

Volume 20, Number 1 Fall 1992 ©1992 Don & Carolyn Davis







As with children, what we planned and what came to pass are two different things, but, again when things are left in God's hands, what has happened far exceeded what we had planned. Syn-Aud-Con has been generously helped by thousands of friends and shaped by them as well.

Those who helped us felt, as we did, that those that follow us should have an easier path insofar as that is in our power. They felt deeply the irresistible power of sharing and the long term value of the best way rather than the easiest way.

Two decades have taught us a great deal. One doesn't experience aging when daily challenged by equally eager-to-learn students. A certain peace comes to those of us who through experience, have found that the untruthful always are found out, the ruthless chastised, and that the life of the mind satisfies better than the life of the physically oriented.

Audio and acoustics - this wonderful combination of Science and Art with its as yet unsolved mysteries and its elegant solutions. The thousands of books read and the thousands yet to be read - all that makes the dawn of each day an exciting and fulfilling adventure.

God pity those not in love with what they do. The common golden thread shared by Syn-Aud-Con grads and staff all over the world is their love for their work.

In twenty years, we have encountered only a minuscule number of "turned off" people in our classrooms. The motivated ones have come to us. Motivated by the beauty of really good sound, motivated by the purity of engineering truth, motivated by the fellowship of fellow sharers, and motivated by a love for a tiny technical industry that contains a remarkable number of entrepreneurial run companies. It has been our joy to share these twenty years with you.

ETYMOTIC RESEARCH

ER-15 MUSICIANS[™] EARPLUG ER-20 HI-FI[™] EARPLUG ER-25 MUSICIANS[™] EARPLUG

Etymotic's literature on hearing plugs addresses such a basic need in the live concert sound industry that we are reprinting it here in its entirety.

Problems With Conventional Earplugs:

There are three basic problems with conventional earplugs. Most important, they produce 10 to 20 dB of extra high frequency attenuation; second, they have a large occlusion effect, which makes the user hear their own voice with a boomy quality; and third, they attenuate more than necessary for much of the noise in industry and the environment. A frequent result of these problems is that some people will either wear no protection or they will wear their earplugs loosely so that sound such as speech, machinery, noise or music can be heard more clearly.

Solutions Provided by the Etymotic Research Earplugs:

The ER-15 and ER-25 Musicians Earplug and the ER-20 Hi-Fi Earplug provide nearly equal attenuation at all frequencies. The fidelity of the original sound is preserved, and the world doesn't sound muffled. Musical levels are attenuated with minimum change of tone quality.

To reduce the occlusion effect, a deep seal of the plug in the second bend of the car canal is necessary. This is made possible by using a custom carmold. The ER-15 (black connector nipple) and ER-25 (white connector nipple) are interchangeable in a custom earmold -- they are snapped into place -- while the ER-20 is available with a different but generic eartip.



Theory and Design of a Flat-Response Attenuator:

A flat-response attenuator must have a frequency response that follows the shape of the natural frequency response of the open car, but at a reduced level. Both the ER-15 and the ER-25 use a diaphragm, similar to a passive speaker cone, to achieve the desired response curve. The ER-20 uses a tuned resonator and acoustic resistor.

Applications for Flat-Response Attenuators:

There are two groups of people that can benefit from the use of these plugs. First are people exposed to 90-120 dB sound levels, who need to hear accurately. This group includes musicians, their sound crews, recording engineers, night-club employees, certain industrial employees such as machinists and foremen, racing pit crews, motorcycle riders, etc. Second are people whose hearing may not be at risk but who want to hear without discomfort, and who will not wear conventional hearing protection because they need to hear more clearly. This group includes regular airline or auto travelers and individuals that occasionally attend loud concerts. Musicians will find the ER-15 and ER-25 attenuators useful in reducing discomfort and ear fatigue without sacrificing clarity. The greater attenuation of the ER-25 should prove useful to percussionists, rock musicians and to individuals that experience post-exposure tinnitus.

Estimated End User Cost

ER-15 with Custom Earmold	\$120 to \$150	per pair
ER-20 with Generic Earmold	\$ 20 to \$ 30	per pair
ER-25 with Custom Earmold	\$120 to \$150	per pair

Further information may be obtained by contacting Etymotic (et-im-OH-tik) Research, 61 Martin Lane, Elk Grove Village, IL 60007. Tel. (708) 228-0006 or fax (708) 228-6836 or by calling any of the below:

All American Mold Lab	405-232-8144
Earmold Design Inc.	800-344-6466
Earmold Design/Canada	519-893-5550]
Great Lakes Earmold Lab	216-842-8183
Earmold Research & Lab	913-469-6509
Microsonic Laboratory	800-523-7672
Mid States Lab	800-247-3669
Precision Mold	800-327-4792
Westone Laboratories	800-525-5071



We first encountered Harry Donovan at a JBL sales meeting where he made an unforgettable presentation on the dangers of careless rigging practices.

Therefore, when we were asked to work with a large multi-ton cluster by a friend, we suggested that he hire Harry Donovan to have a look at it. Thank God! To make a long story short, the entire setup was not safe and was being used in a public building where many users operated under the array.

Rarely have I read a more complete and succinct report. Twelve pages long and accompanied by 30 very clear photographs of the problems described. It included specific recommendations for corrections (expensive) both short term and long term.





Above: One of four main support cables for speaker cluster. Wire rope clamps are the malleable kind, not approved for overhead lifting. Thimble is askew. There should be four clamps, not just two. There should be 15 inches of layback, but there is only about 5 inches.

Above: Pulley for endless line for horizontal travel. Note that pulley is wrong type. It was designed for 1/2" rope, not 1/4" wire, and the wire has worn deep grooves in the sheave.

Mr. Donovan can be contacted at: Donovan Rigging, Inc. 2416 Third Avenue West Seattle, WA 98118 206-283-4419

Skilled men like Harry Donovan don't grow on trees. We know there are other skilled men out there, but Harry is the only one we've personally seen perform and to the highest standards. Mathematical Psychoacoustics from Head Acoustics





We recently had the pleasure of a visit from Wade Bray of Sonic Perceptions, the company formed in the United States to import and distribute the Aachen Head, now called Head Acoustic. He brought with him, as a gift from Mahlon Burkhard, the head of Sonic Perceptions, a new 50 page book, "Computer Aided Classification of Sound Events" with the sub title "Taking into account the psychoacoustic characteristics of human hearing."

This book is a remarkable compendium put together by their parent company, Head Acoustics in Germany. In this volume they provide mathematical and measurement procedures for all the auditory sensations including what hitherto had been regarded as purely subjective judgements such as "Sensory pleasing sound, annoyance, sharpness, and fluctuation strength."

The flow chart shown here is but the tip of an enormous iceberg of meaningful measurement techniques.

We may well be approaching the time when psychoacoustics will no longer mean slight of hand selling by loudspeaker manufacturers.

Using NLA to Monitor Concert Sound Levels

Leq definition

Equivalent sound level. The dBA level of a steady state sound which has the same dBA weighted sound energy as that contained in the actual timevarying sound being measured over a specific period of time.

Farrel Becker has used the various inputs from the field, such as ours in Branson, MO, regarding the effectiveness of using Leq as the best method of assessing when a performance is excessively loud in an audience. He has rewritten the Noise Level Analysis (NLA/program) into a perfect tool for these measurements.



Our interest in the case of Branson, MO, was to measure audience annoyance due to excessive levels. These are quite different from hearing conservation measurements. The personnel in Branson quickly established a criteria of an Leq = 87-90 dB for country western music. Farrel mentions the English A weighted Leq of 104 for audience hearing conservation purposes.

