SYNERGETIC AUDIO CONCEPTS

SYN AUD CON

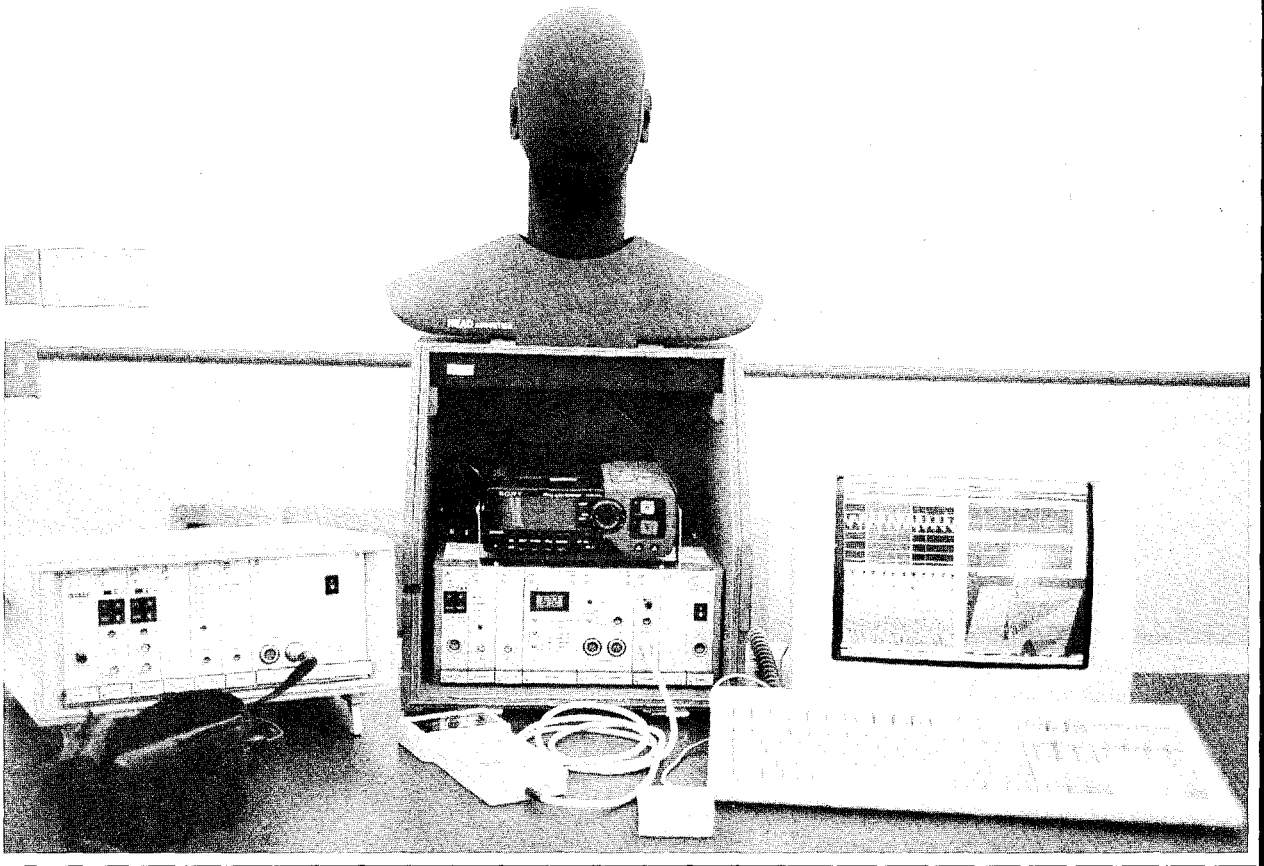
# newsletter

Volume 18, Number 1
Fall, 1990


## HEAD acoustics

*Sonic Perceptions*

*A System to Know About — People to Watch*



SYNERGETIC
SYN AUD CON
AUDIO CONCEPTS

EXCHANGE OF IDEAS

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

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

Synergetic: Working together; co-operating, co-operative.

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

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Carolyn Davis

Design & Layout: Dashia Meadows



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**TEF Measurements in a High School Auditorium**

## When Do I Renew?

You can check to see when your subscription will expire by checking the mailing label on the envelope in which your newsletter was mailed. In the upper righthand corner, beside the name, a date will appear (i.e. 4-90). This means that you will receive this issue and it will be the last issue sent unless you renew. Renewal notices will be sent at this time. You must renew before the next quarter's newsletter is mailed or your subscription will become inactive.

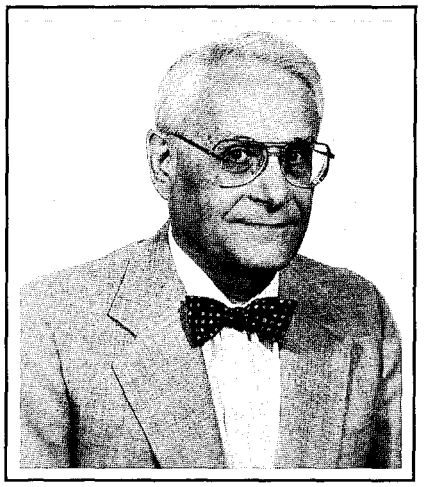
# Sonic Perceptions, Inc.

## (Head Acoustics)

Mahlon Burkhard has been a mentor to Syn-Aud-Con since 1973. Mahlon's background includes the Bureau of Standards and IRP where he literally brought them into our industry and built up the superb staff they enjoy today. So, it was with genuine pleasure that we found he now heads up Sonic Perceptions, Inc.

Sonic Perceptions is a spin off from Jaffe Acoustics.

Those of you that have been reading the Newsletters for the past several years know that on one of our European trips we visited with Klaus Genuit in Aachen, Germany to see and hear what he was doing with his "Aachen Head" and associated analysis equipment. We then drove to Stuttgart, Germany to visit the famous acoustics lab at Mercedes Benz and found that they too were using Genuit's HEAD.



***Mahlon Burkhard of Sonic Perceptions, Inc.***

Wade Bray, formerly of Jaffe Acoustics consulting firm, brought the Aachen Head, manufactured by Head Acoustics, into the U. S. for recording and measurement purposes. Wade now works with Mahlon at Sonic Perceptions.

Ed Wolfrum, another long-time friend of Syn-Aud-Con is their technical representative in Detroit, where the HEAD has revolutionized automobile acoustic measurement systems. One automotive manufacturer has eight measurement and analysis systems whose combined cost is around $200,000.

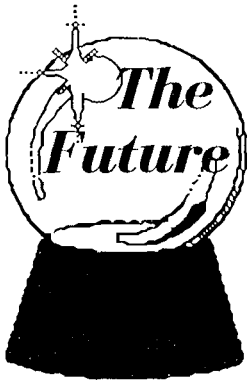
The quality of the system can best be described by telling you that Wade Bray's HEAD Acoustic recording of the West Point Academy pipe organ has been nominated for a Grammy award.

We will have the HEAD with Binaural Analysis System (BAS) at our Intelligibility Workshop. We will be able to:

1. Look at any individual record (digitally) at any point in its time history to get binaural frequency responses and spectrograms.
2. BAS can rearrange sequences of digital recordings to place alike or different responses together or any combinations that seem desirable. It is a complete digital editing system.
3. Comparisons can be made of eardrum response at different locations in the room by frequency or by time, binaurally.
4. Direct and immediate comparisons can be made between responses recorded in the ears of the person with the best score and the one with the worst score.
5. Direct and immediate comparisons can be made of the spectrograms of the rarely missed and most frequently missed words.

The editing capabilities of the BAS allow it to be used not just as an analyzer but also as a jury presentation controller. Levels of filed signals can be adjusted up or down to normalize perceived loudness of comparative examples or to match specific averaged dB or Sones numbers.

It has frequently been postulated that the end of a century is a particularly active and inventive time. Since the end of this century is also the end of a millennium, we suspect that if there is any validity in the theory, then WOW!!!




# The Year 2000 —NOW !

**EASE - Electro-Acoustic Simulator for Engineers from Renkus-Heinz**

**TEF 20 from Techron**

**BAS - Binaural Analysis System**

**SysID - System Identification from Ariel**

EASE, TEF 20, BAS, SysID, and Hyperception make a measurement analysis-design package we didn't expect to see until past the year 2000. It's here right now! It was all operating at the September 1990 AES Convention in Los Angeles.

**Hyperception**

Sam Berkow of Joiner Rose Group in Dallas called a couple of months ago to tell us to look into a software package called "Hyperception" that was specifically designed with the Ariel hardware in mind. (See their data sheet)

Sam Berkow has programmed into Hyperception the ability to import the ETCs made in design programs like EASE and then convolve that ETC mathematically into a music recording placed on the hard disc from either the Denon or the British anechoic measurement of the live classical orchestra.

When this convolution is played back, you hear clearly the effect of that room design on that music. Imagine sitting with your customer in front of your computer and letting him hear from the computer room design the degree of unintelligibility he or she is about to receive if they continue on the path they are following. All you have to do to have this is to record an anechoic word list onto your computer's hard disk.

**Hyperception + Ariel + Techron**

Hyperception plus Ariel does all of the above. We learned at AES that Techron and Ariel agreed to have the data from either analyzer available to the other analyzer for processing. That means that measured ETC's on the new Techron TEF 20 can also be convolved with either speech or music so that we can study what effect our proposed solutions might *sound* like.

**Computer Requirements**

Your computer should be:

1. An IBM or clone 386-25 or 33 (80386 Turbo)
2. Math co-processor 80387 or equiv.
3. A 1.2mg 5-1/4" floppy
4. and/or a 1/4 mb 3-1/2" floppy
5. 5mb of RAM with caching
6. 100mb hard disc

While at AES, we also saw Joel Lewitz and Kurt Graffy work with Dr. Ahnert in demonstrating the transfer of 3-D AutoCad drawings into EASE for analysis and then transferred back with the appropriate acoustic details added.

Two other capabilities of Hyperception that excited us was its ability to display our data in the traditional Spectrographic form. It can also do pole-zero analysis in both the 'S' plane and the "Z' plane display modes.

**Hyperception + Ariel + Techron + BAS + ITE + EASE**

One final note from AES and to those of you who missed our Intelligibility Workshop; thanks to Mahlon Burkhard and Ed Wolfrum of Sonic Perceptions, we are performing these very convolutions on both the HEAD and In-the-Ear, ITE, measurements. Now participants can hear what causes the problems. The problem can be removed digitally and then replaced by using the Binaural Analysis System, BAS.

While we occasionally allow the absurd side of AES to intrude into our thought, the good still out weighs the bad.

