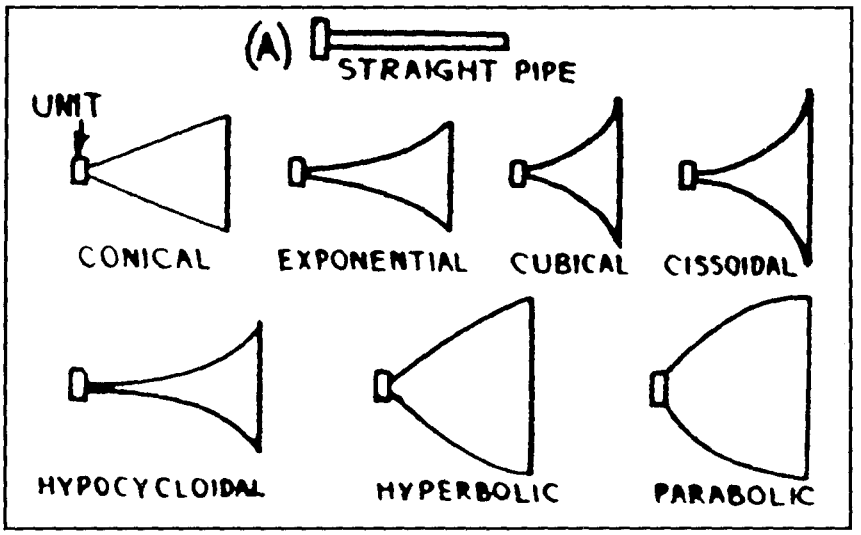
Lissajous Figures

Back in the early days of "Acousta-Voicing" before we had 1/3 octave real time analyzers, we often simply "zero beat" an oscillator by ear to the feedback frequency. If an oscilloscope was at hand then Lissajous patterns became the easy way to locate the feedback frequency. The vertical input was typically across the loudspeaker line and the audio oscillator was into the horizontal input. Shown here are some of the multiples that can occur.

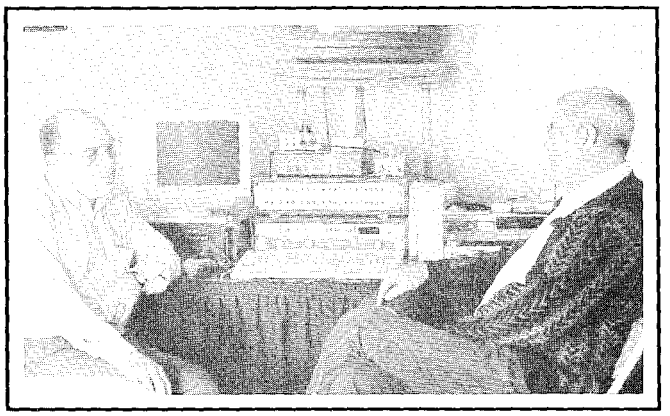


Horns-Horns-Horns

From the early days of broadcasting circa 1933 an illustration of then existing horn types. About the only one missing is the catenary horn. All of these have been tried at one time or another and the subject could easily provide a lifetime of research.



Larry Elliott, Consultant From New Zealand



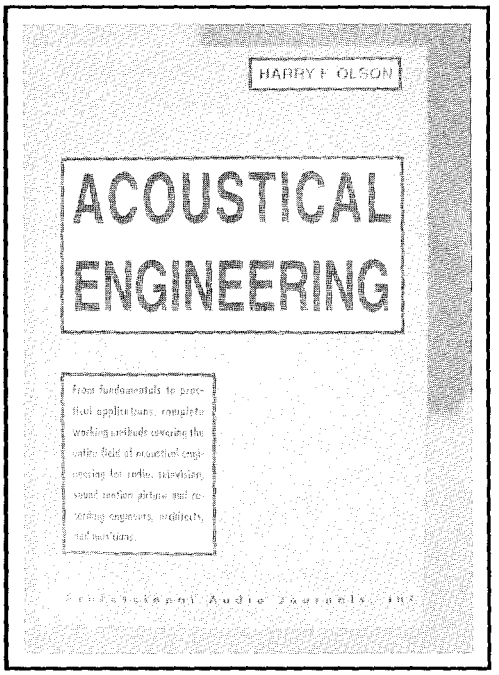
When Larry Elliott came to Louisville to attend one of the superlative IED training classes, they provided him with one of their private planes and a professional pilot so he could come see us at the farm. (We are about 1.5 hours from downtown Louisville.)

I used the farm class acoustic demo setup to make dual channel TEF, SYSid and AcoustaEQ demos. Note that we use the Shure dual channel mixer (it is instrumentation quality as far as we are concerned) plus some Wahrenbrock designed switch boxes to route signals for EQ via dual-channel FFT and music demos, all TEF demos, including their new MLS, plus many design demos.

Hellmuth Kolbe

Hellmuth Kolbe of Wallisellen (a suburb of Zurich) Switzerland and a long time friend and co-worker with Syn-Aud-Con, came to the farm for a short overnight visit. Hellmuth is very active in concert hall design and consequently has been doing advanced work with the TEF-20, EASE, and EARS. All we can say is that when the U.S. catches up with Hellmuth, we'll have a lot more professional industry.

Acoustical Engineering by Harry Olson



Jesse and Hannah Klapholz have done the audio industry a genuine service by reprinting Harry Olson's classic ***Acoustical Engineering.***

We've written on this before but we still get calls asking if we know how to find a copy, so we thought that it would be a good time to mention it again.

Quoting from an early press release that Jesse sent,

"From fundamentals to practical applications, **Acoustical Engineering** presents complete working methods encompassing the entire field of acoustical engineering. Spanning 16 chapters, the text lucidly covers basic acoustics, sound, and vibrating systems and transitions to chapters on dynamical analogies and acoustics elements. While the book is mostly known for its coverage of loudspeakers and microphones, it also includes chapters on measurements; speech music and hearing; sound reproduction; communication systems; underwater sound; and ultrasonics."

The book costs $49.95 plus $4.00 for shipping and handling. Contact 215-465-1975. And while you are talking to Jesse or Hannah ask about the 1993 edition of the Professional Audio Journal. It's free and it is the best audio directory available!

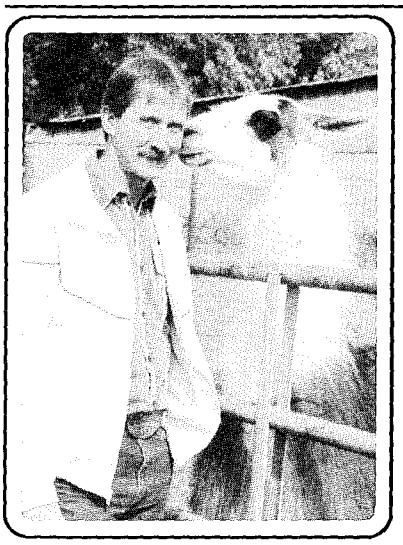
College Student, David Nicosia's Response to a Syn-Aud-Con Class

That's David with the very special classmates he referred to in his letter.