In our opinion anyone sitting in a scat with an Leq A weighted of 104 dB doesn't need his or her hearing examined but their mental capacity for remaining in the presence of such a sound field.

This is the first viable measurement system for these purposes that Syn-Aud-Con has seen. We believe it will prevail. Leq appears to be an absolutely marvelous predictor of audience annoyance once a series of successful concerts are measured to use as criteria.

Larry Hampton, sound engineer for The Grand Palace in Brandson, has made Leq measurements of each performance since receiving his TEF 20. He says he can be sure that complaints will rise when the Leq goes higher than 90 dB for the performance.

Using NLA To Monitor Concert Sound Levels by Farrel Becker

There is beginning to be a great deal of interest paid to the monitoring of concert sound levels, both for purposes of hearing conservation and community complaints. Whether the purpose is to determine what the sound levels are or to monitor sound levels in order to comply with sound level regulations or contractual requirements, NLA provides a useful way to monitor sound levels during concerts.

There are two useful ways to observe concert sound levels: by obtaining an Leq over the duration of the concert, or by specifying the percentage of the total time of the concert that some preset sound level limit was exceeded. There is, for example, a proposed regulation in England (by the Health and Safety Executive) that the Aweighted Leq over the duration of a concert may not exceed 104 dB. An alternative regulation might specify that 104 dB may not be exceeded more than 10% of the time.

NLA may be used by both the enforcing agency and the concert sound mixer. The enforcing agency would use

NLA to obtain the Leq and/or the Ln for the sound level limit at the end of the concert.

The sound mixer would use NLA to monitor the Leq during the concert. By observing the continuously updating Leq indicator on the NLA screen the mixer can monitor the progress of the Leq. If the Leq is nearing or above the limit, the levels can be reduced accordingly and bring the Leq back down to comply with the regulations. This capability allows the mixer to chose when to make it loud and when to reduce the levels.

In any situation where concert sound levels are being measured to enforce a regulation, some means of discriminating against noise generated by the audience is required. As the audience is often extremely loud, it would be unfair to the sound mixer to include these sounds that he has no control over in measurement. NLA's mute feature may be used to exclude audience or other sounds not generated by the sound system.of the concert.



TIME

- 1. Clock Time
- 2. Relative Time
- 3. Signal Delay
- 4. Phase
- 5. Polarity
- 6. Group Delay
- 7. Hilbert Transform

CLOCK TIME

"Time flows endlessly like a river and you can't put your foot in the same river twice" so spake the ancient philosopher in bygone Greece. Clock time is based on the rotation of our planet and it's base unit, the second, has a specific definition "The duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium - 133 atom" (The IEEE Standard Dictionary of Electrical and Electronics Terms).

The concept of time is nebulous and has been shown to contract with increased velocity. No one knows the resultant velocity of the planet earth as a result of all the possible influences. Since the "big bang" (or whatever other theory you prefer) we can't be sure how universal our concept of time is, but at least locally, it can be a useful parameter.

RELATIVE TIME

It's forty five minutes from the farm to Bloomington. When? Starting now? Last week? The time described here is relative time and is found by establishing an arbitrary zero reference and accounting for elapsed time from that zero. The American Indians had little sense of time and those who had participated in the Custer defeat stated in 1935 to a sympathetic interviewer that the fight lasted for as long as it takes the sun to cross the poles at the top of a Tepee (about twenty minutes). Here at the farm (where I don't wear a watch) we have early morning (5:00 a.m. to 8:30 a.m.); morning (8:30 a.m. to 12:00 p.m.); lunch (12:00 p.m. to 1:00 p.m.); afternoon (1:00 p.m. to 5:00 p.m.); and evening (5:00 p.m. to 10:30 p.m.). These five periods are easily recognized by the natural rhythm of our work day and the unit of an hour is a perfectly acceptable plus or minus tolerance.

SIGNAL DELAY

When working with sound systems, as much as one might wish to do so, we can't delay time. We can't even delay relative time. What we can and do delay is the signal. Alas, we just as often wish for a noncausal anticipating signal device as we do for a time delay. Neither is, or is likely to be, available.

In signal synchronization milliseconds is a long time unit. A significant parameter to remember is 74 usccs per inch (73.75 to be tediously exact). The dimensions from one inch to about three feet are audible on-axis but the real danger is that they change the polar response of two devices covering the same frequency range and audience area. The lobes in many cases go straight to the "hot" microphone and are higher in level than the "on-axis" lobe.

PHASE

There is absolute phase which viewed on a TEF analyzer is a straight line sloping downward to the right hand side of the screen. This is a measure of signal delay. There is relative phase which starts from a time zero that coincides with the first energy arrival. Phase is frequency dependent by definition. The IEEE dictionary defines relative phase as "the fractional part t/p of the period P through which t has advanced relative to an arbitrary orgin. Note: the origin is usually taken at the last previous passage through zero from the negative to the positive direction."

To obtain the phase angle in degrees, multiply the phase by 360. To obtain the phase angle in radius, multiply by 2π .

Since phase is "frequency dependent" it is also "wavelength dependent"

$$\lambda = \frac{c}{f}$$

Where:

- λ is wavelength in ft or m
- c is the velocity of sound in ft/ sec or m/sec
- f is the frequency in Hz

Because sound continues to nearly pressure double (5.5 dB) up to 70° phase shift, then a pressure zone for 50 Hz can be

$$\frac{70^{\circ}}{360^{\circ}} \left(\frac{1130}{50}\right) = 4.4 \text{ ft.}$$

In electrical circuits we use ELI the ICEMAN to know when voltage E leads current I as when inductance L predominates and the reverse when capacitance C is predominant.

In acoustics the phase variations we measure in the sound pressure squared level are the result of the participation of kinetic and potential energy. (pressure is potential energy). For a free progressive wave in a free field, the Nyquist display on a TEF Analyzer shows us this partitioning.

POLARITY

The untrained exchange the terms polarity and phase as if they were equivalents. Polarity is quite different from phase in that *it is not frequency dependent*. Polarity does move the arbitrarily chosen point of origin for all frequencies by 180°.

Polarity in everyday usage is the reversing of the connections to a loudspeaker, microphone, or piece of electronic equipment.

When two loudspeakers are polarized, both cones move forward for a positive voltage and rearward for a negative voltage. Phasing two loudspeakers involves moving them about in space until they add coherently. Polarity is audible even on a single channel reinforcement system if a live talker is present. This is because live talkers are "polarized" (the positive going part of the wave reaches a higher magnitude than does the negative going part.)

Deliberate mispolarization can, on occasion, be used to create desired "null" areas where the resultant cancellation keeps undesired energy out of a microphone. Be sure your out-ofpolarity components are creative uses, not an oversight.

GROUP DELAY

This is a term full of wishful thinking and little utility. If I take a record out of its jacket and play it, I may be hearing a "group delay" of many years. As Richard C. Heyser proved, group delay is a term that is correct only for all pass devices (ie. signal delay units that delay all frequencies the same amount).

True signal delay can occur but a group delay measurement is not the way to observe it. There is a minimum phase response for every type of circuit, and there is a phase response generated by taking the Hilbert transform of the magnitude. This results in the minimum phase response for any signal which allows us to observe frequency dependent signal delay in excess of the minimum phase response.

HILBERT TRANSFORM

The Hilbert transform is akin to polarity. The Hilbert transform is also *not frequency dependent*. What it does is move the arbitrary zero origin by 90° for all frequencies. For example, for a Cosine wave the Hilbert transform is a sine wave. For a progressive wave in a free field, the Hilbert transform of the sound pressure (the imaginary response) is the kinetic energy response while the sound pressure response (the real response) is the potential energy. The analytic signal first advocated by Dennis

Gabor and brilliantly exploited and extended by Richard C. Heyser has become readily available via the TEF 20 analyzer.

