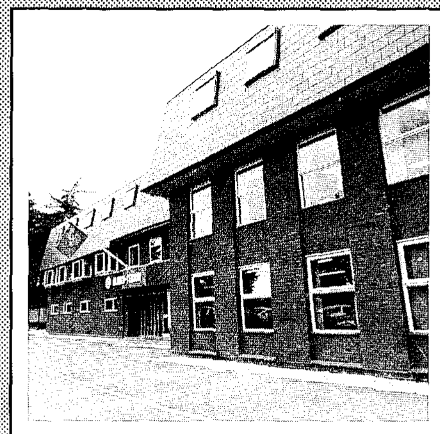
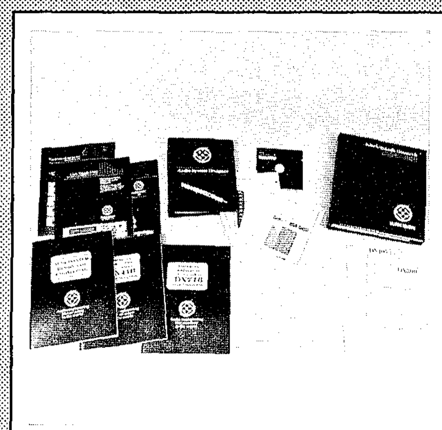
newsletter

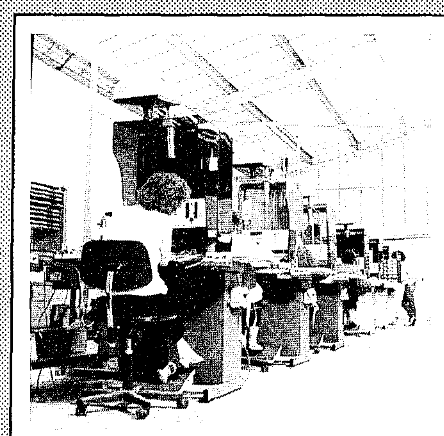
Volume 16, Number 4
Summer, 1989

Klark Teknik Research

Terry and Philip Clarke
Founders of KTR







SYNERGETIC SYN AUD CON AUDIO CONCEPTS

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.

Editors: Don Davis
Carolyn Davis

Design & Layout: Dashia Alfonso

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For additional information contact:

Synergetic Audio Concepts
R.R. 1, Box 267
Norman, IN 47264
(812) 995-8212
FAX: (812) 995-2110

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Klark Teknik

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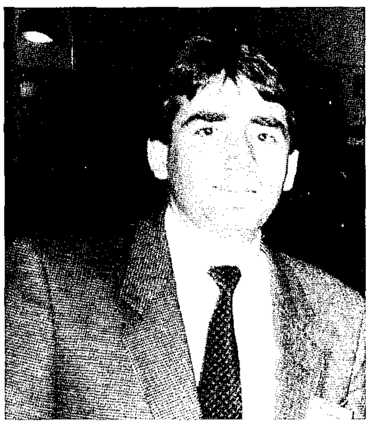


Jack Kelly says, "We have always enjoyed a good relationship with the Syn-Aud-Con sound contractor base—perhaps because we share the same committment to service."

Syn-Aud-Con sponsors come to us in two ways—we see a company that we would like to work with: we may admire an engineer and his work, or feel that the potential of the company is not being realized in the marketplace. The second way is for someone we respect to come to us and ask us to talk with a company: Jeff Loether of Marriott asked us to get to know the FSR company, Bill Bencsik arranging for us to meet the folks at West Penn Wire. Of course, some of our sponsors go back to the early days of Syn-Aud-Con sponsorship: Shure Brothers, UREI, IRP, and Crown.

Klark-Teknik came to us the second way. Peter Mapp, the well known British consultant and good friend, has written, under Klark-Teknik sponsorship, the excellent Audio System Designer technical reference manual. He arranged for us to meet Gaston Goossens, Group Marketing Director of Klark-Teknik, and we liked what we heard.

Only a select few overseas manufacturers have shared Syn-Aud-Con's vision of an impartial third party educational effort aimed primarily at the sound contractor industry. Klark-Teknik Research (KTR), founded in England in 1971 by two brothers, Philip and Terry Clarke, came up the audio ladder building broadcast quality equipment for Decca and the BBC.

In 1980 the Clarke brothers formed a joint venture with Jack Kelly in the United States called Klark-Teknik Electronics, Inc (KTE).

Syn-Aud-Con grads, which include Jack Kelly-1983, know KTE best for their high quality graphic and parametric equalizers, precision digital delay, and real time analyzer. Their DN716 has been successfully used by many sound contractors, including Jim Carey in his large church installations for precision synchronization work.

It has been our experience that Klark-Teknik has been very driven by real customer needs as differentiated from market fads and that their interest in ploughing back into the industry educational tools as well as selling superlative products express a company philosophy of commitment to customer service, product innovation, and respect for the industry they are in.

Recently, in a discussion with Jack Kelly, he said something I really like: "Klark-Teknik has always enjoyed a good relationship with the Syn-Aud-Con sound contractor base—perhaps because we share the same commitment to service."

1989-90 SYN-AUD-CON SEMINAR AND WORKSHOP

2-Day SEMINARS

New York Area
October 15-16

Washington, D.C.
October 26-27

Orlando, FL
November 15-16

Anaheim, CA
January 22-23, 1990

The on-the-road classes are a rapid fire review of audio and acoustic basics and their use and misuse in current system practices. Unlike our 3-day classes at our farm in Southern Indiana which are intended to develop specific audio skills in a limited number of basic audio tasks, our 2-day on-the-road classes provide a global approach to the areas of audio and acoustics that 40 years have shown us to be important to your success in this field.

Our 2-day classes are an excellent introduction to Syn-Aud-Con, the vocabulary of audio and acoustics, and an authoritative overview of what you may well be missing and need.

3-Day SEMINARS

The Farm in Indiana
August 24-26
September 14-16
October 5-7

Workshop Registration Fee
Computers in Audio- $500
Concert Sound Reinforcement - $600
Seminar Registration Fee
At the Farm—$500 for 3 days
On-The-Road Classes—$450 for 2 days

3-Day WORKSHOPS

Computers In Audio
The Farm
September 21-23,1989

We are planning a computer workshop for those who use IBM compatible computers for designing sound systems, bidding systems, and doing audio and acoustic mathematics.

Our instruction staff will have fascinating and innovative ways to to utilize computer spreadsheets for sound system purposes.

Staff for Computers in Audio:
Farrel Becker, Audio Artistry, Gaithersburg, MD
Mario Maltese, TSI, Mineola, NY
Joe Mitchell, Saint Germaine Foundation, Hoffman Estates, IL

You can bring your computer if you want. You will learn from us while you share with others. But isn't that what Syn-Aud-Con is about anyway?

In the next three to four years we can expect to have early Cray capacity at PC prices. If that truly comes to pass, then what we put in such machines better be the best we can do and not our first flawed fumbles. The Computers in Audio Workshop will bring us all up-to-date on today's best.

Concert Sound Reinforcement
January 16-18, 1990
Chapman College
Orange, CA

Workshop Chairman: Will Parry
Maryland Sound

Will Parry is selecting his staff and the outline for the Workshop. A brochure will be in the mail by September.

The Workshop will be held at Chapman College, immediately before the NAMM show. We have a block of rooms in Anaheim, for those who wish to combine the Workshop with NAMM.

Study of Microsecond Signal Delay

by

Jim McCandliss

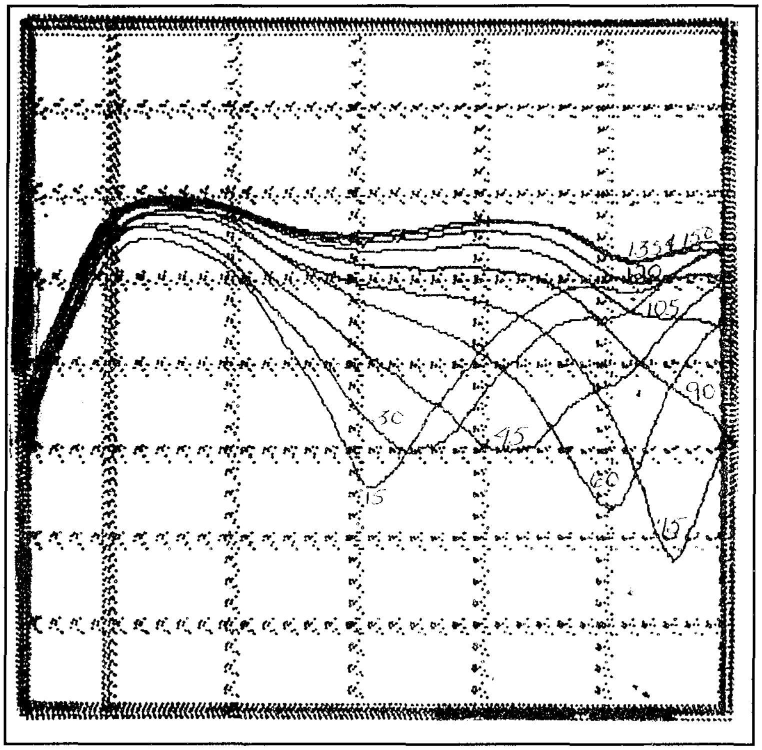
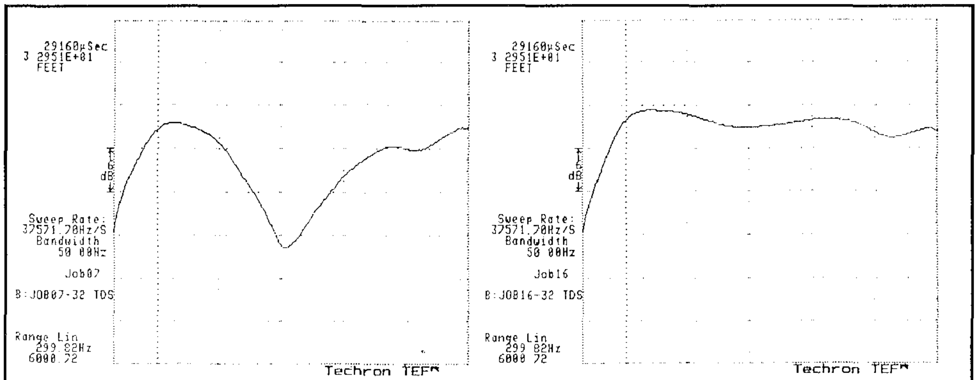


Figure 1. We made overhead transparencies of each of Jim's measurements, overlaid all of them and made a copy. This study shows that the last 15 µsecs is not very dramatic at 6,000 Hz, but at higher frequencies, 15 µsec would be very evident.



Job 7 Job 16

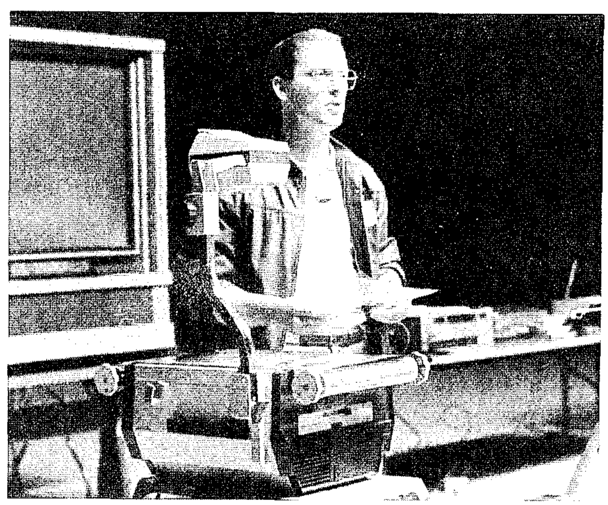
Job 7 has 15 µsec of delay and Job 16 has 150 µsec of delay.

Figure 2. Job 7 is the beginning of the study with 15 usecs added to the out-of-synchronization horns. Job 16 is the end of the study showing the horns brought into synchronization with 150 µsec of delay being added in 15 µsec steps.

Jim McCandliss, Sound Investment Enterprises, Thousand Oaks, CA presented his EFC data at the TEF Symposium in a form that we can share with you in the Newsletter. His subject was Signal Alignment. Jim wanted to show how the direct energy changed as the two horns became aligned.

"This was a two way cluster with two horns aimed in a near throw-far throw configuration. Job 7 reveals the horn's response with 15 µsec of offset for each horn. Jobs 8 - 16 show the response changes as 15 µsec of delay are added to the front throw horn. The frequency range for all these jobs was 300 Hz to 6,000Hz.

"What I found most interesting was how I can use these examples in our Sound Shop classes to illustrate the need for and the benefits of signal aligned clusters. Perhaps other TEF users would have ideas on how they have tried to educate their clients to the advantages of TEF."



