SYNERGETIC

SYN AUD CON

AUDIO CONCEPTS

# newsletter

P.O. Box 1239 Bedford, IN 47421
Ph: 812-275-3853

Volume 15, Number 1
Fall, 1987


SYNERGETIC
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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

**Staff:** Dashia Alfonso
Laura Bailey

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Curt and Jeanna Taipale
Taipale Media Systems, Inc.



The information conveyed in this NEWSLETTER has been carefully reviewed and believed to be accurate and reliable; however, no responsibility is assumed for inaccuracies in calculations or statements.

To receive a subscription to the Syn-Aud-Con quarterly Newsletters and Tech Topics for one year, your cost is $32.00 in North America. All other countries $38.00 airmail payable in U.S. Funds, by MasterCard, or Visa.

If you attend a Syn-Aud-Con Seminar during the year, your subscription will be extended one year. (You receive a subscription for one year as part of the registration fee.

For additional information contact: Synergetic Audio Concepts, P.O. Box 1239, Bedford, IN 47421, Phone: 812-275-3853.

# Contents

EAW

EASTERN ACOUSTIC WORKS

# Syn-Aud-Con's newest sponsor

EAW, Eastern Acoustic Works, is Syn-Aud-Con's latest sponsor. We are pleased to have them as a sponsor as we have come to have real regard for the engineering integrity of Kenton Forsythe, Director of Engineering at EAW.

Their specification sheets show, for example, the half space efficiency as well as the sensitivity of their loudspeaker systems. Forsythe designs asymmetrical sloped filters that electronically compensate for amplitude, phase and impedance. He lists the 100 hour sine wave power handling rating as well as the much inflated AES value.

EAW is currently using a TEF analyzer in their design work and have all parts of the design formula in place.

Brains + Integrity + TEF = Innovative Products

Readers of our past Newsletters know that we have had various grads bring in their personal EAW systems for testing in the classes. Our respect for the products grew with each test.

In 1977, Kenton Forsythe and Ken Berger attended a Syn-Aud-Con seminar in Boston. They had just started Eastern Acoustic Works. Soon after class Ken Berger asked about Syn-Aud-Con sponsorship because, as he said, EAW wanted to support what Syn-Aud-Con was trying to accomplish. Perhaps our attitude was, who is EAW?

Kenton Forsythe and Ken Berger have accomplished a lot in ten years. EAW manufacturers a full range of professional loudspeaker systems intended for concert sound, commercial installations, recording studio, dance clubs, and musician stage instrument monitoring applications.

**A Word About Our Sponsors**

All our sponsers help make Syn-Aud-Con possible. All of them welcome the spotlight of truth we attempt to shine on our industry. We are pleased to have their support, both morally and financially. We have a high quality of sponsor deserving of each grads support when possible. EAW is a worthy addition to a distinguished list.

# *Heyser AES Scholarship Fund*

We recently had a telephone conversation with Bart Locanthi, president of the AES, regarding the graduate student loan fund being established in the name of Richard C. Heyser. This fund will be administered by Dick's widow, Amy Heyser, with the assistance of the AES legal counsel. Its purpose is to honor the name of Dick Heyser by generating a loan fund for graduate students with an interest in furthering the work Dick began. It would be a loan to them to be repaid at a future time thus replenishing the fund to serve others.

**If Every Syn-Aud-Con Grad Gave $25 to the Scholarship Fund!**

If every Syn-Aud-Con grad who had the privilege of hearing Dick in one of our seminars and/or workshops will send a $25 contribution to the Heyser AES Scholarship Fund, we could all help the fund get on its feet.

We hope you all will choose to participate in this project. Syn-Aud-Con will be announcing in a future Newsletter other steps we are taking toward this goal. Send your donation to: The Heyser Scholarship Fund, Audio Engineering Society, 60 E. 42nd St., New York, NY 10017. Amy Heyser will personally acknowledge your contribution. This scholarship is very dear to Mrs. Heyser.

# *Richard Heyser Video Tapes Available*

Richard Jamieson and Amy Heyser have worked together to make available the three VHS video tapes made of Richard Heyser at The Twenty Workshop in Los Angeles, 1979. (See Newsletter Vol. 14, No. 4, pg. 3 for a write up of the video tapes.)

As we said, "These tapes contain the very essence of Dick Heyser." **Everyone** who attended a Heyser Workshop will treasure a copy of the tapes. The tapes will lift you to the heights as you commune with him through these tapes. At the same time they will take you to the depths as you contemplate the audio world without him.

TEF owners must own a set of the tapes. The tapes were made 10 years ago, yet most of us have just reached the level where we can comprehend the genius behind the Heyser Transform and TDS.

The tapes (5-6 hours) are available for $90 US funds plus $2.50 shipping in North America. Air mail is additional. See order form.

The tapes are being reproduced by Richard Jamieson at his cost. An honorarium is being sent to Mrs. Heyser from each order. Mrs. Heyser will receive a list of people who order the tapes and will acknowledge your purchase.

BNL
RESEARCH ASSOCIATES

SEP [illegible] RECD

September 11, 1987

Mrs. Carolyn Davis
Synergetic Audio Concepts
P. O. Box 1239
Bedford, IN 47421

Dear Mrs. Davis:

The following is the statement regarding the Richard Heyser Scholarship Fund as per your request. Mr. Locanthi will be out of town from Sept. 15-29, so if you would like to change anything, I would suggest checking with either Don Plunkett at the AES or Jay Fouts, the attorney for the AES. Mr. Fouts' phone number is (212) 949-0924.

Contributions should be made out to the AES, Inc-Richard C. Heyser Memorial Scholarship Loan Fund, which will be tax deductable.

A separate Richard Heyser Foundation is being incorporated and is applying for tax exempt status from the IRS. In due course, monies collected by the AES will be transferred to this new independent corporation

If you should have any questions, please don't hesitate to call me, as I will be contact with Mr. Locanthi via phone or fax.

Best regards,

Deborah Bach
Admin. Asst

cc: Amy Heyser
Don Plunkett
Jay Fouts

201 S. LAKE AVENUE, STE. 414 PASADENA, CALIFORNIA 91101 PHONE (818) 440-9481

## Cabot Article in AES Journal

To savor the full tragedy of Dick Heyser's passing, you should read Richard C. Cabot's 13 page tutorial on "Audio Measurements" in the June *AES Journal*. This is a tutorial on how to make audio measurements, yet there is no reference to TEF, incorrect definitions of levels, faulty descriptions of spectrum analysis, and a big advertisement for the author's product in the middle of the article.

No mention is made in the 1-1/2 page bibliography of Heyser, and Gerald Stanley is mentioned only in connection with TIM measurements.

We don't expect this kind of unprofessionalism from Richard Cabot who is knowledgeable and makes a very fine product.

## Is Our Face Red!

In listing the "Twenty/Heyser" Workshop in the last Newsletter, Page 3, we left out two important persons who made it all possible, David Brand and Larry Estrin. They provided the space at the old RCA studio, then owned by Filmways Audio, encouraged the gathering, and have loyally supported both Syn-Aud-Con and Heyser efforts in spreading TEF technology. David Brand and Larry Estrin are treasured members of a supportive staff that made it all possible. Our apologies to two old and dear friends.

# JBL Annual Conference

If one were to wonder who the key audio contractors are in the United States they would do well to attend the large meetings conducted for such contractors by Altec, EV, JBL, and Rauland. We have been privileged over the years to attend many such meetings and to meet and know a majority of the contractors who attend. The audio contracting business is a unique specialized one that attracts a fascinating mixture of craftsmen-engineers of a highly individual entrepreneurial type. Certainly this group has held our interest for over 30 years and its legends, myths, facts and secrets are intermingled with our careers so as to often make objectivity difficult. We love the business and the people in it. We are pleased that the best of them are our friends and supporters.

Thus, when Steve Romeo, of JBL, invited us to participate in their annual contractor/consultant conference to discuss their new UREI precision signal delay and to share our hard won data on intelligibility measurements, we were pleased to do so.

We find easy rapport with Ron Means, Ken Lopez, Mark Gander, Drew Daniels, and Steve Romeo of the JBL staff, as well as our solid long term friendships with Brad Plunkett, Frank Kelly, and John Groper at UREI. These are men we appreciate and enjoy being with. They are men who leave us free to agree or disagree with their ideas without it being a cause for acrinomy. They respect us enough to tell us when they feel we are wrong. In other words, we work together harmoniously.

Their annual conference attracted the cream of the crop in sound contractors and consultants. Our colleagues in presenting the program included David Klepper, Rolly Brook, Jeff Loether, Ken Fause, Don Eger and Don Keele, as well as other talented people. We were not able to stay for the entire meeting due to the seminar commitments but we left after one day with the feeling that the sound contracting business has matured remarkably over the past 30 years.

## SOUNDER, *where are you?*

Sounder makes the polarity checker that we have used and recommended for several years. Recently our mail to Sounder was been returned. We can't locate a phone number for them and we are getting calls from "grads" that they have tried to reach them with no success.

If anyone knows how we can reach Sounder, formerly of Mill Valley, CA, please let us hear from you. Or, if you are using a polarity checker that you especially like and feel has engineering integrity, please let us know.

# JBL/UREI Microsecond Signal Delay

At the JBL/UREI Conference in September we used the new JBL/UREI precision signal delay to align, synchronize, or converge two identical loudspeakers. We used the TEF and also the real time analyzer. We took a couple of photographs of the real time analyzer display in and out of signal synchronization.

**Using the RTA**

Figure 1 show two speakers out of synchronization. Figure 2 is of the two speakers in synchronization. Note that the real time shows a dramatic increase in level in the 1,000 to 2,000Hz region because this is an area of major phase cancellation.

We plan to write a step-by-step Tech Topic for the next Newsletter on signal synchronization using both the TEF and the RTA. We decided to go ahead and use these photos now to encourage RTA owners to buy the UREI signal delay and start synchronizing your loudspeaker clusters.

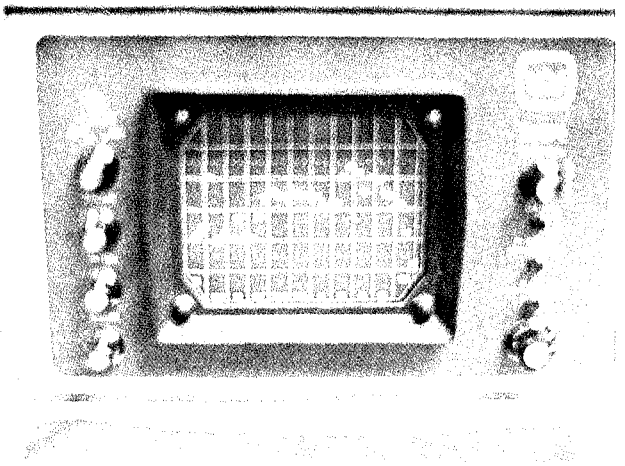


**Figure 1: Two speakers out of synchronization**

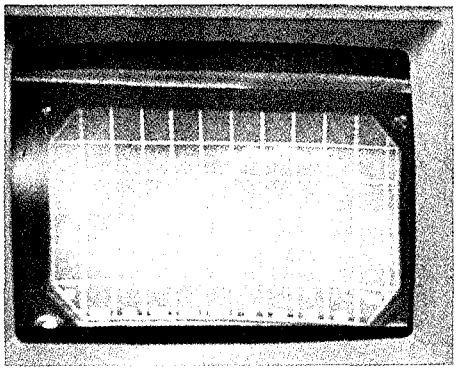


**Figure 2: Two speakers in synchronization**

# Dr. Hume & Modulation Transfer Function

One of the serendipities of Syn-Aud-Con's move to Indiana is that a major university is just 30 miles north of us through the Hoosier National Forest. There is a new highway bisecting this large forest that comes to the farm as if designed for us. Indiana University (IU) is world famous for its music school (opera particularly) as well as its basketball team (national champions last year).