CONCLUSION

When a parameter has the dimensions in secs, be sure to find out which of the many ways time is being looked at by the measurement. The words we have discussed here are quite often misused or distorted in their meaning. You don't have to wear four wrist watches (for the four U.S. time zones) and a pocket watch set to GMT plus a portable WWV receiver to be timely. Many of us rely on our Heath Master time clock synchronized to WWV and settle for the time to the nearest millisecond. Others write Greenwich and ask for the exact GMT as they don't trust the time given out by those little southern radio stations.

The above sentence will accurately determine what time period you first attended a Syn-Aud-Con class. At one time we had "time outs" for time keeping stories. Nowadays we have no time for them. All of which goes to prove time is a tyrant.□

Children of all

Ages & Sizes

"We feel sorry for the poor folks in the cities." (Carolyn was raised on that saying during the Great Depression to make the children feel special for living on a farm.) The natural habitat for dogs, cats, and children is a large farm. Some children like Megan Reynolds, who lives up at the front of the farm, rode her own full sized horse before she was old enough to go to school. Motorcycles also attract the young of all ages. Frederich Ahnert found riding with Don an exhilarating new experience and before he left to return to Berlin he even became good friends with Poncho the Llama. A slightly larger kid, Jim Bumgardner,



wanted to ride the motorcycle on his own and we're ready to suc him for alienation of affection with Poncho.

Another pair of youngsters is Ron and Jeanic Bennett. Ron is the very talented programmer of the special programmers at Techron that are such an aid in our training classes.

A farm is for the young at heart who are full of the adventure of living, the joy of living things, and the fellowship of like minded friends. \Box

Syn-Aud-Con 1993

Seminar & Workshop Schedule

* 3—Day Seminars—\$550 Farm—Norman, IN

Sound Engineering Seminars

May 19-21 June 17-19 July 15-17 August 19-21 September 16-18 October 14-16

An Assistant Instructor (to be announced) will be present at each of the seminars at the farm. Also class size is limited to 12 so that those attending can have hands-on and work closely with their instructors.

* 3—Day Workshop—*

Live Sound Reinforcement January 12-14, 1993 Chapman University—Orange, CA Fee: \$650

Workshop Chairman:

Will Parry, Signal Perfection, Ltd.

Program Coordinator:

David Scheirman, Concert Sound Consultants

Staff:

Albert Leccese, Audio Analysts M.L. Procise, Showco Randy Siegmeister, Maryland Sound Randy Weitzel, Independent Eng. Mick Whelan, Electrotec

Co-Sponsors:

Paul Gallo, Publisher, Pro Sound News Don & Carolyn Davis, Synergetic Audio Concepts One thing is for sure: Our staff members enjoy the workshop and want to do it again! And, Paul Gallo of Pro Sound News wants to Co-Sponsor the event.

There will be differences in the upcoming 4th Workshop on concert sound. They recognize that the concert-quality sound systems are now being used in houses of worship, in theme parks and at special events. Developments in this field are having strong effects in the fixed-installation sound market.

In addition to our regulars: Workshop Chairman: Will Parry, Albert Leccese, M. L. Procise, David Scheirman and Mick Whelan, we will have Randy Siegmeister from Maryland Sound and Randy Weitzel, independent engineer. Special guests have been invited from a church, from a theme park, plus several other guests. We will demonstrate precision equalization using Acousta-EQ.

We will work together to rig and hang a loudspeaker array, mix a stage, and mix a live musical group.

We expect the Live Sound Reinforcement Workshop to be The Best, but then, David Andrews says we always expect that of every workshop. Of course. Otherwise we wouldn't do it.

Interpreting Phase Measurements

If I wanted a quick test of an audio engineer's competence, I'd hand him a phase measurement to interpret. Then I'd ask questions like:

- 1. Is it minimum phase?
- 2. Is it more than one signal?
- 3. Was the measurement correctly made? Is signal delay or advance apparent?
- 4. Any evidence of polarity reversals?

When we asked Gene Patronis how best to show the non-minimum phase characteristic of a reflection combined with the direct sound, he responded with measurements.

Dear Folks:

Since a picture is worth a thousand words here are a couple.

In Condition One we have a simple loudspeaker. The curves illustrate the usual amplitude and phase response and the associated minimum phase response calculated by the SYSid program. In Condition Two a reflector is placed about a foot behind the microphone. The measured response now shows the comb filtering in the amplitude response. When you examine the phase response, you will observe that it now has an additional overall negative slope. This negative slope implies that a superimposed signal, namely the reflection, is arriving at a later time. The degree of this slope is correlated with the group delay of the reflection.

Best regards,

Hene-

Eugene T. Patronis, Jr. Professor of Physics



The Tennessee "TEFER"

Upon seeing Jim Carey's van we asked him if it is a converted van to which he replied, "no, it hadn't even made a commitment"

This Tennessee "TEFER" who is a devoted husband and father once told an inquirer he had been happily married for fifteen years and then added that he and his wife had been married for 25 years. He also one time introduced his only wife as "my first wife" to a confused assembly.



11

Mark IV Audio Presents: A WORLD CLASS DESIGN SYSTEM

Acousta*QWIK*TM

loudspeaker system design assistance software



One feature almost all CAD programs seem to share is the time it takes to enter the data necessary to obtain the "wire frame" view.

Altec's new AcoustaQWIK[™] utilizes 21 predesigned segments that allow rapid call up and then modification of existing standard designs. We applaud the idea and hope that more programs will build library's of already drawn perspectives.□

Determination of the Relationship Between Low-Frequency HVAC Noise and Comfort in Occupied Spaces

Case Histories Needed

Dr. Norman Broner, Manager Acoustics/Testing at VIPAC Engineers and Scientists Limited, Melbourne, Australia has won a contract from ASHRAE to determine the relationship between low-frequency HVAC noise and comfort in occupied spaces.

Dr. Broner states that "If anyone has a good case history, I would be keen to hear from them by fax or mail." Dr. Broner can be reached at: Victorian Technology Centre, 275 Normanby Road, Port Melbourne, VIC, 3207, Australia. Fax +61 3 646-4370.

Dr. Broner is interested in both acceptable and unacceptable case histories where high level low frequency sound is present and has as its source an HVAC system. \Box

Encouraging Words

In writing about the Live Sound Reinforcement Workshop, we mention that every workshop we put together we feel that it is going to be "The Best"—and if we didn't, we wouldn't do it.

When Ed Burquez of Sound Engineering Svc Co. Inc. of Columbiana, AL registered for Horns: Their Function, Measurement, Arraying & Alignment Workshop in Orlando at First Baptist Church, he wrote:

"Please put me down for the workshop at the First Baptist Church in Orlando in November. I can hardly wait to get there. This kind of workshop and fellowship is what keeps the fun spirit of the audio business alive."

It is encouraging words like this from Ed that makes us eager to share workshops with our grads. \Box

Dr. Diffusor Update



We take special delight in knowing genuine talent. We have been privileged to personally know many of the founders of the audio industry.
Most companies are the result of teams of talent.

In the case of RPG Diffusor Systems and Dr. Peter D'Antonio, we have had the opportunity to watch from the beginning a remarkable conjunction of engincering design, entrepreneuralship, marketing innovations, and an extraordinary, unbelievably energetic winning personality, all in the same human being.

We are always very pleased to see cach forward step by Peter and his company, which is the rightful result of such mental force.