# Computer—Analyzer Application Workshop

**—TEF—**

**—SysID—**

**—Hyperception—**

**—EASE—**

**—ITE—**

**—BAS—**

**Editor's Note:**

**Please see the write up of *"The Future -- The Year 2000 NOW!"* Page 4**

*"Of all audio components, the loudspeaker stands alone in the difficulty of measuring performance and interpreting the results of such measurements."*

Richard C Heyser in "Concepts in the Frequency Time Domain Response of Loudspeakers," March 1976, *Monitor - Proc. IREE* (Australia)

Several recent experiences have made us aware of the need for a Computer—Analyzer Application workshop. Most purchasers of Techron and Ariel analyzers have limited experience with acoustical and electroacoustical measurements.

Truly frustrating are the cases where exquisite care is made in setting up the apparatus followed by blank stares at the data gathered. There, right in front of them, is the problem, and its answer, but because of lack of experience, they don't recognize the cause and effect relationship that is being confirmed by the measurement.

The TEF analyzer's ability to confirm or deny each suspected problem *heard* by an experienced ear/brain system is phenomenal.. The Ariel's ability to manipulate the data taken and convolute it with design data is extraordinary. Add to the above the addition of the new software: EASE and Hyperception with BAS and ITE. Powerful tools of the future: Now!

Dick Heyser wrote:

*"The evaluation of the acoustics of loudspeakers and the room containing them proved to be a microcosm of all the difficult problems in wave propagation."*

You must have some basic concept of wave propagation to make a meaningful acoustic test.

Syn-Aud-Con would be interested to know how many users of TEF, SysID, Hyperception, EASE, ITE, and/or BAS would be interested in an "in situ" applications class sometime in 1991 where our experience would be shared and your experience would be increased.

# Using "Clicks" and a Single Headphone to Set Signal Delay

Rick Clarke of The Sound Department Ltd. from London was one of our classmates at IED's outstanding three-day seminar on their products and application.

Rick and his company work in theaters all over the world and has evolved an easy, but accurate way to set signal delays. He uses "clicks" and a single headphone standing out in the audience area. He adjusts delays until the clicks merge.

This could also be applied to live concert use with anyone skilled at hearing the first mis-synchronizations occur.

Real thinking—and listening!

***Rick Clarke of The Sound Department Ltd. in London***

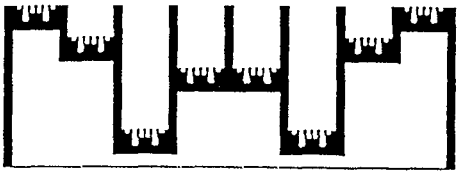
# Diffractal™ Diffusion

The truly remarkable "Dr. Diffusor", Peter D'Antonio, had the peerless Dr. Prof. Manfred Schroeder standing in his booth at AES telling others how great Peter's interpretation of his diffusor ideas has been.

Peter greatly pleased Dr. Schroeder when he showed him the patented RPG Diffractal (Diffractal = **Dif**fusing **Fractal**) Diffusion. Dr. Schroeder has a book on diffractals, "Fractals, Chaos and Power Laws: Notes From an Infinite Paradise," being published by Freeman in the Spring of 1991. Reproduced here is one of Peter's announcement notes on new products. Believe us, you can't do better than buy his home listening room package that came out of experience with our 3L workshops as well as his vast experience with up-to-date environments of every kind. Anyone doing serious work in acoustic spaces and not using Peter's products is a lone wolf indeed if not a lost wolf.❑

Fractals are an important new class of surfaces which possess the property of self similarity (i.e., they look the same at any magnification) and can be used to increase the bandwidth of QRD® diffusors. The DIFFRACTAL™ is a powerful new fractal full spectrum diffusor within a diffusor, which combines low frequency and mid-high frequency diffusion into one hybrid structure, much like a multi-way loudspeaker. This allows a rigid low frequency structure which crosses over into a mid-high frequency diffusor, providing almost any desired frequency range that space requirements permit and almost unlimited visual improvisation. The DIFFRACTAL™ is the heart of RPG's ULTIMATE SYSTEMS™, a marriage between forefront acoustic and designer aesthetics.

DIFFRACTAL



## *June Farm Seminar 1990*

# Always Test the Tester

The latest example of this axiom is the national public radio NPR report on the fault found in the optical null tester for the mirror used in the Hubble telescope. While the telescope was under construction the mirror's quality was monitored by this optical null tester. Now it has been discovered that the null tester used had a 1.0 mm error.

Once more, all together; "Always test the tester."❑

# Schroeder Equation

Manfred Schroeder was the session chairman for an all day session at AES. He started the program. Rarely has an hour passed so quickly or been so worthwhile.

One of the gems he shared was a modification of the large room or Schroeder frequency equation:

*SCHROEDER FREQUENCY**

* *Also known as:*

*Critical Frequency or Wavelength*
*Large Room Frequency or Wavelength*

*Sabines definition of* $\bar{a}$ *in a dimensionless format*

$$\bar{a} = \frac{55.26V}{S \cdot RT_{60} \cdot C}$$

$$\lambda = \sqrt{\frac{\bar{a}s}{6}} \qquad f = \frac{c}{\sqrt{\frac{\bar{a}s}{6}}}$$

$$\bar{a} = 6\left(\frac{\lambda^2}{s}\right) \qquad s = 6\left(\frac{\lambda^2}{\bar{a}}\right)$$

Where: $\lambda$ is the critical wavelength in Ft or M

f is the critical frequency in Hz

$\bar{a}$ is the average absorption coefficient (Dimensionless)

V is the room volume in $Ft^3$ or $M^3$

S is the boundary surface area in $Ft^2$ or $M^2$

c is the velocity of sound in Ft/Sec or M/Sec

$RT_{60}$ is the reverberation time for 60 dB of Decay

$$\lambda = \sqrt{\frac{\bar{a}s}{6}} \quad \textit{and} \quad \frac{c}{\lambda} = f$$

*For one of the design examples in SSE for a large reverberant space the* $\bar{a} = 0.12$ *and* $s = 42{,}500\ ft^2$

$$\lambda = \sqrt{\frac{0.12\ (42{,}500)}{6}} = 29.2$$

*and* $\frac{1130}{29}.2 = 38.8\ Hz$

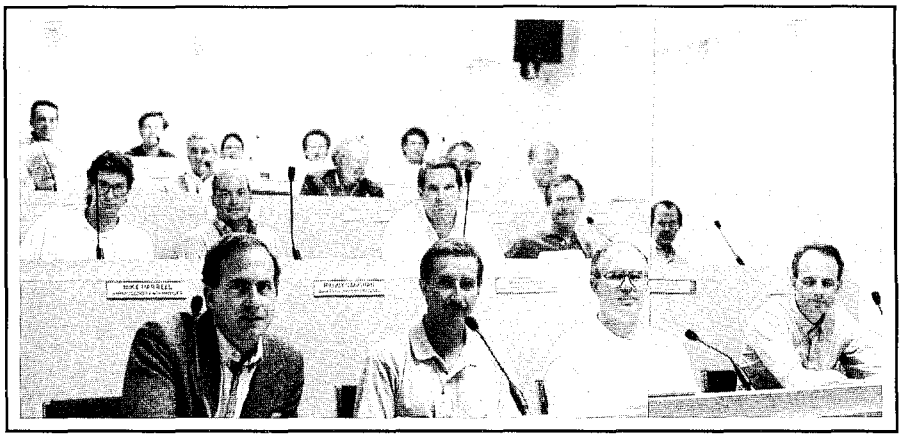
*or in S.I.*

$$\lambda = \sqrt{\frac{0.12(3948.38)}{6}} = 8.89$$

*and* $\frac{344.43}{8.89} = 38.8\ Hz$

so it is a non dimensional equation. Also it can easily be seen that in this church which had a volume of 500,000 $ft^3$ and an $RT_{60}$ = 4.8sec, a critical frequency would indeed be somewhere down near 40 Hz. (Critical frequency, Schroeder frequency, or large room frequency describes the frequency below which standing waves can be found as discrete peaks and nulls).

# An Outstanding Seminar in an Outstanding Facility with an Outstanding Staff



*This picture is actually a composite of two pictures put together in order to include most of the class.*

You can be assured that IED is going to a part of your future whether as your sale or as your competition.

We were invited to be a part of a class of 20 people for an IED seminar at their marvelous training facility. It started on Friday evening with a get acquainted dinner at Mrs. Col. Saunder's original restaurant between Lexington and Louisville and it ended on Monday after lunch.

Saturday morning started with a relaxed atmosphere; just sit back and enjoy the flow of information. Then! 11:30 the first test was announced. When we came back from lunch, our tests were waiting for us. My score wasn't that good. There was no more relax, sit back and enjoy. This was work.

From then on, we knew that we were there to learn and to be completely knowledgeable about the IED equipment - and to be totally excited about the future of IED and a bit in awe of the talent and dedication at IED.

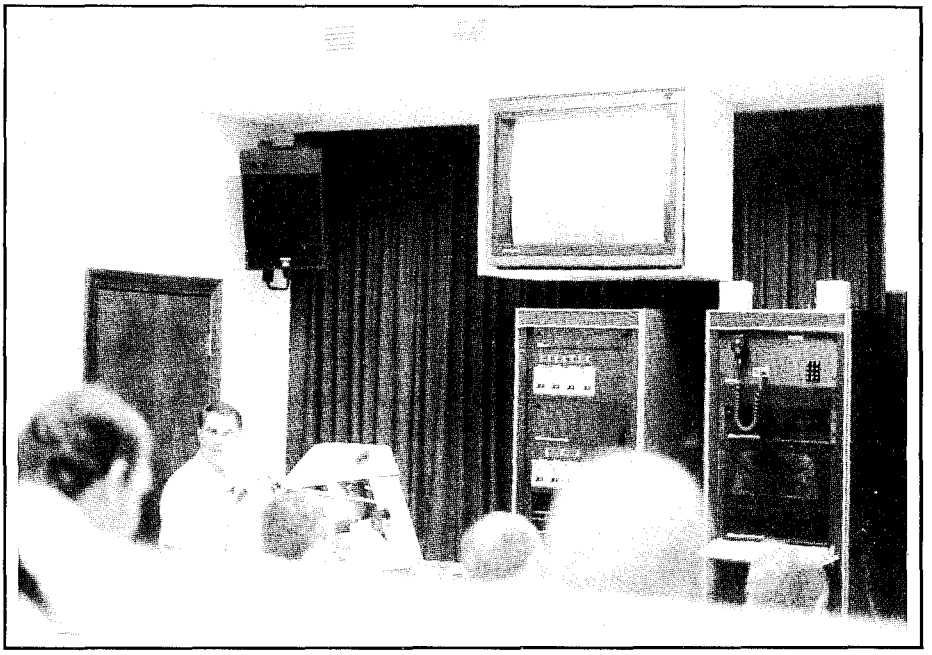
My score on the third test on the 3rd day was not all that great. Certainly nothing to tell anyone about but I glanced about me and took some solace until! it was announced that David Cawley from Disney in Florida had a perfect score. That's David in the first seat (left) in the front row.