It is a big deal for a college student to finance a Syn-Aud-Con class and we don't take the responsibility lightly.

David Nicosia attends Southwest Texas State University in San Marcos, TX. He drove all the way to the class. His eagerness to absorb all that he could was contagious to the class. After class he wrote:

"I've spent quite a substantial amount of time trying to come up with a thank you note that would accurately reflect my appreciation for all that I learned at 'the farm'. As summer school continues, a day doesn't go by when I'm not reminded of something someone said during the seminar, either during the class or in one of the many great stories passed on among the attendees or instructors. The back issues of the Newsletters supplied in the lab manual have kept my enthusiasm for knowledge high. Thank you, and thanks to all the others who shared hard earned knowledge with a student from Texas."



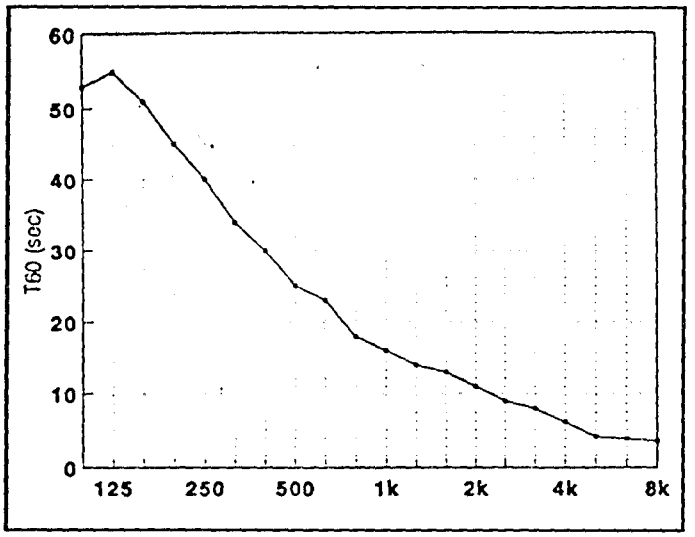
A Very Special Person

Vern Meding has sent several people from Calgary Exhibition & Stampede to our classes. This October ('93) he decided to come and we are delighted he did. He is a very special person. Poncho knows it too.

Can You Believe this T_{60} Curve?

Ray Rayburn of the Joiner Consulting Group in Arlington, TX, send the T_{60} curve. Before you read any further see if you can guess where the measurement was made, that is, what sort of space?

Ray said that Tom Rose told him that it is a large underground storage tank, empty.



The Decibel dB-Correction

The Winter issue of the Newsletter, Volume 21, N2, page 18, has an excellent article on the dB which contains what Don calls a typo and Carolyn calls it a mistake:

This means that a two to one change in power would be a four to one change in voltage.

Steve Roth, Cook's Music in Mount Pleasant, MI, called the mistake to our attention with a, "Am I confused or is this backwards?" When it was shown to Don, he looked shocked and said, "Did I say that?" Yes, he did and it was not a typo. Of course, it should say:

This means that a four-to-one change in power would be a two-to-one change in voltage.

Dr. Bertram noticed it too and ask, "Does that kind of error come with being over 65?"

Decibels, Levels, and Level Changes

A mixer is putting out 1.23V, what is the:

1. level in dBm
2. level in dBV

To find the level in dBm you must find the impedance back into the mixer output (i.e., what R_S is etc.). If, for example, it is 150 ohms, then,

$$L_{AIP} = 10 \log\left[\frac{(1.23\,V)^2}{0.001(150)}\right] - 6.02\ dB = +4.02\ dBm$$

That is 4.02 dB above one milliwatt. The dBV level is:

$$dBV = 20\ Log\ \frac{1.23V}{1.0V} = 1.8\ dBV$$

That is 1.8 dB above one volt. Knowing a level requires knowing a reference value.

If you're told that the level is 1.8 dBV and wanted to find the voltage, the equation that does this is:

$$10^{\frac{1.8dBV}{20}}\ (1V) = 1.23V$$

Since the reference is unity (1.0 something) the multiplication is not necessary, and:

$$10^{\frac{1.8dBV}{20}} = 1.23V$$

A Non-standard Reference

A few companies have aligned their dB scales on their voltmeters so that 0 dB is opposite 0.775 volts instead of being opposite 1.0 volt and to further confuse the issue, they have named measurements made by these voltmeters dBu, $dB_{0.775}$ or dBv.

If you have such a non-standard voltmeter, all you have to do to obtain dBV is:

$$dB_{0.775} + 2.21dB = dBV$$

$$20\log\frac{1V}{0.775V} = 2.21\ dB$$

Microphone and Loudspeaker Ratings

Microphones are often rated in dBV per Pascal (i.e., -54 dBV/Pa) as an open circuit voltage. (Yes! I know that no current flows in a truly open circuit and that the term is used to indicate that the measuring instrument has an impedance at least ten times the circuit being measured.) Loudspeakers are rated in power in either watts, one watt being the most commonly used sensitivity value, or in dBm (0 dBm at 30' for the EIA standard). We really don't care which standard you choose to work in but, like a good politician you've bought and paid for, we don't want you jumping around between systems.

Where both input and output impedances are identical - that is the R_S of the preceding device and the R_{IN} of the D.U.T. are the same as the R_S presented at the output of the D.U.T. to the next devices R_{IN} then,

$$20\log\left(\frac{E_{Out}}{E_{In}}\right) = \text{the increase or decrease in level, but not the level itself}$$

For practical purposes, any set of link circuits that have established a "constant voltage" condition (i.e., the R_{IN} is ten or more times higher than the R_S) can be treated as a matched circuit for ascertaining relative level increases or decreases.

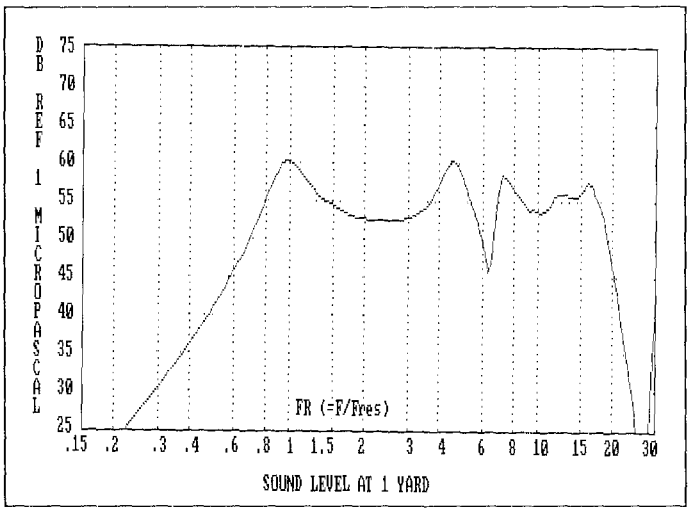
Some Useful Relationships

0.001 watt is a level of 0 dBm
1.0 volt across 1000 Ohm is a level of 0 dBm
-21 dBV across 8 Ohms is 0 dBm
10 volts across 100,000 Ohm is 0 dBm
3.16 volts across 10,000 Ohm is 0 dBm

Let's use the decibel correctly and specify levels properly. After all, the millennium is coming in just five plus years.