Peter is doing so much important work that we could fill the Newsletter to tell you about it. He has recently produced a White Paper on diffusion and the principles and measurement techniques needed to evaluate the acoustic properties of diffusion. He is chairman of the AES Committee on the Characteristics of Acoustic Materials to develop a standard on non-random incidence testing.

Peter wrote us recently:

"We have completed the design of the directional scattering coefficient (DISC) testing rig. We are soliciting all manufacturers to contribute equipment and funding we need for the monumental testing project. Don Eger has freed some of Farrel's time to help out and I really appreciate it, you know how knowledgeable Farrel is. We are going to call this the DISC PROJECT and we will begin implementing directional information when Akira Mochimaru visits us. I am very excited to be back to basic research; the industry really needs these data!"

The audio industry can rejoice that Peter D'Antonio is "back to basic research".

Hardware Heaven— A Synthesized Function Generation for Under \$1,000



In sound system checkouts, one of the most useful tools is a synthesized function generator. The fly in the ointment is the price charged for satisfactory ones.

Stanford Research Systems SRS in Sunnyvale, CA has announced, what appears to us to be, the perfect solution. Their specifications have normally cost from three to four thousand dollars and their DS335 has a price tag of only \$995.

Working from 1 μ Hz resolution in 1 μ Hz steps up to 3.1 MHz with sine and square waves and up to 10 kHz for ramp and triangular plus Dc to 3.5

MHz white noise with both Log and Lin sweeps that are phase continuous all into 50Ω up as a load impedance makes this unit an exceptional buy.

With operating controls that literally require no instruction manual to operate and with distortion, stability and accuracy that allows it to be a standard for checking your oscilloscopes, analyzers and meters, it would be hard to find a more useful and practical signal generator.

Using direct digital synthesis, the DS335 generates extremely clean output with spacious components less than -65 dB_c and is capable of driving

10 V P-P into 50 Ω and 20 U P-P into high impedance loads.

What do you use such a generator for:

- 1. Sweeping out loudspeaker enclosures for buzzes and rattles.
- 2. Sweeping ring modes in systems during equalization.
- 3. Calibrating other instruments.
- 4. Room exitation for FFT analysis.

If interested in more information, contact Standford Research Systems, 1290 D Reamwood Ave., Sunnyvale, CA 94089. Tel. 408-744-9040 or fax 408-744-9049.

"Live Sound" Video Tape Produced by David Scheirman

Reviewed by Curt Taipale - Technical Director of Grace Church, St. Louis, MO

One day I get this call from Carolyn Davis asking if I would be interested in reviewing David Scheirman's new video called "Live Sound." What Carolyn didn't know is that I had seen the ads for the video and was looking for the slightest excuse to purchase the tape for myself. This was even better. Not only did Carolyn send me a copy of the tape, but now I also had an excuse to study the tape even closer than I might have. Here's what I found.

David Scheirman has done a fabulous job of presenting a surprisingly thorough overview of the basics of sound reinforcement. It is geared for the musicians and vocalists in a rock band, but the material is so cleanly presented that it is totally relevant to a much wider variety of viewers than maybe even David may have surmised.

Think of it - here's this tape loosely geared for rock & roll bands, and I took it and played it for my audio ministry volunteers at church as the first step in a structured training series to teach them the basics of sound reinforcement. Each of my students told me that they loved the tape, that it was both enlightening and entertaining at the same time. These are guys that, before viewing the tape, were on a par with most musicians in regards to their knowledge of audio, maybe even less aware. And they thoroughly enjoyed the experience of viewing the tape. I have to say that I also learned a few things myself.

The tape is also good viewing in its own right. I mean to say that the videography is very attractive. The whole tone of the tape is professional yct friendly, with no overindulgence of effects, in either audio or video. The graphics in particular are appropriate and tastefully done. And at 75 minutes running time, it's a comfortable viewing length as well.

The tape is nicely compartmentalized into sections including Equipment Selection, Loudspeaker Placement & Setup, Mic Selection and Placement, the Monitor System, Mixer Position, System Assembly & Cable, Power Amps, Running the Mixer, How to Soundcheck, Crossovers, Signal Processing & Effects, Equalization,

The tape was sponsored by JBL,

Shure Brothers, Soundcraft, ART and UREI, and they never let you forget it either. At nearly every break between sections there is a full-fledged commercial for each company's favorite product of the moment. It was interesting to note the comparison between my reaction at those breaks and that of my students. Mine was one of interruption here I was happily learning new audio truths, and now I've got to sit through some commercials? I can't fault the sponsors for putting those commercials in there, but I was a little put off by how they were placed. I got the same feeling I do when I go a a movie theatre and get forced to sit through a commercial for some new car. The interesting part for me was that my students reacted quite differently than I did. They

were very much drawn into the commercials, and even started asking me questions about the various products mentioned.

Having said all that, I must admit that I actually liked the commercials in that they were equally wellproduced as the rest of the video, not too awfully long, and fairly informative. My preference would have been to stack them all up at the end of the tape.

Y'know what the real kicker was? Granted, my audio students were a captive audience, and they loved the video. But I also invited all of the musicians and singers in our worship team to view the tape. Through all my attempts, I only got <u>one</u> drummer to watch the tape. One lone musician. I'm not sure what that says, but take it for what it's worth.

The bottom line - many thanks to David Scheirman, John Munoa Video, Premier Publishing and all the sponsors, for putting this tape together. It's a great resource that hopefully will affect lots of people. And a question can you top it? I think a lot of people, myself included, would be interested in sceing a series of more in-depth coverage of topics presented in "Live Sound."



Tape is in VHS format. Order directly from Sound Concept, P.O. Box 831, Julian, CA 92036. Retail price in stores and catalogues for single tape is \$39.95; special mail-order price for Syn-Aud-Con members is \$34.95. Enclose additional \$2.50 per tape for postage and handling. California residents add 8% sales tax.

Syn-Aud-Con Newsletter





Galaxy Audio in Wichita, Kansas is well known for their "Hot Spot" small monitors. Another remarkable bargain they offer is their polarity checker for \$221.41 (if paid within 20 days). We use this checker in our farm classes and feel it is a useful instrument.

But, back to the new offerings. The Hot Spot PM now is available in 16 Ω as well as 70 and 100 volt versions. You also can now order a special weather-resistant cone treatment for outdoor use.

These products are proven performers and one need not hesitate to order them; they deservedly have their good reputation among live sound specialists.

For more information contact Galaxy Audio, 625 East Pawnee Avenue, Wichita, KS 67211. Phone (316) 263-2852, or fax (316) 263-0642.□

Imagine a "black box" that has a perfectly flat frequency response. If we connect a pink noise generator to its input and a 1/3-octave bandpass analyzer to its output, we should see the same response from the pink noise generator as we would have had we connected directly to the analyzer instead.

Now, let's put music at the input of the "black box". What we will see on the analyzer is the frequency content of the music, whatever it may happen to be. We will not see the frequency response of our black box.

Again, what we are seeing is exactly what we would have seen if the music had been directly connected to the input of the analyzer instead of to the input of the black box.



Suppose instead that we connect an analyzer with two channels (i.e., two separate analyzers working simultaneously so that one analyzer input is connected to the input of the black box and the other analyzer is connected to the output of the black box.) This would allow us to compare the two signals in such a way that our display of them would consist only of the differences that passing through the black box caused.

The test input could be noise, swept sine wave, music or fireworks. Only the difference between what went in the input of the black box and what came out of the output of the black box is displayed. Such a measurement is referred to as the transfer function of the black box.

Strictly speaking, the transfer function of any device is its 'S' Plane representation but when both the amplitude and phase are measured in the manner we have described, then you have the same data as you would derive from the 'S' Plane.