**Training**

We are hearing of more and more manufacturers that are constructing their own training classes for their reps, contractors, consultants and end users:

IRP, Toa, Crown, Peavy, Yamaha and probably a bunch that I don't know about. It is absolutely vital now that the equipment and installation is becoming so very complex.

One thing for sure. IED has set the standard for all to follow. If you are an IED contractor, rep consultant, user or potential user of IED equipment, work for an invitation to one of their seminars. You will be very happy you did, not just for all that you learn and all the hospitality enjoyed from the marvelous IED family, but for the 19 other people sharing this experience with you. For all that you learn from IED, you'll learn an equal amount from those with you for the three days.❑ cd



*Hardy Martin addressing the class using state-of-the-art AV equipment.*

# Kissing Llamas

Carolyn had one of those periodic impulses that commit us to 30 years of servitude. She felt she just had to have a Llama. Two Llamas later (they get lonely you know), I again had an ecstatically happy wife.

When Pancho and Cisco were unloaded, Red and Jesse, the two horses you see off in the distance, took one look and ran (I mean ran in terror) to the furthest corner of the barnyard and stayed there for two whole days before the need for food and water brought them back. It's no wonder they ran, for Llamas are built like upside down camels (the hump is underneath).

Watching a Llama run is truly a segmental experience. Their only bad habit so far is to wrestle each other to exhaustion with Cisco crying piteously whether winning or losing.

TuTu, one of the goats, was the first to accept them by moving in with them. If you can't like TuTu, you really are a lost beast. Bo soon followed and now three months later, they parade by, two-by-two, for inspection each morning and evening. Some local wag asked if we were building an ark.

Pancho turns out to be a kissing Llama. If you stand still with your hands behind your back, he'll come up, look you in the eye, and then gently give you a buss. If ladies are present, he likes them best and will kiss them first, but is impartial otherwise.

Where but at Syn-Aud-Con can you calibrate to the cry of Llamas.❑

dBA inc.
Consultants in Audio, Acoustics & Noise Control

P.O. Box 11385 Fort Wayne, IN 46857
(219) 744-0331

MEMO

TO: Don Davis

FROM: Tom Lorenzen, May '87 grad

DATE: September 6, 1989

SUBJECT: Information you do not teach, and for a good reason.

Enclosed are some very "enlightening" articles found in the recent Crutchfield catalog.

On page 66 the SPL graph is quite unique. Why did you not tell us that the average output power directly corresponds to SPL, regardless of the speakers sensitivity, distance from the speakers, etc.!

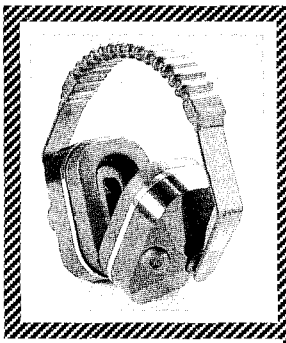
You also did not inform us that (see bottom of page 73) a patch cable exists which can separate the bass, mid, and high frequencies onto appropriate strands of wire with-in the cable for "..ultrawide bandwidth plus absolute phase coherency..".

This type of information can make you angry and chuckle at the same time!

| Average output power, Watts | Sound-pressure level, dB | |
|---|---|---|
| 300 | 110 | possible damage to hearing |
| 100 | | |
| 30 | 100 | very loud music |
| 10 | | |
| 3 | 90 | loud music |
| 1 | | |
| 0.3 | 80 | average music |
| 0.1 | | |
| 0.03 | 70 | average conversation |
| 0.01 | | |
| 0.003 | 60 | quiet music |
| 0.001 | | |
| 0.0003 | 50 | distant traffic |
| 0.0001 | | |
| 0.00003 | 40 | background noise |

*To double the volume (sound pressure level) requires a ten-fold increase in power*

# Noise-Activated Earmuff

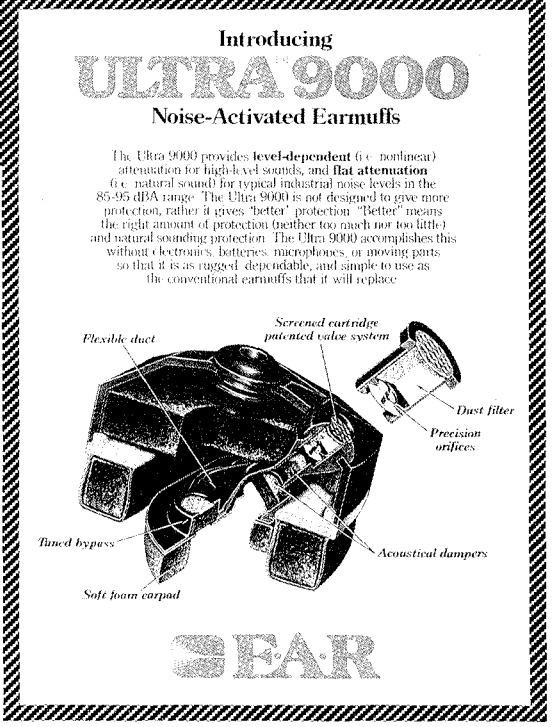


We like to attend shooting classes at the world famous "Gunsite" school under Col. Jeff Cooper. Good hearing protection is mandatory when shooting simultaneously in a firing line with twelve other people to say nothing of the aural stress of firing heavy calibers in indoor combat simulators. Recently we had occasion to write the following letter:

Dear Col. Cooper:

Knowing of your dislike of premature ear cover because it can cause a student to not hear important instructions, I thought you would be interested in a new and unusual hearing protector that, *without the need of electronics,* allows quiet sounds through, but acoustically blocks louder sounds. The technique used is valid acoustically and the people producing it are well-known in our industry for competent engineering work of the highest integrity. The Ultra 9000 noise-activated earmuff is made by Cabot Safety Corp. (formerly E·A·R), 7911 Zionsville Road, Indianapolis, IN 46268—phone 317-872-1111, and retails for approximately $50.

Sincerely, ❑




# Pathological Science

## Symptoms of Pathological Science

▷The maximum effect that is observed is produced by a causative agent of barely detectable intensity, and the magnitude of the effect is substantially independent of the intensity of the cause.

▷The effect is of a magnitude that remains close to the limit of detectability or, many measurements are necessary because of the very low statistical significance of the results.

▷There are claims of great accuracy.

▷Fantastic theories contrary to experience are suggested

▷Criticisms are met by *ad hoc* excuses thought up on the spur of the moment.

▷The ratio of supporters to critics rises up to somewhere near 50% and then falls gradually to oblivion.

Irving Langmuir earned the 1932 Nobel Prize in chemistry for work dealing with the absorption of monolayers of molecules on surfaces.

A recent transcript of a recording of a speech he gave on pathological science was printed in the October 1989 issue of *Physics Today* pp 36-48.

Much pseudo science comes about by exhaustive research in the literature. Langmuir "Symptoms" of science gone awry can prove useful in detecting "research" done via the literature method.

Those cases not the result of self deception are usually caused by outright, bold faced lying. This is an increasing academic problem caused by the amoral TV generation. We appreciate that "common sense" is what tells us the earth is flat, but "common science" can protect us from "fantastic theories contrary to experience." Neil Bohr is reported to have asked of a new theory, "Is it crazy enough to have a chance of being true?" Once the lie is perpetrated trying to squash it is like trying to "unring" a bell.

In times like these perhaps it is best to remember there have always been times like these. ❑

# After the Woofer, What?

Enclosures are for woofers. If every one subscribed to "High Tech Taste" (the architectural view that plumbing, ventilation and wiring conduit in view is beautiful), the other devices associated with loudspeaker systems would be stacked up on top of the woofer enclosure.

The remainder of any enclosure you are designing and/or building must provide protective housing for the crossover network, higher frequency devices and not interfere with the mechanical and electronic synchronization of the multiple sources at the listeners' ears.

**Signal Synchronization**

The term "time align" is trademarked by E. M Long Associates and is often used when what is actually meant is "signal alignment" or signals being synchronized to arrive simultaneously at a given point when radiated from multiple sources.

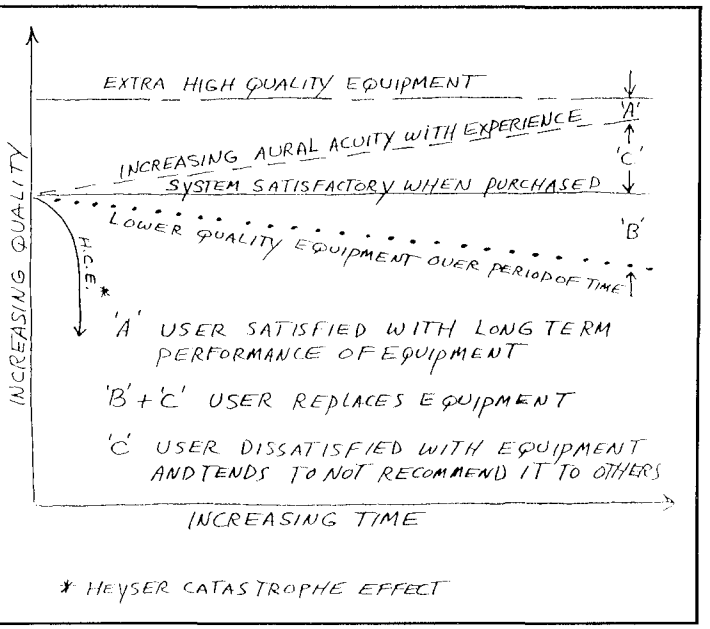
There are two basic signal synchronization problems:

1. Two devices covering the same frequency range (i.e., two mid-range drivers for increased power handling)
2. Two devices covering the same frequency range but only through the crossover region.

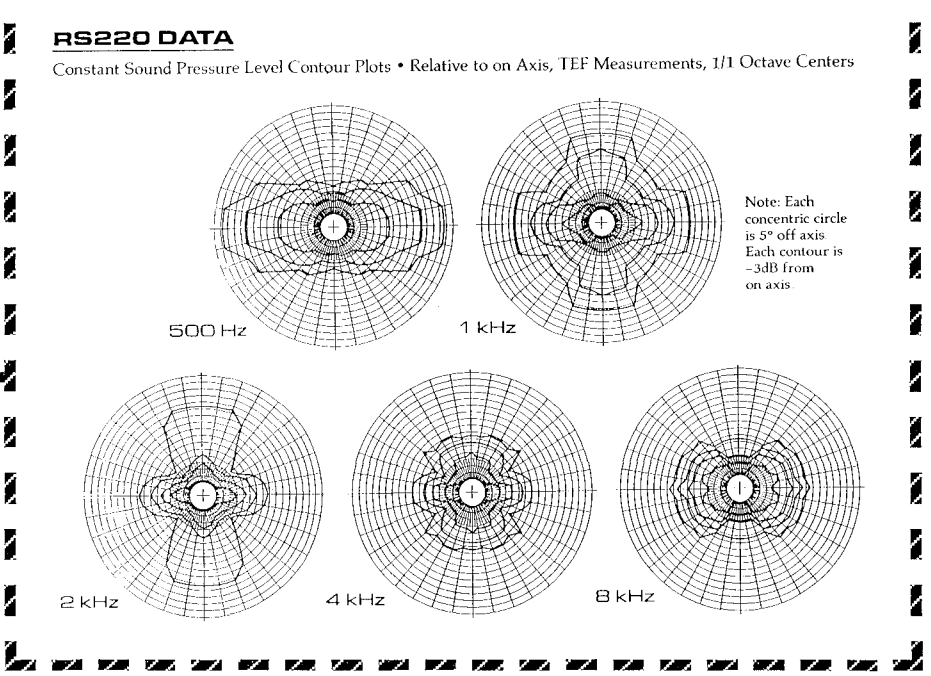
Signal Synchronization in the crossover region is a phasing exercise (remember, phase is not polarity and is best examined with acoustic phase measurements).