Correction From Alan Lubell

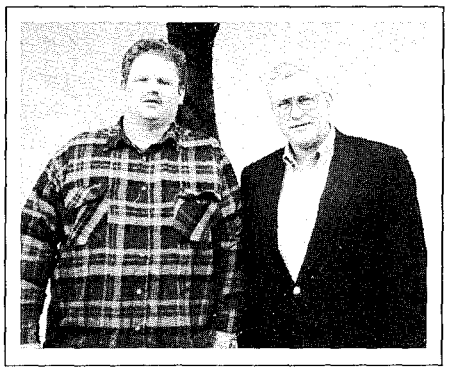
Speaking of corrections and "typos", why do engineers like to call mistakes, typos? Actually I am being cute. Alan didn't call this a typo, but a correction for the #1 Supplement for Newsletter Vol. 21 #1. He would like you to substitute the response curve in Figure 2. He would appreciate it if you would copy the figure from the Newsletter and paste it over the current one. Thanks



LL964 with 18.2 ohm external series resistance

Rancho Carrillo Heritage

When we moved to Rancho Carrillo in California's Santa Ana Mountains in 1973 to write the text for our first seminars, our nearest neighbor had a young son (about 12 years of age) that loved horses and was actively involved in both horse training and horse trading. He sold us his young mare 'Red Reed Truckle' so he could buy a horse and wagon that was available and as part of the deal we would own the horse, provide the feed and he would ride the horse for us while we traveled during our new seminar tour. (Pretty smart for a 12 year old.)



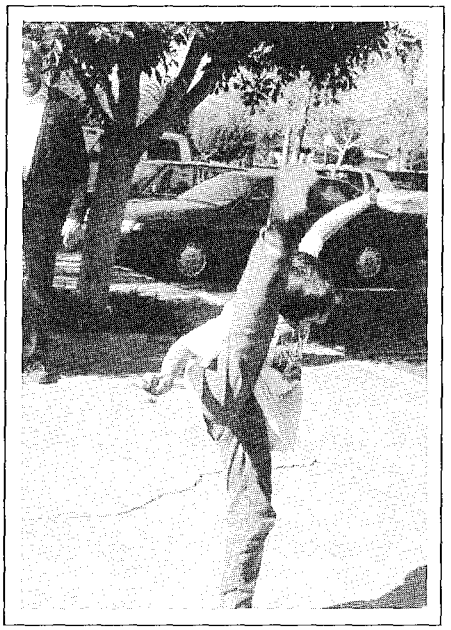
Young Glen Deiter, over the years, became our close friend. I introduced him to my favorite sports and he introduced me to horsebacking and motorcycling in our back country in the mountains.

Today Glen is a successful, hard working owner of his own construction firm (complex large pipe systems) and the father of his own pre-teen son.

Glen heads the list of people I'd not want to wrestle as he has grown into a powerful giant of a man and is as tough as he looks. But to his friends and children it would be difficult to find a more thoughtful, gentle man. We were always impressed, when he was young, with the fact that you could fully trust his good judgment and innate sense of good taste to handle any job around any kind of people.

Glen's raising his young son to be as exceptional as he was at the same age. Chris at 8 years old has a fully earned "Black Belt" and, as can be seen from the pictures, is capable of doing things with his young body that few youngsters his age can consider. Make no mistake about that kick—it's delivered fast enough, powerful enough, and high enough to give any adult pause if not a concussion. Again, what's impressive is the total gentleness and thoughtfulness expressed by this young man towards everyone he's around.

Yes! there are values being passed on in this world that give us hope for the future of the country.



Room Constant

At an Orlando seminar one of the members brought up the "Room Constant" 'R'.

The formula for 'R' is:

$$R = \frac{S\bar{a}}{1-\bar{a}}$$

Now $S\bar{a}$ is total absorption in Sabins (ft^2 in U.S. M^2 in S.I.) and $1-\bar{a}$ is the first reflection in a space assumed to be uniformly absorptive (i.e., equally distributed on all surfaces).

Through practical measurements made by many workers in acoustics such as Beranek, Joyce and others it was found that the stack up of accumulated errors was less using $S\bar{a}$ rather than 'R' in equations such as the Hopkins-Stryker.

$$M_a = \left(\frac{1-\bar{a}}{1-a_c}\right)\left(\frac{Q_{ACTUAL}}{Q_{THEOR.}}\right)$$

Syn-Aud-Con prefers the use of the architectural modifier M_a which does not assume uniform absorption but specific absorption (i.e., audience area only).

where: $1-\bar{a}$ is the averaged reflection of the space as a whole.

$1-a_c$ is the reflection from the specific audience area.

Q_{ACTUAL} is the specified Q for the 2 kHz octave-band of the device used.

$Q_{THEOR.}$ is the perfect Q value for covering only the specified audience area.

For reverberation equations, we prefer $S\bar{a}$ to R.

Another Look at the Sabine Equation

Wallace Clement Sabine's equation for the reverberation time of an enclosed space is:

$$RT_{60} = \frac{KV}{S\bar{a}}$$

where:

K is 0.161 for S.I. and 0.049 for U.S.

V is the volume of the enclosure in Ft^3 or M^3

$S\bar{a}$ is the total absorption in Ft^2 or M^2

RT_{60} is the time in seconds for 60dB of decay after the stimulus is shut off.

The constant 'K' consists of the velocity of sound and the mean-free-path's role in the number of likely encounters with the boundary conditions. If we separate the velocity of sound 'c' from the constant 'K', we obtain a new constant of 55.26 and the equation becomes:

$$RT_{60} = \frac{55.26V}{S\bar{a}\,c}$$

The advantage of this form of the equation is that it is dimensionless (i.e., the same constant for both S.I. and U.S.). When the volume is ft^3 the sabins are ft^2 and the c is in ft/sec, you get the correct answer.

When the volume is in M^3, the absorption is in M^2 and the velocity is in M/sec, you also get the correct answer.