Functional Form Phase Shift

Mick Whelan of Electrotec, Canoga Park, CA., called to discuss the impulse measurements of polarity that we had published in our Winter 1988 Syn-Aud-Con Newsletter, Vol 15, No 2, Page 28. Mick, in attempting to duplicate what we had shown there, came up with exactly the reverse conclusion. Our measurement was an acoustical one using the Heyser disc. Mick's was an electrical one (the new UREI precision delay was being measured) and he used EASYTEF. I was as puzzled as he was and called Don Eger at Techron to seek a rational explanation.

One was soon forthcoming. The way to read the EASYTEF polarity measurements is to find where the doublet goes through zero amplitude and at that time the impulse will be either up or down showing the polarity. The small dips and bumps preceding and following the main event are the result of not removing what Peter D'Antonio calls the functional form phase shift.

Don Eger pointed out another interesting fact, namely that when the doublet descends through zero amplitude, the polarity is correct, and, when it ascends through zero, the polarity is not correct. Note that the phase measurements confirm these readings.

Kudos to Mick for carefully investigating and following up on a problem of fundamental importance.

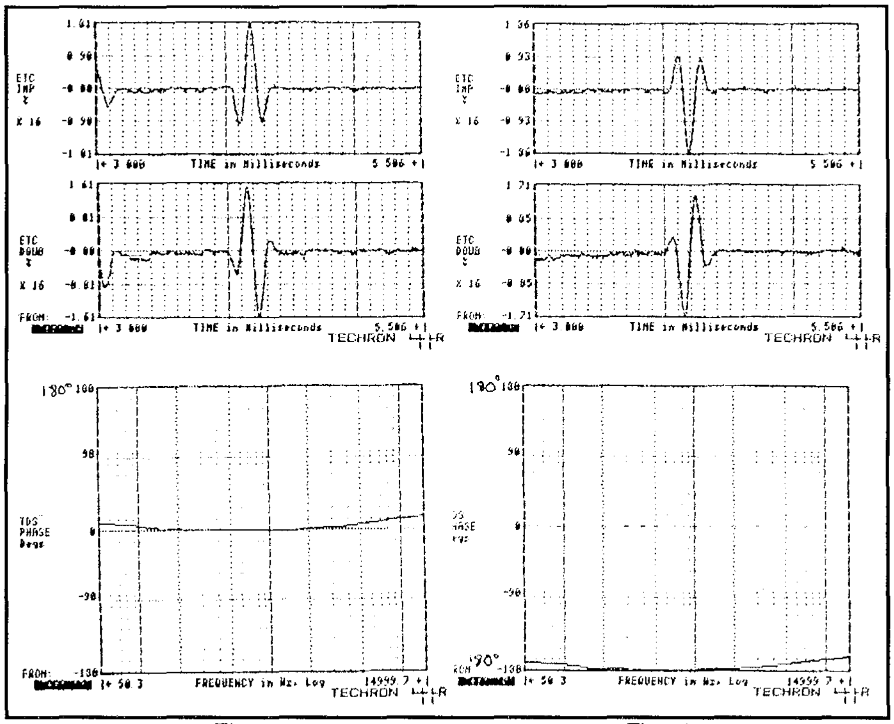


Fig. 1a Fig. 1b

Measurements from Mick Whelan: Fig. 1a-When using EASYTEF, the impulse response contains the functional form phase shift FFPS described by Peter D'Antonio. That is what causes the two negative dips prior and post the impulse arrival. The second clue to polarity is that the doublet response should descend through zero when in polarity. Fig. 1b-When using EASYTEF, here is what out-of polarity looks like for an electronic circuit.

POLARITY AND PHASE ILLUSTRATED

Phase is not Polarity by Another Name

A positive electrical impulse polarity should result in a loudspeaker diaphragm producing a positive pressure acoustic response (i.e. an increase in pressure above that of ambient atmosphere pressure.) In real life loudspeaker, this will occur when tried, but the acoustics signal output - an overpressure - will often be severely limited in amplitude. (see Fig.1)

If we then deliberately reverse polarity, we can observe the initial underpressure that occurs has the same limitations. (See Fig. 2) This can lead, in some impulse type polarity testers, to their reading the first large pressure variation rather than the first pressure change. To verify that the impulse measurements were indeed telling us the truth we measured the total phase response in both polarity connections. The data is reproduced here. (See Figs. 3 & 4) Remember our basic definition

"Phase *is* frequency dependent"
"Polarity *is not* frequency dependent"

The impulse response displays allow you to easily visualize the 180° step in time taken by a polarity reversal. The peak amplitude is 180° in the opposite direction

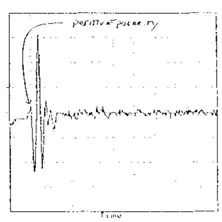


Figure 1
Positive Polarity

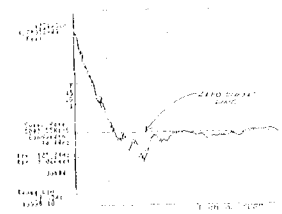


Figure 3
Positive Polarity Phase Response

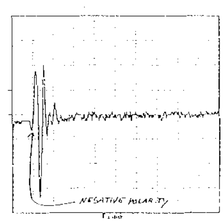


Figure 2
Negative Polarity

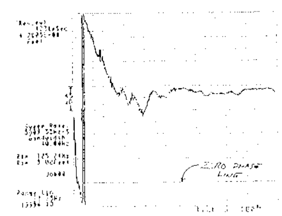


Figure 4
Negative Polarity Phase Response

Note that these impulse figures from Newsletter Vol.15 No.2 were made using the Heyser disc and the small first peak is the signals as is confirmed by the phase vs frequency plots.

Electrical Grounding, Optical Fiber Transmission by Ed Lethert

Ed Lethert has a huge library on grounding and shielding and he shared freely.

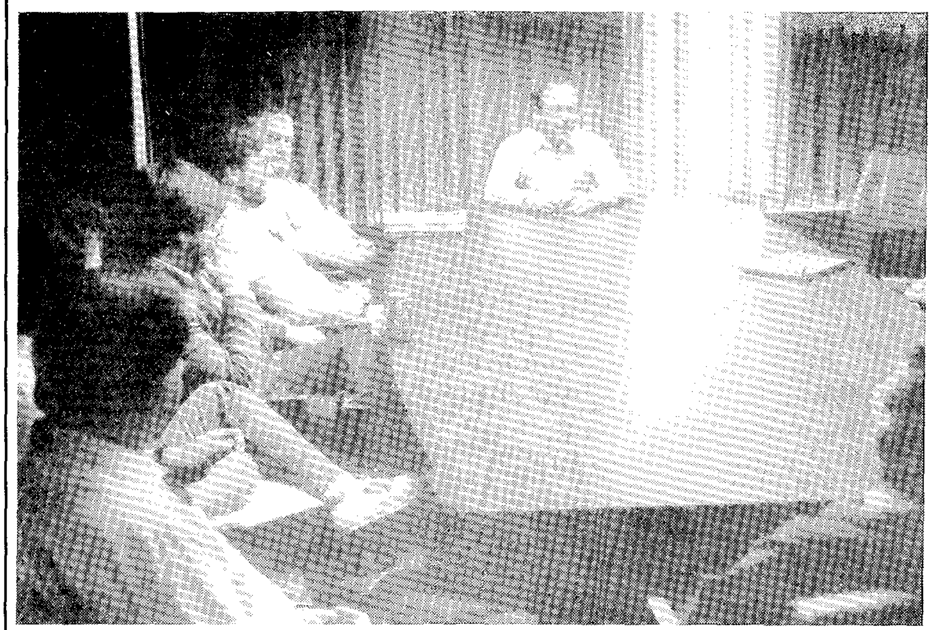
The main thrust of Ed's participation was:

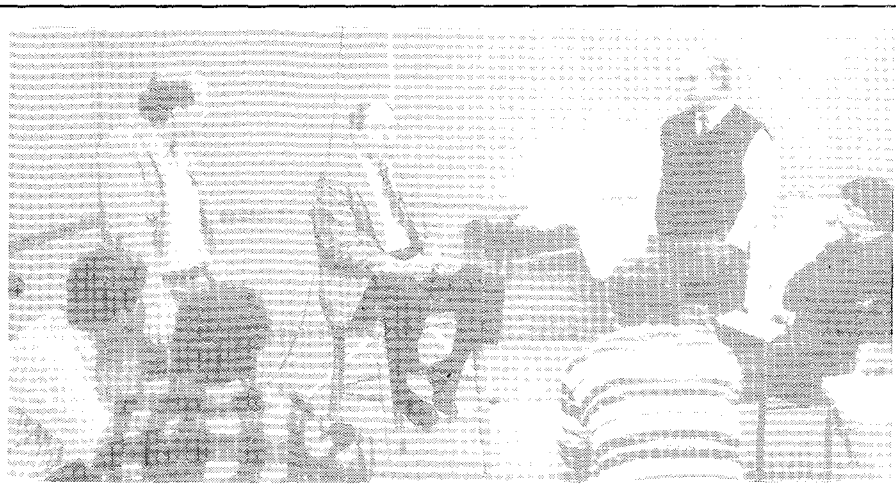
(1) electrical grounding (earthing) including multiple rod grounds, chemical grounds and Ufer grounds. He spent time discussing the difference between ground and the equipotential plane or "zero reference.

(2) Optical fiber transmission, including types of fiber, distances achievable, available hardware and long distance transmission of video were discussed. Consideration was given to multimode and single mode fiber, the bandwidth and distance limitations with respect to noise immunity and general improvement in signal delivery performance over other mediums.

(3) Many of the problems associated with interfacing dissimilar circuits were addressed and some potential pitfalls pointed out. The correct methods of connecting floating, differential and single ended audio circuits were shown.

(4) Discussion ensued regarding separation of cables carrying different signal levels ranging from AC mains to microphone lines. Valuable information was presented in the form of guidelines for using separate conduits and even for separation of the conduits themselves. Effects of twisting wire pairs and shielding wires for noise reduction was considered.





Roundtable Discussions

Our roundtable discussions are very worthwhile. We feel that it is a valuable learning time. It is a time when members of the workshop are divided into small groups to meet with one of the staff members for one hour. During that hour the members of the group are free to ask any questions they like. It is very informal. After an hour, the group moves to another staff member and the members of the group change with each move (worked out on a matrix.)

Goals of the G. S. & I Workshop

Primary Goal - To be Able to Install Excellent Equipment and Achieve Outstanding Audio Performance

1. To Understand the Importance of Earth Grounds
2. To Next Understand Proper Power Ground Systems
3. To Understand the EMI/RFI Environment
4. To Acquire Methods for Controlling EMI/RFI
5. To Acquire Methods for Achieving an Equipotential Environment for the Audio (and Video) Equipment.
6. To Understand Interconnection Problems & Methods
7. To Understand Proper System Set-up
8. To Understand System Testing and Something of the Necessary Test Equipment

One look at the workshop schedule reveals the wealth of subject matter that was covered. This staff put together a two inch thick manual of pertinent data on grounding, shielding and installation for each participant to take with him for further study. The thoroughness with which the attack on the problems was conducted is exemplified in the goals and workshop schedule.

A True Peer in Any Peer Group

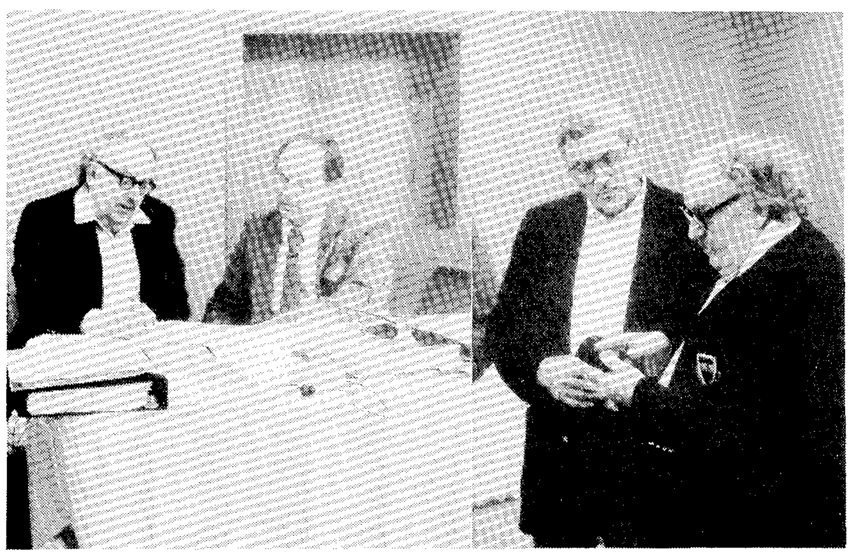
Al Grundy of Institute of Audio Research, New York City, gave an unrehearsed spontaneous talk on levels and their measurements that simultaneously covered the history, the present techniques and the proper way to do the job. Starting with power and voltage developed for varying R_L/R_S he demonstrated the matched case (maximum power, half voltage) then carried out to the constant voltage condition where $R_L/R_S \geq 10$. This is the typical relationship between source and load in today's systems. Al went on to show that the available power theory allows the dBm system to be easily applied in the modern case.

$$W_{AVAIL} = \frac{(E_S)^2}{4R_S}$$

and available input power level is:

$$L_{AIP} = 10\,LOG\left(\frac{(E_S)^2}{0.001\,R_S}\right) - 6.02\text{ dB}$$

This was the third grounding and shielding workshop Syn-Aud-Con has held and we believe that the quality of the staff and the participants says it is one of our most useful.



