



DACsys II ~

"The First Step in My Dream"

Takeshi Isogai, Director R&D, TOA Corporation

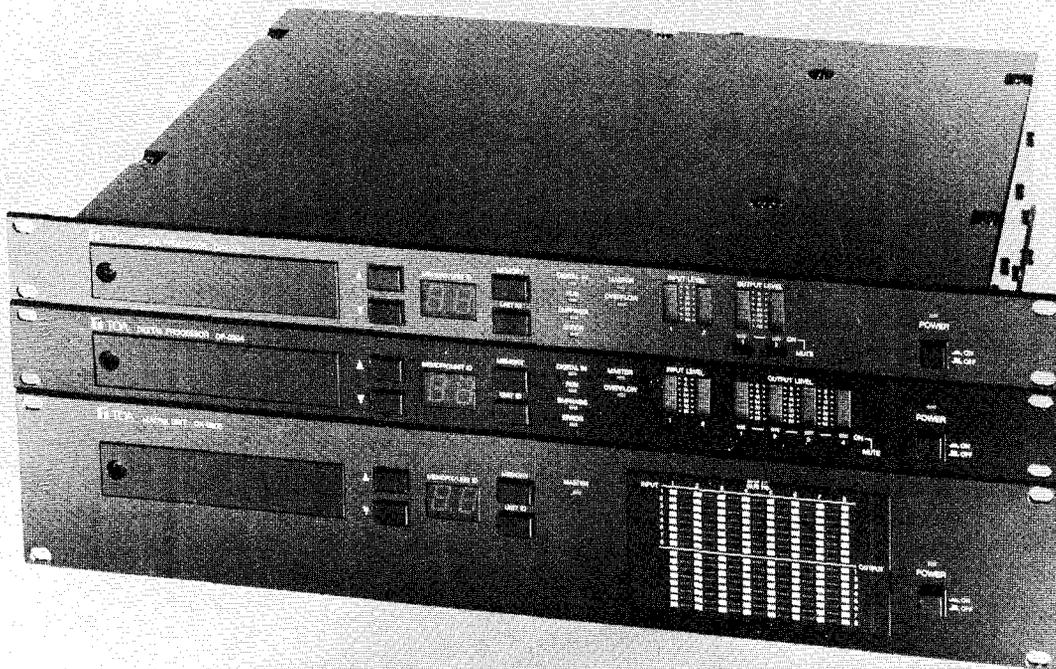




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EXCHANGE OF IDEAS

*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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Syn-Aud-Con Newsletter (ISSN—07397518) is published quarterly for \$35 per year (U.S. and Canada) and \$40 per year outside the U.S. by Synergetic Audio Concepts, 12370 W. CR 100 N, Norman, Indiana 47264. Second-class postage paid at Norman, Indiana 47264.

If you attend a Syn-Aud-Con Seminar during the year, your subscription will be extended one year. (Your registration fee includes a one year subscription to our Newsletter and Tech Topics).

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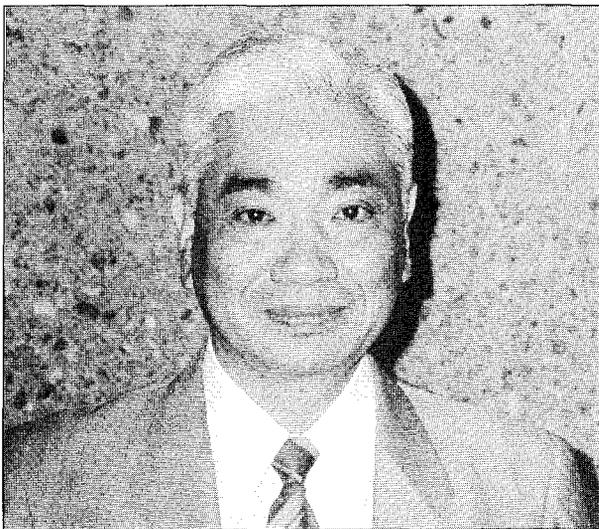
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When Do I Renew?—You can check to see when your subscription will expire by checking the mailing label on the envelope in which your newsletter was mailed. In the upper righthand corner, beside the name, a date will appear (i.e., 7-94). This means that you will receive your last issue with that quarter's mailing unless you renew. Renewal notices will be sent one month prior to your last issue being mailed. 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

The DACsys II - "The First Step in My Dream"

Takeshi Isogai, Director/General Manager of R&D



In our travels around the globe, we have been privileged to meet the best and brightest of human beings from many nations. Anyone given the advantages we have had quickly come to the realization that talent, integrity and industriousness are universal in successful individuals.

Takeshi Isogai and his team are responsible for TOA's next generation of digital signal processing equipment, the DACsys II which will begin delivery in July 1994.

The DACsys II has over twenty different types of signal processing functions, plus signal routing, and level control. The computer-controlled DACsys II is comprised of two signal processing devices and a digitally-controlled 8x8 analog matrix/mixer. The two input by four output device, the DP-0204, includes 16 band parametric or 2/3 octave equalizers, signal delays on each input and output of 1.3 seconds, polarity reversals, full-functioned compressor/limiters, notch filters, symmetric and asymmetric crossover filters, attenuation/gain controls, noise gates, high and low frequency shelving filters, and CD horn equalizers. Twenty bit digital and analog I/O are standard.

Here at Syn-Aud-Con we are particularly interested in the 16-band parametric equalizer for use with our Precision EQ/TEF system, and the up-to-1.3 seconds, in 21 microsecond steps, signal delay modules.

"The DACsys II series is intended to meet professional needs for most any signal processing task required between the output of the mixing console and the input to the power amplifiers." TOA's John Murray explains. "All of this was accomplished with an eye towards the fact that signal processing has but three purposes: (1) to protect the systems' loudspeakers (e.g., with crossovers and compressors), (2) to provide the inverse transfer function of the systems' loudspeakers (with equalization and signal delay), and (3) to provide signal routing, distribution, and combining. We think this series accomplishes all of this with greater control, equivalent sound quality, less labor and space, and at a lower cost than comparable analog equipment."

Because the DACsys II is PC-based, it enables both acoustical analysis and signal processing functions simultaneously with one laptop computer and a TEF 20, making it possible to toggle back and forth from signal processing to acoustical analysis in real-time, within the listening environment.

Since TOA is one generation further advanced than any of their current competition, we await the opportunity to work with this unit with a great deal of interest.

Russ Berger Design Group, Inc.

RPG celebrates their 10th anniversary in the first issue of RPG Diffuse News. RPG tells how it all started and Russ Berger is a vital statistic in their beginning - as is Syn-Aud-Con, I am proud to say.

Peter D'Antonio gave a poster paper at the 1983 AES in New York. We saw him at his poster display and introduced ourselves to Peter and was surprised to hear Peter say that he had built an LEDE room and had experienced problems getting the back wall properly diffused, hence he had used Schroeder's Number Theory to design the quadratic residue diffusors. This pleased us as Don's original paper on the design of an LEDE control room suggested that Schroeder's diffusors would be ideal, but we didn't know of a practical way to implement the idea. Peter did!

We were holding an LEDE Control Room Design Workshop in Russ

Berger's Sound Lab in Dallas in a few weeks. A few days before the Workshop, Russ called us and asked if we would be willing to pay for the air-freight on Peter's diffusors so that they could be tested during the Workshop - and invite Peter to address the Workshop.

I admire Russ Berger. He has a fan for life. We measured the diffusor in the studio. The TEF was brand new. Peter had not seen a measurement of the diffusor. We put up a board and measured the reflection, then we substituted the diffusors. The measurement we got was identical to the measurements that Peter uses today. Absolute proof of the true quality of the diffusor. We were all impressed.

We were all staring at the measurement when someone in the class asked if we could put the diffusor on the back wall in the control room. We all turned and looked at Russ. The

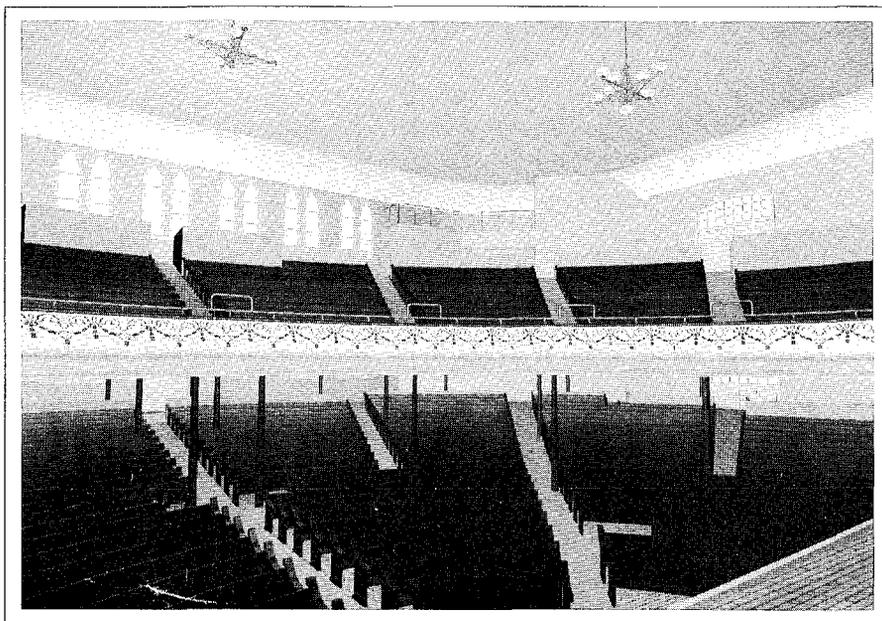
owner of the studio was there. It would have been very easy for Russ to say that now was not a good time to make the measurement. Russ said, come on, let's measure! And there you have the secret to Russ Berger's success.

Russ had built the back wall out of polycylinders. That was what we had then—if you weren't Chips Davis (Chips used strings and a great intuitive sense that others hadn't grasped). Russ had a reflection from the back wall into the mix position. We put the diffusor in front of the area where the reflection was coming from and the reflection disappeared, replaced by a beautifully diffuse field. When the diffusors became a product, the owner of Sound Labs gave the order to install the new RPG diffusors in the wall.

Peter writes in his newsletter, "While at the seminar I met many of the LEDE pioneers who have shaped today's studio design business. Among them was Russ Berger, who has been a friend, design pioneer and recipient of an unprecedented four TEC awards for studio design. In this first newsletter we wanted to highlight Russ's prestigious design for Sony Music Entertainment, Inc., in New York."

Peter goes on to tell about the Sony project in detail and he mentions that Russ has specified RPG in over 300 facilities!

We have been privileged over the years to watch Russ grow from a very shy, but dedicated student into a hard working apprentice to men like Tom Rose, into a full blown internationally recognized successful consultant and we can certify that he did it the old fashioned way, "He earned it."



Russ Berger's computer graphics of Ryman Auditorium in Nashville

Russ has been busy and we haven't had an opportunity to visit Russ and his wife, Lisa, and daughter, Danna, nor had we seen their new house in Dallas. When we were in Dallas recently, we stopped for Sunday morning brunch together.

They made us welcome in their new home in Dallas and dazzled us with genuinely advanced real time, walk-

through graphics of a number of his very prestigious jobs, including the re-work of the original Grand Ole Opry in Nashville.

Russ showed us the computer graphics of several facilities and the remarkable similarity of the finished product.

It was a fun visit with the Berger family. One we cherish.



Danna took this picture of us with Lisa and Russ



Russ showed us a video display of his computer graphics. Behind him is a wall of books at least 20 feet wide and 12 feet high at the peak. Russ and Lisa have a ladder that moves across the wall of books. Spend a few hours with the Bergers and you come away with a list of books to read, a couple of movies to see, and a sense of joy that comes from communion with friends.

Dennis Fink, the "Father" of the Microsecond Delay



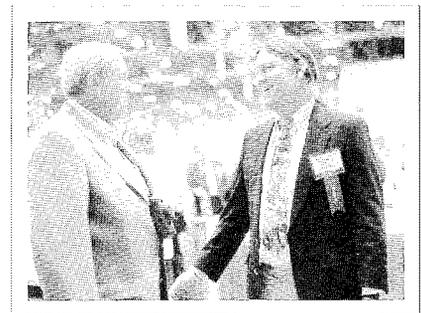
So far as we are aware, Dennis Fink, when he was at UREI during the late 1970's, was the first to develop a signal delay unit that operated in microseconds rather than milliseconds. His original unit was used by Don Pearson of Ultrasound in San Francisco for The Grateful Dead.

Today, the necessity for such precision is widely recognized. The work Dennis did required an experimental "mind set" for it wasn't obvious what one would do with such a device. It was speculative at best.

UREI, recognizing that the market wasn't there yet, elected not to manufacture the unit. We hadn't proved it, but we were sure that it would work and tried to convince manufacturers to build a prototype. In 1982, Larry Lynn, president at Sunn

Musical Instruments, assigned Rod Goldhammer the job, and thus started a new product that is very important in sound system design. Like I always say, it takes 10 years for a new product idea to come to full flower.