While attending the ASA convention in Indianapolis this year we met Dr. Larry Hume of IU's Department of Speech and Hearing Sciences. Dr. Hume has a thorough background in speech intelligibility and is engaged in teaching and research at the University. We are, consequently, planning to explore the use of TEF analysis in some of his research projects.

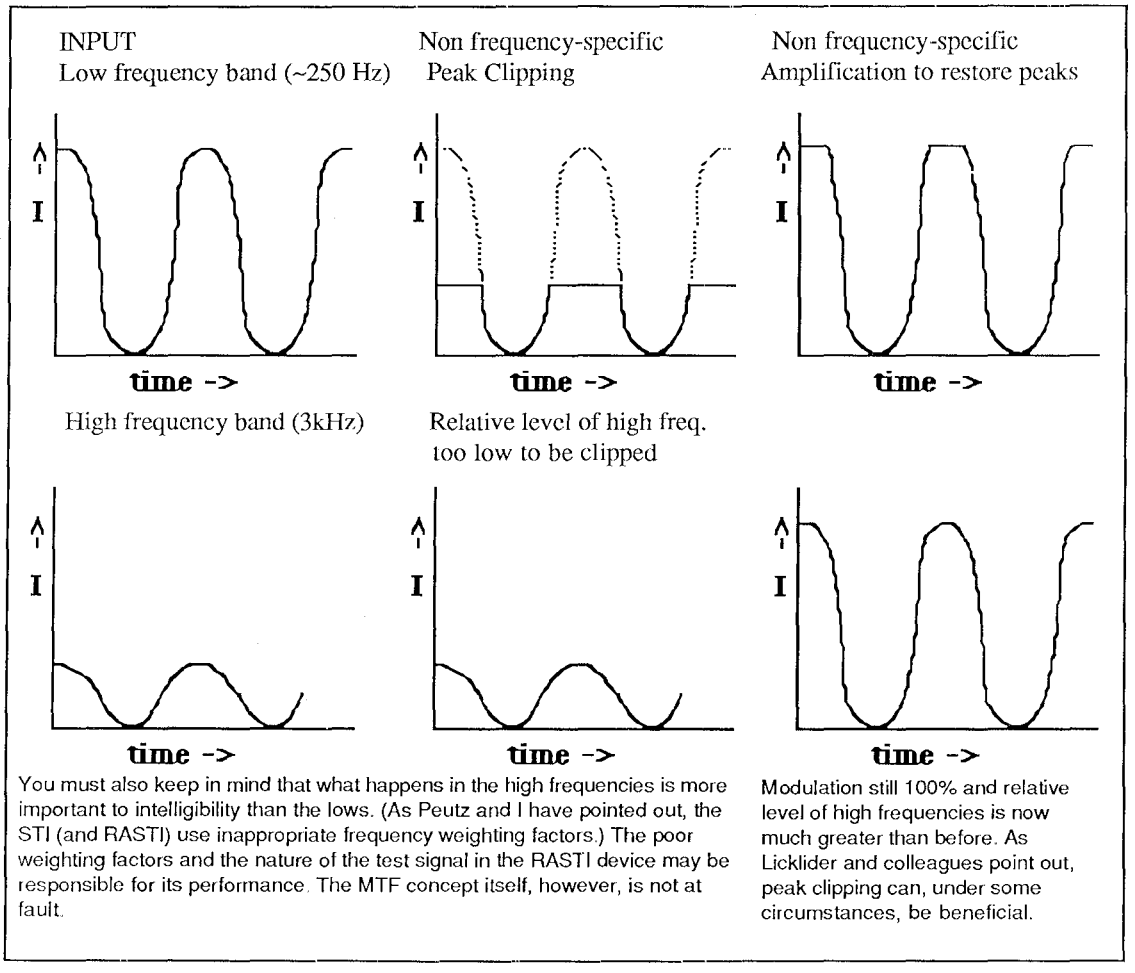
Dr. Hume, in reading the last Newsletter, called our attention to a mistake we were making in assuming that severe peak clipping removed all modulation effects from the audio signal. We are most grateful to anyone who makes the time to correct our mistakes. We are printing his letter and illustrations to provide the proper correction to the previous mis-assumptions.

**Dr. Hume on Peak Clipping & Modulation Transfer Functions**

While it is true that severe peak clipping does not effect speech intelligibility, it is not true that this is at odds with MTF analysis. Only a broadband or fairly non-frequency-specific MTF (like RASTI at just 500 and 2000Hz) will appear at odds with the intelligibility data. When speech is peak clipped and then amplified to restore the peak-to-peak amplitude to original values (as was done in all of Lickleder's work and with the Craig Allen's processor board), the clipping primarily effects the more intense low-frequency components of speech (vowels) while the post-clipping amplification boosts the consonant energy (high frequencies) that were previously low in level. (Lickleder, Am J. Psychology 61:1-21 (1948), discusses this effect in detail.) The appropriate MTF analogy is sketched out below.

Although the case in question is shown in the sketch, similar effects can be demonstrated for noise added after clipping. Noise added prior to clipping would negatively affect the MTF. Both findings have been reported by Lickleder and colleagues, consistent with the MTF approach.

In summary, the STI, and, especially the RASTI, may be wacky, but the MTF approach appears to be sound.

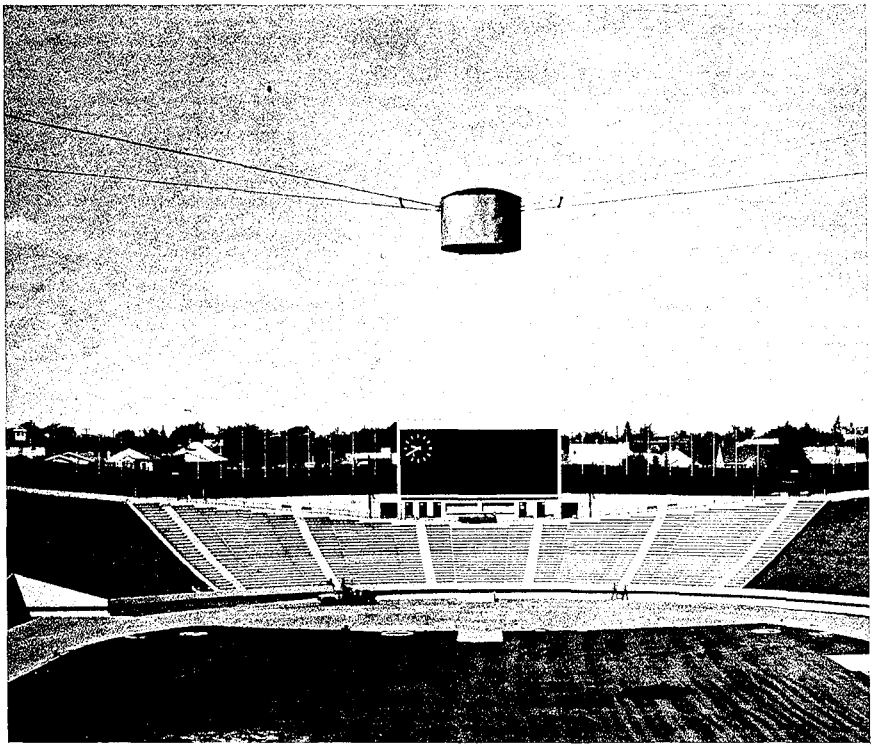


# A MASSIVE "RIGGING" JOB

Syn-Aud-Con Tech Topic V6N10 featured the system shown shown here. One hundred feet above the playing field (30.5m), weighing 24,500 lbs., 44 horns and 28 L.F. speakers are in the array using 5,000 watts of power. It is suspended by four 350 feet long galvanized bridge strand cables. At the time of installation, it was the largest and most sophisticated centrally suspended sound system ever to be installed in an open-air athletic stadium.

The system was designed by Allsopp, Morgan Engineering, Ltd., consulting engineers in Edmonton, Alberta, for the Commonwealth Games in 1978. The system is being duplicated for the Olympic Games in Calgary in 1988.

Note the massive anchoring system used. This truly outstanding technical feat is worthy of emulation. The consultants did tell us that the rigging and installation of the array was more costly than the total equipment list.



**State of the Art Outdoor Sound System**

## SILLY ADVERTISEMENT OF THE MONTH

Since there are so many of them, it's tough competition to win the dunces hat. In the battle of fuzzy words, whoever wrote this must be king. We await the mathematics of RMS Instantaneous Peak Power. You also get a "calibrated *variable reference* meter". We'll admit that a lot of the references we run into these days are indeed variable but we still prefer a reference to be fixed.

**WARNING!**

**THIS AMPLIFIER IS CAPABLE OF DELIVERING 4000 WATTS RMS INSTANTANEOUS PEAK POWER**

## Sound Mixer's Prayer

Farrel Becker recently sent us the sound operator's prayer. We agree that prayer is often needed and we have reverant regard for the original. Just as the original is based on the assumption that you didn't regard the basics as the "Ten suggestions", so too this prayer assumes you have solved the trinity of "Gain, Coverage, and Intelligibility". Just as in other churches, so too in the First Church of the Chirp heartfelt prayer is often answered by "you need to know more of the word."

Our father, who art backstage,
hallowed be thy mic.
Thy gig has come,
thine will be done,
onstage, as it is in house.
Lead us not into distortion,
but deliver us from feedback.

Check, One, Two

# Book Review

## Stage Rigging Handbook

Thanks to Dr. Hume at I.U., we were introduced to Ted Jones, Director of Technical Studies, School of Music, Indiana University. Mr. Jones is a Fulbright Scholar and a professor of Theater Rigging and Lighting. He is a partner in the theatrical consultation and design firm of Jones and Phillips Associates, Inc., 1607 Woodruff Lane, Bloomington, IN, Ph. 812-336-8272.

Mr. Jones called our attention to a new source of good instruction on rigging: **Stage Rigging Handbook** by Jay O. Glerum. Published by Southern Illinois University Press, Carbondale and Edwardsville, IL ISBN 0-8093-1318-9 (PKB). $14.95.

**Stage Rigging Handbook** is extremely well organized and carefully illustrated. Some of the subjects covered are: Hemp rigging, blocks, pin rails, sand bags, spot line rigging, wire rope, lock rails, arbors, hand lines, loading bridge, showtime operation, special counterweight problems, motorized rigging, cutting and knotting rope, special problems.