The point to remember is that the frequency response of a device is not necessarily its transfer function. \Box





In 1931 the Bell Telephone Laboratory demonstrated the effectiveness of multichannel stereophonic reproduction. The Philadelphia Orchestra performed in their hall and transmitted 30 to 15,000 Hz over dedicated telephone lines to Constitution Hall in Washington D.C. They enhanced the level 3 dB and the tonal response of the full orchestra. A lengthy and technically detailed report appeared in one of the 1932 AIEE Journals.

Included in these reports was the exploratory work of Steinberg and Snow on "Auditory Perspective." It was my privilege as a young man to meet Harvey Fletcher, the famous head of Bell Telephone Laboratories in its audio and acoustics heyday and to actually work with Bill Snow of Auditory Perspective fame when he was at Ling Research as a consultant.

I also had the privilege, in the late 1950s when I was working with



Fall 1992

Bell Telephone Labs...continued

Paul Klipsch (as president in charge of vice as he liked to put it) to replicate the experiment shown in the figure here and then to go to Murray Hill N.J. to present the results as a paper given at the BTL audio group (we were sponsored by Mr. Klipsch's famous friend, Nat Norman of BTL.)

Today there is a great deal of "multichannel mono" (Ed Long's ex-

pression for all recordings that sound the same when the mono blend control is used) and very little accurate spatial reproduction.

Steinberg and Snow, Wente and Thuras, Siven, Dunn and White, all orchestrated by Harvey Fletcher, pioneered the entire field of stereophonic sound reproduction. By 1931 BTL had developed the negative feedback amplifier (Black), the condenser microphone, the multicell horn, crossover network, bass reflex enclosure, and the compression driver with phasing plug (Wente and Thuras). These men were literally without peer and their work for the talking motion picture laid the solid foundation for the total electronic entertainment we enjoy today.





From a Grad: "We installed three custom-built speakers in an in-line delayed array in a, large church. We test fired the speakers prior to installation (and they worked) so we installed them (ASSuming all was correct).

"After all the scaffolding was long gone I made the attached measurements. The notch in the frequency response is definitely non-equalizable at about 420Hz.

The speaker is using a 4" compression driver on a 2" throat 60×40 horn, and a 12" woofer. The crossover is standard issue 500Hz with constant directivity horn Eq."

We don't know what is wrong. We discussed it with



Gene Patronis and we concluded that it was possible that it was a mis-synchronization that fell in the crossover region - which is not equalizable. \Box

Mike Paganini,

Applications Engineer at JBL

Mike was in our July class. It is a very special treat to meet a young man just fresh out of college (electrical engineering degree), intelligent, grateful for his job, loves the customer that he serves, and the company that has given him his first opportunity.

The reason that we are so aware of his dedication was because we personally had a problem come up that needed an immediate solution and he worked during his lunch hour getting our order worked out so that we got the correct replacement model for a 25 year-old product.

We thought you would enjoy putting a face to the good customer service you get at JBL. \Box



I'm Not Sure Hughes Has All Their Oars In The Water

Hughes has redefined the dBm at 1.0 dBm = 0.001 watt. We're not sure why, and we sincerely doubt that they know. In the meantime, we'll stick to 0 dBm = 0.001 w. We submit their handout as proof that maybe all their oars are not in the water. \Box





Leo L. Beranek has published a tutorial article in the July 1992 issue of the Journal of the Acoustical Society of America titled "Concert Hall Acoustics - 1992." It is a compilation of selected workers publications on the subject. For example, he cites nine papers by J. S. Bradley who has never designed a hall, but fails to mention V.M.A. Peutz (his best of many great halls, the Anton Philips Hall), Ron McKay (Ambassador Auditorium), and completely overlooks Joyce and Gilbert's work on reverberation equations. No mention of Peter D'Antonio, no mention of TEF analysis, and no mention of Dr. Ahnert or any of the contemporary eastern workers. In this article Beranek develops

seven acoustical features he feels must be provided in a successful hall.

- 1. Acceptable reverberation time.
- 2. Adequate loudness.
- A short initial-time delay (signal delay) gap between the direct sound and the first reflection reaching a listener.
- 4. A number of early lateral reflections that immediately follow the first reflection reaching a listener.
- 5. A diffuse sound field created by an adequate number of reflec-



Roe and Wade at four months old with members of the July class. Roe is the one with the erect ears and Wade's are floppy. The picture also shows off the wrought iron fence and gate around the 110 year old house. And for those who have attended previous classes, they will appreciate the front appearance of the farm house. It has new siding on the front and we have a new porch on the East side. Hopefully new siding will be added to the East side this fall - if the roof doesn't demand attention before winter.



tions from all angles plus irregularities and ornamentation to eliminate acoustical "Glare".

- 6. The ratio of energy in the first 80 ms (0 to 80 msecs) to that in the next 2 secs. (80 to 2000 msecs).
- Warmth of the sound by properly shaping the reverberationtime curve at low frequencies.

There is no discussion of how to physically achieve these results and, contrary to our albeit limited listening experience, hall architectural features are suggested that we have yet to hear perform well.

We have a deep appreciation of Leo L. Beranek's contributions to acoustics. This article is not up to his usual standard. \Box



Absorption operates at the specular frequencies by converting sound power into heat via friction. The absorption coefficient of a material is the percentage of absorption divided by 100. Reflections are guaranteed to be 20 dB below the original sound in anechoic chambers.

Is a reflection audible that is down 20 dB? Yes! But a reflection down 20 dB will not add 0.05 dB to the original signal. The math involved is not difficult but it is exponential, so Art Noxon drew himself a hand chart for the easy conversion of absorption in percent to absorption in decibels.

We are reproducing Gene Patronis' instructions for making absorption measurements to go with this chart. Once you've made the measurement use the chart.

Psychoacoustically, a drop of 10 dB is subjectively judged as half as loud (for mid-frequencies). It would seem to me that any material to be used to supress a specific specular reflection should never be less that α =0.90. You can scan the chart with ease and make your own judgements.



- Determine minimum target size. The target perimeter should be at least three wavelengths at the lowest frequency of interest. As an example assume this is 500 Hz. Then λ = c/500 Hz = 1130 ft per sec./500 Hz = 2.26 ft. Perimeter = 3λ = 3 x 2.26 ft. = 6.78 ft. If the target is square, its perimeter is 4 x L where L is the edge dimension of the square. L = 6.78 ft./4 = 1.695 ft.
- 2. As the lowest frequency of interest is 500 Hz, the frequency resolution need be no better than 500 Hz. Now $B = S/f_R$ where S is the sweep rate and B is the Bandwidth. With a sweep rate of 10^4 Hz per sec, the required bandwidth is $B = 10^4$ Hz per sec/500 Hz = 20 Hz.
- 3. Determine the free field ellipsoid. With a frequency resolution of 500 Hz, the uncertainty relation requires a free field measurement time $\Delta t = 1/\Delta f = 1/500 \text{ Hz} = 2 \times 10^{-3} \text{ sec.}$



4. Ascertain that the entire target lies within the ellipsoid.

The constraints are:

$$x_{2}^{+} y = d_{2}^{n} = 4.52 \text{ ft.}$$

$$x_{1}^{+} + 2.25^{2} = y$$

$$T$$

$$2.26$$
M

In order for the entire target to lie within the ellipsoid, x must exceed ($\sqrt{2}/2$) L where L is the edge dimension of the target. From the constraining equations x is found to be 1.695 ft. Recall that L was also 1.695 ft. \therefore ($\sqrt{2}/2$) L = 1.199 ft. which is less than x.