We revel in knowing intuitive, inventive engineers. Dennis has just joined Crest Audio Inc.; the competition will feel his presence.



Don with Dennis Fink at the NSCA Show in Las Vegas.

Are you a Certified Technician?

We feel that J.W. Davis is alerting the readers of their Newsletter to something that is very important to our readership as well. J.W. Davis has given us permission to include Are You a "Certified" Technician?

J.W. Davis suggests that it is important for you to give your input to this program by contacting Mel Wierenga at Wierenga Associates, 2760 Porter Street, S.W., Wyoming, MI 49509. Phone/fax (616) 249-1817.

Are You a "Certified" Technician?

If not, you need to learn about the industry movement to establish certification of audio technicians. At the Product Safety meeting at the NSCA show in Las Vegas, Mel Wierenga reported that the National Institute of Certified Electronic Technologists had been retained by the NSCA to assist in

setting up a formal program to test installers of "low voltage electronic communication systems."

Although we knew that certification was being studied, we were amazed at the pace Mel's committee is moving. The program currently being proposed would consist of four levels requiring up to 10 years experience leading to final certification. While "work element" would be given major consideration, written examinations would be given at each of the four levels.

Final decisions are still to be made on many issues. For example, to what extent are present practitioners to be given "grandfather" status? If there will be four examinations, how many years experience will be required before each examination can be taken? Will the subject matter include tele-

phone and wireless communication systems? Who will police the work and be responsible for sanctioning any negligent "certified installer?" Will the program be self-regulated or will a state commission have the responsibility for oversight of the installers? At the meeting, it was observed that licensed installers already are required for security and fire alarm systems.

We are concerned that so few contractors appear to be aware that this program may put them out of business. (Only about 20 people attended the Product Safety Meeting in Las Vegas.) If you do not act quickly, you may wake up to find that certification is a "done deal." Fortunately, Mel appears to be open to any input from NSCA members.

Production P.o.G.O. Laser™



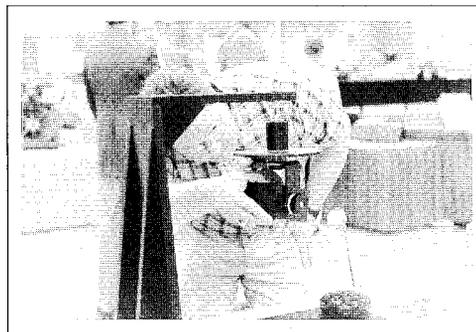
Jim Bumgardner demonstrating the first production P.o.G.O. Laser at NSCA. It brought smiles to all participants.

The precision calibration, the mechanical finesse (Bendix brake engineer designed the drag on the movement) and an appearance that bespeaks quality, accuracy and professional expertise. It's always heartening to witness a job well done.

Techron is selling the P.o.G.O. Laser for \$600.

I hope you all read Wade McGregor's article in ProSound News (NSCA edition) on the P.o.G.O. Laser. I hope Techron reprints it for it is an exceptional article. Quoting from the article,

"The laser beam can be used to align each driver relative to the center of the sphere defined by the acoustic center of the horns, determine the point in the audience that each device is focused upon, and even to set the position of the measurement micro-



That's principle inventor-developer, Phil Allison, getting his first look at the production model. Previously there were only two hand-built P.o.G.O. Lasers - one used by Jim Carey and one by Phil.

phone used to check the performance of the array."

This is a product whose time has come! There shouldn't be a sound system cluster installed that does not have synchronized loudspeakers. The P.o.G.O. Laser makes this a much simpler operation.

QUANTUM SOUND, INC.



Quantum Sound, Inc. (QSI) recently purchased the professional speaker division of Interasonics, Inc.

QSI is a new corporation under the direction of: Terence Heslop, managing director; Billy Runyan, director of marketing; Barry Bozeman, director of sales; Tom Danley and Dennis Merkley, Co-directors of new product development.

Tom Danley and I have a number of common interests in addition to his cleverly designed loudspeakers. Most of our

Quantum Sound Incorporated
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Northbrook, Illinois 60062
Ph 708-272-1807
Fax 708-272-9324

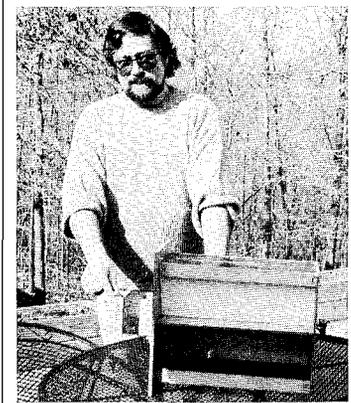
March 23, 1994

Don and Carolyn Davis
12370 West Co. Rd 100 N
Norman, IN 47264

I have recently developed something that I think is as, or even more exciting than the rotary subwoofer driver—a new high frequency (above subwoofer) driver which also works on the rotary principal. This new driver technology has been configured as a tweeter, midrange and fullrange (above 100 - 200 Hz). The fullrange devices are where I have done the most research and am most excited about, personally. Unlike piston radiator/voice coil drivers, these new drivers can be made very large without adversely affecting the high frequency cutoff. Because the radiators amplitude is rotary (although very small at high frequencies), the dispersion pattern is not that of a piston. The pattern does not continue to narrow into a "flashlight beam" like a piston would. The rotary low frequency driver I mentioned is the design we have been working on for some time. Now, the acoustic "bugs" have been put to bed and the drivers are about to be put into production. This very impressive technology replaces the piston radiator, edge suspension, spider and other fatigue-prone parts with a fully rotary device without fatigue points, very large displacement and power capacity. Quantum Sound will be demonstrating the new high frequency drivers and the first rotary subwoofers (125 and 250 cubic inch displacement systems) in their demo room at the N.S.C.A. show in April.

Best Regards,

Thomas J. Danley
Director New Product Development



readers are familiar with the Interasonics Woofers we use at the farm in our "In-the-Ear" experiments.

Interasonics has now become Quantum Sound and Tom has outdone himself by designing a full range, full power, rotating vane, 100 to 20,000 Hz.

We have been following the development of this new product since February 1993 when Tom Danley and Dennis Merkley came to the farm with a working model of a rotary low frequency driver (see pictures).

We visited the Quantum Sound demo room at NSCA. If the demonstra-

tions we witnessed at NSCA are indicative of product model performances, then the audio world has finally seen something truly new. It was indicated to us that directivity could be controlled by vane arrangement inasmuch as waveguides, in the conventional sense are not employed.

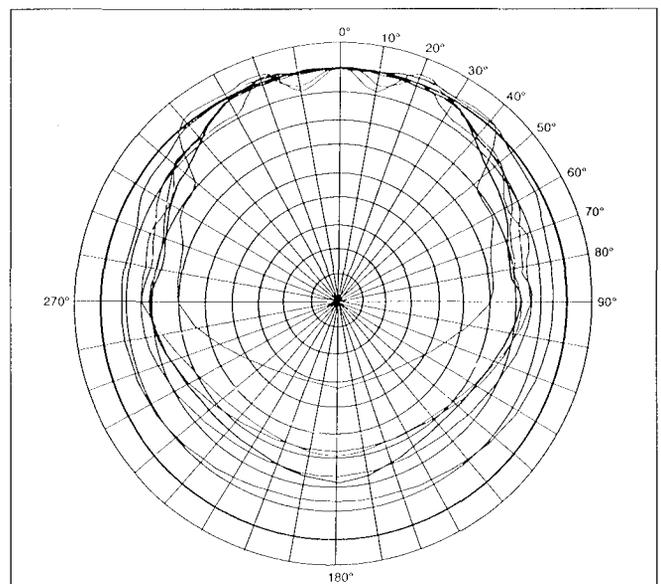
In my 40+ years of audio, fundamentally new ideas are rare. The Klipschorn, the Ionophone, and now the Quantum "vane" loudspeaker.

We have to withhold further comments until we have the opportunity to play with one at the farm.

A couple of pictures of Tom at the farm in February 92 without the white coat. Tom with a model of his original concept of the rotary vein, and Dennis Merkley and Tom greeting Poncho. Poncho dearly loves beards and Tom is obliging that passion.



Pat Brown, Don and Tom Danley at NSCA. The entire team of Quantum Sound were known at the show as "the mysterious men in the white coats."



TD2840 Horizontal Directivity 2 meters

AMC Patronis/EV Loudspeaker System

Sound & Communications has an article by Mark Miller in the April issue titled, "Sony Wonder", part I. The article discusses the new Sony free-to-the-public "museum" with interactive exhibits and high-definition interactive theater.

It is the theater that we want to comment on here and the unperforated screen in particular. Quoting,

"The unperforated screen forces the front speakers to be placed above and below the screen, rather than the usual behind-the-screen placement in most movie houses....The unperforated

screen concept got started with Dr. Eugene Patronis of Georgia Tech, designing for American Multi-Cinema (AMC) theaters. His work resulted in the creation of a nested-horn triamplified speaker, the LJ-1, manufactured by Electro-Voice. Each speaker consists of a set of three horns, the high-frequency horn which is coaxially mounted and a mid-frequency horn mounted above the screen and below the screen is a low frequency vented box."

It is possible to localize the speakers above the screen IF one is sitting

within a few feet of the screen, not where the critical listeners are sitting.

We have been invited twice by theater management to listen to the Patronis designer sound system, plus walk from theater to theater listening to movie previews, which are spaced 15 minutes apart; therefore, it is possible to hear each of the different theater systems on the same program material. Such an experiment left us with a definite thumbs-up approval of the Patronis/EV system.

Janine Masten

One of the advantages of growing older, besides white hair and being addressed as "Sir" all the time, is that you can get a hug occasionally.

The young lady worthy of a Syn-Aud-Con hug is Janine Masten, who has joined Community as Sales Manager of the contractor market.

Janine has been one of the movers and shakers of contemporary motion picture theater sound, working with Gene Patronis to accomplish real improvements in today's smaller theater format.



East, West, and Middle West

Walking the aisles at NSCA is the opportunity to visit with our friends from all over these United States and for that matter, the whole world. Sam Helms is the Syn-Aud-Con representative for New York City area classes and with his partner, Vinnie Macri, has always done a good job for us. On the right is Fred Fredericks who is the guy responsible for my re-entry into computers and who comes to the farm and straightens out the data messes we generate. On the left is Pat and Brenda Brown. Pat is doing the new Syn-Aud-

Con "on-the-road" classes and will be coming to New York City for Sam and Vinnie, October 18-19, 1994.



Special Community Class

PHOTO COURTESY OF COMMUNITY

Pat Brown and Don participated in a special Community sponsored Syn-Aud-Con class at NSCA in Las Vegas for some 50 people from Community's distributors from outside Continental U.S. plus representatives. They turned out to be a lively interactive class.

As always, we were intrigued that no matter how different the languages involved, we all speak the same mathematics, schematics and musical notation. I have a print above my desk of a painting of "The Tower of Babel" by Bruegel as a reminder to at least attempt clarity. If you think the tendency to build such towers is part of our past, you simply haven't been reading the "High Fidelity" literature lately.

It was a fun class. The Community

family provided a marvelous sense of hospitality, the food was exceptional and the people attending were especially appreciative to Community and Syn-Aud-Con for providing the program.

Discussions of large arrays developed inasmuch as Community components allow exceptional arrays to be constructed. And speaking of large arrays, the famous Leviathan has made a comeback: the Leviathan II M4 Tri-Axial Loudspeaker System - fully horn-loaded, signal-aligned Wavefront Coherent tri-axial.

We have often called Bruce Howze the James B. Lansing of our time, and anyone who knows their history of the commercial sound business knows what this means.

The Community family is becoming a major force in our industry. This isn't the same company that called Don 20 years ago to inquire about measurement systems and didn't even own a VOM! The results of that inquiry? Community created their own system and published the results in their White Catalog. Ten years later when the TEF became available, they took delivery of #1! Today they have constructed a state-of-the-art outdoor polar measurement system built around the TEF 20.

Christine and Bruce Howze and John Wiggins have been with Community from Day 1. They have assembled a powerful support team to design, manufacture, market and sell Community products internationally.



Syn-Aud-Con 1994-95 Schedule

Mark IV Conference in Europe

We are going to get a good chance to become better acquainted with Mark Burgin and the ShuttleCad program. Mark is going to participate in the Mark IV conferences in Germany, Sweden, England and Spain. We will be on the program with Mark. This will allow us to have a lot of personal experience with the program.

We haven't traveled abroad since Don woke up in a hotel room in Asia one morning and made the statement, "This is not the way I want to spend the rest of my life."

We came home from that trip, cancelled another trip abroad and all on-the-road classes, instead concentrating our energies on our "Farm" classes and local Workshops. We have declined all invitations to travel abroad since then. Til Now! We have special reasons to accept the invitation from Larry Frandsen of Mark IV. First of all, we have something really worthwhile to share and secondly, they have extended the invitation to Pat Brown and it is our opportunity to introduce Pat to European sound engineers. In the few exposures that Pat has had to people from outside the U.S., we have received invitations for Pat to conduct Syn-Aud-Con seminars in Germany, Canada, Mexico and the Philippines.