Under the subject, "Loading and Unloading Using a Loading Bridge", is a discussion of a runaway set. From the description given I believe the author surely has experienced it. "The arbor will either crash down or up, and the chance is great that counterweights, smashed head, or tension blocks, or other hardware will fly through the air. The batten will either go up or down, and the possibilities of it hitting adjacent flown objects, lift lines snapping, loft blocks smashing and falling, sprinkler systems being activated, are all very real."

The author's advice when a runaway occurs takes three parts: Do not attempt to stop it, shout a warning to all crews, and take cover!

The author states that the cause of such chaos is "human error .... If anyone involved in loading and unloading a counterweight set loses his concentration it is possible for him to make a mistake and for the set to become unbalanced and run away."

**Stage Rigging Handbook** has 138 pages, a good glossary, and an excellent Table of Contents. This book, along with **Handbook for Riggers**, reviewed in the last Newsletter gives a newcomer to rigging the knots, the notes, and the knowledge of experienced riggers.

**Need a Consultant on Lighting & Rigging?**

If you need a consultant for theater rigging and lighting, get to know Ted Jones. We have found him to be experienced, practical, and a good communicator. In addition to theater, concert hall, and ballroom lighting and rigging, Mr. Jones' firm has also been involved in a number of jobs in arenas, solving the special demands they present in rigging large loudspeaker clusters. Having perused his long list of successful jobs and particularly his design and execution of the Opera House at I.U., we are prepared to recommend Jones and Phillips Assoc. to any Syn-Aud-Con grad needing professional assistant in the area of rigging and lighting. Jones and Phillips are the experts to take responsibility for your large clusters when you need such services.

## Spatial Hearing

**Spatial Hearing** by Jens Blauert, translated by John S. Allen and published by the MIT press, Cambridge, MA and London, is a book devoted to "the psychoacoustics of human sound localization". Jens Blauert is Professor of Electrical Engineering and Acoustics at Bochum in West Germany. A 427 page book devoted to directional hearing acuity is an indication of the thoroughness of the modern German academic approach to engineering and scientific inquiry. The chapter heading are:

1. Introduction
2. Spatial hearing with one sound source
3. Spatial hearing with multiple sound sources and in enclosed spaces
4. Progress and trends since 1972 (the original German edition **Raumliches Horen** was in 1972 and the present translation was 1982.

There is a subject index and an author index. Reading some of the names in the author index, one is reminded of Auda Abu Tayi in the film, *Lawrence of Arabia* when he says to his son as he agrees to compromise without violence at his well, "This honors the unworthy". Anyone reading the literature associated with psychoacoustics should remain continually aware that all claims should be but outlines for personal experimentation to either confirm or deny the claims.

With that caution in mind, Mr. Blauert's book is a valuable resource of rigorous definitions, voluminous referrals to other's work in the literature, and a compilation of the best illustrations available in that literature.

The book is useful as an incentive to try the myriad experiments described and a guide as to what terms to use when writing about them.

Puddie Rodgers' work is mentioned only as a paper date in order to allow a prior paper claim by Blauert. Blauert's paper hypothesized that notches in the frequency response *might* contain directional clues. Puddie *proved* it with elegant measurements. Almost every discussion of papers is done to establish when Blauert's first remarks in print were made on the subject.

The above comments should not be taken too negatively. It takes strong egos to do important work. The book is a useful roadmap for trained researchers using the remarkable tools available to today's experimenters such as 1 μsec preci-

sion delays, TEF analysis, ready access to powerful PC's, signal synchronized loudspeakers.

Well worth the investment in time and money so long as you don't take it too literally.

## Handbook

In 1977 Howard W. Sams asked if we would be willing to be the editor of the new edition of the **Audio Cyclopedia**. It didn't take us long to discover that the task was much too large for us and we suggested Glen Ballou as the editor, which Sams accepted.

Being a good friend of Glen Ballou we know how hard he worked for over 8 years to get the new edition together. His wife, Debbie, bought an IBM PC and typed all the manuscripts. Friendship did not stand in the way of him demanding all he could get from his authors. He made us completely rewrite the chapter on Audio Measurements because he felt we should do a better job.

Therefore, when the full page Letter to the Editor from Dennis A. Bohn of Rane Corp was published by **Sound & Communications** we were pained. Bohn's comments were unfair and inaccurate. Ted Uzzle's answer was so reasoned that we felt that it negated the poison of Bohn's letter and we wrote and thanked Ted for his answer. He wrote us one of his gems and we would like to quote from his letter:

"It's terribly hard to know when to reply and when not. My temptation is to reply whenever the criticism is specific to the subject. Much vaguer charges (especially as they spill into adhominem, such as charges of bias or favoritism) are almost impossible to deal with. After all, we all have biases, and we all have favorites. We should be judged on the quality of our biases and favorites, not the fact we have them. There's a time to remember the old adage, if you wrestle with filth and lose, you end up smeared with filth. If you wrestle with filth and win, you still end up smeared with filth ..."

And later on Ted says, " Years ago, audio technical books tended to look like those 'fix your own plumbing at home' books. Now look at the fine audio reference books that are coming out today: your book, the **Handbook** and a few others. Compare them to the reference books in any other engineering discipline. We're seeing audio engineering mature into a profession, in one more way."

As we travel around the country, we see the **Handbook for Audio Engineers** in the library of many, many people. It belongs there!

## *Clarity, the magazine for technical support ministries*

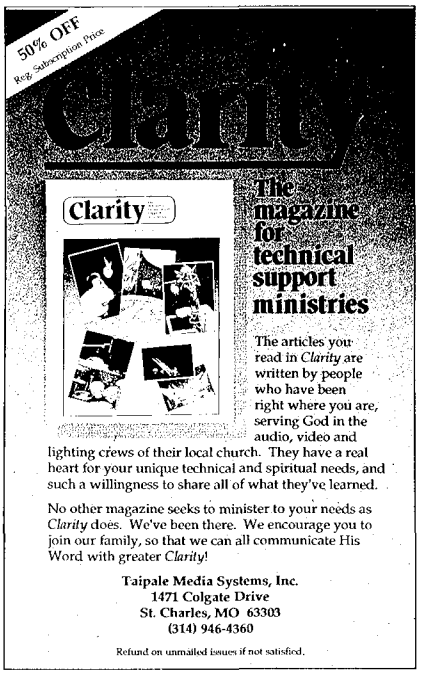
Curt Taipale of St. Louis left his job as Director of Audio at Grace World Outreach Church in St. Louis to start a magazine called *Clarity - The magazine for technical support ministries*. Clarity is a magazine for those involved with audio, video, or lighting in their churches or traveling groups on the road. They, (Curt and his wife, Jeanna) are preparing Vol. 2, No. 1 (now bi-monthly) to be released in January, 1988. Cost of the subscription is $19.95, however a special promotion is on now so that you can receive six issues for just $9.95.

They will be glad to send you a sample copy. If you work in a technical ministry for your church, or if churches are a major market for your company, write: Clarity, 1471 Colgate Drive, St. Charles, MO 63303. (314) 946-4360

**Advertising in Clarity**

*Clarity* rates are very reasonable, $90 for a full page, $55 for a 1/2-page, and $39 for a 1/3-page. Both sound contractors and manufacturers should find *Clarity* a good medium for reaching the churches that need a sound system. Write or call Jim Bullard, head of Market Development for more information on advertising rates.

We recommend you get your sample copy.



# New TEF Owners

Techron has 30 TEF owners to add to our list since the last Newsletter. There are several reasons for this avalanche. Probably one of the best reasons is that the word is out that a TEF analyzer is a valuable tool for the sound contractor, consultant or manufacturer. In case you haven't been counting, Peavey Electronics has three TEF analyzers now.

Techron is helping the small contractor own the TEF with a lease program. For $199/month one can purchase a TEF. So it costs $2400/year (for 5 years) to own a TEF ($1800 principle and $600 interest). Most seriously in audio can justify this cost. Proof of this is the list of 30 TEF owners:

Ken Forsythe
Eastern Acoustic Works
59 Fountain St.
Framingham, MA 01701
215-576-3000

Tim Healy
U.S. Army ARDEC
SMCAR - FSFORM Bldg. 95N
Picattinny Arsenal, NJ 07806
201-724-6274

Richard Feld
TEKCOM
1020 N. Delaware Ave.
Philadelphia, PA 19125
215-426-6700

Andy Anderson
Audio Tech
5600 Oakbrook Pk. #200
Norcross, GA 30093
404-448-3988

Bill Morrison
Acoustic Physics Lab
3877 Foxford Dr.
Doraville, GA 30340
404-934-9217

Bob Hagenbach
Hagenbach Labs
8419 Annwood Rd.
Largo, FL 34647
813-393-6876

Carl Cates
Cates Music Cener
305 W. Walnut St.
Johnson City, TN 37604
615-928-8821

Tom Quinn
Peavey Electronics Corp.
P.O. Box 2898
Meridan, MS 39301
601-493-5365

Jason Dunaway
Peavey Electronics
P.O. Box 2898
Meridan, MS 39301
601-493-5365

Adolph Santorine
CTI
Harbor & Jackson
Conneaut, OH 44030
216-593-1111

John Henley
Four Jay Industries
P.O. Box 14617
Dayton, OH 45414
513-890-6444

Gene Rozzos, Jr.
Amtech
7033 N. Calumet
Hammond, IN 46324
219-937-2248

Kees Bakker
K Squared Assoc.
595 Forest Ave., Suite 2A
Plymouth, MI 48170
313-453-8323

Cliff Henricksen
413 E. Front St.
Buchanan, MI 49107
616-695-7221

Al Osborn
Electronic Sound
691-39th St.
Des Moines, LA 50312
515-274-3546

Joe Mader
Audio Systems
P.O. Box 1174
Bismarck, ND 58501

Mr. Chris West
Naim Audio
1759 N. Swdgwick
Chicago, IL 60614
312-944-2217

Gayle Sanders
Martin Logan
2001 Delaware St.
Lawrence, KS 66044
913-749-1033

Tom Miller
Northeast Tech Comm. College
801 E. Benjamin
Norfolk, NE 67801
402-644-0506

Robert Rouquette
940 Moss St.
New Orleans, LA 70119
504-482-1383

David Bailey
Phase 4 Stereo & Elect
238 Northgate Mile Rd.
Idaho Falls, ID 83401
208-523-1234

W.D. Scott
New Mexico Electronics
Corner Angus & Corral
Corrales, NM 87048
505-898-1213

John Munroe
Anchor Audio Inc.
913 W. 223rd St.
Torrance, CA 90502
213-533-5984

Lawrence Livermore Labs
700 E. Ave.
Livermore, CA 94550

Peter Miller
Northern Telcom Canada Ltd.
3705 35th St. NW
Calgary, Alberta T14 6CZ
403-291-9000

David Joseph
Omnimedia Corp #1
9653 Cote De Liesse
Dorval Quebec H9P 1A3

Vandenberghe BV
Dehoog T8
5175 Ax Loon Op Zand
The Netherlands

Philippe Ranchin
Rue du Dr. Fourniols
95420 Magny En Vexin
France

Michael Pang
ACE International
15 Cheung Yue St.
Cheung Sha Wan
Kowloon, Hong Kong