Al Grundy sharing with Allen Burdick (L) and Don Davis (R)

PA-70 Loudspeaker Study

by

Mike Lamm

Mike Lamm showed us the beautiful set of measurements he made of the Dr. Patronis designed J W Davis PA-70. Mike gave us permission to share his measurements.

Mike installed a PA-70 in his church—a new sanctuary in the Dallas area. The problem was to narrow the coverage angle of the PA-70 to better fit a highly reverberant sanctuary.

Mike is showing that if you use the PA-70 in the horizontal mode, the barn door described in Figure 3 gives a good, tightly controlled pattern. We use the PA-70 in our classes in the vertical mode. The pattern is very smooth but working the microphone to the side of the PA-70, as we do, you can see why the feedback mode "reaches" for us occasionally.

The best part about these measurements is that because Mike took the time to share his findings, we can all learn.

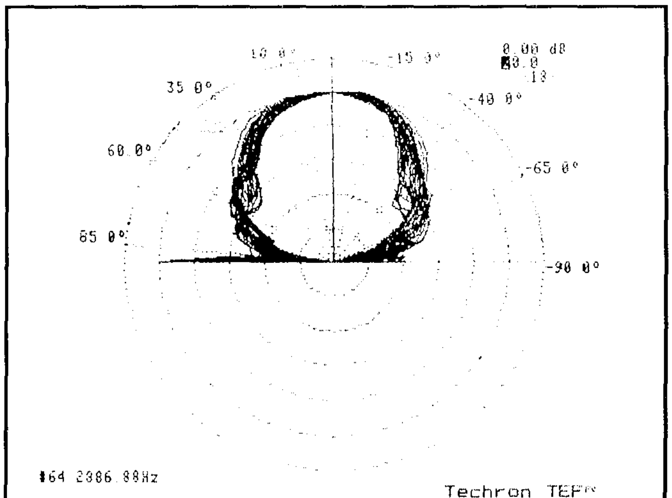


Fig. 2

Figure 2. Horizontal polars, 1400-2886 Hz, using an aperture style arrangement. Three inch thick blocks of Owens Corning 703 fiberglas were placed over the mouth of the PA-70 and extended inwards 8" from each side. This helped but the pattern was actually widened at lower frequencies.

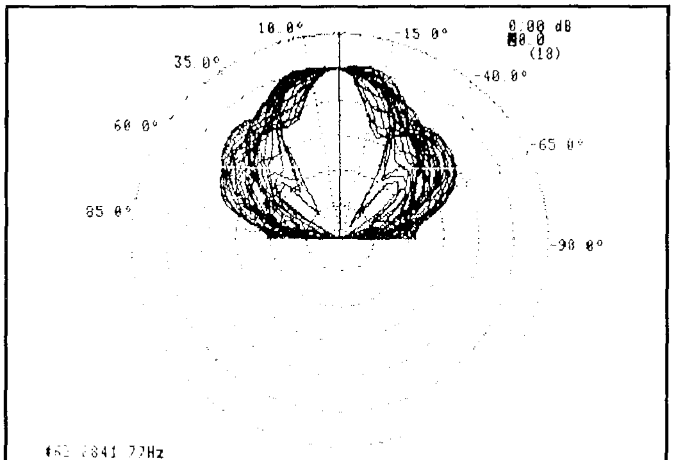


Fig. 1a

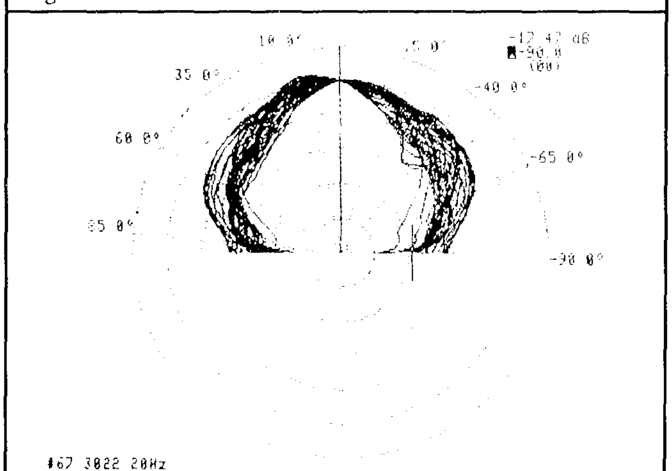


Fig. 1b

Figure 1. Polar of the PA-70. Figure 1a is horizontal; 1b is the vertical polars. The following measurements are on-axis, grid spacing of 6 dB and data gathering of 5.0 degree increments. Center of display is 30dB down.

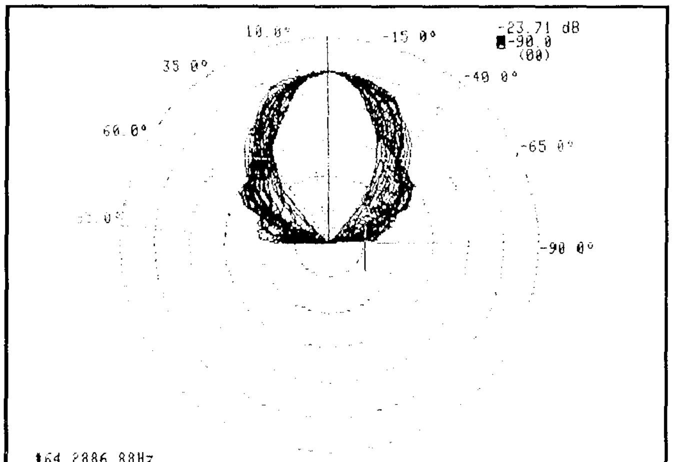


Fig. 3a

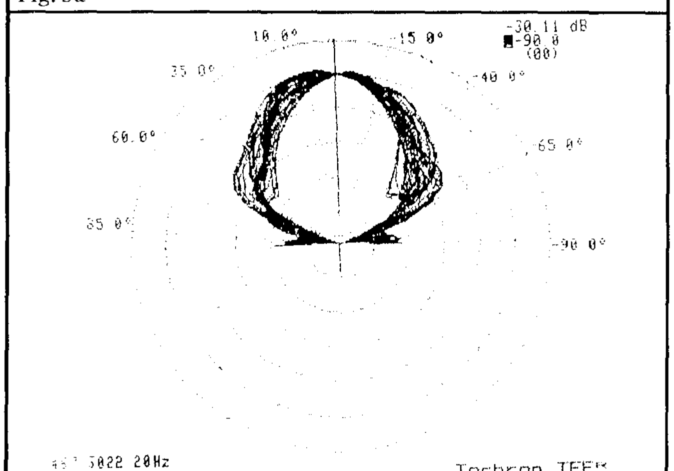


Fig. 3b

Figure 3. 3a is the horizontal polars, 1400-2886 Hz, using three inch thick 703 fiberglas panels extending 10" out in front of and parallel to each side. 3b is the vertical polar.

Mathematical Signs & Commonly Used Abbreviations

Sign	Meaning
$+$	Plus (sign of addition)
$+$	Positive
$-$	Minus (sign of subtraction)
$-$	Negative
$\pm$ ($\mp$)	Plus or minus (minus or plus)
$\times$	Multiplied by (multiplication sign)
$\cdot$	Multiplied by (multiplication sign)
$\div$	Divided by (division sign)
$:$	Divided by (division sign)
$:$	Is to (in proportion)
$=$	Equals
$\neq$	Is not equal to
$\equiv$	Is identical to
$::$	Equals (in proportion)
$\cong$, $\approx$	Approximately equals
$>$	Greater than
$<$	Less than
$\geqq$	Greater than or equal to
$\leqq$	Less than or equal to
$\rightarrow$	Approaches as a limit
$\propto$	Varies directly as
$\therefore$	Therefore
$\sqrt{\ }$	Square root
$\sqrt[3]{\ }$	Cube root
$\sqrt[4]{\ }$	4th root
$\sqrt[n]{\ }$	*n*th root
a^2	*a* squared (2d power of *a*)
a^3	*a* cubed (3d power of *a*)
a^4	4th power of *a*
a^n	*n*th power of *a*
a^{-n}	$1 \div a^n$
$\frac{1}{n}$	Reciprocal value of *n*
log	Logarithm
hyp. log, nat. log, $\log_e$, ln	Hyperbolic, natural or Napierian logarithm
e	Base of hyp. logarithms (2.71828)
lim.	Limit value (of an expression)
∞	Infinity
α	Alpha (commonly used to denote angles)
β	Beta (commonly used to denote angles)
γ	Gamma (commonly used to denote angles)
θ	Theta (commonly used to denote angles)
ϕ	Phi
μ	Mu (coefficient of friction)

Sign	Meaning
π	Pi (3.1416)
Σ	Sigma (sign of summation)
ω	Omega (angles measured in radians)
g	Acceleration due to gravity (32.16 ft. per sec. per sec.)
i (or j)	Imaginary quantity ($\sqrt{-1}$)
sin	Sine
cos	Cosine
tan, (tg), (tang)	Tangent
cot, (ctg)	Cotangent
sec	Secant
cosec	Cosecant
versin	Versed sine
covers	Coversed sine
$\sin^{-1} a$, $\arcsin a$	Arc the sine of which is *a*
$(\sin a)^{-1}$	Reciprocal of sin *a* ($1 \div \sin a$)
$\sinh x$	Hyperbolic sine of *x*
$\cosh x$	Hyperbolic cosine of *x*
Δ	Delta (increment of)
δ	Delta (variation of)
d	Differential (in calculus)
$\int$	Integral (in calculus)
$\int_b^a$	Integral between the limits *a* and *b*
$!$	$5! = 1 \times 2 \times 3 \times 4 \times 5$
$\angle$	Angle
∟	Right angle
$\perp$	Perpendicular to
$\triangle$	Triangle
$\odot$	Circle
▱	Parallelogram
$^\circ$	Degree (circular arc or temperature)
$'$	Minutes or feet
$''$	Seconds or inches
a'	*a* prime
a''	*a* double prime
a_1	*a* sub one
a_2	*a* sub two
a_n	*a* sub *n*
( )	Parentheses
[ ]	Brackets
{ }	Braces

From *Machinery Handbook*, 17th Edition—The Industrial Press

IRP Precision Signal Delay

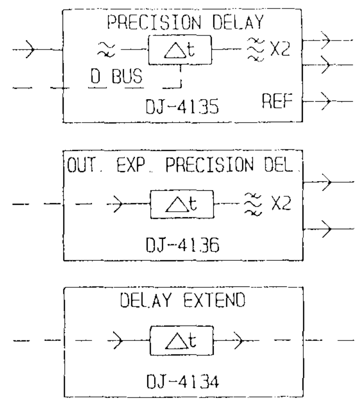
Industrial Research Products, Inc. 415 Busse Rd., Elk Grove Village, IL 60007 has new precision signal delay devices. In a modular format for use with System 41. It would appear that IRP engineers have been reading Syn-Aud-Con Newsletters and Tech Topics with care. We're not sure what "indefinite output delay expansion" means but were hoping they mean "unlimited." In any case the specifications read like a "dream list" made by a TEF loudspeaker synchronizer.

DESCRIPTION

The DJ-4135/DJ-4136 is a precision signal delay system useful for eliminating comb filtering resulting from radiator interference.

The DJ-4135 provides 256 milliseconds of delay, an adjustable input high pass filter, two delayed outputs and a "zero" reference output. The DJ-4136 provides two additional delayed outputs. The number of outputs may be expanded indefinitely. Delayed outputs are selectable in 4.0 microsecond steps to 256 milliseconds maximum. The DJ-4134 Delay Extend module enables indefinite delay extension in 512 millisecond increments. Each output is supplied with a user specified low-pass, band pass or high-pass plug-in filter. This enables radiators within a given band to be individually delay corrected, multi way systems to be delay corrected at cross over, or short throw/long throw radiator overlap patterns to be delay corrected. The Remote Select of Pre-Set Delays option allows four different delay settings to be stored for each output. A remote contact closure selects one of the four pre-set delays.