Examples:

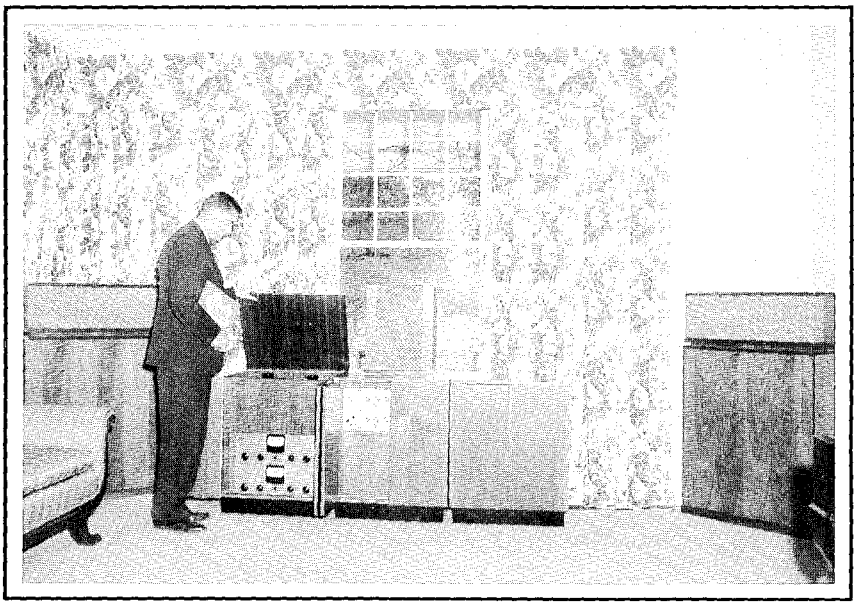
V=500,000 ft^3	or	14,158.4 M^3
Sa=5000 ft^2	or	464.5 M^2

$$\frac{55.26(500{,}000)}{(5000)(1130)} = 4.9 \text{ secs.}$$

$$\frac{55.26(14{,}158.4)}{(464.5)343.4} = 4.9 \text{ secs.}$$

The Sabine equation is the most accurate of all the reverberation equations when conditions are correct for the use of any of them. In rooms that are dead or too large, none of the equations work and we can be grateful for its elegant simplicity. As Joyce proved the Sabine equation is actually the asymptotic limit of the thermodynamic entropy equations.

HiFi Circa 1958-1959



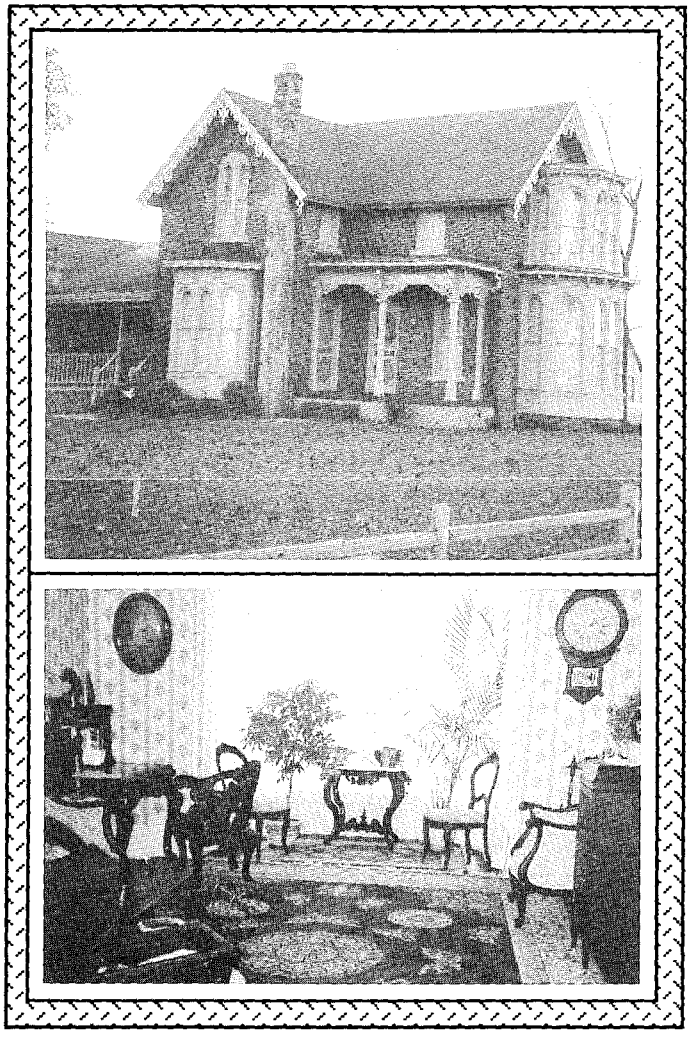
Gary Gillum of Gillum Loudspeaker systems Ridgedale, MO (near Branson, MO) sent us this picture of Don taken in 1958. The sound system was our personal HiFi system when we lived in Hope, AR. It consisted of two Klipschorns, a Klipsch Heresy, three equipment cabinets (all in walnut) and in the equipment cabinets an Ampex 350 tape recorder, dual Marantz mono preamps, dual Marantz power amplifiers, and a Fairchild broadcast quality turntable with a turret head, three phono cartridge, Fairchild tone arm. We called this system "The Brussels System" because this is the one we demonstrated to live audiences at the World's fair in Brussels in 1958. Thirty-five years later anyone who could assemble this same system would still have remarkably faithful reproduction of sound. Tempus Fugit.

Circa 1860

When I was a young boy, I was around actual veterans of the War Between the States (as Gene Patronis likes to state, "There was nothing civil about the war"). To youngsters of today, that war seems as remote as the revolutionary war had seemed to me as a boy. What's easy to forget about those terribly fierce fighters is the graciousness of their homes and family lives when there was no war.

Ron Bennett of Techron is fortunate to own and live in a truly gracious home of that period of American history. (He & Ginny totally restored the house, doing the work themselves, even making furniture.) When I step into their home, I can almost see the spirit of my ancestors and the manner of living I briefly tasted back in the early 1930s at my Grandmother's home in Missouri. The windows, the furniture, and in Ron & Ginny Bennett's manner, the quiet graciousness that so fittingly matches the period.

Ron is one of Syn-Aud-Con's respected mentors at Techron.



More on the dB

From Charlie Baxley
Osborn Sound & Communication
Ft. Myers, FL

"The Winter 1994 Newsletter came last week, and it has already been read cover to cover, as usual. In the Acoustic Basics you left out one of my favorite decibel 'got to be memorized' values.