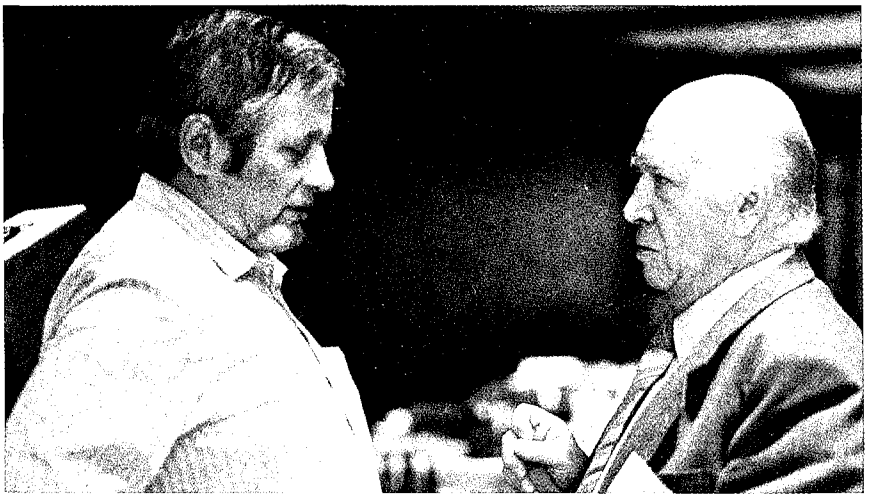
Hibino Electro Sound
5-10-2 Shirokane
Menato-Ku
Tokyo 108, Japan

## *Hoof in Mouth Department*

We recently listed a new TEF owner incorrectly as Mr. Walter Klein. The correct name is:

Mr. Walter Hummel
Klein and Hummel
Zeppelinstrass 12
D-7302 Ostfildren 4
WEST GERMANY

Mr. Hummel is the owner of the firm, Mr. Klein having left in 1982. They are the producers of a precision line of monitor loudspeakers. Our personal contact with Mr. Hummel during the Hamburg workshop was a privilege we greatly enjoyed. Our sincere apologies to him for failing to list him correctly.



Mr. Hummel is the man on the right talking to Hellmuth Kolbe at the Syn-Aud-Con/Heyser Workshop in Hamburg in 1985.

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# New M-200 Driver From Community

One of the real innovations of the past decade and one recognized by their peers as truly a valid insight is Community's advocacy of drivers designed for one decade only.

The M-4 (200 to 2,000Hz) and now the M-200 (400 to 4,000Hz) continues this approach. Three way systems are difficult, but with TEF analyzers it is possible to see the acoustic phase response of the system and evaluate the tradeoffs.

Community was the first loudspeaker manufacturer to obtain a TEF analyzer and the grass has not grown under their feet.

We have included a portion of their latest release on the M-200 to highlight its salient features. One of the most attractive features is its cost at $145 retail.

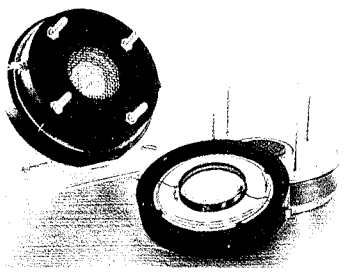
**From Community Light & Sound**

Noted for its high sensitivity, power handling capacity, and extremely low distortion, Community Light & Sound's M-200 midrange compression driver is ideally suited for applications ranging from 3-way enclosed loudspeakers to 1-way full-range voice systems.

Having proven itself to be a rugged performer in Community's RS Series of professional components, the M-200 is unique in that it utilizes a much larger throat exit area than other 2-inch midrange compression drivers. Like its larger predecessor, the M-4, the M-200 produces low-end power by means of long linear diaphragm travel as opposed to being equipped with a small throat and high compression ratio. The result of this unique configuration is that dynamic high-level output capabilities are increased, while distortion remains at a bare minimum.

Designed exclusively to cover the frequency range lying between 400 and 4,000Hz, the M-200 eliminates the need for crossover point in the crucial mid-frequency range, which allows you to create a true 3-way system rather than a 2-way system with a super-tweeter tacked on. Additionally, a 3-way system outfitted with an M-200 permits the low frequency drivers to be run only up to 400 or 500Hz, a factor which greatly helps to avoid the cone breakup and distortion that often occurs in the upper frequencies of low frequency transducers.

Internally, a large magnet structure produces high-flux density in a tall symmetrical gap, providing high motor force and long linear excursion. Constructed of molded aluminized Mylar, the M-200's internal diaphragm and suspension assembly are virtually immune to fatigue failure. The voice coil is edgewound from rectangular copper-clad aluminum wire on a Kapon former, and is suspended in ferro-fluid to insure optimum heat transfer.



Community Light & Sound's M200 compression loudspeaker.

# Syn-Aud-Con Schedule

Anaheim, CA
Holiday Inn - Anaheim
January 27-28, 1988

Seattle, WA
Red Lion - Bellevue
February 17-18, 1988

Orlando, FL
Hilton Inn - Int'l Drive
March 9-10, 1988

## Tentative Workshop Schedule

Master Loudspeaker Designers Workshop
March 17-19, 1988
Atlanta, GA
**Staff**
Dr. Eugene Patronis
Edward Long
Don Keele
Cliff Henricksen
The date, the staff and the place are still tentative, but it's a project we are working on. As soon as we have a committment from our staff we will see who among our preferred staff is available.

Advanced TEF Workshop
April, 1988
East Coast

**Staff**
Farrel Becker
Don Davis
Carolyn Davis

"Live" Sound Reinforcement

We're working on it!

## Tentative Seminar Schedule

New York
(Long Island)
April or May, 1988

Syracuse, NY
April or May, 1988

Toronto, Canada
April or May, 1988

**Lansing, MI Class**

# Circle Theatre Indianapolis

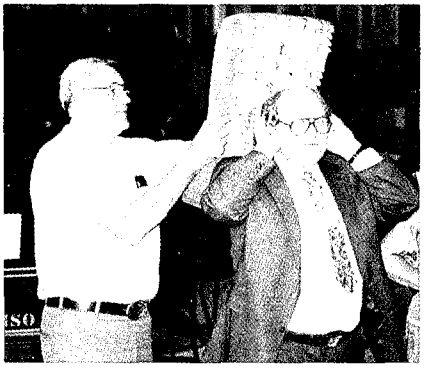
Indianapolis has a lot going for it now, including the Circle Theatre Concert Hall.

The conversion of the old Circle Theatre into a classic concert hall by Jaffee Acoustics is a real success story. Lest it be thought they merely redecorated an old unrecognized great hall, let us hasten to assure you that without the **major** structural changes designed by Chris Jaffee and staff, the results would have been a disaster.

We were privileged to be able to work in this hall during a full orchestra rehearsal and then to measure it with our TEF analyzer. We had the chance to "walk" all seats for orchestral, choir, and solo voices. We were particularly pleased to see the support this facility receives from the local area. We recall all too well when Sir Thomas Beecham turned to an audience at the Purdue Music Hall forty years ago and called them "barbarians" because they had applauded at a break in the music, thinking it was the end of the piece.

We were also pleased to get to know Chris Jaffee a bit and to witness how solidly he can handle the classic hall when allowed to do so. We appreciate all the more his qualifications for and courage in trying new experimental forms of halls when that is called for by the owners.

If we were conducting a concert hall tour of the midwest, the Circle Theatre would be our choice for the example of an excellent concert hall.



Chris Jaffe and Don using Sonex during a listening test

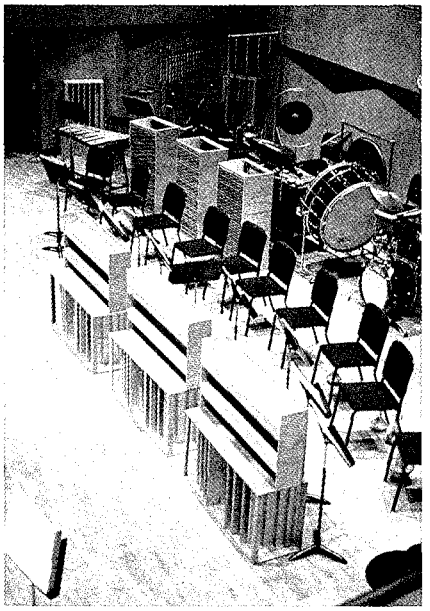
### QRD Diffusors

We were very pleased to participate in an experiment using Peter D'Antonio's QRD's in the midst of the orchestra (to try to control excessive brass levels as perceived by the woodwind and string section) and on the back wall of the orchestra shell. Much to our delight, this unique opportunity to use a full live orchestra for A-B tests revealed that QRD's in the orchestra itself and in the shell provides an audibly improved string sound in the audience.

We are firm believers that diffusion in a concert hall is a vital but easily misused tool. You can't have great sound without it but too much can lower levels excessively.

### A Proposed Concert Hall Tour

I would like to propose a concert hall tour with the same orchestra and the same music at the Purdue Music Hall (large 1,500,000 $ft^3$) in West Lafayette, IN, the Circle Theatre in Indianapolis, and the Indiana University concert hall in Bloomington, IN. These are all a convenient bus ride from Indianapolis as a central location. The "Earucation" would be marvelous.



Diffusors at the back of the shell

View of the Diffusors separating the brass and woodwinds.

Al Tucker, sound man at the Circle Theatre, with his wife and baby who dropped by during the measurements. Joe Quinn, from the technical staff took a break from moving QRDs around to hold the baby.

*Photos by Wade Bray.*

# New Motion Picture Loudspeaker System

A new motion picture theatre loudspeaker system has recently been put into service which we feel will become the standard for the modern multi-plex theatre. Its use solves two problems typical of today's smaller theatres.

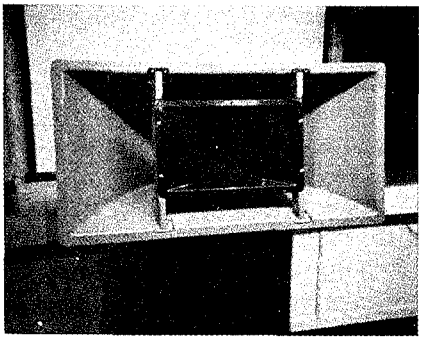
1. Light levels are too low on the screen
2. Sound has to come through the screen

The new system designed for American Multi-Cinema by Dr. Patronis using EV components and installed in an AMC theatre in Kansas City, MO., allows speaker mounting above the screen and utilizes a solid curved screen for maximum possible light level.

We had an opportunity to see the new movie loudspeaker system in Kansas City at the AMC theatre in Metro North Mall. The theatres were truly beautiful with wide plush seating. It was not an economy theatre complex. Larry Jacobson of AMC suggested we arrive as each of the six houses were to start running product (about fifteen minutes apart). This gave us the opportunity to go from theatre to theatre listening to the same program material (the previews of the coming attractions). There was no question that the AMC/Patronis speaker system was superior. The screen light was brighter, the voices were clear and very articulate. How many times have you been in a movie theatre when you had to turn to the person next to you and ask, "What did he say?".