Live Sound '95 Workshop

When: January 17-19, 1995

Where: Chapman University, Orange, CA

Fee: \$650

Staff: Will Parry, Workshop Chairman

Staff: To Be Announced

The Live Sound Workshop has become an Institution. We have received so many phone calls asking if a date has been set. This year the Workshop will be under the full sponsorship of Paul Gallo and ProSound News. Syn-Aud-Con will provide the administration for mailings and registrations.

Special Seminar on AutoSound May 22-24, 1995

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.

❖2-Day On-the-Road—\$550❖ Sound Engineering Seminars

Oct. 19-20, 1994
Secaucus, NJ

January 18-19, 1995
Anaheim, CA

February 15-16, 1995
Orlando, FL

March 22-23, 1995
Bellevue, WA

April 18-19, 1995
McLean, VA

We are delighted with the terrific job that Pat Brown has done with the 2-day On-the-Road classes so far, and with the class response to Pat. We can send him to the On-the-Road classes with confidence.

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'll study the possibility.

❖3-Day Seminars—\$550❖ Farm—Norman, IN 1994-1995 Sound Engineering Seminars

Sept. 15-17, 1994

Oct. 25-27, 1994*

May 17-19, 1995

July 20-22, 1995

Sept. 21-23, 1995

October 24-26, 1995

***Note: The dates for the October class has changed from previous listings. The October '94 class is being held during the week for those who cannot attend on the weekends.**

Insight Into the Architectural Market

Tim Smith, formerly of Altec and Maryland Sound, is the new director of Strategic Projects at Mark IV. One of his first projects after joining Mark IV



Tim Smith shown here with Jim Long. Jim is very active in his first love, EV Pro Sound.

was to plan a special session for consultants at NSCA. The meeting was attended by at least a hundred consultants. Tim invited two young ladies that ran a "Thelma and Louise" look at how to sell to large architectural firms. It was a valuable meeting packed with worthwhile ideas.

Ms. Karen Misener told of how her firm, HOK Inc., Architects, had won a very important project with a client and felt in good position to win an even bigger one, but they lost it. Ms. Kathleen McManamon summed up the lesson by saying, "When you win, you have taught your competitor how to beat you the next time." I thought



Don with Kathleen and Karen.

this was stunning.

Another discussion was on education and how education creates markets. Education in Mexico and China was discussed. It was shown that Mexico chose to concentrate their energies and money in higher education whereas China chose to put the emphasis on lower school education. The result is that a much greater market (translated growth) is accomplished by lower school education.

Atlanta Seminar in April

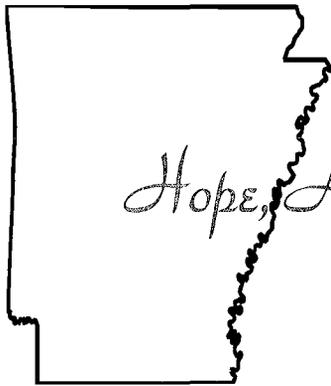
Pat Brown held his first on-the-road seminar in Gainesville, GA in April. J.T. King of dB Engineering in Gainesville, a sound contractor, sponsored the seminar. J.T. felt that the audio industry in the Atlanta area would benefit from the Syn-Aud-Con class. It was the first time in our 21 years at Syn-Aud-Con that a sound contractor took on such a project.



That's J. T. King on the right. It was his inspiration to hold the class and we are very pleased that he encouraged us.

We have had many, many special in-house seminars, but never one sponsored by a sound contractor that was open to anyone who wanted to attend. dB Engineering did all the promotion, registrations - everything except teach the class. And, they say that they want to do it again!

We had three phone calls from people who attended the class before Pat got home saying how much they appreciated the class, what a good job dB Engineering did in hosting the seminar and to tell us that Pat was excellent.



Hope, Arkansas' Leading Citizen

While Hope, Arkansas has a prominent sign outside of town declaring itself the birthplace of a politician, what brought us to Hope like pilgrims to a religious shrine (awe mixed with deep respect and a privileged sense of meeting with a pioneer giant of audio) was Paul Wilbur Klipsch, 90 years young, quicker on the uptake than his younger visitors, and still the possessor of deeper intellectual insights than most of us are ever allowed - though he still loves to mask his powers with humor. Paul graciously spent the morning with Carolyn, Ted Jones of Indiana University, and I. (Ted originally lived in Hope as a young boy and worked with Paul at Klipsch and Associates.)

We all had breakfast together at the local Holiday Inn and then proceeded to Paul's home to see and hear rare audio treasures from the old days at BTL. Jim Hunter, Chief

Engineer at Klipsch and Assoc., a man I am increasingly coming to enjoy as a friend and source of vital audio information, joined us as well.

There are very few better feelings than to have a treasured mentor still with you when you finally arrive at a state of self understanding that lets you recognize and express the deep gratitude you feel for him and his part in your life.

I first met Paul 40 years ago when he came to our hi-fi shop named "The Golden Ear." (We used to get phone calls for hearing aid batteries and hybrid seed corn which exhausted what Hoosiers at that period associated with the words "Golden Ear").

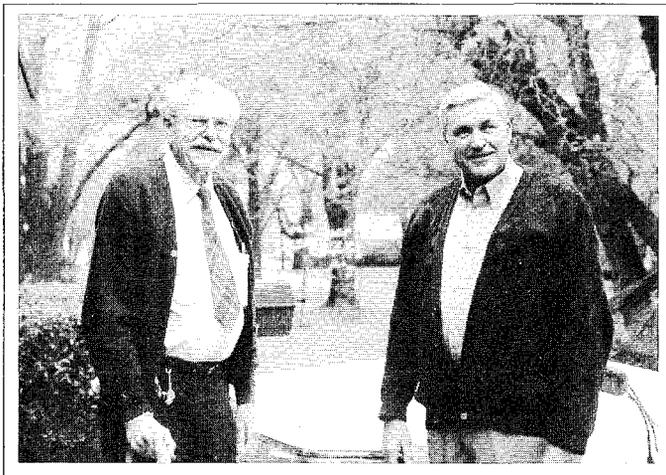
We worked with Paul for a year down in Hope, Arkansas in 1958 (He called me his "president in charge of vice"). He also led me into writing articles by teaching me the secrets of authorship:

1. Announce publicly that you are writing an article.
2. Gather all the necessary supplies (paper, pencil, etc.)
3. Lock yourself in a room and do it.

I am pleased that Paul Klipsch acknowledges me as his friend, as that ranks as high as any award I've ever won.

We all traveled to Dallas, Texas that day and the journey once again reminded me what a friend had written me upon finding I was living in Hope, Arkansas, "I always suspected Texas was about 30 miles beyond Hope".

Forty years has resulted in some changes. In 1958 Paul drove Fords and I drove Porsches. In 1994, I drive Fords and Paul drives Mercedes. One thing will never change. Paul Klipsch is the vital center of any group he's in and all participants benefit therefrom.



Paul W. Klipsch and Don Davis



Paul, Don, Jim Hunter and Ted Jones

Sonics/Imax

Personal Sound Environment System (PSE)

An Improved Virtual Reality

The basic flaw in a majority of virtual reality systems is the failure to coordinate the sound to the visual inputs.

Perhaps the best research tool available today is the IMAX 3-D with their PSE (personal sound environment) audio system. This remarkable system uses the IMAX SOLIDO 3-D liquid crystal shutter glasses with playback for 'In-the-Ear' type recording playback all built into a pair of glasses. Couple this with surround visual images projected on a large dome and with skillful sound recording and you come very close to being transported to other times and places.

The first use of this technology is at the Loews Theater for the Sony Corporation (just across the street from the Lincoln Center in New York City).

This is an IMAX multi-format theater capable of 2-D and 3-D projection at 24 and 48 frames per second. This theater will also have the capability of projecting 35/70 mm formats and will have an expanded IMAX sound system for this purpose. The custom installation calls for additional Proportional Point Source (PPS) loudspeakers in the screen system and places more surround speakers throughout the theatre.

The IMAX theater is one of ten theaters in this complex

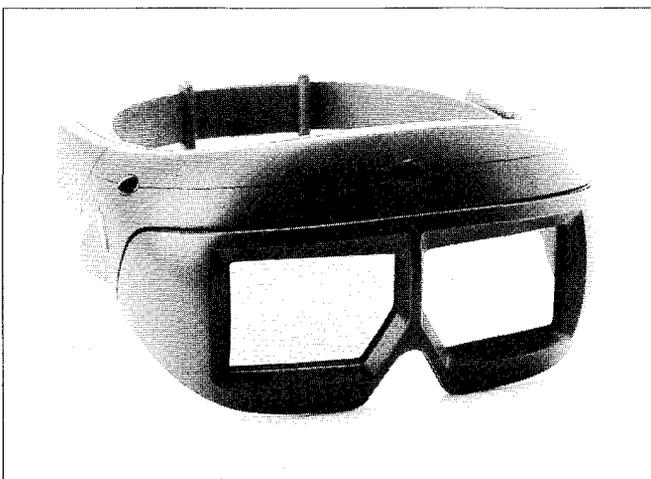
with this theater being the only IMAX. A visit to this complex is a journey into cinema technology.

The PSE system can be utilized either with or without the liquid crystal shutter lens, but our interest lies in the influence of truly realistic visual imaging on the brains ability to then hear frontal clues from the PSE system.

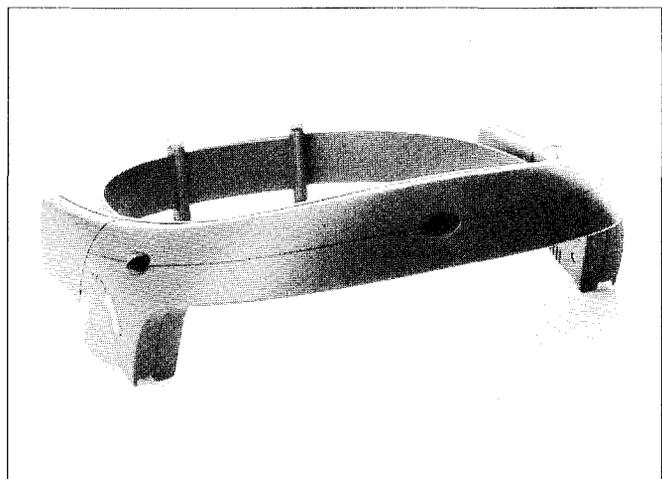
The PSE system is synchronized with the large theater loudspeakers so that the listener (whose hearing of the large loudspeakers is not interfered with by the presence of the PSE system) can have the full physical impact of the full-sized systems while at the same time experiencing the virtual reality acoustic imaging of the PSE system.

The existence of such a facility begs for special research films exploring the complex eye/ear localization problems experienced when only acoustic clues are given minus a realistic visual presence.

We hope to have, for a later Newsletter, a Tech Topic authored by Bill Schofield of Sonics (one of the design team engineers) discussing the inner workings of the PSE. In the meantime, our congratulations on a truly innovative product that could be the reason for millions of couch potatoes to return to the better motion picture houses.



PSE with IMAX 3-D glasses



PSE without glasses

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Andrew Martin has been very successful with his ATM Fly-Ware - successful because he is filling a very valuable need for loudspeaker manufacturers and sound contractors.

Andrew would like to make the Rigging Guide available to Syn-Aud-Con grads. As he says,

“These Guides are not distributed to anyone, as the information on application is critical. However, I feel that anyone with the sense to attend a Syn-Aud-Con seminar or workshop is certainly sensible enough not to endanger the public by misusing the information given in the guide. Therefore, I would like to offer to anyone willing, a copy of the ‘Riggermeister Abridged’ guide - free for the asking.”

The Analytic Signal

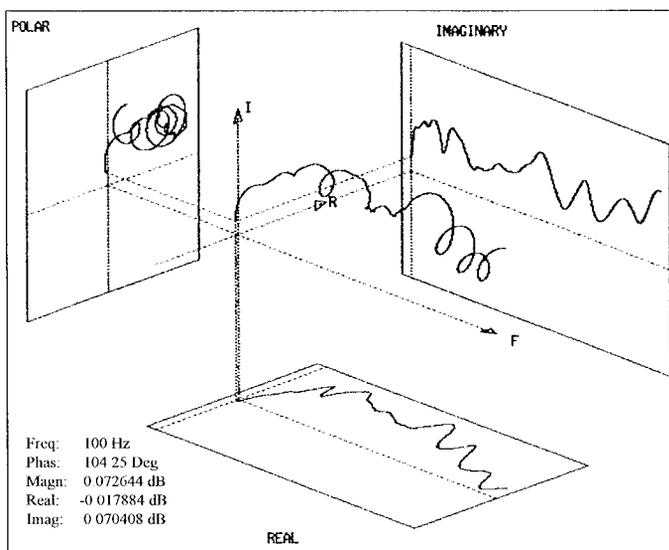
There are few instrumental displays in physical science more intuitively beautiful than the four-fold display of the analytic signal.