DESIGN SYMBOLS



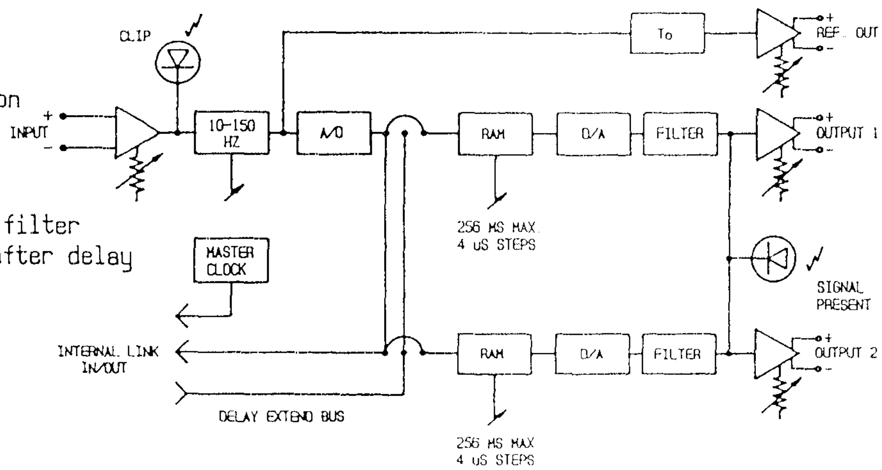
FEATURES

- Delay correction for clusters/multi-way/ overlap systems
- 4 micro second steps
- 24 dB/octave L-R output filters
- Indefinite output/delay expansion
- Active balanced in/out
- Output/input level controls
- "Zero" delay reference output
- 10 Hz-150 Hz. 10 Hz steps input filter
- Implements cross-over function after delay
- >100 dB dynamic range
- 20 kHz power bandwidth
- Clip/signal present LEDs

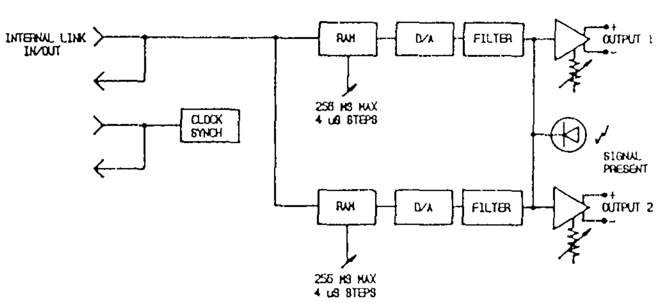
OPTION

- Remote Select of Pre-Set Delay

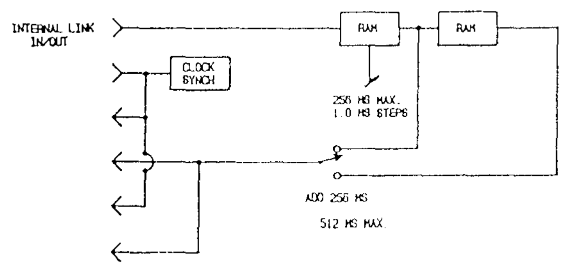
.DJ-4135 FUNCTIONAL DIAGRAM



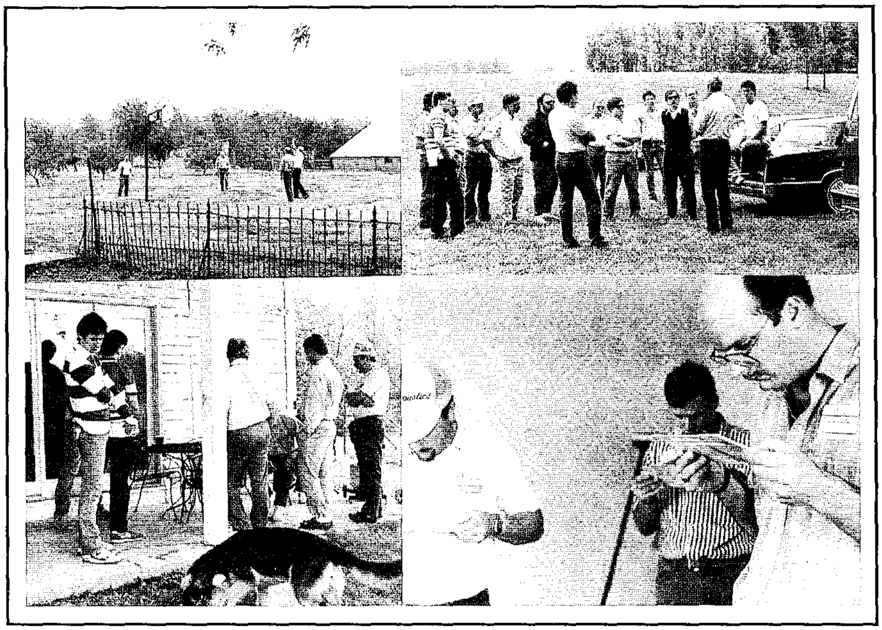
DJ-4136 PRECISION OUTPUT EXPANDER



DJ-4134 DELAY EXTEND



The May Class



Each class at the farm teaches us new and valuable lessons on what those attending need and how to go about supplying it. The overwhelming quantity of misinformation in print can only be overcome by doing "hands on" measurements that demonstrate the truth to the person doing the measurements.

We are learning to stand back and let the learning process go on at the learner's rate rather than some preconceived notion of ours.

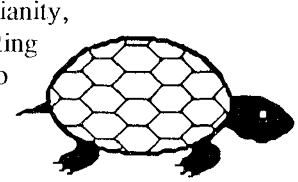
We need to stop occasionally and look at our sound system design philosophy. We need to remember that all the gadgets our industry is becoming loaded with are merely "black boxes" to a systems designer and should remain so. We should not be using any gadgets that we can't describe, on paper, what it does to the signals amplitude, phase, and signal delay, behavior. We need to always know the polarity of each component as well as the overall acoustic polarity at the listener's ears. We need to become increasingly aware of the transient behavior of our system instead of remaining preoccupied with its steady state behavior.

We are very pleased at the quality of the people attending our farm classes. They need what we have to share, they know that they need it, and when we're at the end of the third day they have made the majority of it theirs for keeps. On that basis it's our belief that these farm classes are a success.

We Learn Slowly— Too Slowly

Having recently listened to a consultant completely misstate how to set levels, measure levels and misequalize sound systems, we came to the realization that "hands on" experience with proper equalizers and equalization techniques was necessary. Therefore, a significant amount of time is devoted, in our three day classes at the farm, to how to properly adjust a system for equalization and how to actually perform that equalization.

The class members have "hands on" experience with how filters combine, as observed on a 1/3 octave real time analyzer. Hearing them exclaim, "I never realized they interacted like that," strengthened our belief that a vast majority of knob twisters out in the real world don't know what they are doing with equalizers. Perhaps even more fundamentally we are increasingly coming to understand that a large number do not know what they can equalize, as well. One-third octave equalization has now been misused for over twenty years. It is a very useful tool, properly employed. As George Bernard Shaw remarked when asked about Christianity, "I'm still waiting for someone to practice it."



Microphones & Their Placement in Teleconferencing Rooms

Michael Pettersen spent about 20 hours of his own time making this cassette. There is so little company time to do these important studies. He is to be commended for his work and encouraged to take the study even further.

Michael Pettersen of Shure Brothers, Inc., has prepared a cassette which compares different microphones and their placement in teleconferencing type environments. The purpose of the cassette is to show that acoustics of the room are really what determine where the microphone is placed, not the interior designer. The cassette also shows that controlled directivity microphones aid in controlling the ratio of direct-to-reflected sound picked up by the microphone.

There is a problem of achieving proper LD - LRE ratios in small rooms. The human talker exhibits a Q = 2.5 with a coverage angle of 120 degrees horizontal by 90 degrees vertical in the 2 kHz octave band. Cone type loudspeakers with a Q = 2 or 3 are often used in teleconferencing work. In addition to the problems listed above, many people are ignorant of the fact that in small room acoustics, statistical approaches such as measured RT_{60} is nonsense.

The tape provides excellent audible demonstrations of poor LD - LRE due to microphone choice. Because of limited time and cassette space, Michael does not discuss other small room problems. Also, the cassette does not include "boundary microphones" in all the tests. One wishes he could continue his research and make another cassette available.

Controlling LD-LRE in Small Rooms

All of us involved in TEF analysis of small rooms have seen auditory miracles worked by measuring and controlling LRE (the levels of early reflections.) These are not statistical and must be dealt with specifically. Loudspeakers with controlled directivity in the 2kHz octave band can, on occasion, remarkably improve LD-LRE in conjunction with Ma (the architectural modifier - see *Sound System Engineering,* Page 201).

Boundary microphone systems also provide unusual control when compared to more conventional approaches.

The Cassette is a Useful Learning Tool

One aspect of the problem this cassette does cover is the dramatic difference an automatic mixer can make. A most useful cassette so long as you realize that Michael is discussing only one part of the problem: the microphone and its placement. The aspects of the problem to be considered are:

1. Source (talker: clear, distinct or muddled)
2. Path (close, far, etc.)
3. Receiver (microphone and its Q and placement)
4. System (equalizers, signal delay, automatic mixer, and other signal processing)
5. Source (the loudspeaker and its directional characteristic and placement)
6. Path (the acoustic path between the loudspeaker and listener as well as back to the microphone)
7. Receiver (the listener: skilled, impaired, etc.)

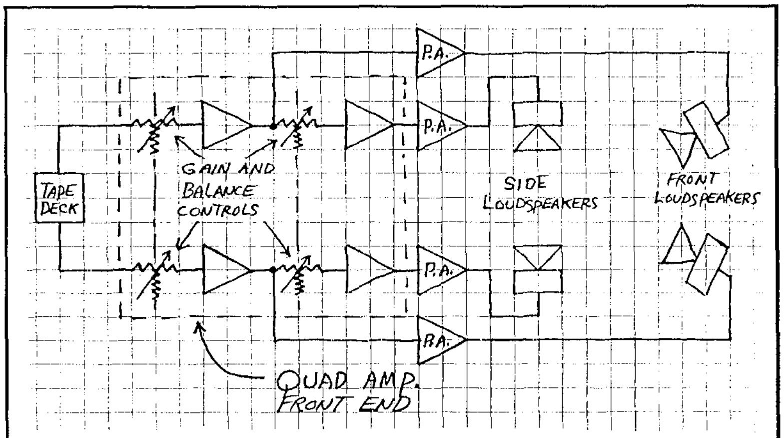
Michael manages the AMS and Mixer Product lines at Shure and is the consultant liaison for all Shure products including the very successful Teleconferencing products. He has found that there is a great deal of ignorance about small room acoustics and especially the detrimental effect of speaking into a microphone from several feet away. The cassette makes the problem abundantly clear. Or, as Michael says, if your client insists that you put the microphones in the ceiling in a hard reflective room, give your client your competitor's business card - or better yet, play him a copy of Michael's cassette.

How to Obtain the Cassette - FREE

Write Michael Pettersen, Shure Brothers, 222 Hartrey Ave, Evanston, IL 60202. FAX 312-866-2279. Michael wants everyone to have the message. It makes his selling job easier.

Benchmark
...the measure of excellence™

up to PAR



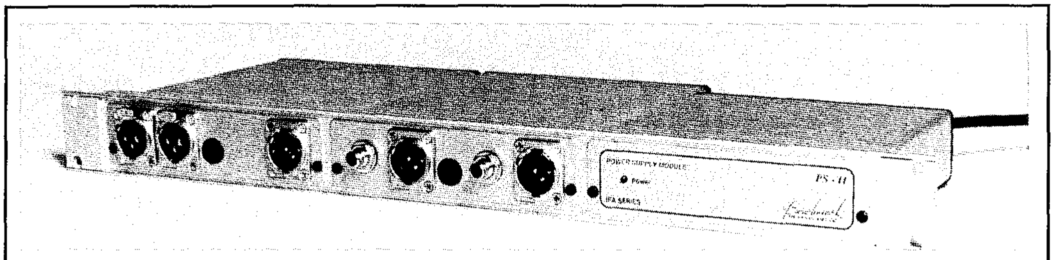
Pinnae Acoustic Response (PAR) Playback System

When we needed a super high quality "front end" for our pinnae acoustic response, PAR. playback system, it seemed natural to turn to Allen Burdick of Benchmark Media Systems, Inc. for a solution.

As expected, Allen produced what we needed from his catalog, added 2 ganged level controls, and shipped us a flawless package that has allowed us remarkable control over four amplifiers and four loudspeakers in a two channel system. The front two loudspeakers are fed from the first pair in the Benchmark IFA-5 Quad output amplifier to a Techron 5530 300 watt power amplifier. The two side loudspeakers are fed from the second pair in the IFA-5 to a IRPI DH 4020 100 watts per channel power amplifier. This allows us to balance all four left-to-right or the sides left-to-right and to adjust the overall level of all four from a single control. A second control allows the setting of the side loudspeakers relative to the front loudspeakers with a single control (see diagram)

Allen's IFA-5 has an open circuit output voltage of 19.5 volts at the clip point which means that with its 60Ω output its available input power level to the next device is:

$$10\text{Log}\left(\frac{(19.5)^2}{0.001(60)}\right) - 6.02\text{dB} = +32.0\text{dBm}$$



The IFA series amplifiers were designed to accommodate a wide range of interface needs with eight different modular devices available. Each of the amplifier systems are housed in small "modem" style chassis, three of which may be rack mounted side by side in a single rack height extrusion. Up to four modules may be powered from a single power supply, via RJ11 modular plugs.