Bill Newton of the US Air Force Motion Picture Department in Dallas heard about the system and also that we would be hearing it in Kansas City. He called and asked us to particularly move about the theatre and listen for image shifts and to determine if at any location one could detect that sound was coming from the top of the screen. We moved all over the theatre from extreme left front to back rear and it was not possible to detect the above screen location.

We attended "Stake Out". Having seen and heard the system we can say it is our idea of how a speaker system for a modern theatre should be handled. The ability to use a curved solid screen with AMC/Patronis system made major differences in both sight and sound as compared to the companion theatres in the same building. A very unique use of the best of the constant directivity possibilities along with a carefully tuned network and EV low frequency systems, leaves the viewer saying, "Oh boy, when can I hear it again?". If it goes the way we think it will, it won't be long before you hear the new AMC/Patronis sound systems at your local AMC theatre.



# Master Class for Loudspeaker Designers

Ed Long, Cliff Henricksen, Don Keele, and Dr. Patronis are acknowledged designers of trend setting loudspeaker systems. Here's your chance to participate with them in a workshop on selecting drivers, designing enclosures, and the mating of all components with engineered networks designed in the spotlight of modern acoustic analysis.

Some of the subjects to be-covered include:

•What to measure and how to measure it when selecting low and high frequency drivers

•How to interpret loudspeaker phase measurements

•Choosing enclosure types for music, speech, and special effects

•Crossover network design including synthesized networks, polarity reversals on drivers (yes or no) and other practical matters not discussed in textbooks

•Selecting compatible polar responses at crossover

•Horn loading vs polar inversions

•Nearfield monitoring vs. farfield monitoring

This and much more detailed and (open to class) questions, demonstrations, and discussions

**Tentative Date and Location**

Tentatively we have selected March 17-19, 1988 for the workshop. Tentatively we have selected Atlanta for the location and we have a tentative commitment from the above staff.

As soon as we have a firm commitment from at least three of the four members we will start work firming everything up.

If you have a definite interest in the workshop, please let us know. Those that we hear from will be notified first. We have already heard from enough people that we are encouraged to go ahead with the detailed planning.

# Pataxial PA 70 Installed

Baker Audio in Norcross, GA installed eight of the J.W. Davis Pataxial PA 70's in Hyatt Ravinia Entertainment Lounge in the Atlanta Area. Phil Cartier sent us pictures of the installation. We'd like to see more sound contractors using the Dr. Patronis designed Pataxials.

## TSI and AUTOCAD

There is a trend happening in the audio marketplace that we do feel is important: a significant number of sound contractors are setting up AutoCAD systems to handle specification writing and shop drawings.

Advanced contractors such as Mario Maltese at TSI, Mineola, NY use AutoCAD for generating block diagrams, and for control panel drawings. Mario says that he can foresee the time when bid documents are a floppy disc.

Mario has been promoting the use of AutoCAD at manufacturer's national sales clinics and everywhere else he can because, "My motivation for promoting it is the obvious advantage of everyone speaking the same language."

We find all of this fascinating. Left to their own devices really potent contractors join together to share advanced ideas. David Moore at ElectroCom in Seattle, Bob Ancha in Chicago, Duke Mewborn of Baker Audio in Atlanta, Algie Broome of Sound & Communications in Jackson, MS are but a few examples of a new breed of super capable contractors. TSI has ten AutoCAD workstations!

Now, if we can only get manufacturers to sense that what's needed is not a different sound system design program from each vendor but an *industry* program supported by the vendors.

TSI

393 Jericho Turnpike Mineola NY 11501 (516) 294-5390

July 24, 1987

Mr. Jeffrey J. Loether
1214 Autre Court
Rockville, MD 20851

Dear Jeff:

It was good to see you mentioned in the last SYN-AUD-CON NEWSLETTER. We spoke briefly at a Syn-Aud-Con Workshop a few years ago. I felt I must write you concerning your comments on AutoCAD.

TSI has had AutoCAD for over three years, and has been keeping up with the latest revisions as they come along. We now have over ten work stations at our facility. We have also developed our own custom menus for generating block diagrams, and for control panel drawings.

For years, I have actively promoted AutoCAD at manufacturers' national sales clinics where I had the opportunity to speak to sound contractors. I found it interesting to see more and more contractors loading up on AutoCAD as the years go by. My motivation for promoting it is the obvious advantage of "everyone speaking the same language."

An ideal situation would have the Architect, system Designer (and other consultants for that matter) and the Systems House on AutoCAD. Bid documents would amount to a simple diskette that would include the AutoCAD drawing files, along with floor plan outlines so that the Systems House can prepare specifications for the Electrical Contractor. It would also include bid specifications in WordStar (only because of its universality). This would result in savings to the end user by eliminating the need for the Designer to recopy plans from the Architect, and the Systems House retracing plans from the Designer. It goes without saying that the finished product would be quite superior. I have attached some sample drawings we have prepared for past jobs.

We are presently experimenting with this approach in a cooperative effort with one of our clients (Grey Advertising) and their Architect. Our experience in AutoCAD has given us the leadership role. I will let you know how it comes out.

In summary, it did my heart good to see you promoting the package.

Very truly yours,

TSI

Mario J. Maltese
President

MJM/jm

copy to: Mr. Don Davis

# An Elegant Study by Jay Mitchell

**Jay Mitchell, a graduate of Georgia Tech and Dr. Patronis, now works at Frazier (located in Arkansas after having been purchased by Earl Love of Soundcraft).**

Jay sent us measurements of his new CAT-40 loudspeaker system. I asked him about the reflection near the direct sound shown in Fig. 1. Jay did an elegant study, which earns him the right to be called a Dr. Patronis student.

Fig. 1 is a full range ETC. Fig. 2 is the EFC for a time window that includes all the energy shown on the ETC. Fig. 3 is the ETC of two of the same horns out of synchronization by the same amount as in Fig. 1 *but now sharing the same frequency range.*

Quoting briefly from Jay's report (we have produced four of the eighteen plots he sent us):

Plots 1-3 are full range ETCs of a production CAT 40. *(Editor's note: Plot #1 is Figure #1 here.)* The cursor has been displayed to show the first three major arrivals. Note in particular the third spike (10624msec). The next plot, number 4, shows the woofer output alone with the cursor on the woofer's first signal arrival (10656msec). Comparison of these two plots with plot number 8 *(Editor's note: See Figure 2)* reveals the spike at 10624msec. In the combination of the woofer's first arrival with the third discrete arrival from the high frequency horn, indicating a misalignment in the region of crossover of about 32msec or 0.433 inches ... It is evident that the response of the high frequency horn contains small artifacts, but these deviations are well within the specified performance window.

Plots 9-12 demonstrate the results of actual broadband misalignment. *(Editor's note: See Figures 3&4)* If, for example, the first two horn arrivals (separated by 48msec) were indeed broadband and similar in level, we would expect to see a major cancellation around 10kHz. Examination of plots 9 and 10 will confirm this expectation. Likewise, if the first and third arrivals were broadband in nature, we would expect to see a notch at 2600Hz and of multiples thereof. Plots 11 and 12 illustrate this situation. *(Editor's note: See Figure 5&6)* There are, of course, other possible combinations of arrival times, but it should be clear that the arrivals represented in the CAT 40 ETC have dissimilar spectral content.

As we have said in the past, and Jay so elegantly illustrates here, misynchronization between L.F. and H.F. elements do not cause major catastrophes so long as the crossover network designer has his wits about him (exception: critical monitoring systems for control rooms).

Jay's analysis was much more detailed than this but we wanted to share the care with which he presented these insights.

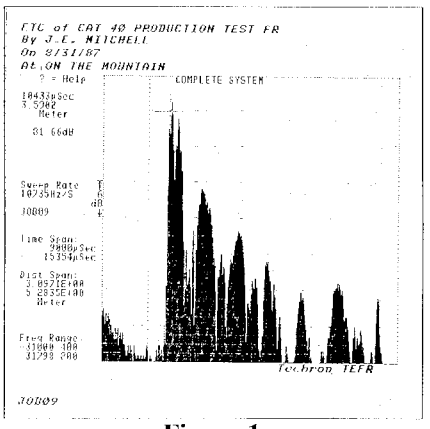



**Figure 1**

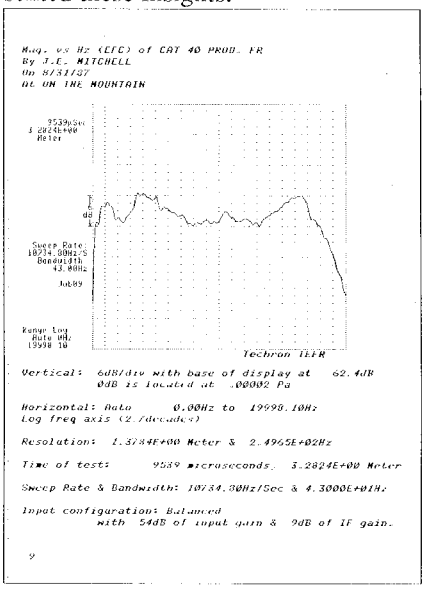



**Figure 2**

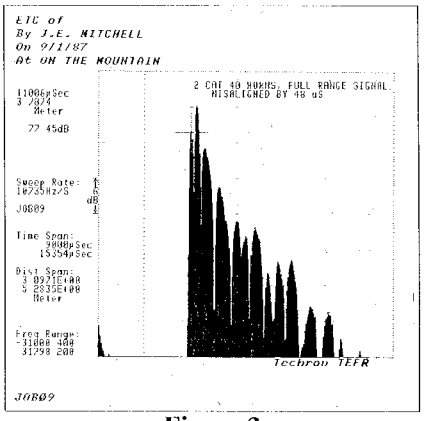



**Figure 3**

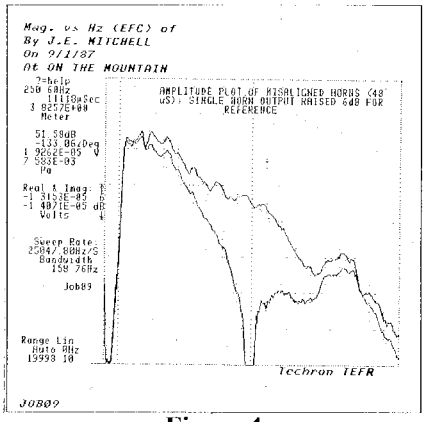



**Figure 4**

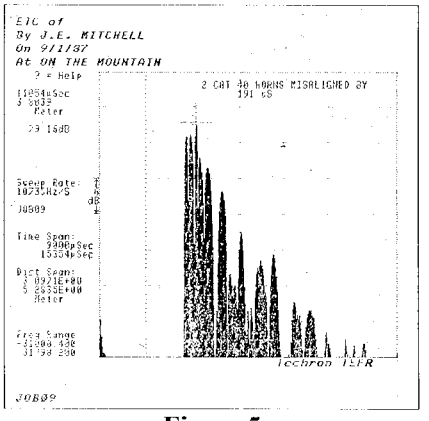



**Figure 5**

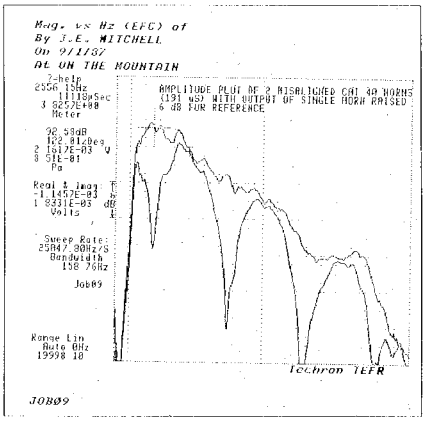



**Figure 6**

# Interpreting the Rasti Number

We were very interested to read the following comments on RASTI from an experienced European observer, D.I. Norman of Electro-Voice/Europe.