The complexity of energy accounting frequency-by-frequency for a given point in space unfolds visually with each mathematical perspective shown as a shadow image of the three dimensional whole. The genius of Harry Nyquist and the brilliance of Dennis Gabor are apparent. Dick Heyser’s use of this imagery for acoustic measurements brought all of us into a new understanding of displays we had been raised with but never really understood.

The polar view is called the Nyquist display. The real and imaginary parts go back to Steinmetz at G.E. at the turn of the century.

The spiral is called the Heyser Spiral when used in acoustic work. Gabor’s work in holography that grew out of his association with radar in WWII specified the ideas for generating such a spiral.

We would be remiss if we failed to credit Ron Bennett for the truly excellent programming he did so we all get to learn our acoustics with the aid of the analytic signal.

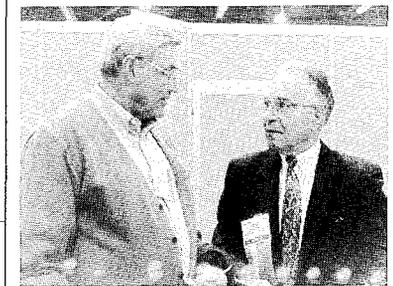


West Penn Wire and Fiber Optics

Visiting West Penn Wire's classroom at NSCA brought to our mind the idea of an installation techniques workshop for Syn-Aud-Con grads. When manufacturers can provide such excellent training tools as West Penn Wire has for working with fiber optics, the opportunity exists for a really useful "hands on" workshop covering installation tools.

We'd like to hear from any of you that have an interest in such a workshop. If the need is there, we think we know how to meet it.

Don and Vice President of West Penn Wire, Lou Valente.



What Does 'Q' Do?

In order to explore what Q does for you, let's compare two sound sources in a reverberant room that has an absorptive audience area. One source will be omnidirectional; Q=1. The second source will be directional; Q=10.

Omnidirectional	Directional
L_W	$1/10 L_W$
L_R	$1/10 L_R$
$L_P @ \text{ref}$	$L_P @ \text{ref}$

As can be seen from the above, the directional loudspeaker can generate the same L_P as the omnidirectional loudspeaker with one-tenth the power input and consequently generate a reverberant level 10 dB lower than the omnidirectional loudspeaker.

Appropriate Q Values

Appropriate Q values are those that possess coverage angles C_Z that match the audience area without exciting the sidewalls or ceiling and only that part of the floor area that has an audience. When this is the case, the initial decay time IDT in dB/sec (or msec) becomes much faster than the statistical reverberant decay and the delay between the early reflected

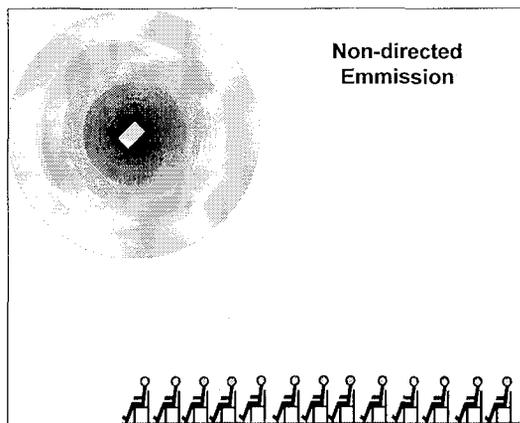
energy and the latter reverberant energy becomes greater for transient sounds.

Idealized Q

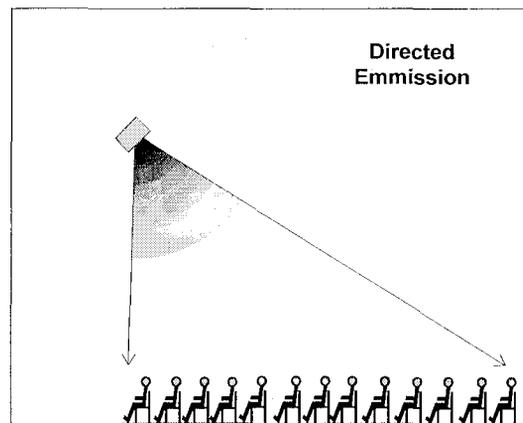
The ideal Q would have C_Z angles exactly matching the audience area at its -6dB down angles thus providing an $Ma=4$, (ie: and increase in effective Q of four times whatever the initial Q was).

Like all parameters available to the sound system designer, Q is a useful tool when used correctly, but it is not a panacea or substitute for careful analysis of the design problem.

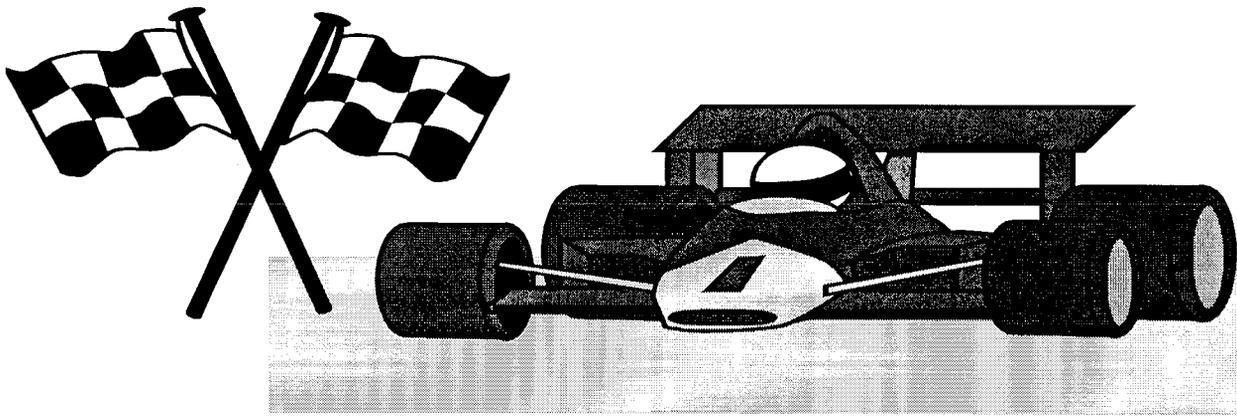
$$\text{Change in } L_W = 10 \log \frac{10}{1} = 10 \text{ dB}$$



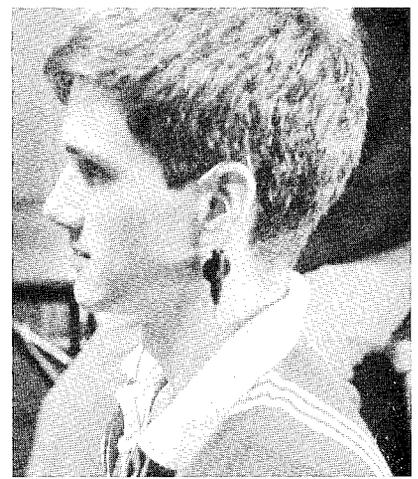
Q=1



Q=10



*An Interesting
Experiment
with Etymotic
ITE Microphones
and the
Etymotic ITE
Headphones*



Two very bright young engineers are participating in this experiment: Carolyn Clifford of Consumers Union wearing the Etymotic ITE earphones and Patrick Poovey of AutoSound 2000 wearing the Etymotic ITE microphones

Richard Clark introduced us to an interesting experiment that is capable of really disorienting a listener.

Have a person wear the ITE microphones and have a second person wear ITE earphones and face the first person. Now the person wearing the ITE earphones is seeing directly someone to the left of the person wearing the microphones but hearing them to their own right. When vision and aural clues don't match, unique disorientation occurs. (When we were in the Mercedes Acoustics Lab a few years ago we heard, on Stax headphones, recordings of cars made using the Aachen Head, passing in front and behind us. We listened with our eyes closed. The car could be directly in front of us and when we opened our eyes, the car snapped to passing behind us *because we could not see the car in front of us*—this occurred for both Don and I.) cd

**ITE Etymotic
ER-4 Earphones**

Richard says that he particularly likes the Etymotic ER-4 earphones. The cost is reasonable, \$330 a pair. Ed Long reviewed the earphones in the December 1993 issue of *Audio Magazine*. He liked them too, "The Etymotic ER-4 earphones are efficient and can produce very high sound levels with relatively little input power. The members of the listening panel gave the ER-4 earphones an overall sound quality rating of 'excellent' and an 'excellent' rating for physical attributes. I personally think that they are better than the Stax SR-Lambda Pro reference earphones. When the price is considered, I think that the ER-4s are an excellent value."

Strong words of praise!

The Indy 500 Time Trials

Following the class, we performed a different form of disorientation on Richard Clark when we took the class to the Time Trials at the Indy 500. We all went to lunch at the Speedway motel before we entered the track and ate outside on the patio where we could hear the cars circulate during practice on the track. Richard was unable to eat. I have rarely witnessed greater distress than he evidenced during lunch. He rapidly recovered trackside. In fact he made the comment as he stood at the pit wall: "Plant my feet in concrete and leave me here!"

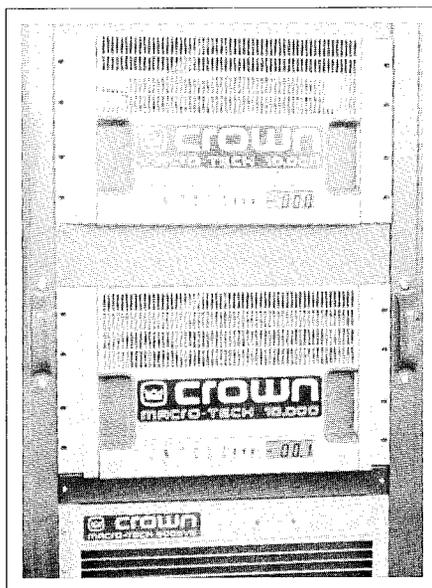
We were guests of John Royer, the head sound man at the track. John very generously arranged for garage and pit passes for the entire group and

he personally conducted a tour of the sound installation in the tower.

Very Special ITE Recordings

Richard Clark used his new Ety-motic ITE™ microphones to make a series of recordings in the Penske pits after I obtained permission from the Penske team to be with the pit crew behind the cars. These recordings played back over our ITE system at the farm let us hear cars going by at 250 mph on the track (40 feet away), plus a Penske Mercedes engine starting up just in front as a car comes into the pits beside us while we are recording. True sensory overload!

As if all this wasn't enough, John Royer came up with a special presentation for me (Don) in memory of Bill Webb, the former sound director at the Speedway when we use to go to the track in the 1960s. John mounted on a special oak board one of the "shorting rods" out of the Ling 4000 watt amplifiers Don had helped Bill obtain back in the 60s. One of the tremendous testimonies to technology is to look at the old Ling units in 6' racks and then glance down at the diminutive 10,000 watt Crown units



Two Crown Macro-Tech 10,000s and one Crown Macro-Tech 5,000 under testing.

currently in use in multiples.

Studying John Royer's system, and it really is a system, not just a collection of components, you realize why a master electrician is a requirement for the head sound man at an installation of this magnitude.

Time Trials 1995 & A Special Workshop

We probably will have two classes in May '95 as we did his year, one the 1st weekend of Time Trials and a special workshop before the 2nd Time Trials for those who have already attended



John presenting Don a memento from the 4,000 watt Ling amplifiers Don sold the Speedway in the early 60s.

one of our seminars. Shall we plan one on AutoSound 2000 with Richard Clark at Indiana University? Or shall we have our *What We Know About Loudspeaker Workshop* with Gene Patronis, Don Keele and Bruce Howze?

The Indianapolis 500

After a 25 year interval, I once again found myself standing on the track in front of the field of 33 cars at the Indianapolis Motor Speedway as Mary Hulman uttered the words that both start the engines and the sustained roar of 400,000 spectators.

There is no rock concert in the world that can match either the music of the cars or the fervor of the fans and there we were in the middle of it all.



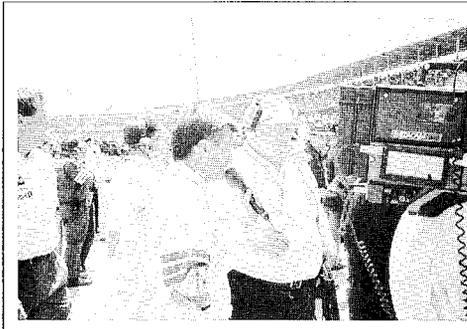
That is our crew (Chris Bell, John Medeiros and Richard Clark) making ITE recordings at the rear of the Penske Mercedes.

Thanks to two real friends, John Royer, who supplied us the passes and made us part of his sound crew, and Gerald Burkett, who after 37 years of attending the race, needed to be an integral part of it, we ran out of the way of the field as it got underway and watched the first laps from the center of the pits. The cars are now approaching 250 mph down the straights. It only takes one lap to realize that if a car came into the pits at that speed, you might see it but you'd never have time to duck (that's 367 ft/sec or if you blinked your eye, 37 feet would be missed).