A Comment on Loudspeakers

We recently received the loan of four UREI 809 Time Align Monitors. When we set them up in the PAR configuration, we were disappointed. Then we realized that they were large enough to be reflectors to each other. We then placed the two side loudspeakers on the floor on either side of us, angled upward toward our ears. At this point we experienced the best illusions we have achieved with the PAR playback system. Do you suppose there is something to "Time Align"?

Classifying Reflections

Jens Blauert always has interesting comments and the two quoted here are useful in thinking about the role of useful reflections. The more we think about it the more we realize they are useful because the ear-brain does not recognize them. That is to say, they do not interfere with what we do wish to fasten our aural attention on.

> "The maximum allowable delay of a reflection for not giving rise to an echo depends on the type of signal. The faster the running spectrum of the signal varies the shorter is this critical delay."

and elsewhere he comments:

> "The parameters of early lateral reflections that have to be discussed in connection with the creation of 'pleasing' spaciousness are mainly the following:
>
> 1. Delay with respect to the direct sound,
> 2. level,
> 3. angle of incidence,
> 4. spectrum."

Comments:

In terms of our 3L workshop and our experiences with intelligibility testing we feel that:

1. Reflections that are 15 to 30 msec after the direct sound are essentially undetectible.
2. Their level should be from -6 to -12 dB relative to the direct sound level.
3. Angles of incidence that enter the ear and excite maximum ear canal resonances (i.e., 45° horizontally and 45° upward vertically) must be avoided. These usually are encountered as contralateral reflections.
4. In terms of intelligibility, the region from 300 to 3000 Hz is particularly sensitive. We are continuing our research in terms of musical parameters
5. The recent paper by Frans A. Bilsen and Its Kievits "The Minimum Integration Time of the Auditory System" states in its conclusions:

> "The minimum integration time of about 2 msecs found in the present study. . . . .might be used as an appropriate time window width in the processing of pulse responses of audio equipment in order to predict the human ears response to it."

and further:

> "This time constant might very well be explainable as a time constant related to the (critical band) frequency filters in the human cochlea. At mid to high frequencies these have a width of the order of 200 to 1000 Hz."

But then the TEF told us so!

"We Will Provide It; You Hide It"

Chris Maione of TSI gave an excellent talk at the JBL conference in March, 1989. He talked of working with an architect on a large project. Chris told the architect: "We will provide it; you hide it!"

Sometimes this approach works so it is always worth trying when the architect is resisting physics. Of course, if you are working with the architect that said, "Never mind the acoustics, I will make it so beautiful you won't care how it sounds" reason will not prevail.

We quoted Burt Boettcher in Newsletter Vol 16, No 1, p.11, but it is worth repeating again. When Burt was told that he couldn't put that ugly thing (a loudspeaker cluster) in his church, Burt said, "You didn't say that to the structural engineer when he told you the size of the beams necessary to hold up the roof, and you didn't say that to the sanitation engineer when he told you the size of the pipe to carry the waste away, so why are you saying it to me? It's my job to make it sound good, it's your job to make it look good." The architect said, "You know, you are right."

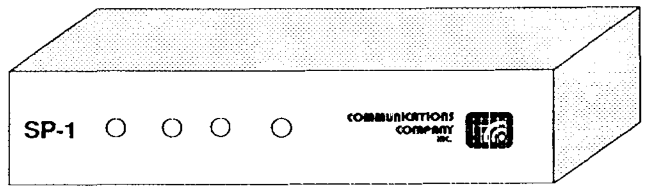
One way to be treated like a professional is to act like a professional.

The SP-1 Speech Processor (at long last)

There are few devices we know of that solve the problem of overcoming an inadequate signal-to-noise ratio as thoroughly as Craig Allen's speech processor designed for use on aircraft carriers. Now Communications Co in San Diego, CA has brought it out as a product - the SP-1 Speech Processor. We are printing their entire description here because we believe that this product has a fundamental place in the inventory of every sound contractor in the world.

COMMUNICATIONS COMPANY INC.

3490 NOELL STREET • SAN DIEGO, CA 92110 • PHONE (619) 297-3261



SP-1 Speech Processor

The Speech Processor 1, developed by Craig Allen for the military's use on aircraft carriers, is the perfect solution to the problem of being understood in a noise filled environment. Craig's combination and refinement of previous techniques has resulted in a speech processor with an intelligibility level four times greater than conventional voice communications systems offer when the listener is immersed in loud noise. This preamplifier also reduces the number of loudspeakers required in some spaces and reduces the total audio power needed, making it a highly cost effective alternative to continually boosting the power level to achieve intelligibility. It is of great value in any voice communication system where noise is added on the channel or noise surrounds the listener.

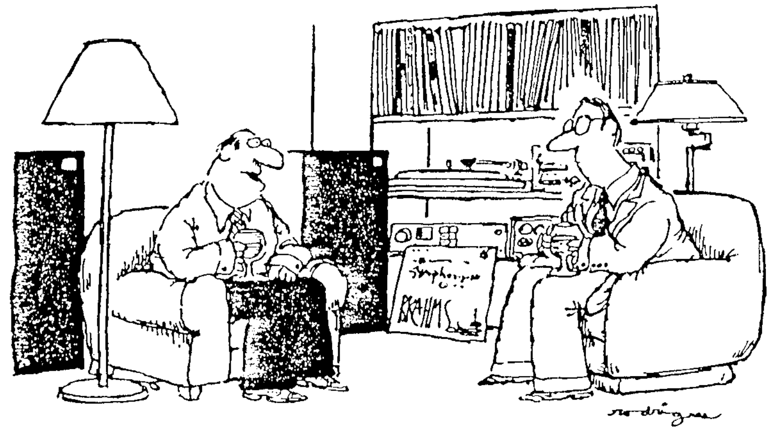
Tests have shown that the processor can make the difference between barely detecting a nearly unintelligible voice and understanding nearly every word.

The SP-1 uses a technique known as "rf clipping" to produce a sound which has a greatly reduced dynamic range with a minimum of distortion, so that both quality and intelligibility are excellent. This technique has been used by amateur radio operators since the 1960s with great success. By performing an instantaneous clip on peak signals, rf clipping avoids most of the problems inherent with other techniques. In addition, eliminating feedback is especially simple with the SP-1 by switching in the frequency shifting option.

Communications Company is proud to be the first to offer this technology to the commercial market. The SP-1 is an important advance in the state of the art of communication, and will be useful in many high noise applications, ranging from airports to Grand Prix racing to factories.

Smile

Steve Romeo of JBL sent this cartoon recently which has now replaced our original favorite of two foreign legionnaires talking to each other on a sand dune in the middle of the Sahara desert. "Yes, I joined the Legion to forget a girl named ------ named------.



". . . Yes, it was back in 1955 that I bought my first system: a Newcomb Royal 712 AM/FM tuner, a Bozak B-305 speaker, a Brociner Mark 30-C control preamplifier, a Heathkit W-5M 25-watt power amplifier, a Garrard PR-456 turntable, and a Ferrograph 66/H tape recorder. When my first wife, I can't recall her name, found out how much it cost me, we had a terrible argument, and she walked out on me. . . ."

TEF Symposium in Nashville

There is no use in trying to sum up the two days at the TEF Symposium. It was an incredibly rewarding two days for TEF users. The Workshop brought together a Who's Who of TEF users. This was the very first TEF gathering devoid of formal TEF instruction and consisting of papers given by experienced users. Under Farrel Becker's supervision, the pace never slackened and the list of presenters is a prestigious one including Dr. Sidney Bertram of Hell's Bells fame.

Our hosts made the TEF Symposium very special. It seemed like we had called every hotel on the east side of Nashville and were not able to find space due to the NSCA show and the pre-show activities. We called Jim Carey to help. He called back later in the day to say that he had run into his good friend, Ken Porter, and Ken suggested we call Steve Garrity at the Nashville Network. We did and were absolutely thrilled at the gracious reception. Mr. Garrity invited us to use Studio A at the Grand Ole Opry. It was one of the happiest and most harmonious atmospheres we have enjoyed at a Syn-Aud-Con workshop. Jim Gilmore and his staff couldn't have been more helpful in providing everything needed: big screen monitors, VHS video recording, a special plug in for our motorhome right outside the Grand Ole Opry! Mr. Garrity suggested that we might want to make measurements of the Grand Ole Opry, which we did the 1st evening, and of their control room. Mr. Gilmore and his staff have a TEF analyzer so they were active listeners and participants during the measurement sessions.

Concert Sound Reinforcement Workshop

January 1990

Will Parry says that he will be our Concert Sound Reinforcement Workshop Chairman again, and we have the auditorium at Chapman College in Orange, CA reserved for January 15-18, 1990 (immediately before the Anaheim NAMM show). That is as far as we have gotten, but we should have it together in August and a brochure prepared for mailing.

If you are interested, let us know. The first on our list will be those who we were not able to accept in the January 1989 workshop. We learned from the 1989 workshop that a large group is necessary to pay the costs of the overhead, which is a constant. This is true even with the generous loan of equipment by manufacturers. A large group precludes "hands on", but there are great advantages in rubbing together the talent in a large group for three days.

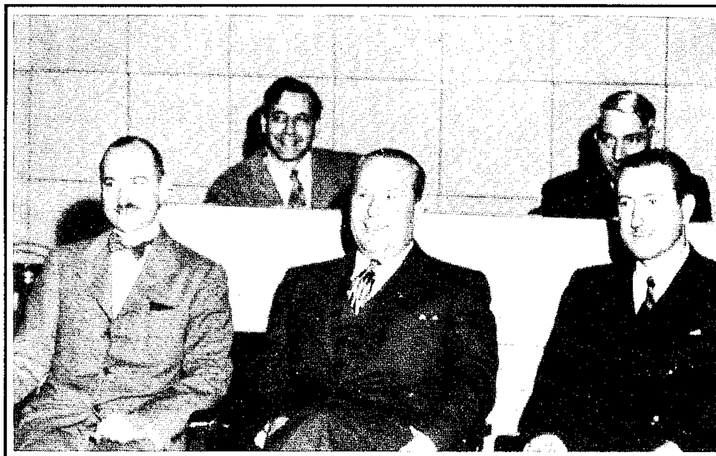
Cassettes, Jan. 1989

Audio West, the good people who provided exceptional equipment and support for our Concert Sound Reinforcement Workshop, made audio cassettes of the three day Workshop held at Chapman College in January 1988. (Staff: Will Parry of Maryland Sound; Albert Leccese of Audio Analysts; M. L. Procise of Showco; Mick Whelan of Electrotec and David Scheirman of Concert Consultants).

We are very pleased with the quality and the content. We are having 100 sets duplicated for us (eleven 90 minute cassettes to a set). The cost for the set to anyone attending the workshop is $45. The cost to anyone who did not attend the workshop is $95.

If you missed the workshop, this is an opportunity to be part of the magic of those three days. If you were there, the cassettes will reinforce the learning experience.

A Picture is Worth a Thousand Words



MGM, *ca.* 1938. At recording console, L to R: Hilliard, Lansing. Front: Bessey, Carrington, Ward.

In this picture (courtesy Altec) we see a 1938 view of John K. Hilliard, James B. Lansing, Harry Bessey, George Carrington, and Alvis A. Ward sitting in an MGM screening room hearing the results accomplished by Hilliard and Lansing with modified W.E. equipment. Altec was a brand new company made up of All Technical personnel from W.E. (thus the reason it is pronounced "All Tech" not "Al Tech".) The figure paid was never disclosed but the men who bought it were regarded as wealthy after the transaction.

When we remember that 1938 was the depth of the great depression and we look at these men, their attire, and their general bearing, you realize that the three men who took the golden opportunity to purchase the theater service, George Carrington, Mike Conrow, and E. Z. Walters, knew of no depression in their activities and were the "fat cats" of their day. Today Alvis (called A^2 Ward) is the sole survivor of this group.

Altec acquired the sheer genius of Ercel Harrison (Peerless Transformers) in 1941, an often forgotten name from this phase of Altec. By the time this photograph was taken, Harrison had built, for the MGM systems, an output transformer that went from 20 to 20,000Hz.

Jim Lansing's company, a small operation that made components for MGM, was also purchased by Altec in 1941 and became known as Altec Lansing. Hilliard joined them in 1943.

The continuing relationship between these men and Western Electric has never been told and may never be told. It would be an interesting story.