At 10 dB is where the power multiplier factor and dB scales cross:

+10 dB requires ten times the power
-10 dB is one-tenth the power

So, if you want to go up 10 dB (and get twice as loud), you have to apply ten times the power, or:

+10 dB = 10^1 Watts
+20 dB = 10^2 Watts
+30 dB = 10^3 Watts
et cetera

Around the Stove

During the winter months, much to the surprise of someone who truly enjoyed the sun soaked Southwest for a quarter of a century, I spend a goodly number of joyful hours out in the elements. I happen to enjoy being snowed in, or seeing the entire forest as crystal (as we did this year after a freezing rain), and the return to the warm glow of the woodstove has few peers for pure sensual pleasure.

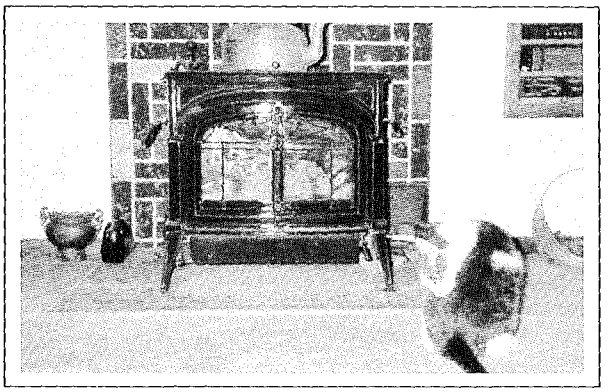
Perhaps I enjoy the chores of feeding the livestock on sub-zero mornings out in the barn or splitting wood by the hour for the woodstove because I did not have to do these things during my years in the West and on-the-road. It's amazing how manual labor that must be done vs mere exercise overcomes the aches and pains of age. Age truly does have its compensations and if it is filled with real-life experiences rather than programmed mesmerism the reading of good books becomes an exceptional adventure because you can discern whose telling what's true and whose fantasizing.

This particular facet of life became vividly apparent when Carolyn and I decided to watch the network morning news for fifteen minutes and the network evening news for thirty minutes each day. After about one month of witnessing total lies, extreme stupidity on the part of the "talking heads," and down right total avoidance of significant events, we found ourselves growing negative in our thinking. So, we did the obvious thing, we shut off the networks and turned to PBS—slightly better. About a week later we were back to our normal optimistic mental state.

I have no idea what the hidden agenda of the networks is and I really don't care but those addicted to this kind of distortion of reality need an awakening. When what's harmless is demonized and what's really dangerous is excused, ignored, and misreported, it can create a "mindset" that is without foundation in reality, good sense, or sanity.

I have found that local small town newspapers are better sources of news, for the most part, primarily because they make some attempt to differentiate between material generated by the wire services, press releases, and editorial opinion. The question you truly need to ask yourself is, "Just how much of so called world news do I truly need in order to be a good human being, competent at my work, and happy in my home?" The honest answer is, "Very, very little."

I've found watching a log burn for fifteen minutes vastly superior to "talking heads" in terms of my daily mindset.



Richard Heyser and His Greatness

The October 1993 issue of *S&VC* was an exceptional issue on Tests & Measurements. Ted Uzzle, editor of *S&VC*, wrote a fine editorial as an introduction to the issue, "Of Education." I would like to quote from the last paragraph from the editorial:

"You must teach the students broad interdisciplinary liberal arts. Teach them how to work the great ideas of all time, not just how to work today's ephemeral machines. The great ideas come to us from Aristotle, from Galileo, from Isaac Newton, from George Simon Ohm, from Michael Faraday, from Wallace Clement Sabine, from Harvey Fletcher, from Richard Heyser . . .Their writings are not historical artifacts, not vocational instructions, not inaccessible arcane; they are immediate lessons in invention, insight and inspiration."

I wrote Ted to thank him for the issue and the reference to Richard Heyser. He answered:

"On the day Dick died I think many eyebrows would have raised at his being included with Newton and Faraday, but since, his reputation has only risen while that of his detractors has declined. Like Newton and Faraday, he not only discovered, he not only invented, but he also wrote wonderful, clear, concise papers. We won't know in our lifetimes, probably, all the consequences of everything he wrote."

It is our life desire that the audio world recognize Richard Heyser for his greatness during our lifetime and we have not given up that goal.

Zagreb - February 19, 1994

We have written several times about a Professor we met in Zagreb when we were there in 1991 for a special TEF conference. We will never forget him. He told us about World War II and said "Never Again!" We didn't dare break the silence following his declaration to ask him what those words meant.

Again we hear from the Professor and his letter again leaves us quiet and sad. Any manufacturer reading his letter that has any equipment to share with the University, please let us know and we will send you the Professor's address so you may correspond with him directly.

Dear Mr. Davis:

More than one year pass away as I did not write you but I have many worries and problems (also with my health), and the time passes so quick. First I hope that Mrs. Carolyn and you are well, what I wish you sencerely in this new year. I thank you for all you had done, specially on your interest for our land on inserting my letter in your view, and for sending Syn-Aud-Con Newsletter in Zagreb.

Concerning my work on faculty, we are very busy and crowded here because Acoustics and Electroacoustics (and Radiocommunication, in which composition is our Department) are very popular, so we have more than hundred students on the year. My main occupation is now Digital Audio Broadcasting, I work specially on digital processing of audio signals for DAB. In Zagreb is founded a branch of AES for Croatia, and it works with remarkable activity.

Concerning the situation in our land I cannot say it is good (although much better than till now), Europe and USA loose any interest for Croatia and her huge problems. Yet a quarter of land is under Serb occupation, which they captured by aggression and from occupied parts eject and exile all native Croats, appropriating all goods and values (Serb's invention-"etnical cleaning"). In Croatia there are now about six hundred thousand exiled persons, about half of it are Moslems from Bosnia (who are now enemies of Croatia). Serbs in Croatia (they are national minority of about 9%) are descendants of refugees before attacks of Turks (from which Croatia had defended) in past centuries, and to day they pay so the helping hand.

I suppose that you got some contradictory news from Bosnia and Hercegovina, so let me try to inform you well. Before Serb's aggression Croats in Bosnia (in number of about 1/3) defend as they could, and they armed and supported their quite unready (by catastrophic politics of their leaders) neighbours Moslems, with which they than fight against Serbs. Serbs in dash (stronger in technics) capture on most brutal and homicidal way about 60% of Bosnia. They will take whole land if (before all) Croats did not resist.