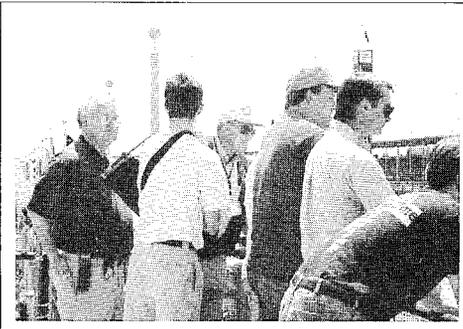
Back in 1955, Carolyn and I had followed the Mercedes racing team through their season and we knew that in the 1954-1955 Grand Prix seasons they had never had an engine fail during the course of either season (we were in the garages when they tore down the first Mercedes engine - the turbine had failed on the super charger). The Turbine was not made by Mercedes.



Happy members of the class on the tower terrace during Time Trials.



That's "Big John" wearing the headset and the 8000 HME wireless intercom just to the right of the man with the microphone. This picture was taken in the pits at the height of the race. Noise levels? Impossible to hear speech over the sound system when a car passes. Communication? Continuous through the HME wireless intercom.



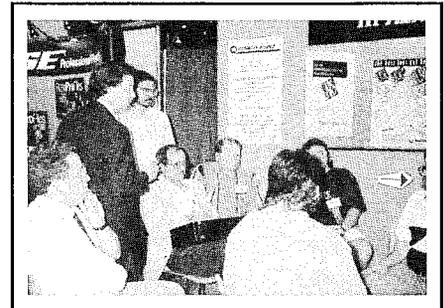
It is truly refreshing to watch 400,000 fans salute the flag, pray respectfully, and cheer brave, skilled men on their way. If God, country and honor strikes a resonant note in your heart and mind, then the start of the 500 will be an American emotional moment in your life. If you haven't experienced it, don't put it off. Your life in the United States is not a complete one until you are swept up in an event larger than life and uniquely American.

DARWIN in ACOUSTICS



Carolyn remarked a couple of years ago, following a meeting in Indianapolis with representatives from seven manufacturers with direct involvement in sound system design computer programs, "We will have to let Darwin determine the outcome."

Walking through the demonstration area for computer programs at NSCA, by the quantity and quality of the crowd gathered around Ron Sauro in the EASE booth, it was obvious that Darwin had made his choice.



Ron Sauro demonstrates the capabilities of the EASE program to a very interested group at NSCA.

More on Morgan



I wrote, in a recent Newsletter, that outriders from Morgan's Raiders "took" the three best horses at the farm in 1863 (during the late unpleasantness between the states) and that General Morgan perished in Greenville, TN. Don Fillers, whose family came from that area, discussed it with his grandmother, who assured him that it wasn't his kinfolks who took our horses.

I didn't tell him it could have been my kinfolks since they escaped the surrender at Vicksburg and fought with

either Forrest or Morgan and ended up imprisoned in Michigan. It took them (father and son) ten years to regain their citizenship after the war.

Don Fillers (May Farm Class 1993) is also the man who told Buddy Ward, "If you come up with any more stories (like 'The Pilot'), call me collect!"

It's these kinds of grads that keep us from retiring.



Don Fillers at NSCA

IRP Professional Sound Products

IRP Professional Sound products has been a sponsor of Syn-Aud-Con from our earliest classes and a friend of Syn-Aud-Con from the start. Our very first class demonstrated the IRP signal delay loaned to us by Mahlon Burkhard. Our association with IRP's then parent company, Knowles Electronics, Inc., went back to the days when Don was on the AES Board of Governors with Hugh Knowles.

When Brian Benn came to IRP following Mahlon's retirement, we saw IRP become a major factor in the overseas market.

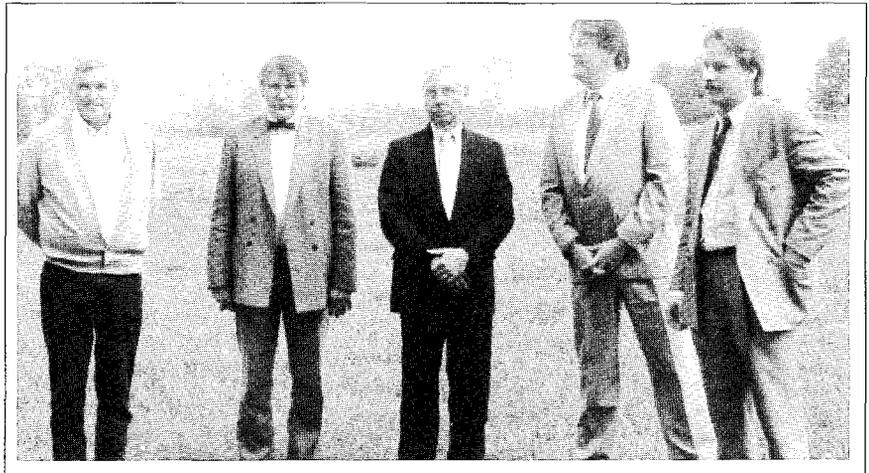
IRP Professional Sound is now owned by Brian Benn, previously General Manager and will continue as President, and Matthias Mueller. Mueller has been the distributor of IRP products in Germany and in his new

role will be Executive Vice President in charge of all IRP distribution in Europe. It was as a distributor for IRP that we first met Mr. Mueller in 1990.

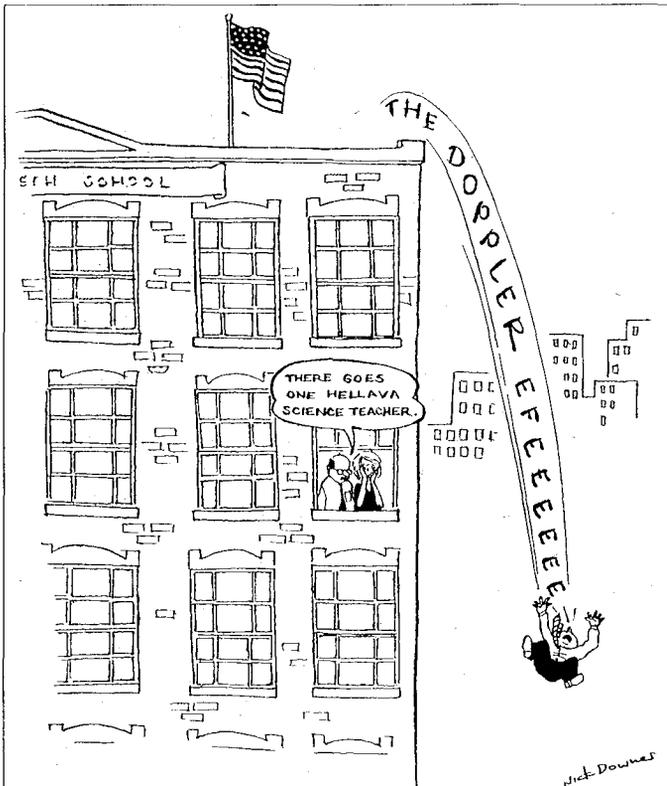
IRP has always been an especially innovative company. They have care-

fully selected their marketing niche - and it has always been with their customer's needs in mind.

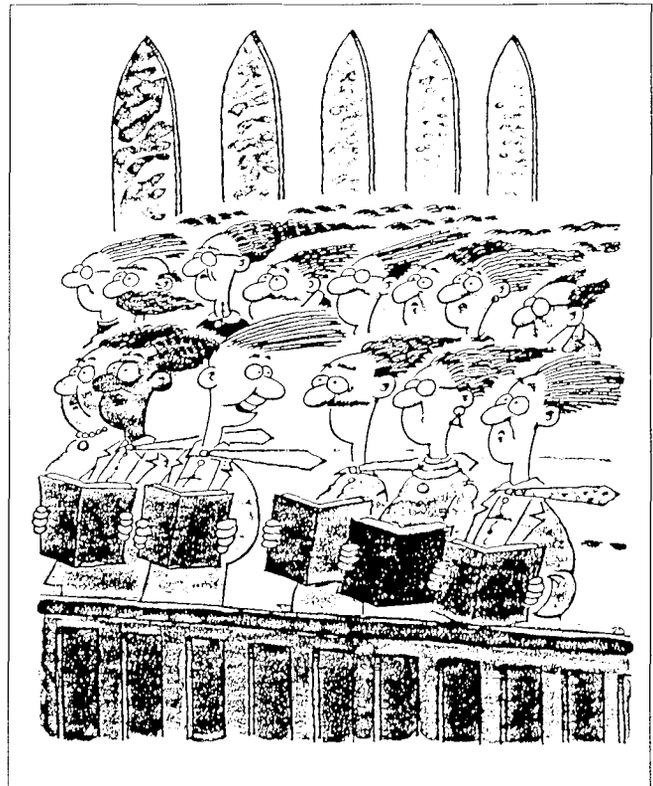
IRP's new address is 1111 Tower Lane, Bensenville, IL 60106. Ph. 708-860-1993 or fax 708-860.1997.



Don, Dr. Ahnert, Roger Carroll, Brian Benn and Matthias Mueller in 1990.



Reprinted with permission of the IEEE "The Institute"



"How do you like our new sound system?"

Noise Level Analysis

~NLA~

Perhaps the most overlooked capability of the TEF 20 is the NLA section. This truly versatile and highly useful program should be must have for anyone mixing a live show.

The illustration shown here was a one-minute measurement (up to 24 hours can be made). During that one minute the max 'A' weighted level was 91.5 dB. The minimum level was 37.2 dB. The equivalent level L_{EQ} was 70.1 dB (That is a single exposure equivalent level with the same energy as the one minute distributions of energies would be 70.1 dB.)

Ten percent of the time the level exceeded was 69.6 dB. The level exceeded 50% of the time was 39.4 dB and the level exceeded 90% of the time was 38.1 dB. Finally, the mean level was 47.4 dB. These exceedance percentages can be set by the operator.

The L_{EQ} was updated every one tenth of a second during the one minute sample taken. It's this continuously running L_{EQ} that is so vital to mixers. OSHA allows up to three hours of exposure at levels of 97 dBA. Any mixer who can handle total sound levels so that L_{EQ} never exceeds 97 dBA in a three hour show - even though max levels hit 115 dBA has satisfied OSHA requirement (see attached data).

This is the proper way to handle the local "want to be authority" with a sound level meter and a badge.

U.S. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION —OSHA—STANDARDS

As of August 1981, OSHA noise exposure standards consist of a two-stage program where hearing conservation measures become mandatory at 85 dBA for an 8-hour day but feasible engineering or administrative noise controls are required when exposures exceed 90 dBA.

Hearing Conservation Programs — include annual audiometric testing and provision of hearing protectors.

Engineering Controls — include reducing machinery noise through redesign, replacement with quieter equipment or by reducing the transmission of noise along the path from source to receiver including enclosing the noise source or noise receiver

Administrative Controls — include reducing noise exposure by limiting the time an employee is exposed to given noise levels.

1. Criteria for Engineering or Administrative Controls

Feasible administrative or engineering controls shall be utilized if noise dose D is greater than 1.0 in accordance with the following equation:

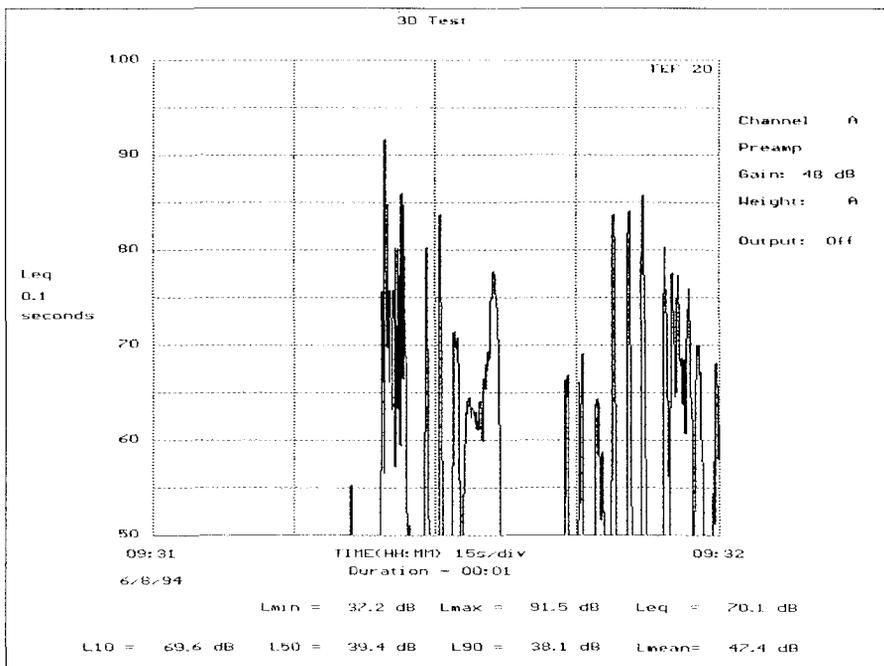
$$D = \left(\frac{C_1}{T_1}\right) + \left(\frac{C_2}{T_2}\right) + \left(\frac{C_3}{T_3}\right) \dots + \left(\frac{C_N}{T_N}\right) \quad (F-3)$$

where:

- D = Daily noise dose (must not exceed unity)
- C = Actual exposure time at a given noise level
- T = Permissible exposure time at that level in accordance with the table below.