For those without instrumentation, you can use interstation noise on an FM tuner (white noise) fed full range, but at a very low level, to both devices (i.e., no crossover network for this test) and mechanically move the HF unit back and forth until the smoothest high frequency response is heard. Attenuating the HF unit, while doing this test, until it is approximately equal in perceived level to the woofer at what will later be the crossover frequency, is helpful.❑

## Relationship Between Time, Quality, and Increasing Experience With Audio Equipment



# Polar Measurements




Community has used for their RS 880 measurement format originally developed by John Prohs for the PHD Program. This format takes a polar plot display and arranges it so that each concentric circle represents five degrees off axis. The angular information remains the same as in normal polar displays. The contour overlays are in 3 dB steps. See illustration.

While it takes a moment to reorient from old habits, there is great intuitive value in any valid change of perspective because of the mental turmoil it creates. Our observation of many inventors over many years is that they simply don't see the world the same way so-called normal people (read—not alert to the opportunities around them). Our congratulations to Community for bringing us out of white alert to red alert regarding using polar data creatively.❑

**Editor's Note:**
This is the first document that Don has composed and typed on the computer. Everything to date has been handwritten. Don faithfully practices everyday with a program called typing tutor.

---

# Correction—Tech Topic, V17N4


## *Physical Alignment & Electronic Synchronization*

We got a few phone calls telling us that we left out a few sentences in our paste up. I hope that adding them now will help.

**What Was Left Out?**

Page 3, bottom of the first column: HOW TO PROCEED WITH ALIKE DEVICES?

"The first step is to work in the overlap area between two of the devices. You will first adjust two followed by turning them off when you adjust another two. Then....." The paragraph continues as we have printed it: "twos can be combined with twos, etc."

Sorry that we clipped those important sentences.❑

# Intersonics Servo-Drive Sub-Woofers

## A Very Moving Experience

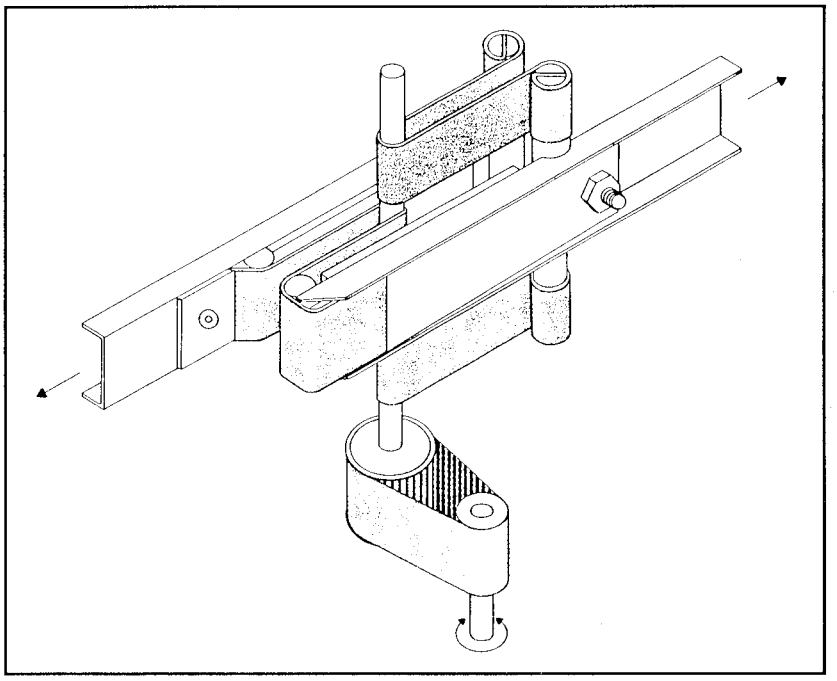
A conversation with or a letter from Tom Danley of Intersonics is always a delight. His wit and intelligence is a shining light.

The main source of enjoyment from our sponsorship program, aside from the fact that it strongly supports our Syn-Aud-Con seminars, is the close association that we can develop with so many fine engineering staffs.

Tom calls and tells us about some of the fascinating projects that he is working on: The elephant mating call —14Hz at 105 dB (written up in National Geographic); the Sonic Boom Simulator — 3Hz at 133 dB on a 10'x12' wall? Well, maybe! That is a big order for a subwoofer.

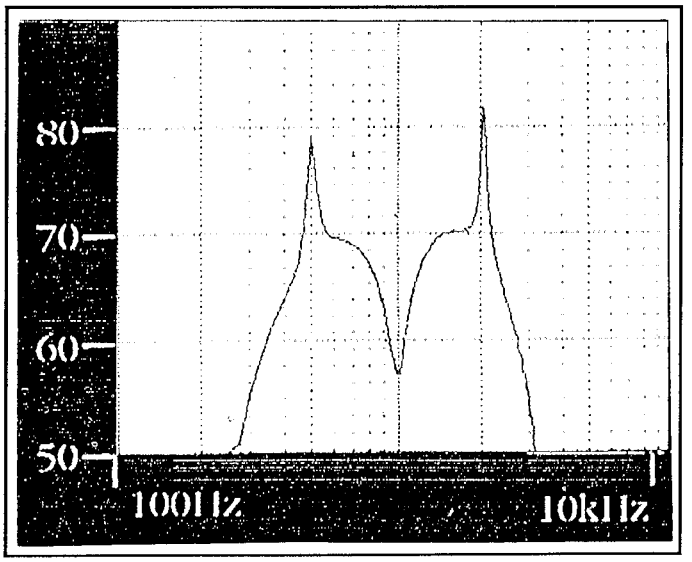
Recently Tom sent us a very good drawing of the belt mechanism they use to convert rotary motion to linear (back and forth) motion. Listening to Tom give his paper at the AES again reminded us that he's a well prepared, thoroughly equipped, articulate engineer. The world needs more like him. I'm grateful we know him.

I was talking to Barry McKinnon who installed the Calgary Stampede sound system. He promises to send us pictures and details of some very clever concepts and procedures. One is the use of the Intersonics Servo-drive subwoofers. Barry said that the opening ceremonies was a very moving experience.❑



## Be Very Skeptical About Quoted Intelligiblity Scores

Peter Mapp has been extensively testing a multitude of products and devices. I presume some skepticism with RASTI led to this measurement. It sure would measure well and sound lousy as well as unintelligible, yet the advertised scores would be very high.❑



# Loudspeaker System Design Workshop

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# A Superb Subject — A Superb Staff

Syn-Aud-Con takes justifiable pleasure in presenting workshops that have no peers. How could you top our two Concert Sound Reinforcement Workshops where the "BIG FIVE" worked together to prove how professional their industry has become?

Those who attended the 70s workshop with Dick Heyser, Gerald Stanley and Gene Patronis in Pasadena understood the sentiments of the participants who called us and said, "What do you mean "limited" attendance"? "Are you telling me that you are having the Father, Son and Holy Ghost of audio and that I can't come?" That's how attendance rose from a limit of 30 to 70.

Another workshop of that caliber is in the planning stages. It will be in Atlanta, GA in February. We don't have an exact date at this point, but we are working on it.

**Subject:** Designing & Measuring Loudspeaker Systems

**Staff:** Gene Patronis, Don Keele and Jay Mitchell

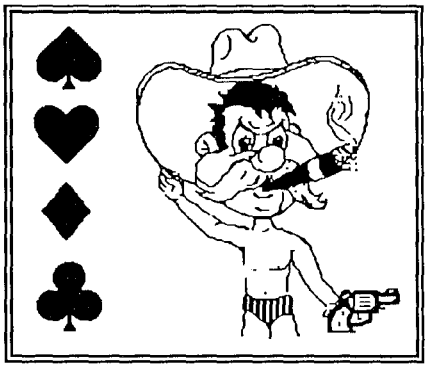
**Tools:** New TEF 20, Ariel SysID, Hyperception, and EASE

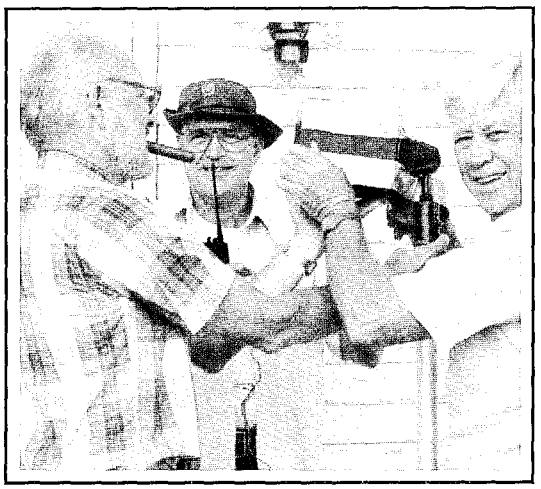
Technical societies can't allow the kind of synergy that's going to be developed in this workshop. Syn-Aud-Con can and does carefully screen presenters. These men qualify as:

1. Knowing more about the subject than others in the industry,
2. Are willing to communicate what they know,
3. Are capable of communicating it in an accurate, entertaining and useful manner.

Help spread the word. A special class at a special time with special tools and extra special instructors.❑

# What Do These Men Have in Common?





What do these men have in common besides Syn-Aud-Con?

All three are avid shooters and use Smith & Wesson 745 semi-automatic 45 caliber handguns. In between shooting contests on the steel plates, acoustic measurements are taken - in this case of a new acoustic absorbing metal - **Yes**, metal.

With Gene Patronis' ability with a cigar and Jack Daniels, we are going to cast him as *Wild Bill Hickok* in a new version of the *Plainsman*. Anyone who saw the original with Gary Cooper saying, "I'm playing the cards in your hat" over the barrel of a 45 to a cheating gambler should be able to envision Gene Patronis stripped down to his shorts saying, "Give me the check" to a fellow diner who had not responded to the demand for the bill.