It seems that RASTI is in trouble because STI itself has a fundamental problem with incorrect frequency weighting. Through all of this turmoil, Peutz's %ALcons remains a constant — a predictable, measurable, proven standard that has now served accurately for twenty years. It would seem that %ALcons will survive this assault also.

**Interpreting the RASTI number**

I found the article "Invasion of the RASTI Meters" by Ed Simon in the Nov. 15, 1986 issue very interesting, but I would like to make some comments about it.

1. RASTI does not, as hinted in the article, replace ALcons as RASTI can only be measured, whereas ALcons can be calculated for a room *before* a loudspeaker system is installed. After the installation the ALcons can be confirmed with measurements. As there is a mathematical relationship between ALcons and RASTI one can calculate ALcons before the installation and then check the results documented in the Syn-Aud-Con Newsletter and I can confirm it with my experience. It is, however, important that one use the latest ALcons formulas from VMA Peutz as published in various AES preprints in order to get consistent results.

2. For the simpler ALcons formula to be true, Don Davis says in his book, *Sound System Engineering*, that the $RT_{60}$ must be longer than 1.6 seconds. Mr. Simon has chosen two rooms with a $RT_{60}$ of less than 1.6 seconds and it is not surprising that he gets the observed results.

3. It seems strange that he says he used a system with a 'Q' of 35. RASTI measures at 500Hz and 2kHz and therefore to get results consistent with simple theory (i.e. ALcons is proportional to distance squared) the system would have to have a Q of 35 at 500Hz and at 2kHz. I suspect that the quoted Q is only for 2kHz as there are very few systems that achieve a Q of 35 at 500Hz. The results will therefore not fit simple theory.

I find that the RASTI is a a good device, but it still needs interpreting and the simple RASTI number does not necessarily say that the system is good. For example, other factors in the system, such a frequency response and distortion, may be bad although the RASTI reading is good. Thus in the extreme case the system with the better RASTI may sound worse.

Another problem is that the RASTI scale is exponential whereas the ALcons scale corresponds roughly to our hearing. This means an improvement in RASTI values of say 0.1 will make very little difference at the upper end of the scale (say from 0.8 to 0.9), but there will be a huge difference between RASTI 0.30 and 0.40.

Although RASTI is a useful measurement and the single number is a good selling tool for systems, it should not be considered as an answer to all our problems. The RASTI value will be difficult for lay people to interpret.

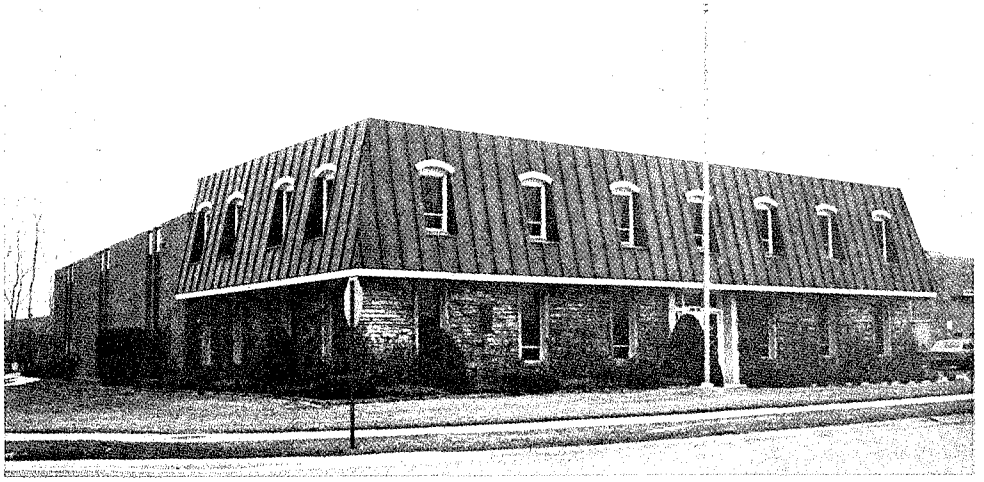
*D.I. Norman*
*Electro-Voice*
*Berne, Switzerland*
*Reprinted with permission from Sound & Video Contractor, May 15, 1987 edition.*

# Ancha Electronics

Ancha Electronics is well known for the high quality large jobs they help specify as well as install. We recently had the opportunity to visit their facility in Elk Grove Village (just west of Chicago). Ancha Electronics has multiple CAD stations, a very talented engineering capability, an unbelievable inventory, and large installations under construction.

We knew Bob Ancha when he started his firm in the 60's. One of our genuine pleasures is to be able to witness such well earned growth.

Bob Ancha recently purchased his own building (see picture). Just in the past year we have heard that several of our contractor friends have recently purchased large new facilities: Algie Broome of Sound & Communications in Jackson, MS; Ron Steinberg of RentCom in Shiller Park, IL; Deward Timothy of Poll Sound in Salt Lake City. These new facilities rival the size and value of many of the manufacturers from whom they buy.



# Microphone Sensitivities and EIA Ratings

# Microphone Sensitivities and EIA Ratings

## by Ken Wahrenbrock

A recent magazine article in *MIX* Magazine, written by people who should know better, stated that "basically, microphone sensitivity is a measurement of the efficiency of the microphone." We award them a BS degree.

To find the "efficiency" of a microphone requires a knowledge of the microphone's directivity. Sensitivity figures do not include this information. Microphone sensitivity values are the comparison of an acoustic input source resonance causing an electrical voltage amplitude. Both the sound pressure and the voltage amplitude can be converted into decibel levels using appropriate equations and references.

As an example, let's first assume an *acoustic* test signal that is a free field sound pressure level of 94dB. That means that at that point, since it is a free field value, the sound intensity is:

$$I = 10^{-12}\ W/m^2 \times 10^{(94/10)} = 2.51 \times 10^{-3}\ watts/m^2$$

Thus acoustic power is then converted (transduced) into an electrical power level by the microphone of 57dBm (that is, electrical power level out for the given acoustic power level in). This electrical level is a power of:

$$W_e = 0.001 \times 10\ (dBm + 6/10)$$
$$= 0.001 \times 10\ (-57 + 6/10) = 7.94 \times 10^{-9}\ watts$$

If we treat the acoustic input power as 100%, then:

$$2.51 \times 10^{-3}\ W/n^2/100\% = 7.94 \times 10^{-9}\ watts/X\%$$

$$X = 100 \times 7.94 \times 10^{-9}\ watts/2.51 \times 10^{-3}\ W/m^2$$
$$= 0.000316\%\ efficient$$

Now, this would **only** be true if the microphone were *omni*directional. If it were a Q = 3 (ie. a cardiod) then 10logQ would first have to be subtracted from the sensitivity level -57-10log 3 = 6.18 dBm for an efficiency of 1/3 the omni rating. You would also be highly dependent on knowledge of which axis the measurement had been taken.

With all the above in mind, Ken Wahrenbrock's sensitivity data reveals the very real directional gains available from some of his special microphones utilizing PZM techniques in conjunction with intersecting boundaries.

Using the technique presented in the second edition of *Sound System Engineering* on pages 280-283, the following ratings were measured for PZM's. The standard does not clearly indicate what to do about boundaries, so the measurements were made with the capsule diaphragm at the 94 dB-SPL mark. The Standards Committee may have some more work to do concerning measurements using boundaries.

There is a wide difference in sensitivities. The implications of these for signal-to-noise in the capsule and "reach" are quite interesting. It would also be useful to compare measurements to other boundary microphones and free field microphones which were not available to me.

Note the confirmation in many of the multiboundary PZMs of the increased sensitivity approaching the additional 6dB for each boundary. There is some variation in capsule sensitivity which, if closer tolerances could be achieved, would most likely more nearly approximate the theoretical.

It will be interesting to have someone with the physical understanding of waves to explain why the 75° and 60° are even higher. What this seems to point out is that the additional forward gain adds much to the usability of the mike and the plus of very large rear rejection makes them even more important to understand and use.

These measurements stimulate several new versions of PZMs in my thinking. How about you?

## Mr. Wong Is Mr. Wrong

Readers of the Newsletters will recall a recent article entitled Is Mr. Wong Mr. Wrong? Martin Greenspan of the National Bureau of Standards in a Letter to the Editor of JASA says yes! For those interested in further reading about it, see JASA 82(1) July 1987 pages 370-374.

We'll continue to use 331.44 m/s and will not fight with those who prefer the Wong value 331.29 m/s.