- The measurement proceeds in two steps. Make a target from the sample wall surface which is to be treated and measure EFC as reflected by this target.
- b. Cover the target face with the absorber in question and make a difference EFC measurement
- 6. Calculate absorption coefficient. Suppose the measured reflected level in step b at some frequency is x then the relative reflected power is $10^{x/10 \text{ dB}}$ and the absorption coefficient is $1 10^{x/10 \text{ dB}} \text{ example let } X = -2 \text{ dB}, 1 10^{-2/10} = 0.37$

Courtesy Eugene Patronis



Horses, Flamas, Dogs, & Little Girls

While Liz Becker's dad, Farrel Becker, was instructor for the special Morningstar class in June, Liz and Megan Reynolds kept Patch and Pedro company in the back of Don's truck.

This led to happy children and if you don't think horses sense the mental atmosphere of their riders think again. Jesse is smiling right along with all of them. For a little while we thought Farrel had ears by Poncho, but Poncho finally came out from behind and said, "Oh, you sillies, its me."

July 16-18, 1992 Farm Seminar



"My Mind Has Been Buzzing Since the Workshop..."

Not every one who comes to a Workshop is a "grad" of Syn-Aud-Con and it always makes us nervous when we get a registration from someone who isn't acquainted with Syn-Aud-Con.

Fritz Zuhl attended our Auralization and Equalization Workshop in August (conducted by Dr. Wolfgang Ahnert and Dr. Eugene Patronis).

His letter outlines a little of his work at Arvin and his reaction to our Workshop. The sentence I like best in his letter is "My mind has been buzzing ever since the workshop...." Good things happen when fresh thought is brought to bear on old problems. Dear Don and Carolyn:

Thank you for creating a very intellectually stimulating weekend with your Auralization and Equalization Workshop. I have heard much about your think-tank Farm from previous employment in an acoustic/audio consulting firm, and was very curious what Syn-Aud-Con had to offer. My expectations were surpassed.

Even being a neophyte in the business, I see many people charging professional fees for amateurish performance. I have seen a dangerous mix of arrogance and ignorance. So it was refreshing to be with a group of professionals with a healthy dose of curiosity being taught by sharp minds who actually knew the physics. Being a physicists I am often bothered by "acousticians" who really don't understand the acoustics, yet justify themselves with hyped-up rhetoric. So I am glad to see such a thing as Syn-Aud-Con exist, and also so near to where I live!

At Arvin in Columbus I do acoustic FEA on car exhaust systems. My mind has been buzzing ever since the workshop on how to use computer aided engineering on architectural acoustics. I have a Sun SPARC II workstation on my desk with Nastran acoustic modeling capabilities. I can't promise anything soon, since Arvin doesn't pay me to model such things, but I'll keep you posted.

Again, thank you for hosting the workshop. \Box

Quoting from <u>Physics Today</u>, article by Carver E. Mead in "Innovative Genius",

Worth Thinking About

"What he avoids early on, however, is discussing his struggle, because, he said, the only language of a problem already contains the traditional viewpoint and if you use that language, you come up with the same answer everybody else has."

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Highland Park, IL, recently voted to allow the destruction of a 100 acre woods and wetland area so a million dollar per house sub division could go in. We are told that the affected area is one of the two places in the world where there are Hybernia flowers. At the same meeting the same officials voted to call their fair city "The Tree City."

The above are the facts as related

to us by Tom Danley of Intersonics. A number of disparate responses arise in our thought. The idea of man's stewardship towards God, man, and country seems best expressed by the cynics, "Let's do something religious; let's take up a collection."

Modern man lowered by television rather than raised by parents, dedicated to the dollar rather than educated to man's true purpose, and apparently bent on self-destruction rather than production, would totally discourage us except for the fact that a majority of the men and women coming to Syn-Aud-Con classes represent a potent, powerful, albeit small group of persons with all their oars in the water.

It has been said that when you have the opportunity to totally relax, it is wise to observe where your thinking gravitates. Wherever that gravitation tends to be is probably your God.

Any mob is non-thinking and you can't get a group of protesters without at the same time generating a form of mob. The true and pressing need is for more honest careful thinkers who are capable of "throwing the rascals out" at the polls. The pigs currently at the trough are not only greedy, they're belligerent and after our rights and our heritage. We still have faith that there's still some spiritual power left in America.



We are always interested in articles written by knowledgeable people that we respect. Kenton G. Forsythe of EAW is in that category and while his article, "Processing Panacea or Problem?" in the July '92 <u>Live Sound</u> magazine is pure sales pitch, it's sales pitch built around basic facts. The article is well worth reading for his remarks on what not to do as well as for what he did do.

His comments relative to how cabinets and crossovers interact is from successful experience in reducing spurious radiations in his own products, which are among the very best in this regard.

We hope that his prediction that the day of the tinkerer is over is correct. The number of young people mad with the ambition to tweak electronic crossovers is equalled only by the availability of such devices. We're continually grateful that bad audio is not fatal. If it were, it would be the leading cause of death. \Box



Bishop Ussher of Arlet in Ireland, a contemporary of Newton, worked out the exact day and hour of the creation of the world as determinable through the genealogies in the Old Testament. The creation of the world, he stated, occurred at nine o'clock on Oct. 26, 4004 B.C. Even Newton accepted this date.

Unfortunately, this date is as provable as the earlier ones, via the BigBang Theory, suggested by today's leading physicists. Perhaps this subject is best suited to religious discussion.

Stephan W. Hawking has proposed that the universe had no beginning inasmuch as "space-time was finite but had no boundary, which means that it had no beginning, no moment of creation". With this delicious infinity of choices we're not apt to argue this matter with anyone. \Box

Higher Than an Elephant's Eye

In the musical, *Oklahoma*, they sing that the "Corn is as high as an elephant's eye."

This picture, taken during the July class, shows Fred Fredericks acting as a scale for crop height. Fred has seen his share of elephants during his service in the Far East and his only comment was, "What happened to 'knee high on the 4th of July'?"



Going Around in the Best Circles

The earth rotates as do the Sun and the planets. A radio station in Del Rio, Texas once advertised a "pink and pleasant plastic Jesus" who would rotate on the dash panel of your car as you drove along.

The main use of rotation in acoustics is the need to rotate transducers in order to measure their polar response. It has been difficult to find both.

- 1. A rugged reliable, accurate indexing, remotely controlled turntable.
- 2. A reasonable priced turntable.

It now appears that "Outline" of Flero, Italy has available a 13.78" diameter (35cm) by 3.94' (10cm) high electronic turntable capable of rotating, without harm, a loudspeaker weighing 661 lbs. (300KG).

Thanks to a very rugged and fairly large bearing gear driven by a powerful motor, it can rotate such weights with precision in steps as small as 5°.

Any measurement system that provides a TTL signal to drive external equipment can be used to control this turntable. It comes with its own electronic control allowing choice of direction for rotation, 5, 10, 15, 20, 25, 30, 35, 40, and 45° per step as well as manual and auto controls for CS and CCW.

As can be seen from the picture it is an attractive unit.



We are eager to make actual field tests with one. The quoted price to the USA is \$975. If it does all it says it does, we feel it's a bargain.

For more information contact:

Outline snc, via Leonardo da Vinci, 56 25020 FLERO (BS), ITALY. Tel. 030-3581341 or fax 030-3580431.



Last fall we filled in the swimming pool at the old house and made it into a flower garden. Early this spring we thought we had a buyer for our RV lot in Arizona and we decided we'd rather have a swimming pool by our house in Indiana than an RV lot in Arizona. (The sale fell through - now we have a lot in Arizona, a swimming pool by our house, and a loan at the bank.)

The new building is 42' x 32' with a scissor truss supported roof. Its a nice place to hold lunch for the Seminar class on the 3rd day. The pool serves as a water reserve in case of fire.