If you haven't heard the story, be sure to ask.❑

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# A New Monitor Loudspeaker

# or

# Two Sauls on the Way to Damascus

We recently had a pleasant conversation with John Meyer at AES. What occasioned it was his new small self-powered monitor loudspeaker. Several grads, whose ear-brain systems we have the highest respect for, told us of its excellent imaging reproduction. We were able to hear them in a special imaging demonstration by the Roland Co. while at the AES.

We also had a talk with Bob McCarthy of Meyer Sound who was with Dave Andrews at the show. McCarthy is a sincere young man and it turned out that he was an Indiana University grad and knew Ted Jones. We discussed his work with SIM and our thoughts about the subject.

Perhaps the future may hold a further look at what they are doing. In the meantime we are pleased to have an amiable dialogue going as each of us has the opportunity to learn from the other.

We recently read a quote from Meyer Labs that said:

*"Why SIM works will be understood, eventually. We're sure it has to do with echo structures being ordered—the reverb of an explosion in a room is not random, just complicated. What's important now is that SIM equalization does work. It's not unusual for mechanisms to show up before theory—we knew how to navigate by compasses centuries before we knew exactly why they pointed north. With SIM, we have a tool to remove resonant effects and assist in tuning a performance space."*

*John Meyer*

Our own equalization experience tells us that when you remove a resonance from the direct sound, a microphone watching in the reverberant sound field will see the direct sound's reflected clones change as well. That after all is what equalization is all about.

The future does hold, especially for low frequencies, the possibility of using adaptive digital filtering to convolve the direct sound with other energy. The question remains, if and when we can, is it worthwhile?

We are pleased to hear this less dogmatic approach to SIM and as everyone begins to understand the chasm between the electronic response domain, the transducers domain, and the listening room domain, we'll see thoughtful progress in the application of dual channel FFT to one port measurements.❑

# The AES Continues to Depreciate Dick Heyser's Work

Carolyn and I have been very fortunate to grow up in the company of some true giants in acoustic and electroacoustics; men like Dr. Prof. Manfred Schroeder, V M A Peutz, Richard C. Heyser, Dr. John Hilliard, Dr. C. P. Boner, and Paul W. Klipsch. Perhaps that is why we are able to recognize real acoustic talent when we meet it in men like Dr. Peter D'Antonio, Dr. Eugene Patronis and Dr. Wolfgang Ahnert and a host of others, whom future generations will look back on in awe.

Such men, in their lifetimes, sometimes undergo severe criticism by their jealous competitors who are possessors of a lessor spark, but a bigger ego. The sign of a super Nova giant is when the unworthy continue the attacks beyond the grave in attempts to purloin the knowledge inherent in the material the giant left behind rather than in helping it grow and expand.

The attempts by certain academic nerds at the AES to bury Dick Heyser's contributions is despicable and we continue to firmly believe that justice must and will prevail. The word "Peerless" means without an equal. Unfortunately that was a title that rightfully belonged to Dick and the non-peers are remarkably active in proving it.

**The Heyser Foundation Scholarship Fund**

On a more positive note, there is now over $70,000 in the Heyser scholarship fund, thanks in a large part to the generosity of a few people-- namely John Prohs and Ambassador College assisted by David Andrews. They are looking for qualified recipients for low interest loans to graduate students. We know of one loan that has been made because Deward Timothy read about it in the Syn-Aud-Con Newsletter and encouraged a young man to apply. If you know anyone that you think would qualify, contact Amy Heyser, 10415 Fairgrove Ave, Tujunga, CA 91042.❑

# Energy Investigation Prior to Heyser

A number of years ago I purchased a remarkable book entitled, *"Atomic Artillery"* by John K. Robertson, and published by D. Van Norstrand Company Inc.

In Chapter 4, Dr. Robertson wrote, "Destroy matter and gain energy. The idea has amazing possibilities...To them we shall return when considering more fully the bombardment of the nucleus of an atom."

And in the same chapter, after literally describing 90% of the necessary knowledge to build a bomb, he further writes:

"As we stated on page 59, the possibilities are astounding, nay, even frightening. The annihilation of a very small amount of matter would release energy which, if misdirected, could destroy a whole nation."

You probably read the above and said, "So?"

What's unusual about the book is its publication date of 1937. It contains, thanks to Prof. E. O. Lawrence, four photographs of his cyclotron.

This writer can't help wondering what a government security man would have thought had he encountered this book on his local library shelf back in 1944-45.

John Kellock Robertson, Professor of Physics, Queen's University, Kingston, Canada deserves some posthumous recognition for a totally coherent description of the most advanced science of his day and his prescient interpretation of its implications for the future, "The ancients are stealing our inventions."❑

# Studio Designer's Workshop

Surely the audio world knows that Russ Berger is now Russ Berger Design Group, Inc.

I will never forget receiving a phone call in 1978 from a young man who worked in the pro audio division of a Dallas MI store and had recently attended one of our classes in Dallas. He asked for a TDS license. I made the judgment that he really shouldn't be wasting his money, so I didn't do my job. He persisted, though, and in a few months, Russ Berger had invested some $25,000 to build a TDS system for himself (we didn't even have ETCs then).

Using that instrumentation system, Russ designed dozens of studios on his own, and started to build his reputation and wealth of experience. In 1982, the Dallas acoustical consulting firm, Joiner-Pelton-Rose, hired Russ to form a new studio design group within that company (now The Joiner-Rose Group).

Four hundred studio design projects later, Russ has formed the Russ Berger Design Group, Inc., located in Dallas, TX. The new company has some thirty projects in house now, and offers services in recording and broadcast studio planning and design..

Russ Berger enjoys the finest reputation in our industry. We are very proud to say that we knew him when.

**Studio Designers Workshop?**

We saw Russ at AES in Los Angeles and mentioned that we'd like to hear from him shoud he ever consider conducting a Studio Designer's Workshop for Syn-Aud-Con. Russ said, "Any Time, Any Where!!" Proof that Russ hasn't changed since we met him in 1977.

If you have an interest in a Studio Designer's Workshop conducted by Russ Berger, be in touch. Such a workshop must necessarily be limited in size. If we hear from you, we can put your name on a list to be considered first when the time and place is determined.

I wanted a picture of Russ to use here. I couldn't resist using this picture taken at Acorn Studios in the summer of 1984. That's Russ, along with Peter D'Antonio, leaning on the back of the Oak Ridge Boys' chairs.

I especially like this picture because so many people from this class have become important names in studio design: Russ Berger, Steve Blake, Peter D'Antonio, Chips Davis, Neil Grant, Doug Jones, Steve Langstaff, Neil Muncy, Lennert Nilsson, Bob Richards, Bob Skye, Bob Todrank, and we can't fail to mention the late Charles Bilello.❑ -cd-

# The End is Nigh

Mick Whelan of Electrotec sent us a fax that speaks for itself. We have been warned!

"Yes indeed the end is near for welding cable as a power feeder. Many states, including California and Washington are exercising Article 520-53, section "h" which explains which conductors are allowed. Welding cable is not one of them.

"Washington state is also exercising Article 250-99. This concerns connections and states that the grounding connector must be a make-first, break-last type of system. For a single pole connector this must obviously be of the interlocking type. So, for portable power systems, use of the camlock J series connector will no longer be acceptable."❑

# Computers in Audio

Three members of the July class stayed over for a 4th day in order to work with the various audio computer programs: EASE, PHD, AcoustaCad, Ariel SysID, etc.

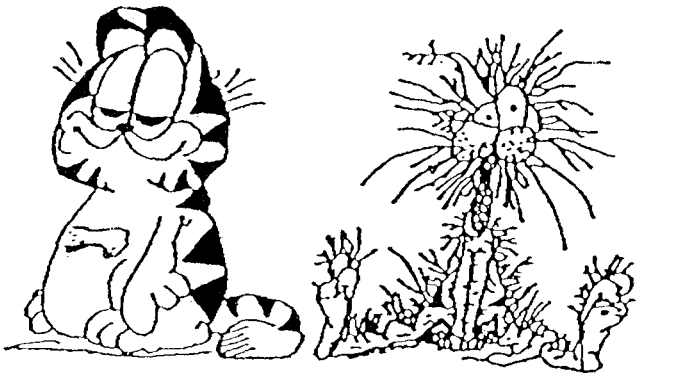
Before the day was out the teacher-student ratio was one to one (see "The making of a Colonel").

Farrel Becker was the adjunct teacher for the class in July. He is, of course, a seasoned computer programmer. It was amusing to Don that upon Farrel's return from this class he exactly duplicated the setup Don has. Don and Farrel both agree Fred Fredericks did a fantastic job of assembling a state-of-the-art clone.

The three attendees, Lang Holland, Rick Brehm, and Mike Lamm, had a chance to see and hear the Ariel measurement system work. They also were introduced to EASE. As a result, they are in a better position than most to understand the powerful significance of the TEF 20 - Ariel SysID - Hyperception - EASE combination.

We can only say that those whose attendance at a Syn-Aud-Con class or workshop is more than a year old are missing out on a very rapidly moving set of changes in our business.❑

# Smile




Ken Jordan of Navy Motion Pictures in Brooklyn sent us this cartoon of Garfield. Ken has attended many Syn-Aud-Con seminars and Workshops—so he knows whereof he speaks.

# Ariel SysID

Syn-Aud-Con has now had the opportunity to experiment with the Ariel SysID analyzer. SysID stands for System Identification. It consists of a full length plug-in card which utilizes the advanced TMS32020 digital signal processor (DSP) from Texas Instruments and some very clever initial software. At this writing this system is offered for IBM type computers only.

The following from the owner's manual: "SysID guarantees the accuracy of the transfer function" followed by an exact description of the required constraints. Syn-Aud-Con has published these constraints in the past and they're just as correct today.

1. The system being measured must be time invariant and LINEAR for well behaved stimuli.
2. The stimulus period must be greater than the system's complete impulse response.

The owner's manual is well written and avoids the pitfalls of claiming more than they can do. With a potential dynamic range of 120dB there's not much you can't do. In our 386-33, the speed is more than satisfactory. This is due, in our opinion, to their clever use of the DSP rather than extensive use of software. Again, in our opinion, anyone purchasing this type of analyzer (i.e., a plug-in card, computer based unit) dual channel FFT that is not based on an advanced DSP chip is placing an unwarranted faith in somebody's software integrity.

Syn-Aud-Con, at this writing, feels that SysID is the ideal companion to the new TEF 20. When you need to make one port measurements, SysID will prove to be an ideal choice. SysID is a fine alternate way to do two port and with impulse, chirp maximum length sequence MLS signals. Cost is around $3,000.