Duration Per Day, Hr	Permissible Exposure "Slow" Response, dBA
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or Less	115

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.



In the second edition of *Sound System Engineering* we dropped the section on OSHA requirements. It is our opinion that the primary hazard to hearing has been and continues to be high level impulses, not steady state levels. We know that firearms, race car engines, and many intercoms generate hazardous impulse levels. We continue to believe that music is an unlikely source of hearing loss.

Never-the-less, we receive almost weekly calls asking for OSHA data. We do tend to believe that the OSHA dBA vs time of exposure chart is a good guide for establishing realistic L_{EQ} s for live performances—certainly for any we have to attend.



*Looking for an
Audio
Degree?
Check out
Columbia College*

Columbia College in Chicago, Illinois offers both a time delay spectrometry class and a Sound System designer class. Both offer four credit hours. See class description below.

Time Delay Spectrometry—4 cr.

This class explores the theory of TDS and gives hands-on training in the use of the Techtron TEF analyzer. Students will be required to do a class project in which a device or acoustic space is thoroughly analyzed with the TEF. *Prerequisite: Advanced Acoustical Design and permission of the instructor.*

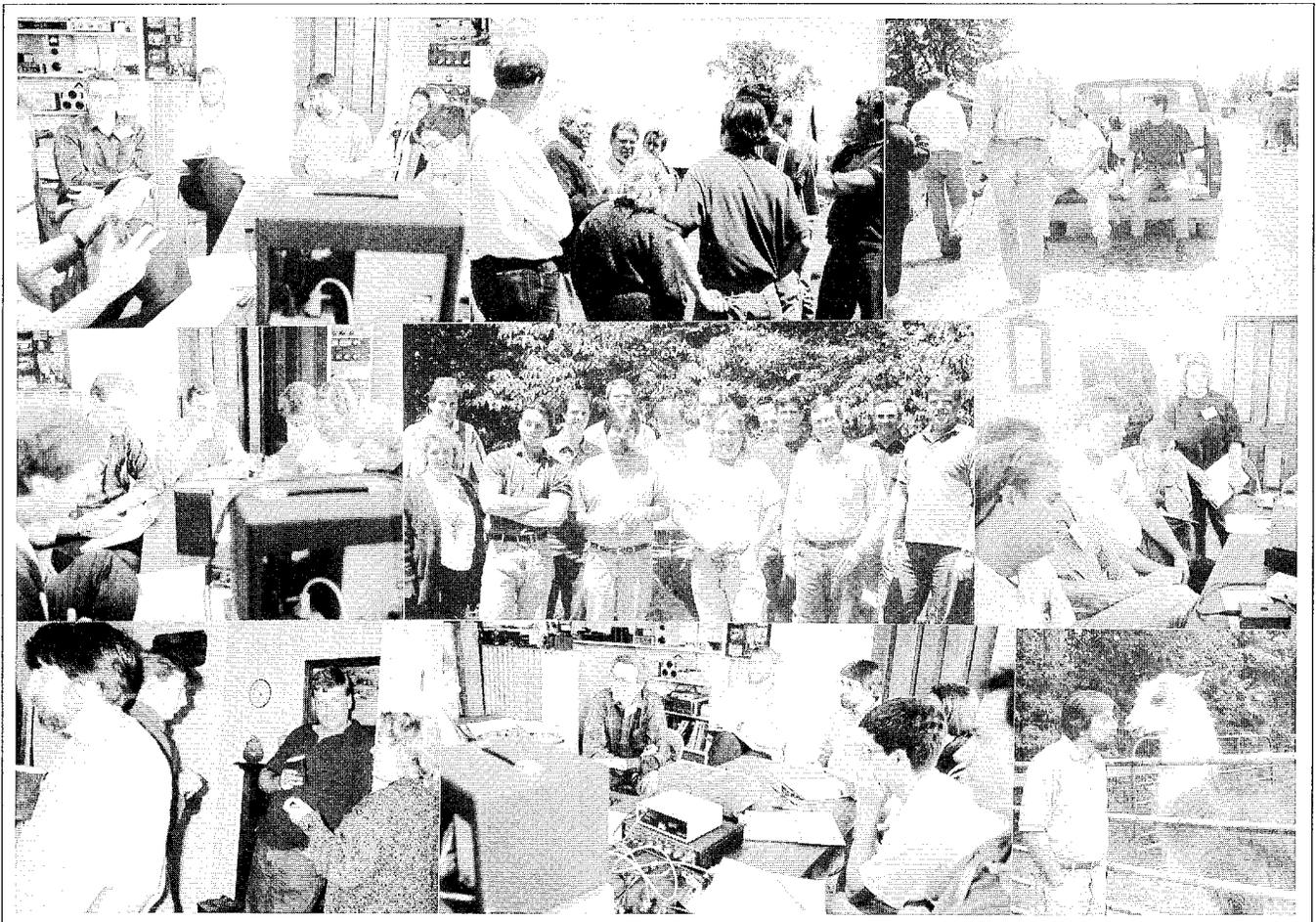
Sound System Design—4 cr.

This course provides an in-depth look at the parameters required in designing, installing, and optimizing permanently installed sound systems. The emphasis is on learning the basic fundamentals of the design process. The role of computers in sound system design is also discussed and demonstrated. *Prerequisites: Basic Audio Systems.*

For individuals seeking full length courses in audio subjects Columbia College should be high on your list. Write Doug Jones, who heads up the audio program at:

Columbia College - ATC
676 N. La Salle
Chicago, IL 60610
PH: 708-328-2022

May Farm Class ~ May 18-20, 1994



Maximum Length Sequences (MLS)

We first encountered the concept of maximum length sequences and the Hadamard Transform in radar signals being reflected from objects in the solar system. Manfred Schroeder in his book, *Number Theory in Science and Communication*, second edition, Springer-Verlag, gives the mathematical underpinnings.

An early version of the basic idea unfortunately was software-based only, making the unit, in our opinion, a poor choice as future options were severely limited. Techron has addressed the MLS technique in the TEF 20 by having Paul Kovitz design, around the DSP code for a sophisticated MLS program capable of creating eleven second impulse responses in realistic time periods for the operator of the measurement system.

The TEF 20 version of MLS has all the bells and whistles one could hope for:

Heyser spiral (both time and frequency domain)

ETC	RT ₆₀
Impulse	L _D -L _R
STI	Freq. response
RASTI	Very rapid 3-D displays

While MLS probably has more utility for the acoustic consultant than for the sound contractor, its low cost availability in the TEF 20 means everyone will become familiar with this technique's useful post processing characteristics.

The test signal for the MLS stimulus sounds like periodic "white" noise.

It is a digital signal generated by shift registers in a manner that develops all possible combinations of 'N' bits with the exception of all zeros (i.e., the maximum in MLS is the maximum combination of 'N' bits).

The maximum length sequence is

$$L = 2^M - 1$$

To compute the impulse response it is only necessary to compute the cross correlation between the MLS excitation signal and the system output.

A problem that arises is that over 1 billion calculations would be required to compute the impulse response.

The solution lies in the use of right-circulant matrix, a Sylvester-type Hadamard matrix and two permutation matrices. The product of a vector with a Hadamard matrix yields the Hadamard Transform of the vector.

Because the "linear" impulse response is estimated from a circular convolution, the sequence N must be chosen with care. The same constraints that affect dual channel FFT measurements apply to MLS measurements, namely, obtain the entire impulse response record present in the test environment.

$$f_s = \text{sampling freq. (48,000)}$$

$$N = f_s \times T \quad (T = t_1 - t_2)$$

$$\text{line spacing} = \frac{1}{f_s}$$

$$R_f = \frac{N}{f_s} = 1$$

$$R_T = \frac{1}{T}$$

Shown in Figure #1 is the impulse response of the small TOA loudspeaker we use in class for our acoustic measurement demos. We have bracketed it with a left and right hand set of cursors 4.125 ms - 1.875 ms = 2.25 ms Time resolution; 1/2.25 = 444 Hz Frequency resolution.

Figure # 2 shows the magnitude of the frequency response for these settings.

The reason for making MLS measurements, whenever the ambient noise

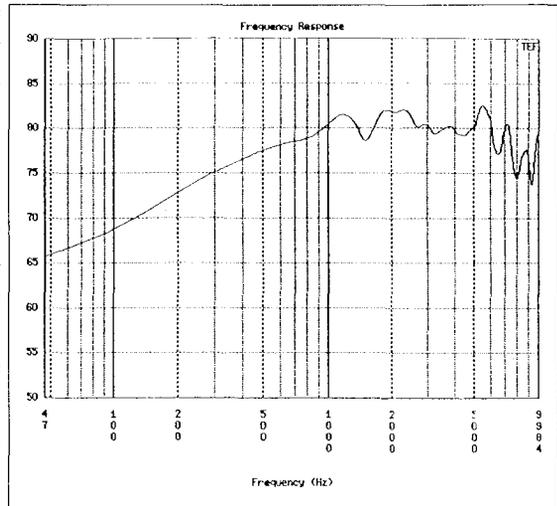


Figure 2

level allows, is that once you have obtained the entire impulse response record you can then go back and edit out any portion of it for further study (using the two cursors) without having to remake the measurement. This is particularly ideal when studying ratios of direct-to-reflected sound in concert halls and other large auditoria.

The cautions with MLS are its sensitivity to ambient noise levels and the necessity to always obtain the entire impulse record.

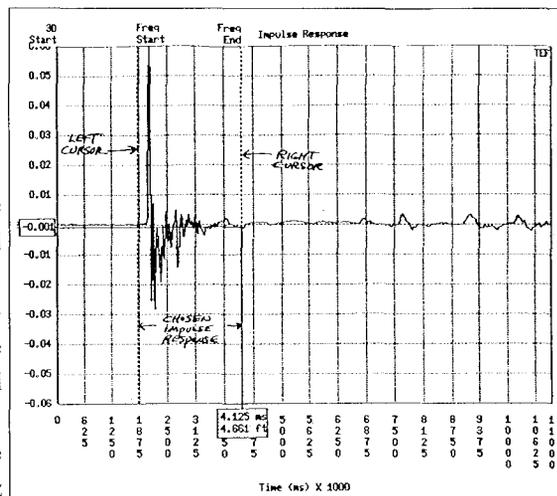


Figure 1

Contractor's Corner

A Simple Way to Estimate Impedance

When interfacing line level signal processing equipment, a careful check of input and output impedances is highly recommended. One of the best tools for this purpose is the TOA impedance meter.

But what does one do if such a meter is not available? One economical solution is to purchase dual banana plugs and 10K resistors from Radio Shack. Place a resistor across each plug. You now have a 10K "dummy plug" to aid you in estimating the output impedance of a device. Inject a sine wave into the device under test (DUT) and place a

"dummy plug" across the output. Does the voltage change? Continue adding plugs until the voltage begins to drop. Count the number of plugs that you added and calculate their parallel resistance. This is the minimum input Z that this DUT should operate into (assuming that a constant-voltage condition is to be maintained). If you continue to add plugs until the output voltage is one-half of its open circuit value, the total parallel resistance of the plugs will equal the output impedance of the DUT.

Term-Pro: Box Design for the Rest of Us

During the second May Farm class this year, people attended from the car stereo industry. We found their insights into audio both fascinating and educational, and have a new respect for this huge market and many of its technologies. One member of the group was Wayne Harris, Director of Research and Development for



Rockford Fosgate. Wayne, a gifted programmer, shared with us his enclosure design software program, TERM-PRO.

Term-pro is designed to take the box designer from concept to finished product, providing all of the necessary data along the way. A database of 800+ devices is included with the program, and can be updated as required. The designer has the option to design an

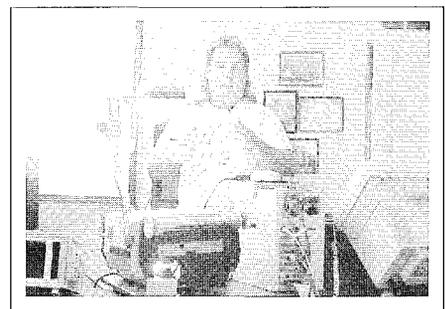
enclosure for an existing loudspeaker or find a loudspeaker for an existing enclosure. The program will quickly tag all drivers that will work properly in a user specified enclosure size. This is especially helpful in situations where enclosure dimensions are constrained by the application at hand.

Once a desired loudspeaker is selected from the database, the designer can choose from 20 enclosure types. The choices included the standard sealed and ported boxes, as well as a multitude of more "esoteric" enclosures, including many multi-order and isobaric types. Port design is simple and straightforward, allowing user control over all port parameters.