The Perfect Specification
(We would like to propose it as a standard)

Altec Lansing's latest specification sheet on their A700 loudspeaker system is about as good as they come. Full TEF measurements are made—truly meaningful, carefully made, beautifully displayed for ease of reading. In Syn-Aud-Con's opinion, this specification sheet should be used as the desired standard, rather than the totally outdated and politically flawed AES standard. The Altec specification sheet tells a sound system designer what he wants to know with an accuracy and integrity that let them make informed decisions about system performance at the drawing board stage. Figures 12 and 13 are particularly delightful and their presentation of the ETC data as two overlaid measurements is the way to go.

We sincerely hope other manufacturers will follow this pattern. Not only is such data of extreme value to the system designer but the manufacturer's engineers must benefit from the knowledge they gain in gathering it.

It's obvious that the Altec engineers had already completed every step in the process of offering a successful product. Our congratulations to everyone that took part in producing the A700 loudspeaker and its descriptive literature.

We are often asked what parameters should be used for TEF measurements of loudspeakers. Altec engineers are leading the way.

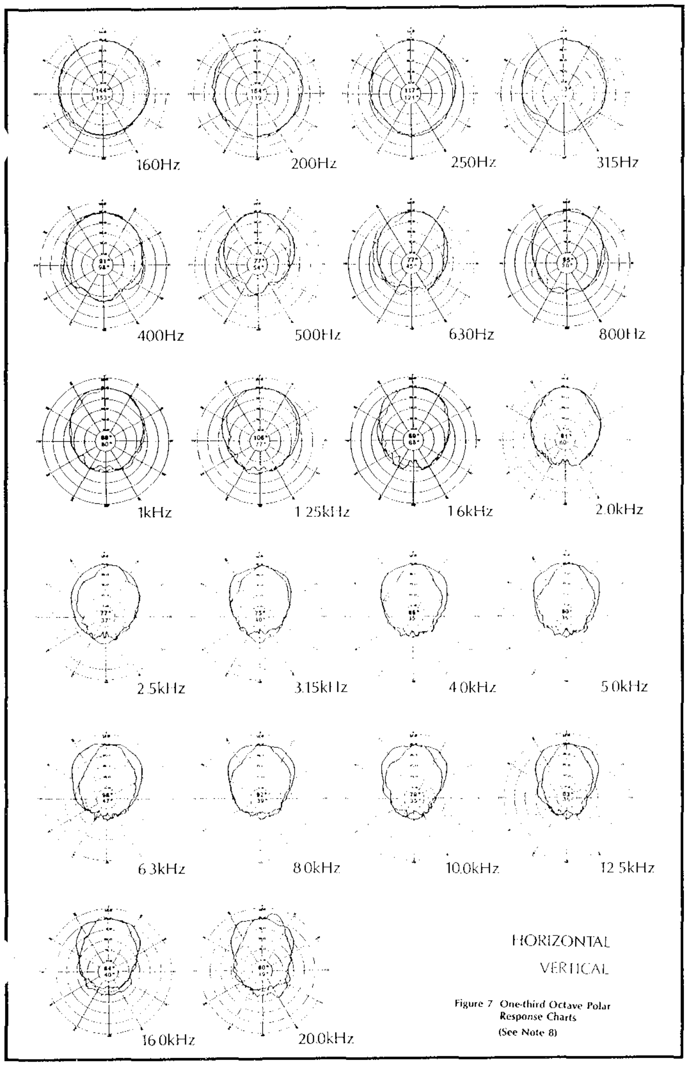
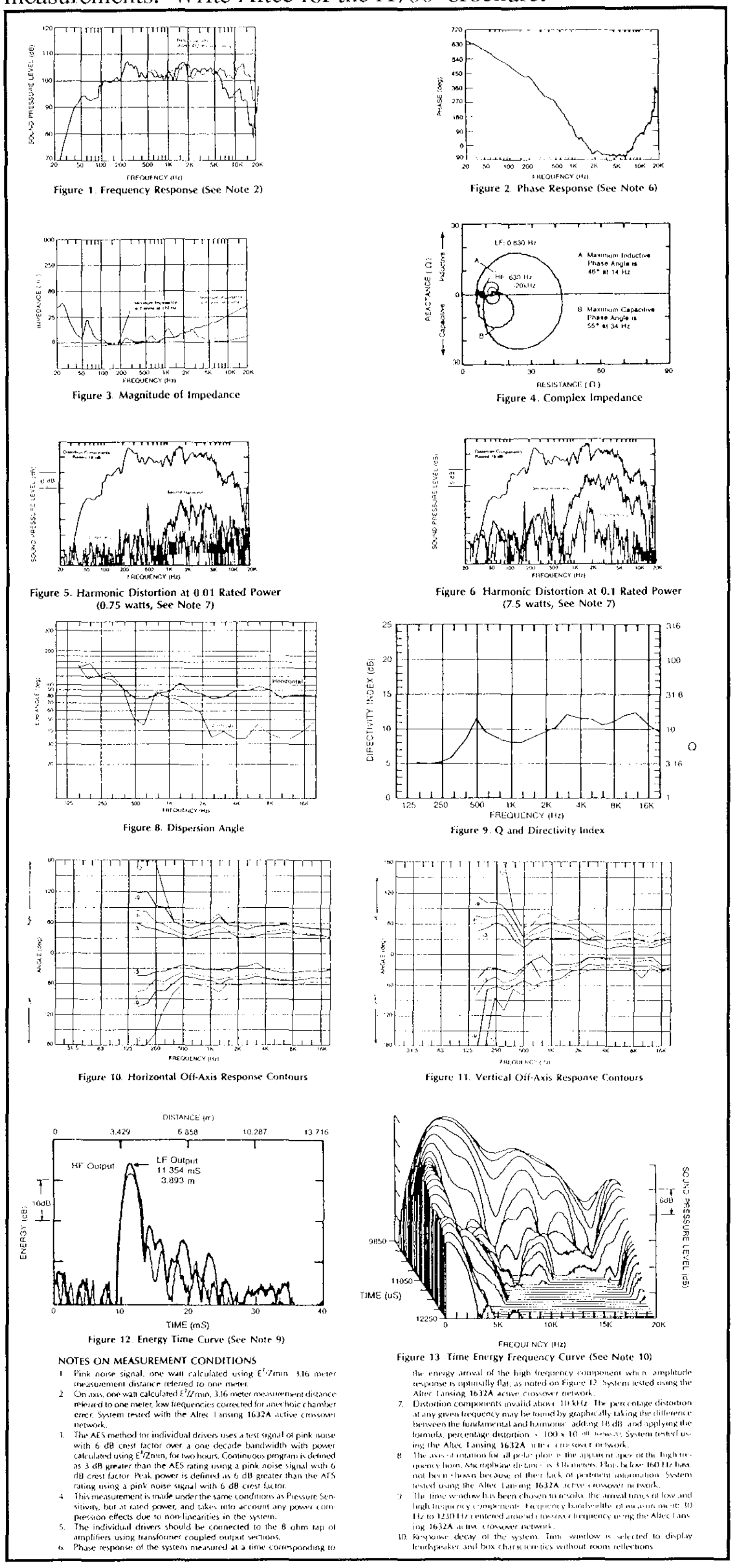


Figure 7 One-third Octave Polar Response Charts (See Note 8)

We are reproducing three pages from the Altec A700 brochure, not for you to study in detail, but to show you the scope of their measurements. Write Altec for the A700 brochure.



Do Digital Filters Ring?

The answer seems obvious but we still hear it put forth by responsible companies. Answer: Anything that has a transfer function of a steep filter will ring no matter how that transfer function was accomplished.

The Sound Pressure and Sound Pressure Level

What we call sound is the response of our brain to the stimulus of our auditory system generated by the relatively rapid variations above or below the ambient atmospheric pressure at our eardrums.

We know that the atmospheric pressure at sea level, due to the mass of air above us is 101,324 Pascals or 2116.2 lbs/square foot. This pressure operates as an acoustic bias. One Kg moved one meter/sec/sec equals one Newton of force. The dimensions are:

$$\frac{Kg \cdot M}{S^2} \qquad \text{Eq. 1}$$

The amount of force that is acting on each unit area (i.e., one Newton per square meter) is called one Pascal of pressure.

$$\frac{Kg \cdot M}{M^2 \cdot S^2} = \frac{Kg}{M \cdot S^2} \qquad \text{Eq. 2}$$

When we do work, we are said to expend energy. The energy a mass has due to position is called potential energy. The energy a mass has due to its motion is called Kinetic energy. Work, in Joules, equals force in Newtons times distance in meters.

$$\frac{Kg \cdot M \cdot M}{S^2} = \frac{Kg \cdot M^2}{S^2} \qquad \text{Eq. 3}$$

The rate at which work is done is called the power in watts. The power in watts is equal to the work, in Joules, divided by the time in seconds:

$$\frac{Kg \cdot M^2}{S^2 \cdot S} = \frac{Kg \cdot M^2}{S^3} \qquad \text{Eq. 4}$$

If we move a piston surface (i.e., a cone) rapidly back and forth, it would generate first an over-pressure followed by an under pressure at a point in front of the moving surface. The acoustic power generated by the motion of the piston can be found by

Where: W is the acoustic power in watts

$$W = \left[\frac{Af^2d^2}{K}\right]^2 \qquad \text{Eq. 5}$$

(A) is the RMS amplitude in inches or cm of the piston movement
f is the frequency in Hz
d is the effective cone diameter in inches or cm
K is the constant
S.I. = 1.91×10^6
U.S. = 116×10^3

Once we have obtained the power W generated by the piston (assumptions: omnidirectional point source) we can find the sound pressure, $P_{r\theta\phi}$ at a given radius and set of directional angles from the source by

$$P_{r\theta\phi} = \sqrt{\frac{W \rho_0 c Q}{4\pi (D_\chi)^2}} \qquad \text{Eq. 6}$$

Where:

$P_{r\theta\phi}$ is the sound pressure at radius r and angles from the source of θ and ϕ
W is the acoustic power generated by the source in the air
$\rho_0 c$ is the characteristic acoustic resistance of air (400 RAYLS)
Q is the directivity factor and is dimensionless
D_χ is the distance from the sound source to the measurement point.

If our piston has an amplitude A = 2.27 cm (0.9 inches) at a frequency f = 30 Hz from an effective diameter d = 30.48 cm (12 inches), we can then calculate:

$$W = \left[\frac{(2.27\text{cm})\,(30\text{ Hz})^2\,(30.48\text{cm})^2}{1.91 \times 10^6} \right]^2 = 1.0\text{w} \qquad \text{Eq. 7}$$

Followed by:

$$P_{r\theta\phi} = \sqrt{\frac{1.0\text{w}\,(400\,\text{RAYLS})(1.0)}{4\pi\,(0.282\text{m})^2}} = 20\text{Pa} \qquad \text{Eq. 8}$$

We can further simplify this equation to allow us to observe the interaction of the key parameters. By consolidating the constants

$$\sqrt{\frac{400}{4\pi}} = 5.64 \qquad \text{Eq. 9}$$

then

$$P_{r\theta\phi} = 5.64\sqrt{\frac{WQ}{(D_x)^2}} \qquad \text{Eq. 10}$$

This allows us to see that the sound pressure is directly proportional at a given point of observation to the power in watts and the directivity factor and inversely as the square of the distance between the source and the observation point.

What We Now Know

1. We are radiating 1.0W (by definition) so our total power is 1.0 watt.
2. $4\pi r^2$ = area of a sphere. So at r = 0.282 we have a spherical surface area of $1.0M^2$. Therefore, we have an intensity of $1W/M^2$.
3. We have a sound pressure at all points on this spherical surface of 20pa (because it is omnidirectional—all angles receive the same sound pressure)

The Acoustic Levels

There are three principal sound levels that are basic. The first is the sound power level L_W. The second is the sound intensity level, L_I. The third is the sound pressure level, L_P (more correctly called the sound pressure squared level). Each of these levels is an absolute level and therefore has a reference value associated with it. The three reference values are:

1. For total power, one Picowatt (10^{-12}W).
2. For intensity, one Picowatt/square meter ($10^{-12}W/M^2$).
3. For sound pressure, twenty microPascals (0.00002Pa).