Our preference for TEF and SysID is founded not only on their splendid performance, but also on their projected possibilities. SysID came out of Bell Telephone Laboratories. TEF came from Richard C. Heyser and Gerald Stanley. Both of these analyzers are DSP based and remarkably compatible. Both are subject to continuing development by clever dedicated people. ❑

## *July Farm Seminar 1990*

# Superb Audio Programs Available at Columbia College—Chicago

FIG. 11a thru FIG. 11d—Neil Muncy and his ripple tank. Note Peter D'Antonio in pictures 11c and 11d. The pictures express his joy in seeing a concept elegantly demonstrated. Picture #11d tells us that he has new material to feed his innovative mental processes.

Doug Jones of LEDR tape and Prosonus SRD CD fame is having an exciting new career at Columbia College.

Teaching audio is not new to Doug. He was an instructor at the very excellent Institute of Audio Research in New York when we first met him. From there he spent several years in Africa and he was at Zenith dB recording studio in Chicago when we heard from him next. He attended almost all the Syn-Aud-Con workshops on Studio and Control Room Design and many regular Syn-Aud-Con classes, bought his TEF analyzer and started his own company, EASI.

It was because of the TEF analyzer that Doug started working at Northwestern University with Gary Kendall and Bill Martens. (Gary Kendall worked with Puddie Rodgers at Northwestern in the late 70s.)

Doug started teaching part-time at Columbia College about five years ago. I had several opportunities to talk with him. He stresses to his classes that only 1 in 25 will be able to get a job in the recording industry; therefore, his classes will cover a broad base of audio including audio fundamentals.

I heard that Doug had six TEF 12's. Then I heard that he had received a $175,000 grant. I called Doug to see if he would tell us about it.

"As of September 1, 1990 I am a full time faculty member with oversight responsibility for the sound department. Our program offers a 4-year bachelor of liberal arts degree and is dedicated to preparing students for careers in professional audio. We have created three areas of concentration (minors) in our degree program; Recording, Acoustics/Sound Contracting, and Sound with Pictures. This semester we are piloting a course called Sound System Design taught by Jon Laney from Bridgewater Custom Sound. The class uses *Sound System Engineering* as a text.

Over the next few semesters we will be offering as many as six new courses focusing on the use of computers in audio. We received a federal grant that will go a long way to fund these classes. Currently we are planning two levels of classes in Computer Aided Design for audio including drafting and documentation, Bose Modeler, EASE, and PHD, two levels of classes in measurement/analysis using our existing six TEF 12 machines, a TEF 20 and an ARIEL system; and courses in digital audio production.

In addition to the classes supported by the grant we have plans for classes in Psychoacoustics, an advanced course in Sound for the Visual Medium, an independent study in advanced Digital Production and a course in Theater Sound.

On another note, many have asked how my increased involvement at Columbia will affect EASI. Well, EASI is alive and well, and I will continue to design and consult, but on a more limited basis. We have added two people to our staff, Marty Wilde who does home listening rooms and Brett Johnson who specializes in studio systems design."

Recently we read an article by Martin Polon in *Studio Sound* saying that audio courses educational administrations were dropping audio courses because they felt that audio manufacturers were not supporting the training. (By that I assume that they meant that audio manufacturers were not making sufficient financial contributions to the academic programs.) I mentioned this with some alarm to Doug, who said that perhaps it was a good thing to eliminate the classes that concentrated on recording to the exclusion of basic fundamental audio courses, such as he is teaching.

It is a very fortunate student that has the opportunity to attend the Columbia College audio program, and a very fortunate employer that will be able to hire a graduate from Columbia College's 4-year audio program.

We went looking through our Newsletters and Tech Topics for a picture of Doug Jones to illustrate the write up. I can't resist using a set of pictures from 1984 - the Studio Designer's Workshop at Acorn Studios. That is when the LEDE™ design really began to really come together — because we now had Peter D'Antonio. In these wonderful pictures we have Neil Muncy, the late Charles Bilello, Doug Jones, Don Eger, Neil Grant - all in a powerful learning experience. We hope you enjoy these pictures as much as we do.❑

# New Dorian Recordings

We are not only totally taken with the remarkable technical quality of Dorian Recordings but also with their ability to locate superb artists to perform for them.

Normally I do not read the copy that accompanies record releases, but whoever does Dorian's is an artist-scholar in their own right. I selected one of the releases as typical (if such a word is admissible for such quality) as an example of the research that goes into their record notes:

## *Harpsichord Music of Frescobaldi*

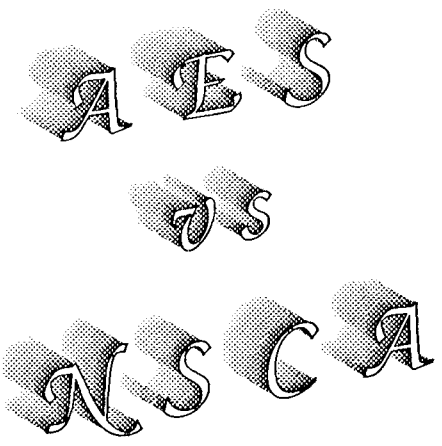
CATALOG NUMBER: DOR-90124 DDD

*Revolutionary of Early Keyboard Music Featured on Dorian CD with Colin Tilney*

**THE MUSIC**

**A SINGULAR VOICE**

Girolamo Frescobaldi (1583-1643) stands as one of the most remarkable contributors to the evolution of keyboard music. Organist of St. Peter's in Rome, and to the Grand Duke of Tuscany, Frescobaldi was a revolutionary figure, developing a uniquely florid keyboard style, full of daring chromatic experiments, virtuoso display, and free imitative counterpoint. One of his great achievements was the keyboard elaboration of the radical new vocal styles of such Mannerist composers as Caccini, Peri, Gesualdo and Monteverdi. With his adventurous runs, extravagant ornamentation and pungent harmonic effects, Frescobaldi created a body of harpsichord music so powerful and original that even today it strikes the ear as fresh, exotic and dramatically new. Frescobaldi proved a potent influence long after his death: his works were studied by J.S.Bach, and even provided inspiration to leading French composers such as Louis Couperin. The program selected for this CD features some of the composer's most remarkable harpsichord works, including a selection of toccatas, partitas, galliards and capriccios.




Philosophically we have many disagreements with the AES and start out to each AES convention with the conviction that this will be the last one, and leave the convention with the knowledge that it is one of the most important meetings we attend —because of the technical papers and the interaction between people attending the technical sessions.

Until the NSCA develops a forum for technical papers, they can never replace the AES for sound contractors. The NSCA manufacturer oriented "training" will never accomplish the give-and-take of technical papers given by some one hundred people, such as was the case at AES this year.

I am sure that I will never forget the exchange this year between Sam Berkow of Joiner Rose, who was giving a paper, and David Griesinger of Lexicon, a member of the audience. So much love, respect and intelligence evident! By the same token, neither will I forget the hatred expressed by Stanley Lipshitz as he rudely shouted at Keith Jebelian following his paper on the new TEF 20. Keith proved what a giant of a man he is — both intellectually and emotionally and Lipshitz proved to everyone what we already knew.❑ -cd-

# The Growth of and Recovery from TTS in Human Subjects Exposed to Impact Noise

The November 1989 J. Acoustical Society of America contained a Letter to the Editor from noted authority, W. Dixon Ward, Hearing Research Laboratory at the University of Minnesota. I would like to quote the Abstract:

"This letter disputes the contention that the growth of temporary threshold shift (TTS) with time can be adequately described by Gompertz functions. The similarity between TTS growth functions in high levels of impact and of continuous noise is stressed, a similarity that leads to the proposition that some sort of peak-limiting action that occurs at the stapes serves to protect the cochlea in the 120-dBA region."

At the end of the Letter, Dixon Ward states,

"Another possibility is that the maximum amplitude of motion of the stapes is limited to the elastic characteristics of the annular ligament, so that peak clipping occurs whenever the input signal exceeds some fixed value, as suggested by Price (1974). Either mechanism would account for the present results; however, the mode-of-vibration scheme would predict only a brief plateau in the growth of TTS with level, while a peak-limiting mechanism should product an asymptotic value, at least up to levels at which some structural failure occurs in the outer or middle ear.

"Further research is obviously necessary to establish the relative contribution of the two possibilities, but, in any case, we may have *here an explanation of the failure to find widespread hearing loss that nearly everyone seems to expect to occur in young adults exposed to music amplified to reach peak levels of 120 dBA."* (italics mine.)❑

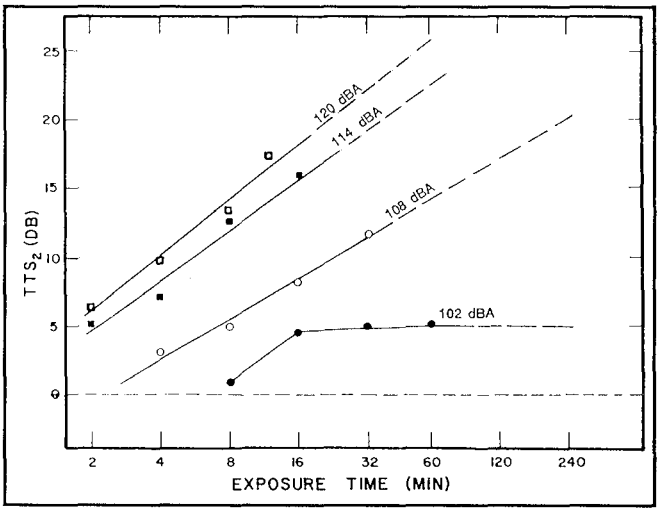



*Fig. 2—Growth of TTS2 with exposure duration, the latter plotted logarithmically.*

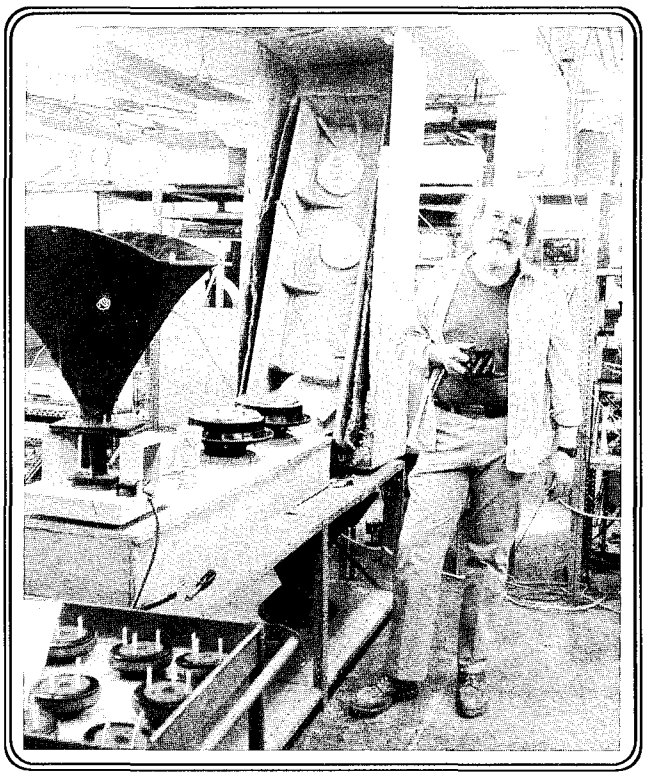
# *The Pursuit of Higher Fidelity*

True music lovers move to a city where abundant live music is available. No sound system can approach the live classical orchestra. We have been impressed by the 3-D reproduction of some individual instruments as close to reality but there is no serious contest between even the most elaborate system and the large orchestra. The good news is that the quest can go on for more centuries. The bad news is that we aren't even close.