Term-pro is not limited to box designs only. A passive crossover calculator allows the designer complete control over filter type and slope, and even rounds components off to commercially available values if desired. Once designed, the response of the crossover/box combination can

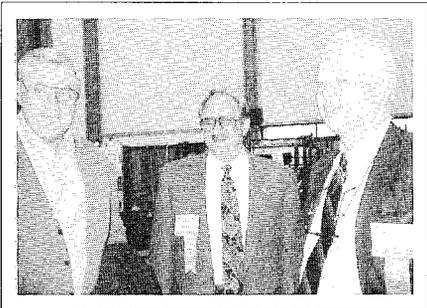
be plotted.

Term-pro is a valuable tool and is highly recommended for anyone with an interest in building boxes. I found the interface to be intuitive and the documentation and support well above average. Term-pro is a DOS application that can be run under Windows if so desired. The manual is well written and will serve as an excellent primer for enclosure design. Please contact Wayne Harris at 1-602-967-3565 Ext. 3079 for more information.

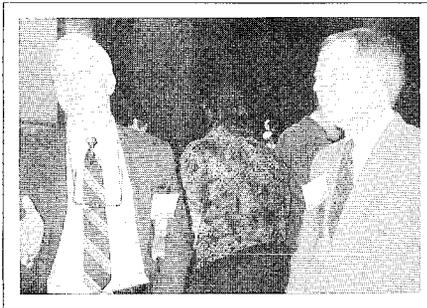


Wayne Harris speaks to the class.

Biamp and Sound Contractors



Don (L) with Rauland president, Ken James (C), and Ralph Lockhart (R).

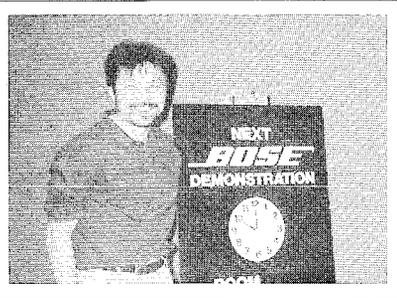


Biamp president, Ralph Lockhart (L), with Tom O'Brien (R) who is moving from Rauland to Biamp.

We are particularly heartened to find that Tom O'Brien (shown above with Ralph Lockhart, President of Biamp) will be moving from Rauland headquarters in Chicago to Biamp in Portland, Oregon. (Rauland and Biamp formed an affiliation about four years ago.) Tom's move is to enable

Biamp to better serve sound contractors and coordinate their future designs to sound contractor's future needs. Combinations like these possess remarkable synergy and we eagerly await output from this team.

Bose Update



Akari Mochimaru looking very happy in his new job at Bose.



Phil Nelson with Don Davis

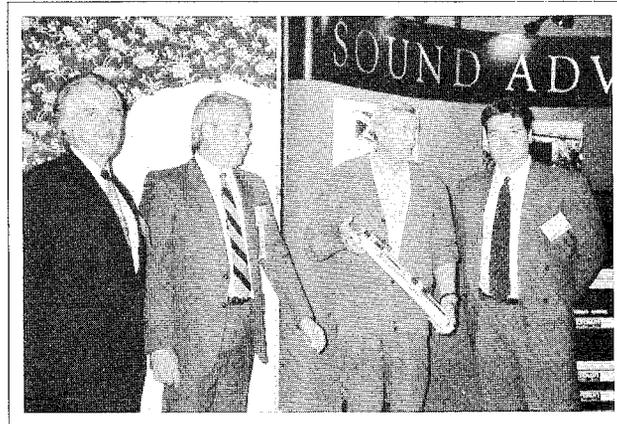
Bose has hired some fine Syn-Aud-Con grads, the latest being Akari Mochimaru. Phil Nelson also works for Bose, as does Cliff Hendrickson.

We are always pleased to see and visit with friends and to hear they are doing well. Akari has learned the "American Way" and has tried more than one company as an employer (first Altec, and now Bose).

Men of this quality and with backgrounds of this diversity have to make a difference in their work environment.

Sound Advance

Last April at the NSCA demo room we met Jim Schuessler from SOUND ADVANCE SYSTEMS, formerly B.E.S.T. The demo room held an impressive demonstration of not only their ceiling loudspeakers, but also that of their competitors. The overall quality was good, however, the focus of their demonstration was to show the benefits and disparity of SOUND ADVANCE SYSTEMS wide angle dispersion. Due to their polystyrene planar technology, the results of the demo were twofold; it clarified the difference between the coverage pattern of their devices vs conventional cone loudspeakers and proves to be cost effective by using fewer devices when utilized in a distributed sound system.



(L-R) Bill Scheirman, Alex Bertagni, Don Davis and Jim Schuessler.

HME Needs Service Contractors for Their Drive-Through Intercom Systems



That is Ed Burquez of Sound Engineering Services in Huntsville, AL, giving his business card to Asmar Al-Qawi of the Service Dept. at HME. Ed walked into the HME booth at NSCA and heard us talking to Asmar about their need of making

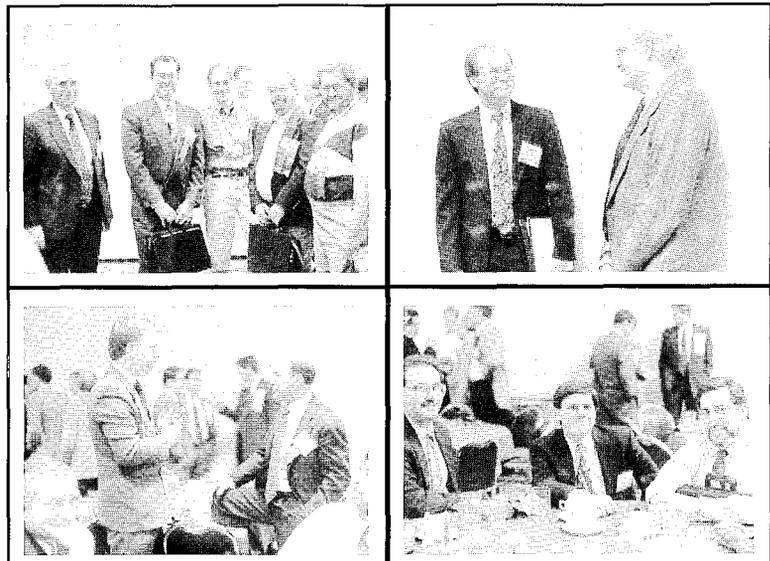
contact with sound contractors to provide service for their intercom systems in fast food drive-throughs. Ed was very interested and if you are interested in knowing more about their program, call Asmar Al-Qawi at 619-535-6086 or fax. 619-552-0172

Address and Phone Number Correction for Jesse Klapholz

In the last issue of the Newsletter, Vol 21, #3, P 14, we told you how you could order the reprint of Acoustical Engineering by Harry Olson, but we gave the wrong phone number for Jesse Klapholz. His new address is P O Box 11206, Elkins Park, PA 19027, Ph 215-548-7238, fax 215-548-3423.

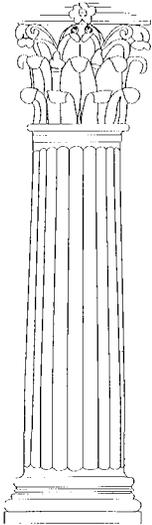
The Giants

Many of the younger generation tell me that they envy my having known James B. Lansing, Robert Stephens, John Hilliard, Avery Fisher, Paul Klipsch, and other giants in their hayday. Well, such giants are just as available today and will be looked back at as remarkably capable innovators. Harro and Ralph Heinz are two such individuals. Just like the above mentioned greats, they are just trying to make a living - but like the giants, they have brought that something extra to the party - namely creative innovation expressed in manufactured products.



Photos taken at the Renkus-Heinz breakfast meeting for consultants at NSCA.

Pythagoras (569? - 500? B.C.)



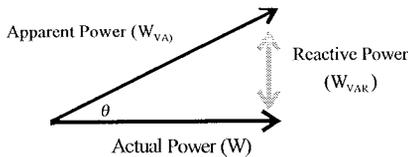
Before Pythagoras it had not been clearly recognized that proof must proceed from assumptions. Pythagoras imported proof into mathematics. Devastated by the square root of two, brought forward by his great gift to engineering, $a^2+b^2=c^2$ for the right triangle, he nevertheless is one of history's greatest mathematicians.

Today we use his right triangle formula to solve problems in:

1. Impedance
2. Power
3. Acoustics
4. Finding Heights

and many, many other applications. We have shown the trigonometric forms as they are the quickest to use with today's calculators.

The Power Triangle



$$W = W_{VA} (\cos\theta)$$

$$W = \frac{W_{VAR}}{\tan\theta} \quad \text{Average Power}$$

$$W_{VA} = \frac{W}{\cos\theta} \quad \text{E*I=W Power}$$

$$W_{VA} = \frac{W_{VAR}}{\sin\theta}$$

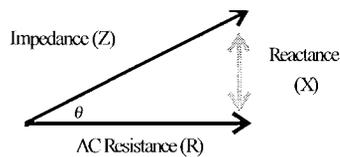
$$W_{VAR} = W(\tan\theta) \quad \text{Reflected Power}$$

$$W_{VAR} = W_{VA}(\sin\theta)$$

VA is Volt Amperes

VAR is Volts Amperes Reactive

The Impedance Triangle



$$R = Z(\cos\theta)$$

$$R = \frac{X}{\tan\theta} \quad \text{AC Resistance}$$

$$Z = \frac{R}{\cos\theta} \quad \text{Magnitude of the Impedance}$$

$$Z = \frac{X}{\sin\theta}$$

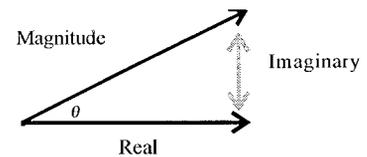
$$X = R(\tan\theta) \quad \text{Reactance}$$

$$X = Z(\sin\theta)$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$\theta = \tan^{-1} \frac{X_L - X_C}{R}$$

The Acoustic Triangle



$$\text{Real} = \text{Mag}(\cos\theta)$$

$$\text{Real} = \frac{\text{Imag}}{\tan\theta} \quad \begin{array}{l} \text{Impulse Response} \\ \text{in Time Domain} \\ \text{Coincident Response} \\ \text{in Frequency Domain} \end{array}$$

$$\text{Mag} = \frac{\text{Real}}{\cos\theta} \quad \begin{array}{l} \text{Energy-Time Curve} \\ \text{in Time Domain} \end{array}$$

$$\text{Mag} = \frac{\text{Imag}}{\sin\theta} \quad \begin{array}{l} \text{Energy-Frequency Curve} \\ \text{in Frequency} \end{array}$$

$$\text{Imag} = \text{Real}(\tan\theta) \quad \begin{array}{l} \text{Doublet Response} \\ \text{in Time Domain} \\ \text{Quadrature Response} \\ \text{in Frequency Domain} \end{array}$$

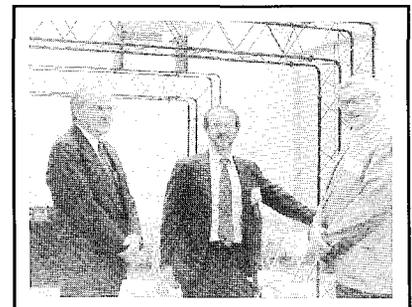
$$\text{Imag} = \text{Mag}(\sin\theta)$$

$$\text{Mag} = \sqrt{\text{Real}^2 + \text{Imag}^2}$$

$$\theta = \tan^{-1} \frac{\text{Imag}}{\text{Real}}$$

Frazier Update

We ran into Jay Mitchell at the Frazier room at NSCA. Hugh Donnell of Frazier and Jay spent time with Carolyn and I bringing us up-to-date on the new engineering developments at Frazier. Jay has been productive in design at Sonics in Alabama and at home with a brand new baby.



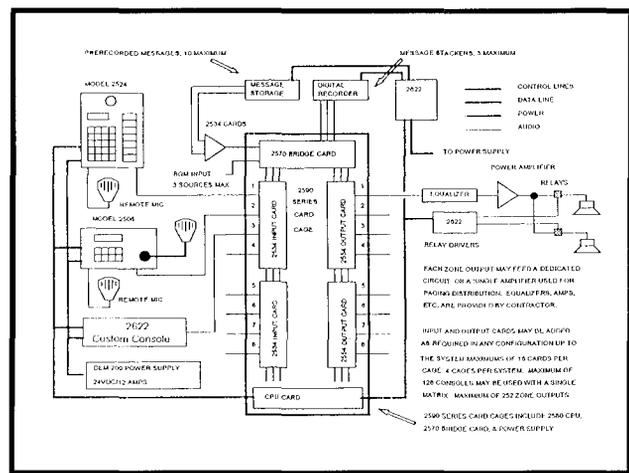


AMSYS

ANNOUNCEMENT MANAGEMENT SYSTEM



Altec Lansing's new Announcement Management System is currently being installed in the Zhuhai International Airport located in the People's Republic of China. The Announcement Management System is a microprocessor based, computer controlled paging system. Features include zone and group paging, emergency paging, background music control, message queuing and stacking, and playback of prerecorded messages. Although development of the Announcement Management System was primarily aimed at the transportation industry, it is being specified in many industrial applications as well. The single line diagram shown here indicates the configuration of the system and its components. The Announcement Management System is a part of the Mark IV Audio Control Technology family of control products. Over 100 Mark IV ACT systems have been installed throughout the world.