Therefore, the acoustic levels are:

$$L_W = 10\,\text{Log}\left(\frac{W_{\text{MEAS.}}}{10^{-12}\,W}\right) \qquad \text{Eq. 11}$$

$$L_I = 10\,\text{Log}\left(\frac{W/M^2_{\text{MEAS.}}}{10^{-12}\,W/M^2}\right) \qquad \text{Eq. 12}$$

$$L_P = 20\,\text{Log}\left(\frac{\text{Pa}_{\text{ MEAS.}}}{0.00002\text{Pa}}\right) \qquad \text{Eq. 13}$$

If we insert the values we have assigned and computed above for our theoretical source, we find:

$$L_W = 10\,\text{Log}\left(\frac{1W}{10^{-12}\,W}\right) = 120\text{ dB} \qquad \text{Eq. 14}$$

$$L_I = 10\,\text{Log}\left(\frac{1W/M^2}{10^{-12}\,W/M^2}\right) = 120\text{ dB} \qquad \text{Eq. 15}$$

$$L_P = 20\,\text{Log}\left(\frac{20\text{ Pa}}{0.00002\text{ Pa}}\right) = 120\text{ dB} \qquad \text{Eq. 16}$$

What we have here is a very useful acoustical identity, namely that for an omnidirectional source in a free field at a distance of 0.282 meters, L_W, L_I and L_P are identical numbers—note carefully that they are not identical labels but identical numbers. This means that if you have an L_P measured at a given D_χ from a source with a known Q, you can, by calculating the directivity index D_I from the Q and subtracting it from L_P

$$D_I = 10\,\text{Log}\,Q \qquad L_P - D_I = \text{New } L_P \qquad \text{Eq. 17}$$

and converting L_P to a D_χ = 0.282m by inverse square law,

$$L_P \text{ at } 0.282\text{M} = L_P\text{ meas.} + 20\,\text{Log}\left(\frac{0.282\text{M}}{D_\chi \text{in M}}\right) \qquad \text{Eq. 18}$$

obtain the number that represents L_W and L_I for those conditions (0.282M, Q = 1.0).

The Facts—Nothing but the Facts

James B. Lee, Concert Acoustics, Portland, OR, recently gave a paper to the ASA in which the following statement was made.

> ". . . look at the stage of Boston Symphony Hall: 8 m deep, bounded by an open trapezoid of very hard, very plane walls! If it were smaller, an orchestra would not fit; if it were larger, players would hear echoes and ensemble would suffer. This "Henry" (i.e., Joseph Henry 1856) scale stage works in the frequency domain too: Bass viols, with their low E of 41 Hz, $\lambda = 8$ m, are less than 1/4 wavelength from a wall; not only is their sound reflected geometrically, but also its source strength is augmented due to the enhanced impedance of radiating in a pressure zone."

Now that's what I call getting your act together! Mr. Lee makes a clear distinction between small room and large room acoustics in his paper and then shows how the hall is a classic "large room" case while the stage is a classic "small room" case. His use of the words "plane surface" rather than "plain surface" are not accidental. It would indeed be a challenge to say as much on any subject in as little space as Mr. Lee has successfully done on room acoustics.

Milton T. (Bill) Putnam

1920-1989

Milton T. (Bill) Putnam passed away at age 69. Our association with this pioneer engineer traces back to his Chicago days and becomes even closer when his company, UREI became one of the pioneer Syn-Aud-Con sponsors. Bill Putnam and Bud Morris always come to mind when we think back to those early sponsors who had faith in what we were attempting to do.

Bill and I participated together in one of the BYU seminars where I demonstrated the very first H.P. real time analyzer that had been made to my special order. It was Bill Putnam who flew with Carolyn and I to hear Chips Davis' new LEDE room and who participated in the very first PZM tests. Bill immediately had several made for him by Ken Wahrenbrock and used them to remove the boundary coloration in his reverberation chambers at his studio.

Bill Putnam was one of the extremely rare breed who can both start up companies using new technology and also run them efficiently and profitably by being a good judge of the men he chose to manage each division.

Bill is probably best known to Syn-Aud-Con grads for his championing of Ed Long's Time Align. It took a man who knew his engineering, market, and the mysteries of the recording studio business.

We'll leave his recording studio career to those who knew him in that environment. Syn-Aud-Con remembers him as a good friend to have, a loyal and longstanding supporter of all that's worthwhile in audio, and a man who loved to learn about new ideas.

Good men do pass away—that's a foregone conclusion when we're born—thank goodness the good they have accomplished does not and they are rightfully honored for having made our world a better place.

Time Align is a registered trademark of E. M. Long Assoc.

TOA Automatic Mixer

TOA has announced an automatic mixer model AX-900. It is an 8 channel mixer with adjustable gain compensation (i.e., from 20 Log NOM through 10 Log NOM to no attenuation as NOM increases). Each input can be individually adjusted for its "inactive" microphone inputs as to their level relative to the active input levels. Full control over threshold sensitivity is part of the package (i.e., how easily a given input can be turned on by a sound)

The AX-900 mixer has plug-in modules. John Humble, TOA rep in S. CA, pointed out to me that a truly useful feature is the interchangablility of TOA's normal modules with their automatic modules so that some signals, such as recordings, can be handled manually while simultaneously using automatic mixing for microphone inputs that require it.

Recently *Sound & Communications* published the results of a contractor survey in which they asked sound contractors to list the audio manufacturers with whom they have the best relations. TOA received lst place. This is high recognition. TOA can be very pleased.■

Shure Prologue Loudspeaker Series

We recently had the Shure Prologue series of equipment brought to our attention. A four channel mixer, a small power amplifier, two loudspeakers and a series of microphones make up an inexpensive installed system or easy to use rental system.

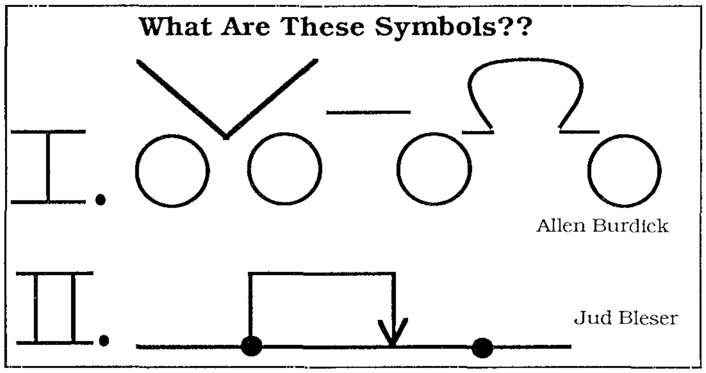
They feature "no interference from outside radio sources. Fully RF protected, a very unusual feature at this price."

The loudspeakers shown have sensitivities of 94dB/1W/1M for the Model 250 and101dB/1W/m for the Model 260.

Shure offers a very informative brochure AL 929A on this equipment.■

Smile

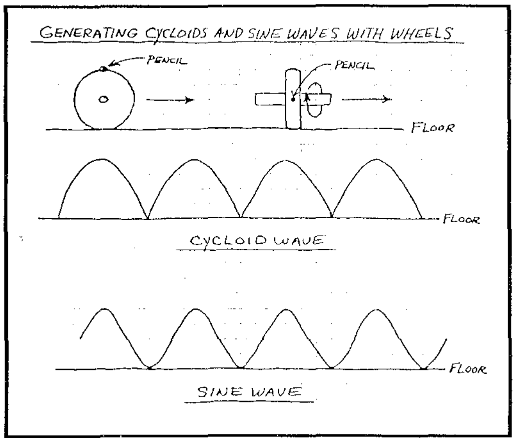
Allen Burdick and Jud Bleser in our Syracuse class last summer, gave the class a short quiz, which we all failed miserably. How did you do?

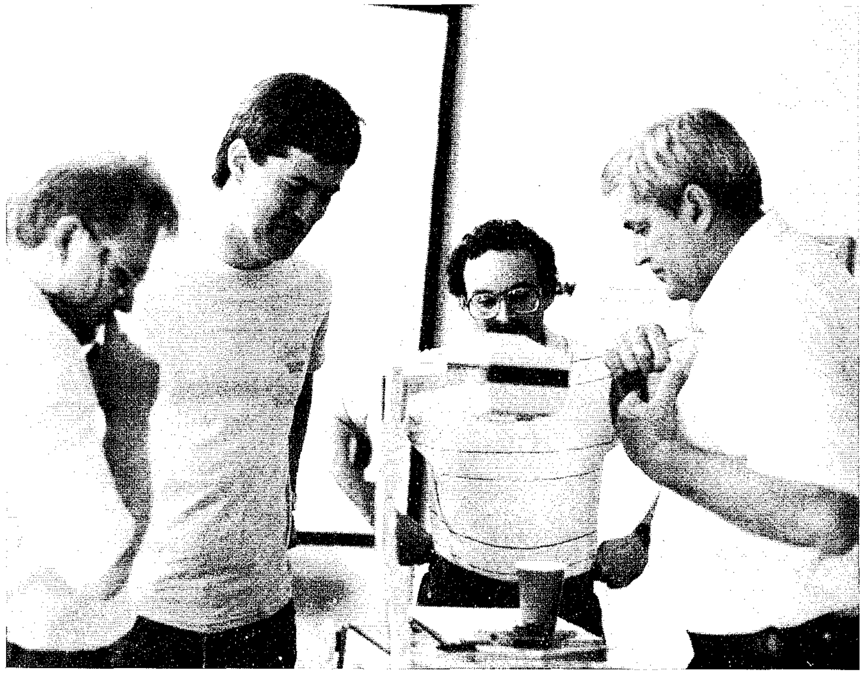


Answer:

1. Volts-wagon pulling a Mobile ohm.
2. Variable short

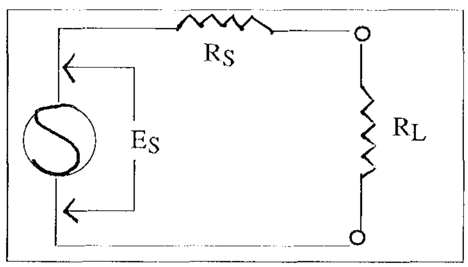
HILBERT BITES AGAIN





Stafford Henley of Baker Audio (he's the tall one) caught Farrel and me 90° out of phase on illustrating a sine wave. We were trying to do it by running a wheel with a pencil attached to the rim along a vertical surface. We got a cycloid (a cycloid is a sine wave squared). If you turn the wheel 90° (i.e. run to wall) and then move it along the wall as you rotate it toward the wall, the pencil attached to the rim will prescribe a sine wave for a viewer looking at the wall. Hilbert bites again!

Ohms Law—Power Into a Load



$$E_L = \left(\frac{E_S \cdot R_L}{R_S + R_L}\right)$$

$$W_L = \frac{(E_L)^2}{R_L}$$

Let R_S be very low (i.e., 0.01Ω)

Let E_S be 1.0v

R_L	W_L
1.0Ω	1.0W
10.0Ω	0.10W
100.0Ω	0.001W

What Have We Learned?

We have learned that as the load resistance lowers in a constant voltage system, the power being dissipated in the load increases.

The Frazier 40 a New Cat From Frazier

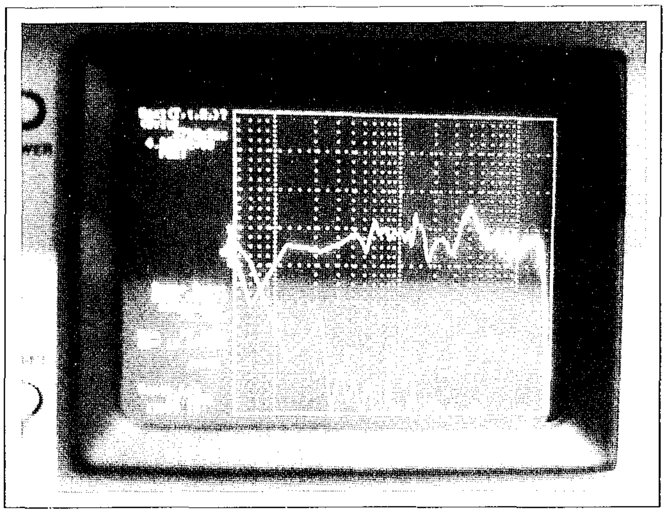
Norman Relich, one of our many-time grads, brought along to the last Chicago class a Frazier 40 loudspeaker designed by Jay Mitchell, Chief Engineer at Frazier. Norm had met Jay at the Intelligibility Workshop in Chicago a couple of years ago and was impressed. When Norm had the opportunity, he ordered one of Jay's products.

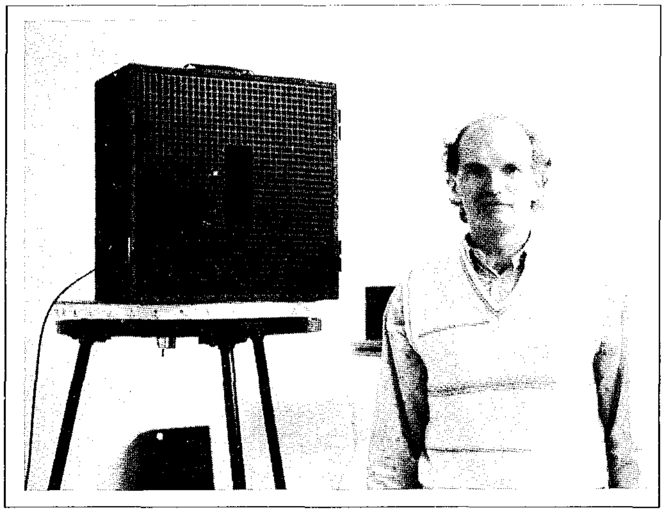
The photographs show Norm with the Frazier 40 and a log measurement of the front and back response. We were especially interested in the back response because we are seeing this measurement as important as the front response. We hear so often from churches and clubs that it is difficult to get gain before feedback when the loudspeaker is mounted overhead, even if it is well beyond critical distance. If the bass frequencies, which are omnidirectional, clobber the open microphone, there is little left to do but decimate the frequency response below 500Hz, or change to a new loudspeaker.