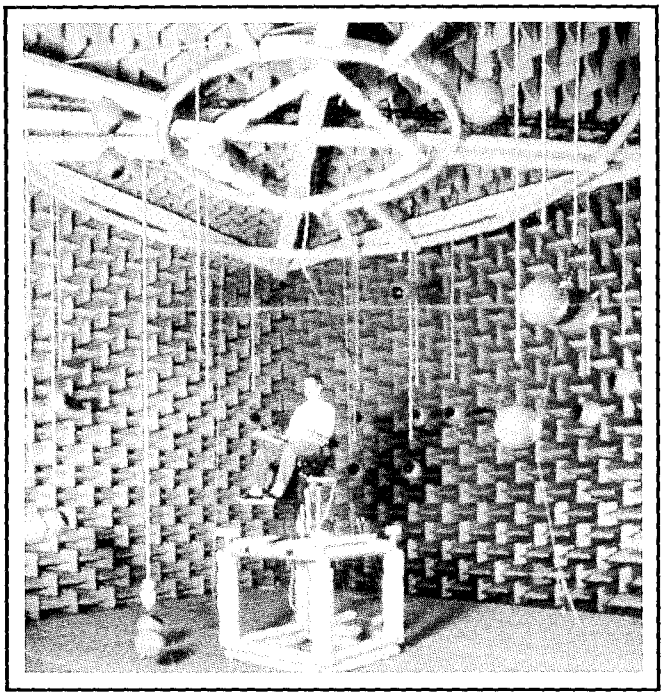
For a short time supported with great money and volunteers from Arab-lands (Malasia, Pakistan,Liban, Afganistan etc.) Moslems form "their" army and attack not Serbs but Croats, and wat to take all remnant parts of Bosnia (they concluded that Serbs are too strong). Moslems (at least their leaders) want to form a fundamentalistic Arab-state (like Iran), and in parts they control at one introduce arabic language and flags, life by Kuran ("feredze" for women) etc. Croats do not want to live in such land and form from about 20% of Bosnia (where they are in majority and which they defended) their own Croatian Republic Herceg-Bosnia. Unfortunately there stayed great spaces in other parts of Bosnia (under the control of Moslems) where Croats are majority and which they have to defend (Vitez, Zepca. Kiseljak etc.), so great fighting begun. Moslems now become aggressors, they torture and kill and want to clear all rest Bosnia from Croats (the other parts cleared Serbs). Croat want confederal Bosnia, and do not want to be under Moslems or Serbs, and tragedy goes on, all became very complicated and bloody.

Economic in Croatia slowly recovers, considerable part of land is a great building ground, at least those parts where Serb's long range artillery can not demoish.

At the end I thank you for your attention and hope my letter interested you. I wish you all goo specially health, with many kind regards.

P.S. Please do not write Yugoslavia, it thanks God exist no more.

Where is Tø?



In live reinforcement you mess with Tø at your peril. In sound reproduction you can do as you please.

For example, suppose you insert between your CD player and your power amplifier ten minutes of signal delay. Other than a delay at the start, the listener would be unable to detect that such a delay was present. This would allow you to take the input signal to the delay line and have ten minutes to analyze and manipulate it prior to the listener hearing it.

Home listening environments fall in the 500 usec category, while large auditoriums, arenas, etc., fall in the 2000 to 5000 usec category with regard to "listener" hearing the acoustic response of the room. In order to "listen to a room" the analysis would have to last at least as long as it takes the sound to reach all surfaces and return to microphone pickup of the analysis system plus the analysis time itself.

What's the point of this discussion you ask? Europeans are heavily engaged in analyzing small room acoustics in terms of high fidelity sound reproduction in them. They want to manipulate, for a small listening area, the room acoustics via supplementary output devices. Technically all this is possible and early attempts have been expensive. When you consider what can be done with In-the-Ear or really good dummy head recordings played back in controlled listening environments using RPG technology, it seems a pity to settle for more expensive half measures.

The First Transistor Radio

The picture shown here is of a nameless Texas Instruments engineer showing Congressman Brue Alger the "first commercial transistor radio" which had been manufactured by the J. W. Davis Co. This picture appeared in the Dallas Morning News of that day.

Few persons today realize that the USA is the birthplace of transistor radios because so many of them now come from overseas.

What has attracted men and women from all over the world to come to the United States and what has turned the resulting Americans into the world's most prolific inventors is the fact that here is where you are allowed to make a fortune from your ideas. Freedom means the right to excel, to be better than others if you can. Fairness means equal opportunity not equal results. Prisons are an excellent example of everyone being treated equal. The United States needs more freedom to prosper in invention, industry, and wealth. Perhaps the mistake made was showing the product to the congressman.

Oversights in Designing for Speech Intelligibility

As computer programs proliferate, promising a performance paradise for sound system designers, experience warns us that all such gift horses need to be looked into with care.

The area in the programs dealing with speech intelligibility need special attention because available algorithms in the literature only predict the performance of perfect systems in well controlled environments. The sound system designer's check list needs the points listed below addressed as part of any truly meaningful design aid.

1. What is the N factor
2. What L_{AMB} is expected from the HVAC system
3. What missynchronization is likely in the array components and are they reconcilable with the components at hand
4. Detrimental room geometry

All of these factors can and do affect speech intelligibility and yet are almost never addressed in manufacturers computer programs. So, let's address them here.

The N Factor

N is the total acoustic power radiated by a system divided by the acoustic power radiated by a device or devices producing a direct sound level L_D at some distance D_x.

The careful avoidance of sound power and sound power level L_W by manufacturers of professional sound equipment is striking in its total unanimity. Without some reasonable approximation of this parameter, it becomes difficult to predict the D/R relationships for a given audience area being covered by a system utilizing more than one driver per frequency range.

Because most large sound systems are in large rooms in the acoustic sense (i.e., The Schroeder f_C is sufficiently low to encompass all of the useable speech range) we can speak of the far field (where the majority of the audience will be) as either reverberant or semi reverberant. This means that the level of the reverberant sound field is the sum of the sound powers emitted by each driver relative to 10^{-12} watt according to:

$$L_W = 10 \text{ Log } \frac{N(\text{ S.P. }) \text{ in watts}}{10^{-12} \text{ watts}}$$

On the other hand the direct sound pressure level L_P at a listener's ears varies with inverse square law and the relative point of the devices polar response (let's for the moment assume that the frequency depending of the level is controlled).

The presence of ambient noise can, on occasion, add further to the level of the reverberant sound field (for the purposes of this discussion let's assume the L_{AMB} is under control (i.e., 25 dB lower in level).

Fortunately there is no need to account for absolute values if, and its a big IF, you can get accurate sensitivity and directivity factor Q data. The relative acoustic power of a given set of drivers sharing the same electrical power input, sensi, and Q can be found by (1w 1m sense - 10 log Q).

If this process is done for each set of drivers possessing either a different sensi, power input or Q, and then separate the sets into those delivering L_D to a listener, divided by those not delivering L_D to a listener, then the ratio of L_D-L_R is obtained.

Toilet Training or So You Want a Patent

"This invention relates to a device which renders it impossible for the user to stand upon the privy—seat; and consists in the provision of rollers on top of the seat, which, although affording a secure and convenient seat, yet, in the event of an attempt to stand upon them, will revolve, and precipitate the user on the floor." U.S. Patent No. 90,298 (1869) from History of π.