## PZM Microphone Sensitivities and EIA Ratings

| Microphone | mv | Sensitivity | EIA Rating |
|---|---|---|---|
| EV 635 | 1.2 | -55 | -149 |
| EV RE-50 | 1.0 | -55 | -149 |
| EV 660 | .6 | -56 | -150 |
| Shure SM-57 | 1.3 | -57 | -151 |
| SM-58 | 1.3 | -57 | -151 |
| AKG D-310 (ca 150 ohms?) | 1.2 | -56 | -150 |
| D-321 | 1.3 | -55.7 | -149.7 |
| D-330 | 1.0 | -57.8 | -151.8 |
| PRESSURE ZONE MICROPHONES: | | | |
| Crown handheld | 1.6 | -48 | -142 |
| WSA handheld 1 1/2" | 1.4 | -49.7 | -143.7 |
| WSA handheld 1 1/2" w filter | 1.5 | -48.8 | -142.8 |
| WSA handheld 3" cove | 3.5 | -41.5 | -135.5 |
| WSA handheld 4" flat plate | 3.2 | -42.2 | -136.2 |
| WSA Pyramids | | | |
| 3 sided 15" | 5.2 | -38 | -132 |
| 3 sided 18" | 10.0 | -32.3 | -126.3 |
| 3 sided 18" 60 degree | 11.0 | -31.5 | -125.5 |
| 3 sided 15" 75 degree | 7.2 | -35.4 | -129.4 |
| in midair | 9.0 | -33.2 | -127.2 |
| 4 sided 18" 110 degree | 6.5 | -36 | -140 |
| in midair | 6.8 | -35.7 | -149.7 |
| WSA 2 1/2s | | | |
| 24" W x 36" H Bass | 3.8 | -40.8 | -134.8 |
| 24" W x 12" H Stage | 5.8 | -37 | -131 |
| 18" W x 18" H Celli | 3.2 | -42.1 | -136.1 |
| 48" W x 18" H Brass | 3.0 | -42.8 | -136.8 |
| 36" W x 8" H Tapered Podium | 3.1 | -42.2 | -136.2 |
| 12" W x 12" H Stage | 2.8 | -43.4 | -137.4 |
| WSA 3: | | | |
| 12" x 12" | 5.2 | -38.1 | -132.1 |
| WSA 60 Degree Folded Plates | | | |
| 1560 x 6" | 5.0 | -38.3 | -132.3 |
| 1860 x 6" | 4.2 | -40.0 | -134 |
| 2260 x 6" | 4.0 | -40.3 | -134.3 |
| 3660 x 12" | 4.8 | -39.0 | -133.0 |
| verticle | 7.1 | -35.4 | -129.4 |
| 1260 x 6" with V inserts | | | |
| WSA Dishes and Cones | | | |
| 12" x 3 1/2" | 5.0 | -38.3 | -132.3 |
| 28" x 7" | 2.8 | -43.4 | -137.4 |
| Cone 60 degree x 12" | 50.0 | -18.3 | -112.3 |
| Plate PZMs | | | |
| Crown 6S | | | |
| 90 degree | 5.0 | -38.3 | -132.3 |
| Flat on table | 1.5 | -48.8 | -142.8 |
| Crown 31S | | | |
| 90 degree | 2.4 | -45.6 | -139.6 |
| Flat on table | 1.8 | -47.2 | -141.2 |
| Crown 30GP | | | |
| 90 degree | 1.8 | -47.2 | -141.2 |
| Flat on table | 1.7 | -47.8 | -141.8 |
| WSA 130-B | | | |
| Flat on table | 1.6 | -48.3 | -142.3 |
| CROWN PCC-160 | 15.0 | -28.8 | -124.8 |

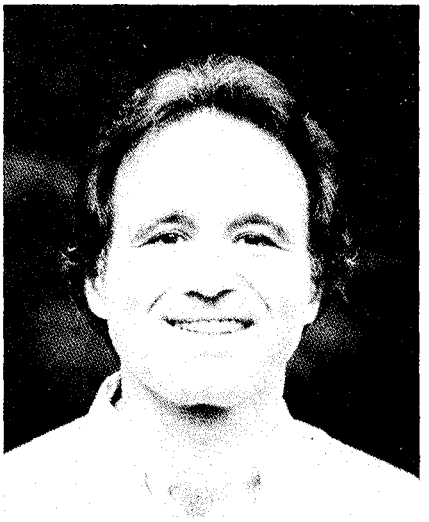
# *Speculative Reflections from Dr. Diffusor*

Peter D'Antonio and John Konnert have taken the TEF Torch and climbed to new heights on Mount Heyser. Their paper, *Complex Time Response Measurements Using Time Delay Spectrometry* is "dedicated to the late Richard C. Heyser".

It's a paper that would have truly pleased Dick as it introduces software with full mathematical proof of something he shared with all of us at his last Syn-Aud-Con appearance: the Syn-Aud-Con Intelligibility Workshop. Dick showed us actual TEF measurements of the phase of the ETC but was not ready to share exactly how he had accomplished it (it's not as straightforward as it might appear).

The gospel of Peter and John have added materially to the literature of the First Church of the Chirp. A new term enters TEF technology "functional form phase shift FFPS". In this paper they present a generalized FFPS which can be used to correct any experimental setup using both time and frequency offsets. *This will allow easy post processing of new or previously collected data.*

The measurement of phase in the time domain, they state, is very sensitive to any uncompensated delays of the low pass filter LPF in the TEF analyzer since they affect the origin of the IF output. The IF output can be calibrated with known delays for various values of experimental bandwidths. Any offsets due to the LPF can be removed with a phase shift on the transformed data similar to the FFPS. (The above quoted from their conclusion in the manuscript.)



**Dr. Diffusor (Peter D'Antonio)**

# *Articulation vs. Intelligibility*

Dr. Diffusor has programmed the TEF to do impulse squared modulation transfer functions to produce RASTI measurements. The measurements shown here are of a church before and after the installation of diffusors to control a severe flutter echo condition.

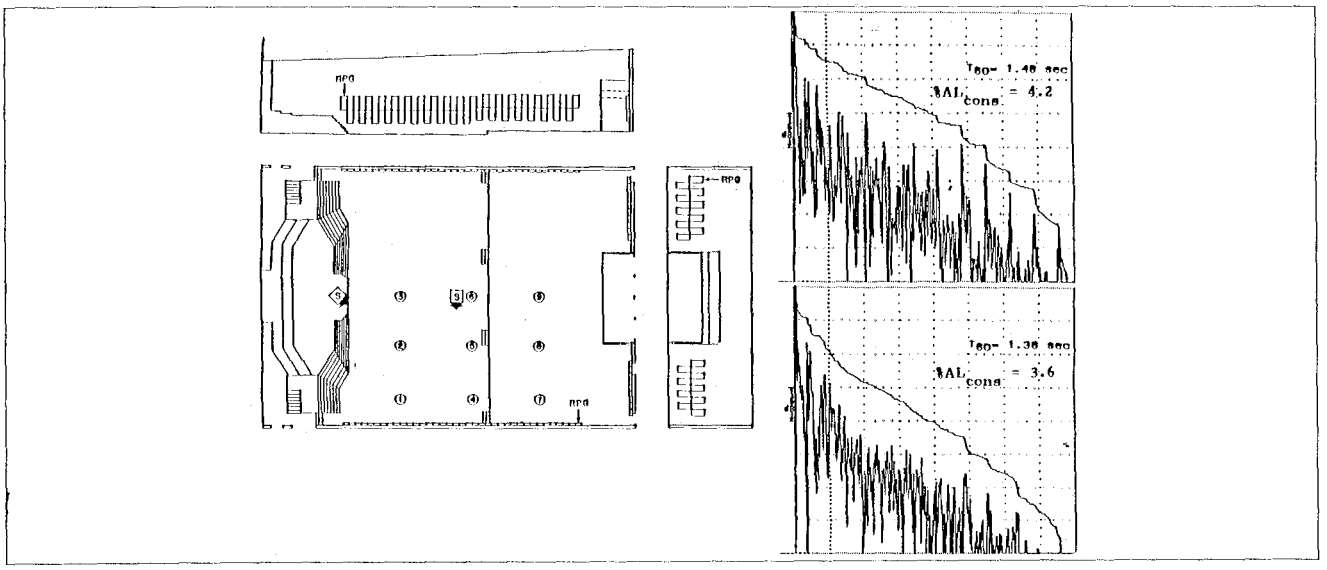
The display form is straightforward, easy to use and presents a good overall picture of what transpired.

What interested Peter D'Antonio was that while the quality change was appreciable, the intelligibility change was not. We also have had this experience and it points up the fact that what can sound bad is not necessarily unintelligible (aircraft radios are intelligible but sound terrible).

John Bareham of B&K sent us a copy of the American Standards Association "American standard method for measurement of Monosyllabic Word Intelligibility" S3.2-1960. Page 6 has the following footnote:

*"The word 'intelligibility' is used when units of speech material are complete and meaningful words, phrases, or sentences. The word 'articulation' is used when the units of speech material are meaningless syllables or fragments."*

All of our attempts at measuring how humans hear touch on how mankind uses languages as the basis of intellect. How humans perceive sound is not a trivial subject.



# Polar Time Plots

Farrel Becker produced the first polar time plots PTP on the TEF analyzer. These plots reveal the direction each energy return came from at a given time. The distance from the center of the plot (the cross) to the energy return (small crosses) is the time or distance the sound travelled. The vector from the center to the energy point yields the direction. The markings around the outer edges of the plot are FD (forward), RT (right), RR (rear), and LT (left).

This measurement is post processed from four normal ETC's made by facing a high quality cardioid microphone in the four cardinal directions indicated (up/down as well if those directions are of interest).

Figure 1a is a classic. It is the directional plot of the energy from two parallel walls causing a flutter echo. Figure 1b is the relevant ETC from which the data was processed. Figure 2a is a more complex case taken from ETC (Fig. 2b) made in a small concert hall having rear wall difficulties.

We have drawn a line across the ETC in Figure 1a to illustrate how the "initial" and "final" value below maximum are typically chosen. The plots are normally made front, right, rear, and left as sequential ETC's.

Many psychoacoustic effects are not directionally detectable with the unaided ear yet can cause remarkable imagery effects that would absolutely seem to be coming from another specific direction whereas measurement reveals that the real directionality isn't that being perceived. LEDR tapes are as good an illustration of this as can be found. (Tech Topic 12N8.)

Farrel's remarkably useful tool allows for level, directional, distance and time discrimination, and frequency discrimination as well when frequency ranges for the sweep are chosen. That's a lot of information out of four simple sweeps.

At the recent ASA conventions in Anaheim and Indianapolis, it was evident that a majority of the workers in room acoustics are still mucking about with impulse, FFT and even dual channel 1/3-octave measurements, all in a single port mode. The experienced workers of the past are literally dropping the ball. It's a rare opportunity when beginners in a field can easily and significantly outmeasure experienced workers. The best results are obtained when a skilled TEF user combines with an open minded experienced acoustician to explore if what they think they know is really so in the light of TEF analyzers. Polar time plots, PTP, is a bright sun in a hitherto dark room.

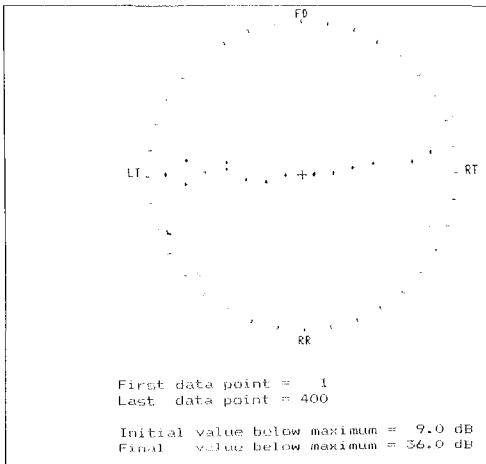



**Figure 1a**

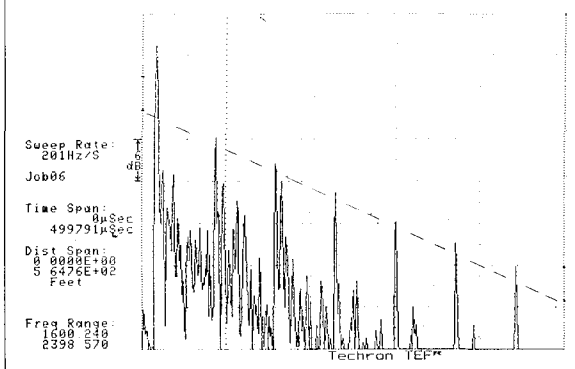



**Figure 1b**

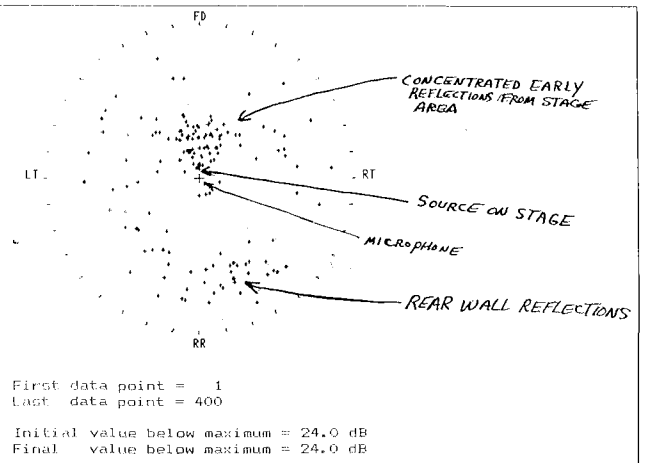



**Figure 2a**

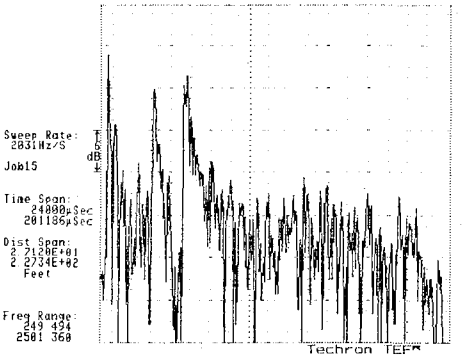



**Figure 2b**

# *Feedback from Farrel Becker*

Syn-Aud-Con Newsletter **are** read. The following from Farrel Becker surely illustrates how one idea generates another like stones rolling in the surf until each idea is polished to perfection.