It is easy to see that the Frazier 40 has no problem with bass leakage except below 100Hz.

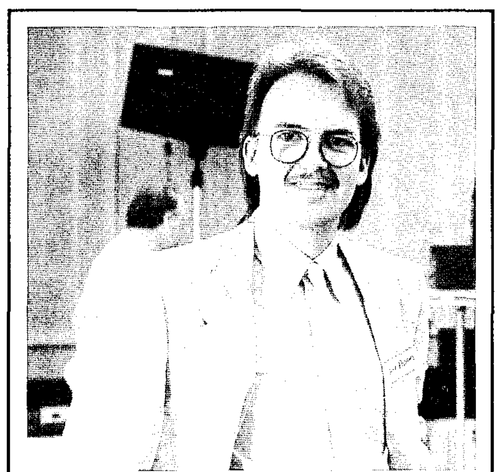
Norm writes about the Frazier 40:

> The Frazier design by Jay has a cabinet that is much more versatile because it is not very deep. Using a simple bracket, the unit can be installed easily, it is light to carry and set up, and can be used easily as a time coherent ceiling speaker.





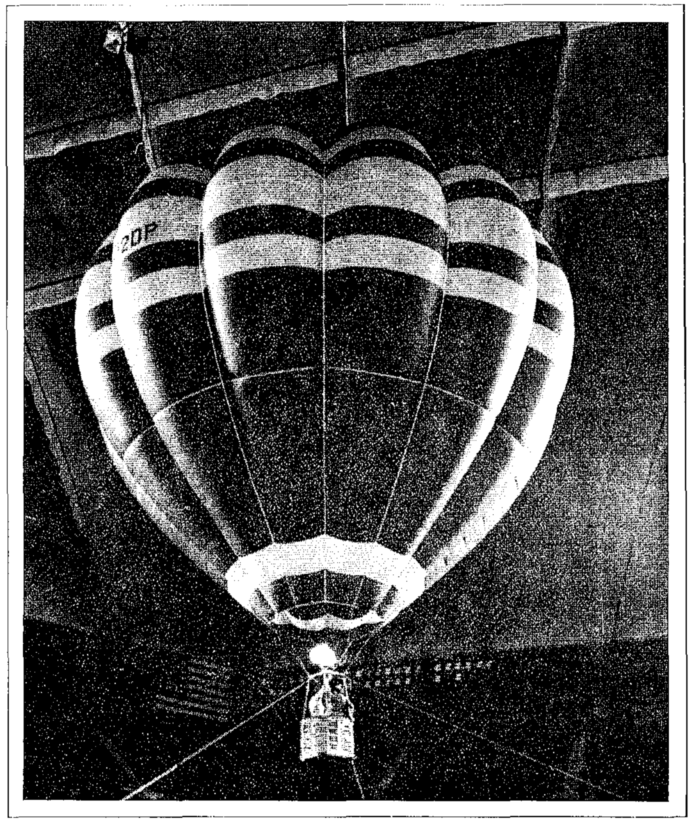
Another 2nd Generation



About 1982, Don and Lorainne Adams from Regina, Sask. attended a Syn-Aud-Con seminar in Vancouver. Their son, Jeff, attended our Toronto class last year.

When we first started Syn-Aud-Con, we were told that we would have trained everyone in audio in about three years. Now we are training the 2nd generation.

How are You Going to Service the Array Once it is Installed?



Another in the series of: Yes, it did happen once. The photo illustrates to what desperate straits sound contractors are driven on occasion. This just goes to prove that all the hot air is not in the balloon.

This epic occurred inside the dome at Pontiac, MI. I'm sure the Silver Dome has solved this problem in the years intervening since this balloon flight, but it is obvious that it wasn't a simple solution.

We are particularly concerned with the new computer programs that draw the array without any hint of mounting. Rigging is an art as well as a craft and fortunate is the firm with in-house expertise in such matters. Steve Simpson of Southwest Sound in San Antonio showed us a particularly difficult-to-mount array on a set of plans. We asked him how the consultant suggested hanging the array. Steve said, "with chewing gum."

Smile

(An Excellent Example of Audio Newspeak)

From the January 1988 issue of *Recording Engineer/ Producer* , in answer to an interviewer's question, "If you didn't profess to the 'compression room' theory, what was your design philosophy?"

Answer: "Modern rooms are reflecting what a listening environment should be. There is no longer a reason to use a compression ceiling. The concept was to compress low frequencies at the mix position because of a lack of it. Now that isn't necessary because the speakers can deliver the low frequencies. Before, you were compressing the low frequencies (acoustically), causing them to be out of phase and untrue."

From *db* Magazine, July/August 1988:

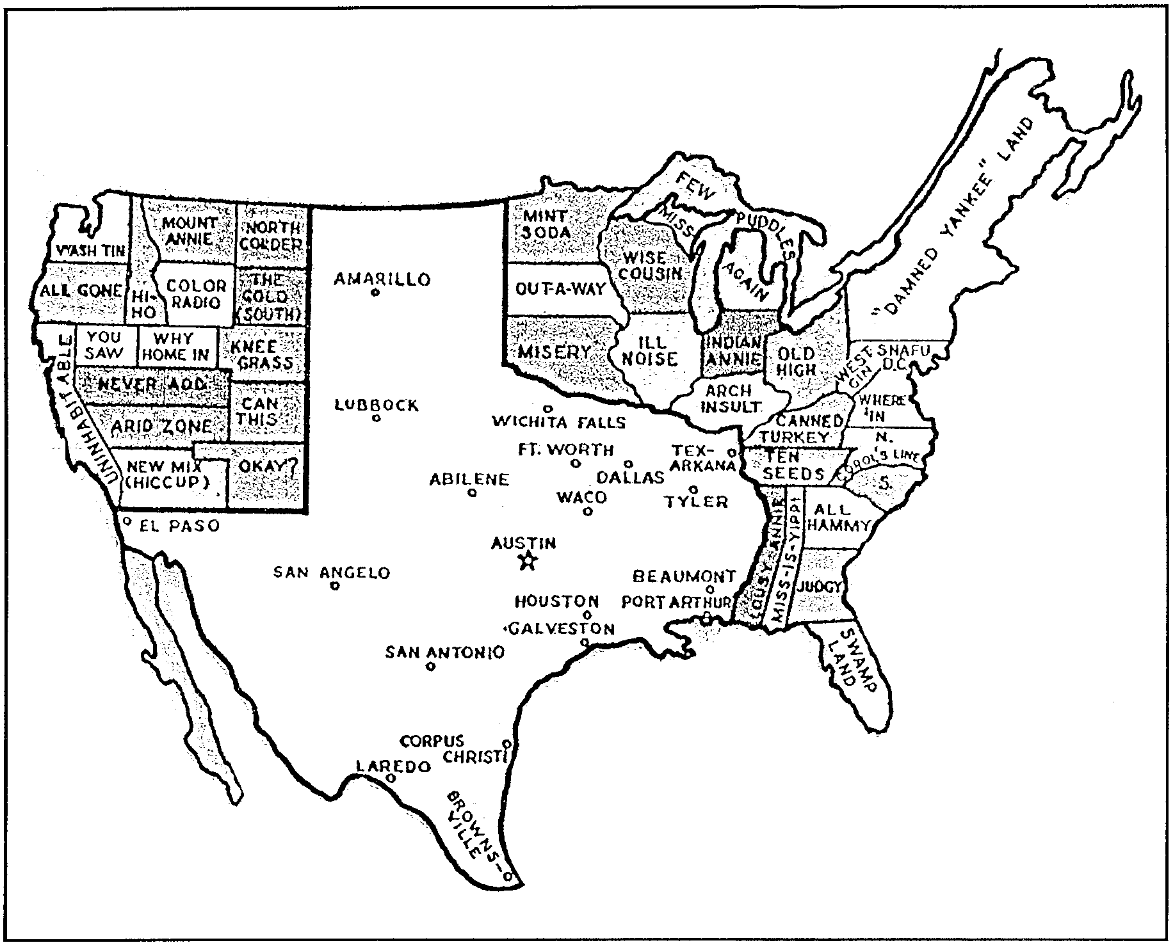
"Glenn says, 'If you're getting a peak of 120 dB sitting at the console, you're probably hitting 126-127 dB at the baffle board of the speaker. The room is actually inefficient due to the large volume of trapping space that is present in order to control the low frequency response of the room. That's going to suck up power.

"Milan adds, 'Part of the reason why we have so much trapping (18 feet in one place alone, above the control room ceiling) is so the room won't go into acoustic compression. This room won't start compressing until levels are 160 dB SPL. So when a transient of a snare drum hits, the room hasn't compressed it and you can hear its real character. That gives you the ability to put it in the mix where it's supposed to be. The average control room goes into compression at about 110 dB."

Editor's Note: The article truly said "160 dB SPL". They didn't say how the measurement was made or if anyone was in the room when it was hitting "160 dB SPL." It would be helpful if those who speak of "acoustic compression" would write an article using the law of physics to explain exactly what they mean. And show measurements of "acoustic compression."

A Texan's Map of the UnitedStates

projections accepted by the Cartographers of the world. Less known but far better adapted to inertial guidance of pickup trucks is the Texas "Bug-eyed" projection that occurs whenever Texas supremacy is questioned. This new map not only corrects one's perspective of the United States but is also a valuable guide to proper pronunciation of "foreign states." Note particularly that true totalitarian states such as the Peoples Republic of Massachusetts is put beyond the pale as is a certain earthquake fault in the west



Texas is especially dear to our heart as the state to first successfully challenge OSHA and force them to get a search warrant listing "probable cause" before entering a man's place of business in their usual Gestapo manner. A "True Texan" was the shop owner talking to an irate customer on the telephone who when the customer said "let me talk to your superior" responded with "I have no superiors and damn few equals."

There's an old saying "The sun has ris and the sun has set and I ain't out of Texas yet" followed by the Kentucky boy bragging about Fort Knox and all its gold. "Why there's enough gold bricks there to build a fence two feet high around Texas" to which the Texan replied "You do that and if I like it I'll buy it." Finally there's the congressional proposal to divide Alaska into two states making Texas the third largest state. Speaking of Alaska, two Texans were up there in -60 degrees F weather when one turned to the other and said "if it's this cold here just imagine what it's like in Amarillo."

With all this folklore in mind we were delighted to finally receive a more accurate map of the United States. There are Mercator, Molliveide, Van Der Grinten and Robinson and a sand dune left over from the last hurricane in the southeast.

A final note is to acknowledge that this priceless document came from a Syn-Aud-Con ranger in Dallas who says that sound consultants design their systems using the same projections.

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A Morning Walk on the Farm–

June 1, 1989

When Carolyn and I moved to the farm in Indiana from our ranchette in California, many people thought some disaster had overtaken Syn-Aud-Con.

For those of you not familiar with the deep southern Indiana woods in the hills of Monroe, Morgan, Brown, and Jackson counties, the farm is indeed a pleasant surprise. This morning I took the two dogs, Patch and Princess, on a hike through the woods to the west of the house. Many of you have already met Patch and she is the gentlest German shepherd we have ever encountered. Princess is half German shepherd and half Husky. She successfully hunts and kills ground hogs, mice and other assorted vermin. Yet manages to live quietly with four cats.

It's a hot morning about 75°F at 8:00am and we cut through on a new trail crossing the branch that flows from a spring up near the old house. We walk the edge of the woods in the west field and then plunge into the woods near the west line. I decide to explore a ravine I haven't been in all year. I see Patch springing up ahead of me like a jack in the box and see a flash of brown. At first I thought I was seeing Princess until she came up in back of me and then I realized it was a deer.

Taking the creek as a highway we proceeded northwest until we found an old logging road that let us work our way up to the back field enclosed by woods. Just as I got up the slope, Princess chased a large coon up a tree right in front of me. The coon paid no attention to me so I got to watch it climb straight up about 40 feet on a tree without branches until that height. We don't hunt coon so I just enjoyed the show. The deep woods need to be re-explored every year. High winds drop trees, high water reshapes stream beds, and in dry years the woods are dramatically different from wet years.

Fields not worked rapidly return to forest in this area and the edges of the woods are a solid jungle you have to cut your way through. Once under the canopy of the large trees the forest floor is a cathedral space with a soft floor of humus and leaves. The quiet, the sheer beauty of sunlight glinting from ripples in the stream bed, the shale bluffs, and the sheer exuberance of the dogs remains in our thoughts for the remainder of the day. Tomorrow we'll have new adventures.■

Anonymous

The modern diffusion of misinformation deserves no mercy, and the technical writers who do not hesitate to spread lies for the sake of money should be punished just as one punishes the purveyors of adulterated food. One poisons the body the other the mind.

Classified

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

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