The only person I ever knew who stood on the toilet was a banker in Boulder, CO. He had read about the African Mamba's hiding in the field outhouses at the hunting camps first waiting for the unwary to sit down. On his trip to Africa he chose to stand on the toilet. That may have been a transplanted African who applied for the patent.

Mike Lamm, who just received a patent for a loudspeaker design at Atlas/Soundolier wrote, "A patent is worth whatever you pay the lawyers to defend it." I don't think this individual with his rotating toilet seat will be spending much money defending his patent.

Peter Drucker's Six Rules For Presidents

As you may have detected from reading the Newsletter, we have gleaned much from the writings of Peter Drucker. We have all his books on "management" and we are not a collector of management books, just Drucker.

We first met him in 1971 or 1972 at a small meeting for business people in the Los Angeles area. There were only about 12 people present and we sat in a round circle listening to Mr. Drucker say how the world was going to be run by the Sheiks of the Middle East. I never doubted him but I wondered how that could be. We started our touring seminar business in 1973; the first oil crisis was in October 1973 when the price of gasoline went from $0.40 to $1.50—if you could find gasoline to buy!

He also said at that meeting that hospitals and medical facilities would rule our country. How prophetic.

Peter Drucker's official title is Professor of Social Sciences at the Claremont Graduate School of California. He first caught our attention when we heard him interviewed by Studs Terkel on WFMT in Chicago in the early 60s. He told about being in Germany in the early 30s and hearing the Nazis outline to the head of the University how things were going to be run - which horrified Drucker, but all the head of the university asked the Nazi was, "Will we continue to be financed?" Peter Drucker, a Jew, packed his bags that night and left Germany!

An article in the *Wall Street Journal*, 9/22, reminded me of the wisdom of Mr. Drucker, "Six Rules for Presidents." (Each question has a lengthy answer so we are reproducing the questions only. The questions apply to any business manager.

"What needs to be done? is the first thing the president must ask.

"Concentrate, don't splinter yourself is the second rule.

"Don't ever bet on a sure thing is rule three. It always misfires.

"An effective president does not micro-manage is rule four.

"A president has no friends in the administration was Lincoln's maxim and is rule five. Any president who has disregarded it has lived to regret it.

"And the sixth rule? It is the advice Harry Truman gave the newly elected John F. Kennedy: 'Once you are elected you stop campaigning.'"

Pontificating Postures

We recently heard some remarks from a young man who had been listening to a lifelong "sandbagger." Much to our surprise many younger people are unaware of the term "sandbagger". A sandbagger is one who dwells in a sandbagged defensive position awaiting any new idea that comes along so they can drop a sandbag on it. When an individual is struck heavily with a sandbag, no trace is left of what delivered the blow so the perpetrator can't have the dirty deed traced back to him easily.

Sandbaggers are usually urbane, sophisticated (in the worst meaning of the word) persons, often heavy with honors from the various societies, and dropping an aura of experience and unplumbed technical depths that turns out to be stopped up plumbing. As one friend said about a sandbagger, "He gives the appearance of telling you only a tenth of what he knows when in actual fact he has told you all he knows."

Sandbaggers often affect an artistic air as well as a technical air but most of us recognize "an air" as gas.

The remark that triggered these philosophical thoughts was by a sandbagger, when told that Syn-Aud-Con was using high speed computers with instrumentation,

"When you use the good old B&K sine wave sweep and level recorder, you know what you have got."

Indeed we do! Total obsolescence. The entire underlying meaning of Dick Heyser's work was that such measurements were not now and never had been the "frequency response" and that steady state processes missed most of the reality of the live listener's perception.

Our sole objection to sandbaggers is their corruption of the young and gullible but then they have always been with us too.

Damn with faint praise,
assent with civil leer,
And without sneering,
teach the rest to sneer;
Willing to wound,
and yet afraid to strike,
Just hint a fault
and hesitate dislike.

Specmanship

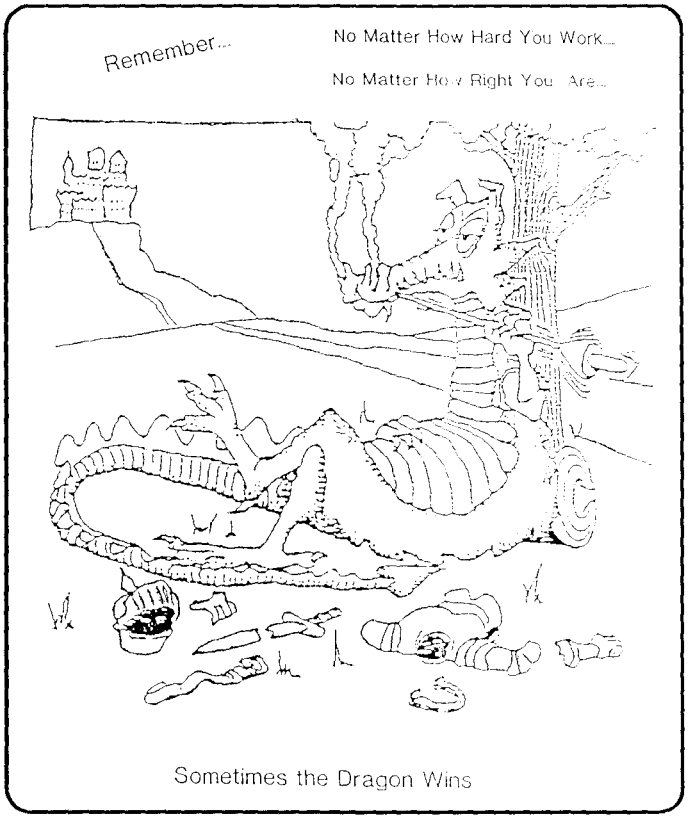
We receive many interesting specifications. Most manufacturers tell the truth most of the time. A recent spec sent to us had the following:

"All speakers to be specified by P.A. system supplier for indoor gymnasium sound quality without echo."

Another part of the spec had:

"Speaker assembly to withstand a 7 lb. at 25 to 35/second impact load."

Jim Thielemann of Ceitronics in San Jose sent these jewels. The attached cartoon from Bob Reim of Acromedia probably describes what happened to these specs.



Sometimes the Dragon Wins

Fear Mongering

The Nuclear fusion reactor 151 million Kilometers from us provides 1000 W/M^2 of energy from photons at high noon that can be converted into electric power.

Above the earth's atmosphere the available power is 1367 W/M^2. The available power varies as 1/cosθ with 0° being the sun directly overhead.

The maximum theoretical efficiency of photovoltaic cells is quoted as 29%.

Using the 6403 Km as the radius of the earth and inverse square law, this is an 87.5 dB energy loss.