We have also built a new enclosed porch for lunches at



the kitchen entrance to the Farm house where we hold our Seminars (first two days) and we have added new truck trails to the rear of the farm (previously unseen except by the hardiest of hikers.) \Box

Does the Darn Thing Work?

Our network of grads keeps a close watch on management procedures and practices, and the material herein is a direct result of this research. The flow chart is useful for everything from the office copier to a new pre-production prototype.

The second discovery, "DuPont Discovers New Element" (an excerpt reproduced here) is more serious and ranks up there with Rolarity and Hanger polarity. Rolarity, of course, is the installation of toilet paper so that it rolls over the top rather than under the bottom. Hanger polarity is the standard for hanging hangers so that the open part faces the rear of the closet. Administratium is not only destructive but obscenely costly. (Have you looked at mismanager's salaries late-ly?) As America strives for industrial last place, we surely want to protect those executives with multimillion dollar salaries from importation of foreign ratios of executive-to-employees salaries.□



DuPont Discovers New Element

The heaviest element known to science was recently discovered by DuPont physicists. The element tentatively named Administratium has no protons or electrons and thus has an atomic number of 0. However, it does have 1 neutron, 15 senior vice neutrons, 60 vice neutrons, 125 assistant neutrons, and 111 assistant vice neutrons. This gives it an atomic mass of 312. These 312 particles are held together in a nucleus by a force that involves the continuous exchange of meson-like particles called morons.

Since it has no electrons, Administratium is inert. However it can be detected chemically as it impedes every reaction it comes into contact with. According to the discoverers, a minute amount of Administratium caused one reaction to take over four days to complete when it would normally occur in less than one second.

A Hard to Find Product A Sound Detection Relay

A company by the name of T-S-K Electronics, Inc. in Tonawanda, NY offers a sound detection relay. This plug-in card examines three distinct levels of discrimination and detection before reporting the disturbance. The trigger level varies automatically with the ambient noise level eliminating the need for day/night switches but will immediately report sudden loud noises, above ambient, such as shouts, breaking glass, gunshots, etc.

Two models are available T-S-K SDR-C for existing intercoms and the T-S-K SDR-D which is compatible with most microprocessor based intercoms.

T-S-K has a full line of security oriented intercom devices worth looking at.

For further information contact T-S-K Electronics, Inc., P.O. Box 190, Tonawanda, NY. Phone (716) 693-3916 or fax (716) $692-6433.\square$



So far as we can ascertain, most loudspeaker sensitivity ratings on current specification sheets are for an imput power of one watt and a distance of one meter. This means that loudspeakers with the old rating of one watt at four feet need

$$20 \text{ Log } \frac{4'}{3.28'} = 1.72 \text{dB}$$

added to them to become a one watt at one meter rating.

The Preferred Rating Method

So far as Syn-Aud-Con is concerned, the preferred rating is the EIA sensitivity based on one milliwatt at thirty feet. Ten meters is 32.81 feet so the difference between the EIA distance and 30' is:

$$20 \text{ Log } \frac{32.81}{30} = 0.78 \text{dB}$$

This means that to obtain a one milliwatt at ten meters rating you would simple subtract 0.78dB from an EIA rating.

Changing from one watt to one milliwatt results in:

$$10 \text{ Log } \frac{0.001 \text{ w}}{1 \text{ w}} = -30 \text{ dB}$$

change in level. Changing from one meter distance to thirty feet results in:

$$20 \, \log\left(\frac{3.28'}{30'}\right) = -19.22 \, dB$$

change in level

$$(-19.22w) + (-30) = -49.22dB$$

correction factor to convert one watt, one meter to one milliwatt, thirty feet.

The older conversion from one watt, four feet to the EIA rating was -47.5 dB.

The new conversion from one watt, one meter to the EIA rating is for all practical purposes -49.22.

The difference between the two conversions is:

$$(-49.22w) - (-47.5) = -1.72dB$$

This is the amount you would add to a one watt, four foot rating to obtain a one watt, one meter rating or subtract from a one watt, one meter rating to obtain a one watt, four foot rating.

The power of one watt is measured by manufacturers as the voltage across the stated impedance that would produce one watt. This voltage is then placed across the loudspeaker terminals.

 $E = \sqrt{WR}$ $4\Omega = 2.0 \text{ volts RMS}$ $8\Omega = 2.83 \text{ volts RMS}$ $16\Omega = 4.0 \text{ volts RMS}$

If this voltage is the cause of a magnitude of the frequency response, then you have the sensitivity frequency by frequency. If it is a band of pink noise, then you have the sensitivity for that band of noise.

Syn-Aud-Con likes to use the ANSI noise curve as available on the General Radio noise generator. This curve mimics the typical power distribution of the human voice.

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A 5.4 billion dollar German holding company "Aktiengesellschaft für Industrie und Verkehrswesen (AGIV)" has gobbled up Brüel & Kjaer.

Brüel & Kjaer founded fifty years ago by Dr. Per V. Brüel and Viggo Kjaer established an enviable reputation for uncompromising quality especially with regard to measurement microphones. Their "Technical Review" enjoyed our greatest confidence because it always told the truth even when it hurt—such as comparing TEF to their dual channel FFT and reaching the conclusion the TEF was best for most purposes where two port measurements were employed.

The departures of the founders guiding hand in the affairs of B&K truly signifies the end of an era.

Ford has purchased Jaguar and we hold our breath to see who will swallow Porsche. All we can say is that we were privileged to share the fifty years with all of them. \Box

Educated Beyond

Their Intelligence

It is not uncommon for perpetual students at large Universities, those educated beyond their inherent intelligence, to surface in many phases of daily life. While politicians lack both education and intelligence, they undisputedly have remarkable cunning.

Recently Carolyn came across the following "sophisticated" remarks by a, not only brain dead but soul dead, art critic.

Richard Nilsen, art critic for <u>The Arizona Republic</u>, dismisses work by the cowboy artists of America with "Their work lacks the bite and edge necessary to qualify as art. A real artist works beyond the scope of his talent not comfortably within it."

This would be akin to saying a mixing engineer who is a real artist makes sure the performance has lots of hum, feedback, buzzes and rattles in order to reassure the audio critic that said mixer is working beyond the scope of his talents. Come to think of it, a lot of them do—I just didn't realize it was art.□





The directivity of the Conque Elipson is specially suitable for sound reproduction in locations where acoustic conditions are bad and echo effects are objectionable.

The Ancients

Are Stealing

Our Inventions

Neil Thompson Shade of Acoustical Design Collaborative Ltd., Falls Church, VA sent us a reminder that the ancients are still stealing our inventions.

The Conque Elipson appeared in G. A. Briggs 1955 book, <u>Loudspeakers: The Why and How of Good Repro</u> duction.

A Mr. Leon, of Paris, had designed this device to have a "defined coverage area" of use with a rectangular floor area. We can thank Neil for a very useful term for describing all the special devices - Defined Coverage Area (DCA). \Box

Corporate Philosophy at Crown International



Pro Sound News published an interview with Joe Spiegel of PSN and Crown's Gil Nichols. (July 1992) Anyone who is active in our audio industry has to be aware of the powerful impact that Crown has made and is continuing to make with their many new products, the most important being the IQ System 2000.

We are reproducing here the last question and Mr. Nichols' answer from the interview:

Gil Nichols of Crown International

"Does the company have any guiding principles in its corporate philosophy?"

Nichols: "The mentality of Crown includes our corporate principles to honor God, to serve people, to develop excellence, and to grow profitably, while upholding biblical principles.