Roe, Versus, Wade



Readers of the Newsletter may recall that awhile back we found two little puppies that had been thrown out on the highway and we adopted them. We named them Roe (female) and Wade (male) as a mild protest regarding any young life.

A member of one of the farm classes remarked that the next dog that strayed in should be called "Versus". Well, in April "Versus" arrived in the form of a "Poozur" - half poodle, half Schnauzer. Or is it a Snoodle?

Nowdays, when I call the dogs to come for their dinner, the woods resound with Patch come! Pedro come! Roe Versus Wade come!

Carolyn advertised in the local newspaper trying to find the owner of the stray dog, as well as calling animal shelters, lost and found departments, and neighbors. At 8:00 a.m. after the Friday evening ad, a man called and was certain that the dog as described to him, which he had lost four months earlier was his dog.

Carolyn wanted to take a picture of the dog as a remembrance of having rescued it. This is as clear a picture as you will ever get of ole Don completely depressed.

When the man arrived, he took one look at the little growling dog and said it was not his. We asked how

come he saw our ad after four months, and he said that he read the lost and found column every day!

The second picture, reading right to left, is Roe, Versus, Wade. Roe and Wade instantly sensed that Versus, in spite of his small size, was an integral part of their life pattern and they wait each morning to share their outing with him. Versus loves riding in the red truck; the others like the back of the truck, and when on the ground can run for several miles at a steady 15 mph beside the motorcycle.

If a previous owner showed up now, he would have a fight on his hands.

Men of High Fidelity

Early this year the audio world lost two decent men when Bert Whyte and Avery Fisher passed on. Both of these men were a formative part of our audio education.

Bert Whyte

We met Bert Whyte when he was at Concord Radio in Chicago. I proudly told him of having Altec 604s in our hi-fi shop in Indiana. He waved his hand and said, "Oh, I left that years ago." He then demonstrated to me the superiority of horn loaded woofers.

When Bert went to Magnacord in the early 50's to help develop the first binaural tape recorder, we were drawn into the project as a user and the first binaural recordings of Dave Burbeck when he performed at Purdue University.

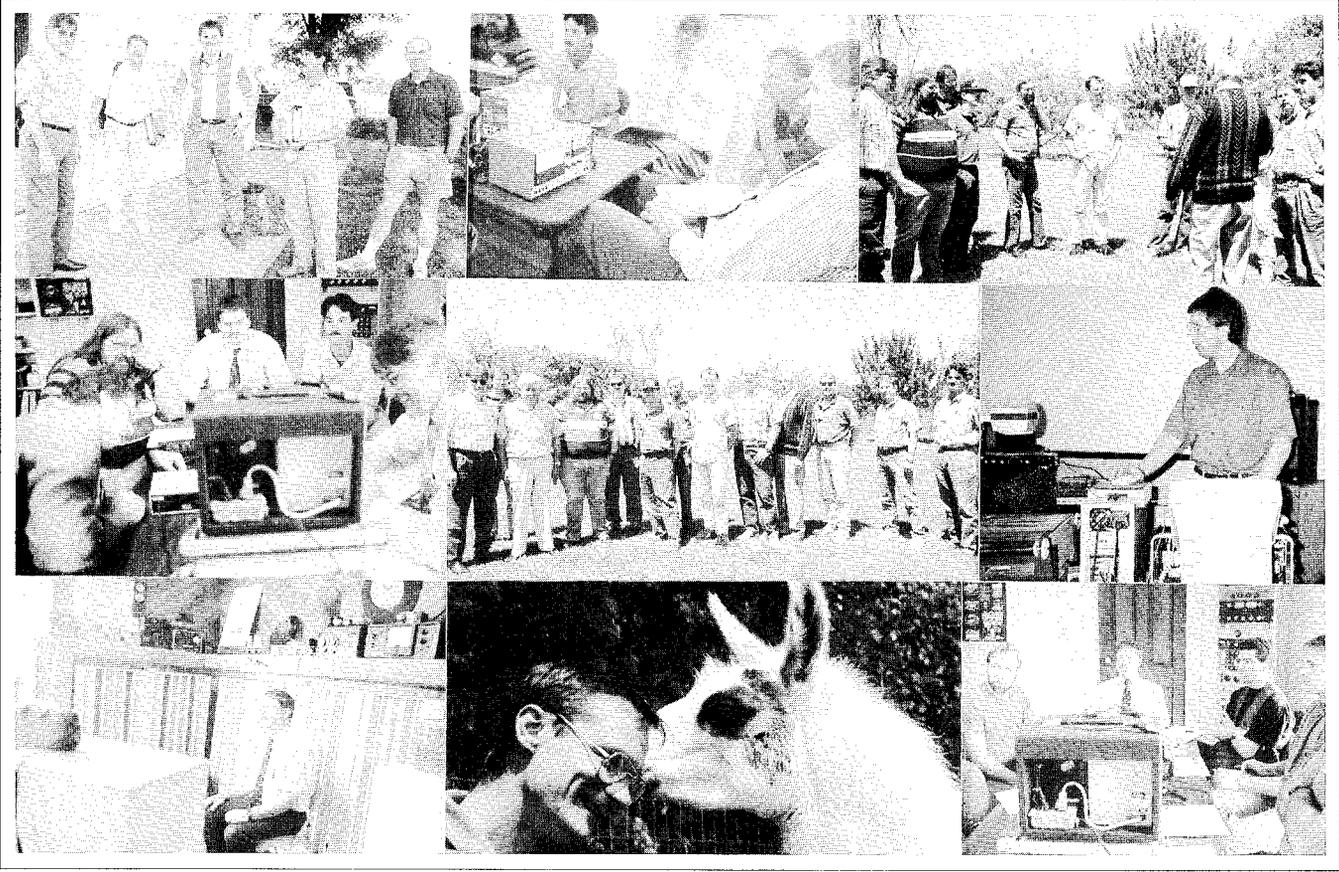
We maintained contact with Bert over the years and he occasionally called on us for our thoughts on measurement procedures.

Avery Fisher

Avery Fisher was our first quality product line at our "Golden Ear" stores in Indiana back in the early 50's. Imagine my surprise when years later Mr. Fisher recognized me at the Waldorf Hotel in the hall and called me by name, remembering the Golden Ears days of almost 30 years earlier. He was a famous man, but he still remembered and identified with his friends at the beginning. It would be difficult not to admire such a man.

Those early days of our hi-fi shop were the days when the great men of hi-fidelity personally traveled around the country to hi-fi shops promoting their products: Frank McIntosh and Gordon Gow, Saul and Jean Marantz, Paul Klipsch, Rudy Bozak - to name only a few.

May Farm Class ~ May 11-13, 1994



Mark Ureda - Refining the Ways We Use Horns

Mark gave an interesting paper at a special Altec meeting during NSCA, covering predictability of array behavior. Mark has arrived at the same conclusion that Dr. Patronis has, namely that phase vs. angle for a horn and driver combination is not a parameter we need to consider since merely rotating a driver on a horn will vary the data significantly. We do need to account for the propagation times of multiple devices arriving at our listeners.

The significance of all this is that Mark has examined the measurement choices available, screened them for relevance and practicality, and arrived at a system that manufacturers can economically employ to give us invaluable product data for array design.

The picture shows Mark's good natured response to Don's instruction on "finger pointing."

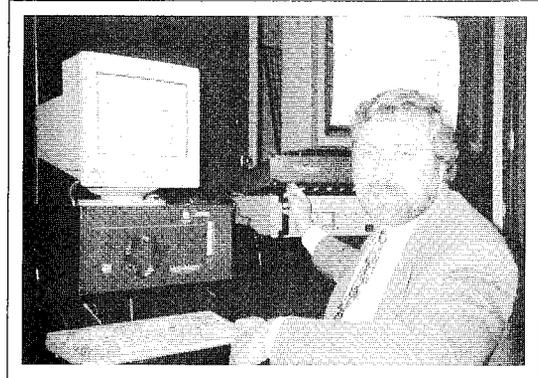


**Rich
Zwiebel**



Syn-Aud-Con graduate Rich Zwiebel is a man we admire for his gentleness and genuine love of audio. Rich is up to his armpits in the Peavey project for software control of complex sound systems. Knowing both Rich and Hartley Peavey, we have little doubt that some time in the future a worthy product will emerge.

What's given us the white hairs over the past six and one half decades is the lesson that you never spec anything



that hasn't already been successfully utilized on a real life job you can go and study. At the present time, only IED and the Crown IQ System meet that all important qualification.

The future is wide open.

SHOULD WE LAUGH or CRY?

Mike Harrell, Technical Operations Manager at Ambassador Enterprises in Portsmouth, VA, sent us a "SMILE" which we have to share. He says that the following specification proves that the TEF is becoming obsolete. Mike assures us that this is a real spec. As for the name of the project, he says "I'm afraid to tell you!"

Gymnasium System:

After the system has been installed initially, the Contractor shall perform an analysis using the real time analyzer type test equipment in the Gymnasium to assure proper aiming of all loudspeakers and proper adjustment of the relative sound output level of each loudspeaker system. The level of direct sound and the intelligibility level shall be measured at an average number of locations throughout the Gymnasium. Sound levels and intelligibility shall be adjusted at each step to assure that levels are matched between the front and rear of the Gymnasium. The instrument shall then be used to equalize the system. All tests shall be printed in hard copy format and given to the Electrical Engineer for review.

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.

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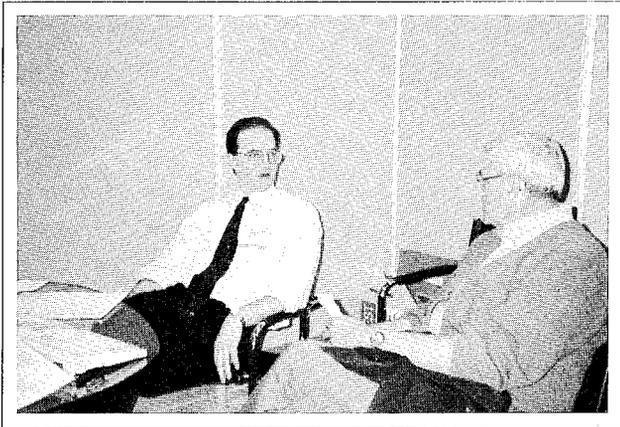
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ShuttleCad

Mark Burgin was on hand at NSCA in the CAD section that NSCA has so wisely provided to the industry at no charge. The ShuttleCad computer program is receiving wide manufacturer support and is rapidly becoming an industry standard.

We had a chance to sit and talk with Mark at NSCA. They had a training area and we were impressed with the progress they are making and the support they give this program.

Contact the U.S. distributor at Acoustical Supply International, 100 Cherokee Boulevard, Suite 211, Chattanooga, TN 37405, Ph-(615) 752-1720 or fax (615) 752-1725.



Classified Ads

WANTED: "Broken" GenRad 1933 SLM. Need the parts. Contact: Ray Rayburn, Sound Visions Consulting, 1184A West Corporate Drive, Arlington, Texas 76006. Ph: 817-640-7300, Fax 817-633-5920.

FOR SALE: TEF 20 HI, Rane SP-15 Studio Parametric EQ, Stewart MM4-S Stereo Mixer, Stewart PA-100B Amp, Furman PL Plus AC Power Conditioner w/lights, AKG SE300B Condenser Mic w/CK-92 Capsule, TOA F-155G Test Speaker, Mogami Mic Cables (100' and 60'), AKG Boom Mic Stand, Speaker Stand, SKB Rack (6 spaces), TRS Patchbay (unwired). Also has all necessary cables to wire the patchbay. Dealer cost is approximately \$8000. Asking \$6,500. Contact: Paul Goure, Technical Industries, 6000 Peachtree Rd. NE, Atlanta, GA 30341. Ph: (Work) 404-455-7610 Ext. 322; (Home) 404-736-9011.

AVAILABLE: I would like to utilize my 17+ years experience in Professional Audio Design Engineering and my Apple MacIntosh & IBM PC programming knowledge, as well as DSP, and analog and digital circuit design experience with your company. Familiar with graphics, the MAC and PC operating systems, MPW development environment using Pascal and C, MS Windows, Object Pascal, Serial Communications, and user interface design on both platforms. Also Motorola 56,000 DSP Coding as well as analog and digital circuit design. If you have no current full-time opening, perhaps you would entertain some project/contract work, as I am fully equipped both on the Apple MacIntosh and IBM PC platforms, having my own development equipment, to help in any project you may have. Contact: Brian Flinn, 58051 CR 13, Elkhart, IN 46516, Ph: 219-875-1379.

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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.

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