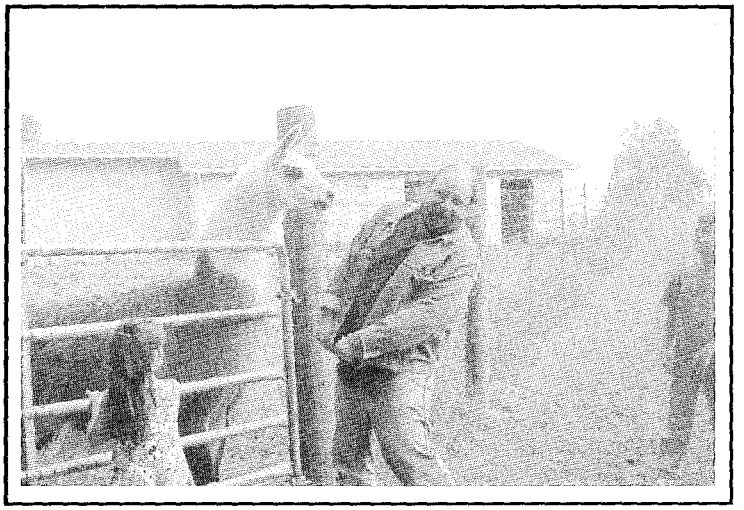
$$20\text{LOG}\left(\frac{151{,}000{,}000}{6403}\right)$$

Years ago I read in a scientific magazine that the total energy generated by technological man was only a ratio of 25 to 1 over manual labor for the entire globe. This, it is felt, is why the third world so resents the USA. Here we have a ratio of over 300 to 1. The same article stated that available energy from the sun was 500,000 to one. 500, square meters at 1000 W/M^2 would provide 1/2 MW.

Interesting steps on the way to a power supply for the day our petroleum resources reach empty.

Reluctant Lover

Sam Berkow has now made two trips to Poncho and despite iron-willed willy-washing has still not made physical contact. Poncho, however, did cough on him for future identification. The youngsters enjoyed watching the bigger kid get it.



Professional Services

Acoustical Consultants may list their cards on this page. There is no charge. The only requirements are that you are a full-time consultant, that you have attended a Syn-Aud-Con seminar, and have an active subscription to the Syn-Aud-Con Newsletter. If you would like to be on our Consultants page, send in four (4) business cards for our file.

Classified Ads

For Sale: Bruel & Kjaer 2215 octave-band sound level meter with Type 4165 Microphone; Bruel & Kjaer 4230 calibrator; tripod; extension cable; input connectors. All excellent physical and working condition. Asking $1500.00 for all. Call 703-533-0717.

For Sale: TEF 12+ All upgrades, in perfect shape. Software includes TEF, EasyTEF, Workbench, Graph, STI, FTC & other utils. In road case, asking $2000. Call Mark Dennis at 201-831-0063 and leave a message.

More Humor off the Internet Dept.

It's amazing how many odd humorous anecdotes and jokes are passed around the Internet. This one came from the University of Washington (I think) and was found in the *Young Scientists Network Digest:* "The juvenile sea squirt wanders through the sea searching for a suitable rock or hunk of coral to cling to and make its home for life. For this task it has a rudimentary nervous system. When it finds its spot and takes root, it doesn't need its brain anymore so it eats it. It's rather like getting tenure."

February 22, 1994, PC Magazine
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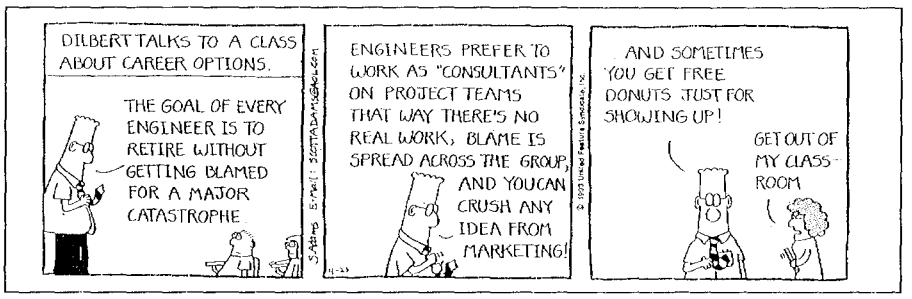
Academia vs. The Real World

While very slightly simplified, the interchange here does well at expressing how the real world affects teachers. I know of few greater shocks than to have graduated from a great engineering school, obtained your first job and encountered the everyday real-life tasks of an engineer. The only greater shock is to work for a world famous entrepreneurial, inventor, engineer with a sixth grade formal education who has made himself a millionaire, many times over from truly creative, innovative engineering of products of genuine merit.

The greatest indictment of formal education is its failure to relate to real-life situations.

The rare teachers who can relate end up revered by their students and often reviled by their jealous faculty. Great teachers are God-like because they inspire students.

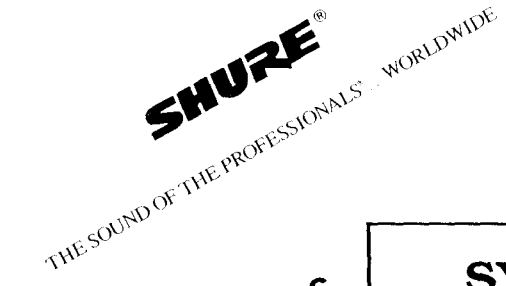
To "be inspired" is, according to the dictionary, "to be touched by the hand of God." We know of one case where a "touched by the hand of God" individual appears to be a Jack Daniels drinking, cigar smoking, non P.C. story-telling, professor of physics whose very existence keeps us from being total pessimists about formal education.

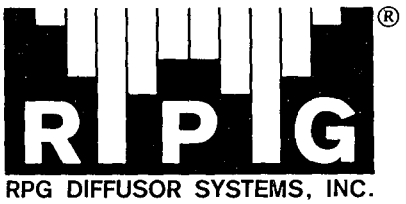


Print What Fits, Not What's Fit to Print

I was talking to someone recently about our Newsletter and the fact that something I had planned for the last Newsletter didn't fit. He laughed and said, "You print what fits, not what's fit to print." And it is true.

We are not all that different than a large University library in Moscow that we visited in 1959 when we were there for the summer working at the American National Exhibition. The books looked so neat on the shelves with all the big books on lower shelves and the smaller books at the top. I asked our guide how were they able to keep books of the same subject and author together. She said, "Oh, we don't. We catalog by size!!"





SYN-AUD-CON SPONSORS

Syn-Aud-Con receives tangible support from the audio industry. Eighteen 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 grad needs.

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

Altec Lansing Corporation	**Innovative Electronic Designs**
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EAW-Eastern Acoustic Works	**Shure Brothers Inc.**
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