Your degree of susceptibility to auto suggestion can be measured by how near to the real thing you think a music reproducing system is.

In fact, that's the crux of the whole matter, namely how to create an "illusion" satisfactory to the listener as a substitute for the live event. ❑

# Exceptional Horn and/or Driver Designers I Know



*Bruce Howze of Community Light & Sound*

Note that I said "know", so the list is not intended as a complete list of outstanding living horn and driver designers.

There's Don Keele, of EV, Klipsch, JBL and now splitting his time between Audio Magazine and Techron; Cliff Henricksen of Altec, Community and now American Audio; Kenton Forsythe of EAW; Jay Mitchell of J.W.Davis, Frazier, and now working his magic for IMAX at Sonics Assoc.; a host of exceptional young men at EV and JBL; and Bruce Howze at Community - the reason this subject got started in my thought.

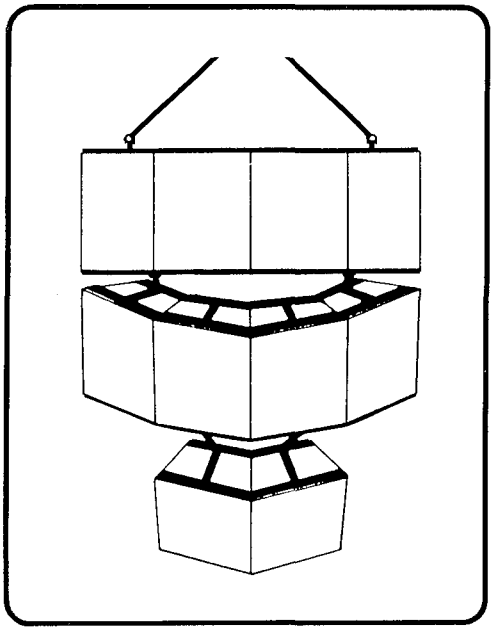
Now you know what I mean when I say, "outstanding designers that I know", for I am sure there are other good designers in the audio field.

Some engineers are "golden boys" straight out of college, like Cliff Henricksen with all the formal training (MIT) and the gifted intellect.

Then there are others like Bruce Howze who is this generation's Jim Lansing - without formal training: it all comes out of his finger tips. One has to have the tour of the Community factory in Chester, PA to appreciate the scope of Bruce's talent: the innovative fixtures assembled to not only design the product but to assemble the prototype, test it, and manufacture it!

It's a lot of fun knowing these people and seeing their progressive successes and their influence in our marketplace.❑

# ATM Fly-Ware



Rigging, especially *safe* rigging, is very much on the minds of sound equipment installers today.

We saw Andrew Martin in a booth at AES and stopped to talk and found that he was manning his booth for ATM Fly-Ware.

We met Andy almost two years ago when he attended the first of many Syn-Aud-Con seminars and workshops. He has been in the touring and rental sound business eight years and knows from experience what is needed for safe rigging. Check it out for yourself.

Andy has prepared a paper, *AMFS Flying Hardware System Concept Description and Application*. Andy would be glad to send it to you.

ATM Fly-Ware, 17104 S. Figueroa St., Gardena, CA 90248 or phone (213) 528-2004, fax 213-516-1829.❑

# FALL, FIRES AND FIRE-PLACES

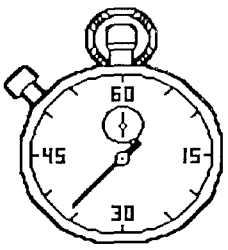
Theodore Roosevelt once said, "We loved a great many things—birds and trees and books and all things beautiful and horses and rifles and children and hard work and the joy of life." And from reading his writings about his ranch life in western North Dakota (his ranch was near a town named Medora just as our farm is near Medora, IN) he loved fall, fires, and fireplaces.

We've just had our first cool nights here at the farm and that was sufficient excuse to build a fire in the wood stove. Ours is a Vermont Castings which can be opened up like a fireplace so we can hear the crackle of the fire and see the soaring flames go up the flue.

A wood fire in a good stove provides radiant heat that fills the entire house in a warm dry embrace. We understand the efficiency of our propane gas fueled furnace, but it's pretty mundane when compared to an open fireplace.

The animals recognize its attraction at once and soon are arranged in a semicircle around it with their heads all pointing at it. I suspect that the first wolf that became a dog crept in to share a fire with some primitive man on a cold blowing night.

I recently read an ignorant article on Theodore Roosevelt wherein they stated he was "all material action." I used the article to start our fire. One can only hope that those who view men like Theodore Roosevelt and General George Patton as some kind of brute instinct types will one day read some of their writings with some semblance of understanding. To read the opening paragraphs of the chapter "Winter Weather" in Roosevelts's *Ranch Life and the Hunting Trail* and not feel the sensitivity of a great man is to reveal oneself as unredeemable.❑


# Observation of the Exterior of a Ticking Watch

We can observe the hands moving, hear the ticking, see its correlation with the earth's rotation. But, if we have no other clues, we would have to hypothesize how it might work. Any of the following might be correct hypothesis.

1. Water turning a tiny wheel at a fixed rate.
2. A pendulum.
3. A spring and escapement
4. A quality oscillator.
5. Some clever way to read the angle of the sun.
6. Sand running through an orifice.
7. Atomic pulsations.

These are just the beginning.

What if I now said none of the above! I will pay $25 to the best hypothesis that does not use any of the above ideas.

Note that the question of whether the mechanism, which you suppose hypothetically to be inside the watch case, is really there, nor even the interesting philosophical question of whether you may be sure that there is anything inside the case, need trouble the practical scientist as long as you have a theory which enables you to predict successfully the phenomena which can be observed.

Good luck!❑

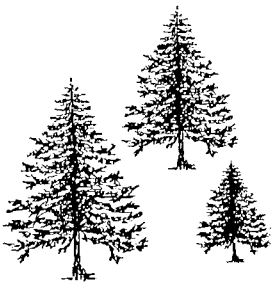
# "When a Pine Needle Fell in the Forest...."

It has been said that, "When a pine needle fell in the forest, the eagle saw it fall; the deer heard it; and the bear smelled it."

Deep in the forest, man is an intruder, but an intruder with dominion if he or she chooses to exercise it. Man is not equipped to compete with animals in terms of the five physical senses. But, man has a mind in addition to a brain. The animals have brains, but they do not have a mind. How do I define mind? It's a form of consciousness that can improve its function so that its future form modifies its physical manifestation progressively.

I'm well aware of the mindlessness that puts forth that man is an animal and those who wish to live as an animal are free to do so as far as I'm concerned.

Thinking man vs reacting man is the real struggle of all mankind. While their number is increasing, thinking man is still a tiny but persistent minority. Reacting man is everywhere evident. Younger people might prefer the even more descriptive term, "programmed man". Thinking man is distinguished by being more self programmed. Thinking man is not afraid of religion - he knows there has to be a first cause and that as Einstein put it, "Subtle is the Lord, but malicious he is not". Thinking man knows he is responsible for his own behavior, and therefore, he respects immutable law but questions mankind's arbitrary rule



making. He has little time for those who in essence say, "Who pooped in my pants?"

Thinking man is not interested in changing others, but can't help loving those trying to change themselves. Thinking man often has much to share, but recognizes that truth is always known by the "fewness and faithfulness of its followers."

What eighteen years of Syn-Aud-Con has taught us is the joy of working with thinking man, both male and female, and we evidence that there are more of them than is commonly believed.

How do you recognize a thinking man? It's easy. They leave you with changed thinking about a subject after their departure from your physical presence and we find that ideas rather than personalities are what remain in our thought.

Problem solvers are not necessarily "thinking men". Much problem solving is reacting in a preprogrammed manner. Some have been more cleverly programmed than others - both in lateral and vertical thinking.

Thinking man thinks the previously unthinkable. Perhaps he is the divine receiver.

Deep in the forest it is inspirational perhaps because we can sense there the remarkable chasm between man and animal and man's real dominion over so called material reality.

Time and again we hear of imprisoned men and women who testify that the human mind cannot be imprisoned, only the human body.

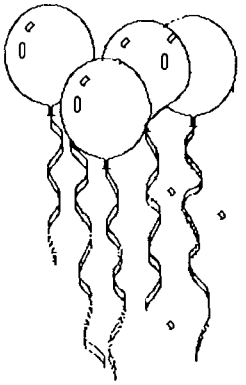
As we end our eighteenth year we have paused in gratitude to celebrate the many thousand Syn-Aud-Con grads whose *thinking* has helped lift an industry into new and exciting paths full of promise for the future.❑

# "No! It's His Problem

While protesting to an AES official about a howling hyena outburst by a never uncertain, seldom correct enemy of everything Dick Heyser ever stood for, I was told, "You are no mathematician." Exactly what that had to do with my protest I'm still considering. It is our current observation that anyone defending Dick Heyser's work is immediately given a higher voltage by the present ruling hierarchy of the AES. Considering the sources, we are apparently infuriating; the following story appears apropos.❑

*Two psychiatrists are riding in an elevator. As one of them starts to get off at the 5th floor, he suddenly whirls around and hits the other psychiatrist and then goes on his way. The elevator operator looks at the psychiatrist who was struck and says, "Pardon me, I couldn't help noticing what that man did to you. Aren't you going to do something about it?" To which the psychiatrist said, "No, it's his problem."*

# Surprise Party



## *Meet the Colonel – Don Davis*

## *by Ernie Pence*

There are ten thousand stories in Don Davis' life and this is one of them. A gathering of some forty friends met at a surprise event at the farm on July 28, 1990 to honor Don and to crown him as a Kentucky Colonel.

Those of you who know Don—to keep a secret this long is somewhat miraculous. You know that Don's life is full of enthusiasm and he can get enthused over an audio class, a shooting marksmanship or the care of a lost animal.

I am taking the liberty to write this article because Don's modesty towards writing this is second only to his placing a blindfold on the rubber duck when taking a bath.

Back to the colonel. The Honorable Don Davis now takes his place alongside entertainers Bing Crosby and Red Skelton; politicians Lyndon Johnson and Sir Winston Churchill; astronaut John Glenn—all of which were awarded the Kentucky Colonel Commission.

This is an honor awarded by the Governor of Kentucky for outstanding contributions, service and accomplishments on behalf of his fellow man. Recognizing Colonel Davis as an individual who meets all of this criteria, I nominated Don to the Governor of Kentucky for this award.