"Another Crown principle you don't often hear about is value. We are created with value, we create value, and we value creation. The first point guides our interactions with each other and with our customer. Secondly, we view, as a very important part of our role, the fact that we're given powers to understand electronics and manufacturing and to create value with what we have. Thirdly, we value creation by making good choices for ourselves and our environment."





A Must on Your List

Subscribe to Pro Sound News It's Free

If you are in the audio industry, you are probably qualified to receive Pro Sound News free. Each issue just gets better. I have finally stopped writing and telling them that the last issue was the best yet because I am beginning to sound like a stuck record. If you are not subscribing, write:

Pro Sound News P. O. Box 0513 Baldwin, NY 11510-9830

And, if you can, get them to start your issue with the September 9 issue.



Those of us who live where severe weather can occur rely on the National Weather Service (NWS) transmissions to alert us to threatening conditions.

Inexpensive weather radios can be purchased from Radio Shack but in our case here in Indiana our NWS transmissions are on a frequency not available on the Radio Shack unit. Scanners can be utilized as they can be tuned to any of the seven NWS frequencies

162.40,	162.425,
162.45,	162.475,
162.50,	162.525,
162.55 MHz,	
162.55 MHZ.	

At the recent NSCA convention, we ran across a very professional answer to the problem and we have a feeling that such a device should be in the rack of the sound system for any public building.

This unit - the Gorman-Redlich Model CRW Weather Receiver has the sensitivity to work in fringe areas like the one we live in and is built for reliable automatic warning service. The price is \$540 which, considering the specification, is a reasonable figure.

If units like these were installed in major public buildings like schools, theaters, etc., then the only remaining problem would be to train the listeners to not ignore warnings when issued.

Gorman-Redlich Mfg. Co., 257 W Union St., Athens, Ohio 45701. PH 614-593-3150. □



ering $E = MC^2$. <u>Physics</u> soons that hit the nail on concerned. nod of research for sure. nen like Einstein are re-



Einstein on the verge of discovering $E = MC^2$. <u>Physics</u> <u>Today</u> magazine often publishes cartoons that hit the nail on the head, as far as we personally are concerned.

In this case, P.T. shows our method of research for sure. In studying the history of science, men like Einstein are revered because the majority of men can't do what he did, they do what we do - keep guessing until we get it right.



After California, Why Indiana?

We left the middle west in 1965 to move to S. CA. We loved it there, especially the years on a rancho in an inholding eight miles up a private road in the Cleveland National Forest, for many years without telephone and still without electricity. We thought we would never leave there, though we were building a summer house on our farm in S. Indiana when our attorney told us that someone was interested in purchasing our property. We decided that it would be a wise move for us to cash out in California and move our home and business to Indiana (that was in 1987), and we are pleased at how much we enjoy being here.

We were surprised to see a list the other day of "Top Retirement Sites" and there was Bloomington/Brown Co., IN, 27th on the list. Now that doesn't sound very remarkable, but when you remove the Cities in the Sun, then only Branson, MO #17 is ahead of Bloomington, IN. The Hoosier woods, the clear air and pure water, no traffic jams, the huge Monroe lake (where no houses are allowed on the coastline of the lake), even a ski resort within 45 minutes of the farm - all make it a good place to live, but it is Indiana University that makes the area special. It has a superb music school with world famous musicians in residence - great performances every week: ballet, opera, theater - the list is long. These students spill over into the community with their talent. Even in the little church we attend, our soloist two years ago is now with the San Francisco opera. One time our soloist and the organist had the tenor lead in Elixer of Love on alternate nights at Indiana University!

Of course, the highlight of our life here at the farm is that we have converted the old farm house (where I grew up) into a seminar facility, and we can enjoy our classes here in Indiana. $\Box cd$

BEAVLLIUM COPPER CLAMPING SPRING STAINLESS STEEL CASE STAINLESS STEEL CLAMPING RING STAINLESS STEEL STAINLESS

TABLE I. 21BR microphone specifications.				
Code	Open circuit sensitivity, db re 1 v/dyne/cm²	Av linear limit, SPL re 0.0002 dyne/cm ²	Average noise threshold SPL	
21 BR-150 21 BR-180 21 BR-200 21 BR-220	$\begin{array}{r} -55 \text{ to } -60 \text{ db} \\ -55 \text{ to } -75 \\ -85 \text{ to } -95 \\ -105 \text{ to } -115 \end{array}$	164 db 174 194 214	68 db 78 98 118	

maybe acid rock could use them).

One atmosphere is an $L_P = 194$ dB; therefore, this microphone could measure an overpressure that contained over 250 times the power of a fully modulated atmosphere. Looked at another way, the overpressure it could measure was nearly 16 times normal atmospheric pressure (33,549 lbs/ft².)

Drs. John Hilliard and Walter Fiala published a paper in the ASA Journal in the 1950s and the illustrations are from that paper. \Box

Measuring High LPs

In the Syn-Aud-Con classes I sometimes mention the 21BR series microphones made by Altec in the late 1950s for use in measuring the overpressure of explosive forces up to and including atomic bombs.

The 21BR-220 had an average linear limit level of $L_P = 214$ dB. Before all of you rock and roll fans salivate, note also that its own noise floor level was $L_P = 118$ dB. That is, a signal that produced 120 dB would only have a 2 dB S/N (come to think of it,



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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.

Models 916 and 964 are high power models for large pools and lakes (equals power output of 100 brand "U" speakers).

Lubell Labs 21 N. Stanwood Rd. ◆ Columbus, OH 43209 PH: 614-235-6740

Alan Lubell's Underwater Loudspeaker

Many years ago, Alan Lubell attended our class in Pittsburgh. It didn't take long to become aware that he was a very talented engincer. He had worked for years for Hughes in underwater research and had recently moved to Columbus, OH to start his company which was building an exceptional underwater loudspeaker.

His loudspeaker is used throughout the world in synchronized and competitive swimming, scuba training, surface-todiver communication, sensitive sound or vibration pickup, and utility source for experiments in tanks or at sea.

The new models shown in the illustration are largely due to the efforts of his son Brian, who is carrying on the tradition of excellance that has been established in the 23 years of Lubell Labs existance.

It occurred to us, since we still get phone calls asking how to reach "that company that makes such a good underwater loudspeaker," that it was time to put the information in the Newsletter. \Box

"More Sound Systems Are Purchased for Houses of Worship Than Any Other Venue."

Todd W. White of Southwest Building Systems, Beaumont, TX gave an excellent address on selling the church market at the 1992 Altec Conference. It was full of useful selling tools and mental attitudes. He said, "There are more sound systems purchased for Houses of Worship than any other single venue in the nation today." And, many are entertainment quality sound systems which perhaps explains why several of the "Big Five" touring companies are actively pursuing this market.□

For Sale: TEF-12 upgraded to 12+, like new condition-\$4,000. TEF tools software-\$250. Contact Johnny Farmer at (804) 496-9220.

For Sale: HP 334 Distortion Analyzer \$795; Wavetek 185 Autosweep Function Generator \$275. Contact Russ Griffith, LVW Electronics, (719)-540-8900.

For Sale:

4-Altec 1520T Bridging amps & rack (amps used 5U4's).
6-Altec Model 600B speakers (8 Ω) in enclosures.
3-Altec Model 515 speakers (20 Ω) loose.
3-Altec Model 288B Horns (20 Ω)
Contact: Gregory Boardman, Lorraine Theatre Corp., P.O. Box 642, Acton, CA 93510.

Available: 26 years of telecommunications, mobile radio and sound reinforcement experience, recently retired, seeking to use past background plus newly found awareness from Syn-Aud-Con seminar attendance. Contact Allen K. Moyer, 12 E. Eighth Street, Pottstown, PA 19464. Phone 215-326-4004.