I am sure that all of those at the party and those of you whose life has been touched by Don Davis can share my joy by this nomination and award. I am sure that his many friends around the world will rejoice with me, and I am personally proud to call Colonel Don Davis my friend.❑

**Comments from Don**

I suppose not everyone has had the experience of a surprise party attended by dear friends from different parts of the country. My first thought was to touch myself to be sure I was among the living. Why else would all these people be here: friends from business, church, neighbors—for no apparent reason: no birthday, anniversary, or other known reason for a party.

It was fun!

***That's Ernie on the right with a look of intense satisfaction***

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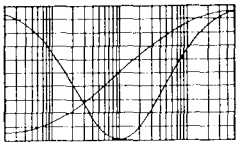

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# TECH TOPICS

Volume 18, Number 1
Fall, 1990


## *TEF Measurements in a High School Auditorium*

We were out with the TEF 12 on an auditorium job recently and were reminded once again how easy it is to find the problem with a TEF and how hard it is with anything else. We were working in a relatively noisy environment and yet we were able to ignore it and seek out interfering reflections from balcony fronts, rear walls and rear stage areas driven by rear wall auditorium reflections. We sincerely hope that the TEF 20 will have as easy to use calibration, cursor, and display length. There truly is a huge chasm between TEF users and all others. Yes! It's possible to misuse a TEF — so what.. We don't and we hope you don't. It's far more common to miss using a TEF when you should.

**The Problem (User's Viewpoint)**

We were recently asked to assist in evaluating a sound system in difficulty at a new high school auditorium.

We were told upon arrival at the auditorium that the stage was suffering from a severe echo from the house. We were also told that some participants were made "nauseous" by the blurred reflections. When questioned, the users said that it seemed to come from the curved upper rear wall above the balcony. When asked if stage monitors helped mask the reflections, they said yes, but the staff meeting that had complained had not used monitors. Listening to the hall from the talker's location on the stage seemed to confirm what had been said.

At this point we brought in a TEF 12 analyzer from the car and measurements were made. The output of the TEF 12 was fed to a microphone input on the stage via a Shure A15LA which takes 600 ohm unbalanced at line level to 150 ohm balanced at mic level. The measuring microphone (a GenRad 1/2" electret) was placed at the talker's position near the front of the stage area.

Figure 1 shows the ETC that resulted. The loudspeaker array was just above the test microphone and sound from it arrived first 21.8' from the reference point, 0, quickly followed by a floor reflection, 32.4'.

Out in the center of the ETC was the mass of early room reflections that were too high in level and too late in time, 138.6' to 180'. Use of a 100 foot tape measure revealed the balcony face and the lower rear wall under the balcony. (Remember these distances are double distances: from the loudspeaker to the surface and then, via reflection back to the measuring microphone.) The 253.1' reflection was determined to be the loudspeaker to rear wall to rear wall of the stage area to the measuring microphone. Drawing the curtains completely eliminated this echo.

Careful listening with cupped ears to speech revealed that it was indeed the lower rear wall. As the listeners raised their heads, the sound would then jump directionally from the rear wall to the array overhead. Sonex was used to block, one by one, every reflection to the measuring microphone, confirming in each case where the reflection was from. We often say that Sonex and our ears are our most valuable measuring too, and they are, but in this case the reflections were so com-

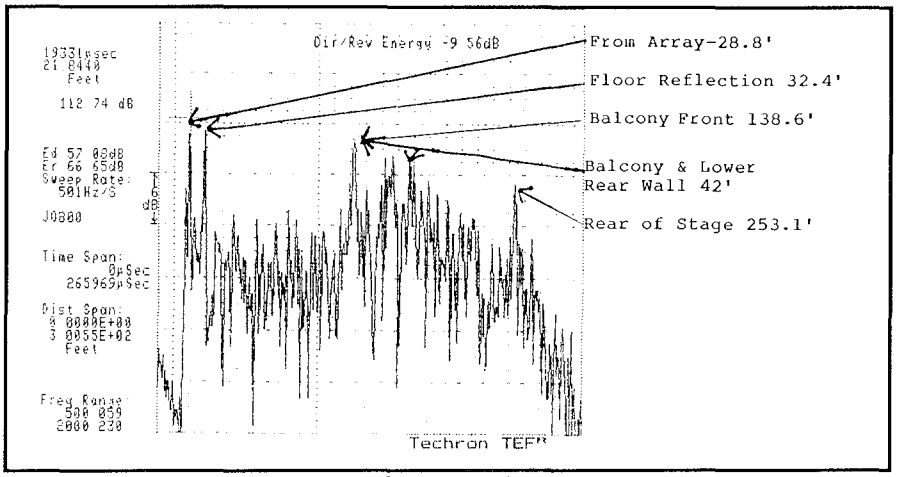


***Figure 1—View of the problem as seen on an ETC. Measurement made on stage.***

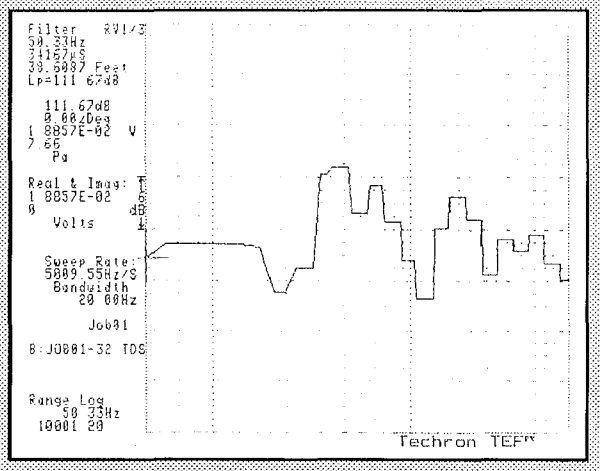


**Figure 2—A 1/3-octave view of sound system response. This correlates best with listener perception.**

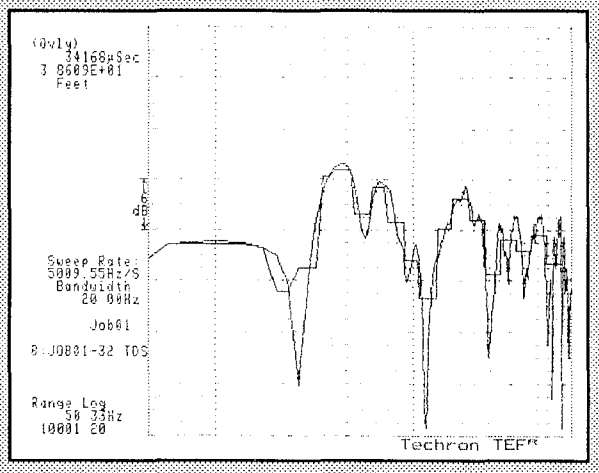


**Figure 3—A 1/3-octave display overlaid with a measurement made with a 70 Hz CBF.**

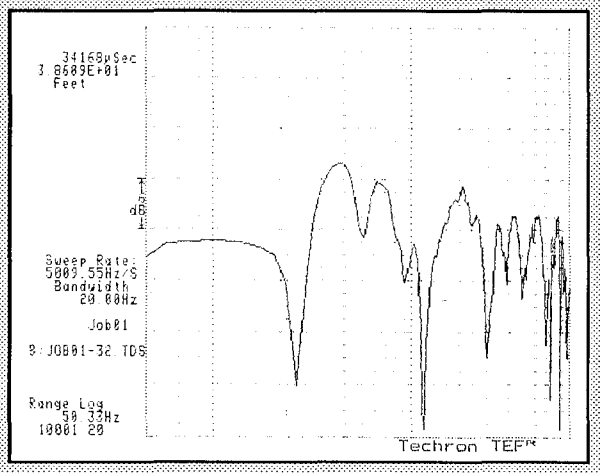


**Figure 4—is the logarithmic scale view of the 70 Hz resolution measurement.**

plex that it wasn't until we saw the measurement that we were able to use our ears to localize the problem.

Witnesses were impressed with the precision of measurement and the ability to confirm the data through simple physical test.

### A Sound System Problem

Since the sound contractor was at hand and about to equalize the system, I asked them if they'd like a frequency response of the system. They agreed, and Figs. 2-5 show what was present. They had planned to "lift" the dips in the response with a boost filter, but the linear frequency scale response showed that the cause was comb filters which are not equalizable. They were in need of synchronization with microsecond signal delay, not equalization.

It is important to note that this job had an excellent acoustical consultant and a first rate sound contractor. The architect had fought both of them into these problems.

How many of your jobs could I walk in on and find similar compromises?

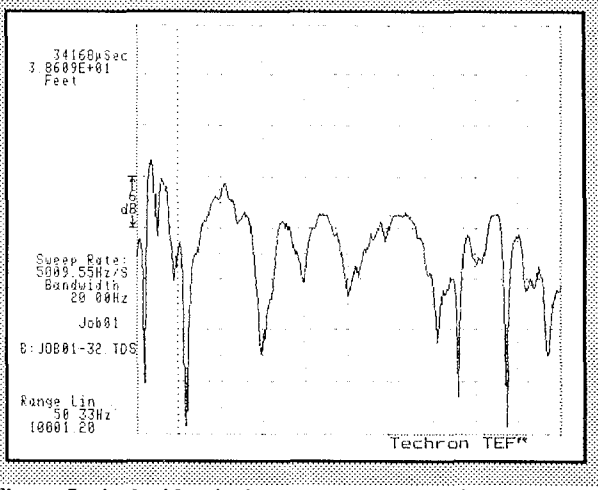


**Figure 5—is the identical measurement on a linear rather than a logarithmic frequency scale revealing that the dips and peaks are indeed due to missynchronization, and therefore, not equalizable.**

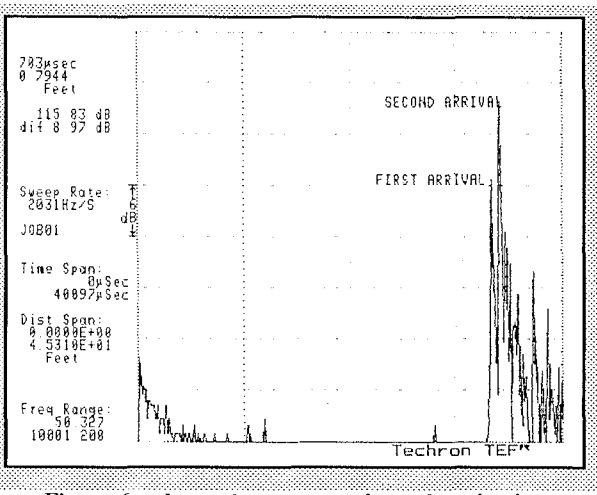


**Figure 6—shows the present missynchronization between units on one side of array. It is 703 usec (microseconds) or 0.7944' or 9.5"**