**Omnidirectional Low Frequencies**

Your discussion of the omni-directional nature of low frequencies and the resulting need for equalization to prevent feedback (Newsletter Vol. 13, No. 4, pg. 10) brought to mind a technique that I have been pushing for a few years now. I'm not sure how or when I came up with this, but I think your suggestion of similar setup for recording studio control rooms (Newsletter Vol. 7, No. 3, pg. 7) provided the idea. It's a cross between the monitoring setup and an in-line distributed array (see Tech Topic Vol. 4, No. 3). The benefit here is improved low frequency coverage.

Usually a bass cabinet will be aimed so that is provides good coverage at the upper end of its frequency range. However, at the low end of its range it is omni-directional. Figure 1 shows a near throw horn and a bass cabinet both aimed at the same seat, indicated as the on axis position. If the drive levels to the two units are adjusted such that both units provide the same level of direct sound on axis, then, assuming the off axis position under the loudspeakers is at the 20 degree off axis point and twice as close as the on axis point, the off axis position will receive the same high frequency level as on axis but 6 dB more low frequency level. The polar pattern of the high frequency horn compensates for the increased level due to inverse square law. However, the bass cabinet is omni-directional at the lower frequencies and does not compensate. At an off axis position that is twice as far as the on axis, the lower frequencies are 6 dB down (we will assume that a far throw high frequency horn provides even high frequency coverage). So we go from +6 dB at the front of the room to 0 dB in the middle and -6 dB at the rear for a 12 dB spread.

Now, if we use two bass cabinets, as shown in Figure 2, and set the drive level to LF1 so that the high and low frequencies are at the same level below the loudspeakers, the low frequencies will be 6 dB down at the on axis point. We not set the drive level for LF2 to provide 3 dB too much level at the on axis point. This results in the level at the front of the room being at a relative 0 dB with +3 dB in the middle and -3 dB at the rear for a spread of only 6 dB. The gain before feedback has been increased and, although it is still not even, the low frequency coverage is improved.

The far throw horn can be located in the main array with the near throw, but it is often better to locate it with the second bass cabinet. In this case the in-line array is being used not because of intelligibility requirements, but to improve low frequency coverage and gain before feedback. This is especially useful for theatrical sound reinforcement where foot mics are used and Ds must be maximized.

**Peak Voltage**

I think the term "peak voltage" is mixed up somewhere in the history of National Electrical Code article 640-5. (Newsletter Vol. 14, No. 1, pg. 4) I had always assumed this to be so, but am unable to find a reference to it. Could it be mere coincidence that: 100 peak volts = 70.7 RMS volts? Also, notice that 100 volts - 3 dB = 70.7 volts.

Article 640-5 is confusing not matter which reference you use. Article 725 isn't much better. If anybody can cite the origin of 70.7 volt rating i would be very interested.

**Signal Alignment**

On aligning near and far throw horns (Newsletter Vol. 14, No. 1), it is my opinion that the mouths of the horns should not be lined up unless the horns are identical devices (i.e., the same make and model). If, for example, one horn is a 40 x 20 and the other is 90 x 40, then their horizontal apparent apexes should be lined up. If this is done, then every seat in the horizontally wide but vertically narrow overlap zone will have an approximately constant "apparent distance" to each of the loudspeakers. We then use the precision signal delay to make these distances equal. I have discussed this with Don Keele and he agrees.

As a side note, some people use the term "acoustic center" to describe the point from which the sound seems to radiate on an angular basic instead of time. Most

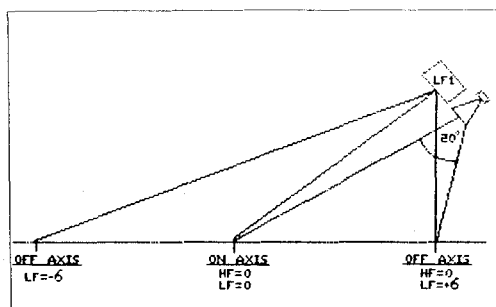



figure 1

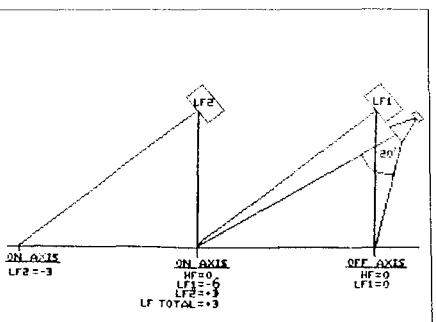
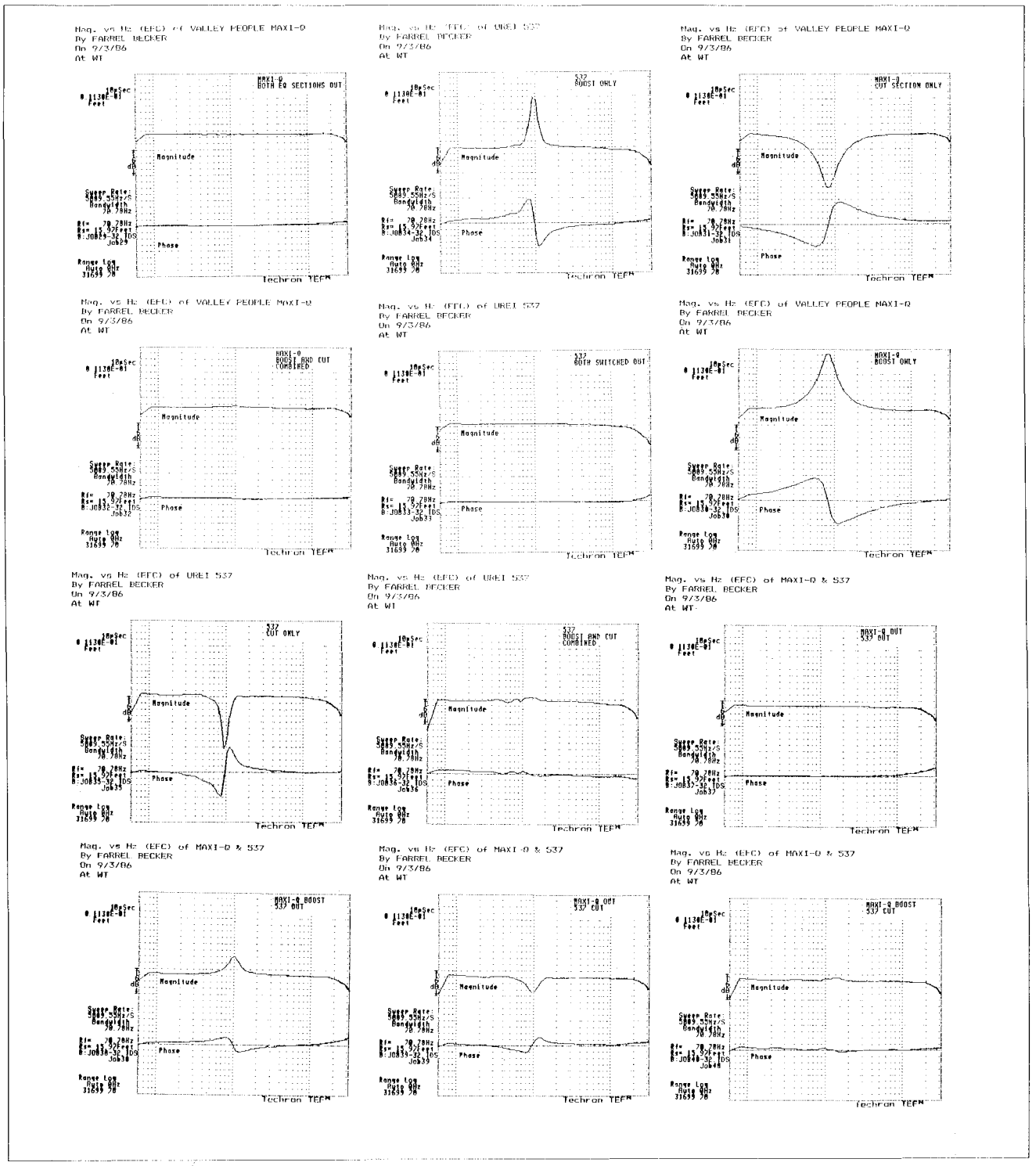



figure 2

people, I think, use it to describe the point of radiation in time (the folks at the Bureau of Standards use it this way in reference to microphones). We need an accepted term for the point of angular radiation. Mark Ureda used "apparent apex" in his 1978 paper and it seems like a good term to me. If, for some reason, we need a different term, I suggest "center of radiation".

**Equalizers**

Your "Equalizer Basics", (Newsletters Vol. 14, No. 1, pg. 12) brought to mind some measurements that I had made to show that the Meyer equalizer has no special magic. You might find them interesting. I measured a Valley People Maxi-Q parametric and a UREI 537 boost and cut 1/3 octave. The enclosed printout shows the responses for two of each equalizer in series with one set to boost and the other set to cut. (See measurements) There are printouts for both equalizers switched out, boost only, cut only and the resultant with both in. To top it off, the last set shows a Maxi-Q set to boost combined with a 537 set to cut. No magic here, just minimum phaseness.



# Quotes from *Studio Sound*

**Near Field Monitors**

Nearfield monitors solve some problems while at the same time creating other problems. The large wall mounted monitor signals reflect off the console mounted nearfield monitors, causing comb filters.

**Studio Sound**

Studio Sound, July 1987, had an article about Mack Emerman at Criteria Records in Miami. Emerman said, "For nearfield monitoring, Criteria has built a lift-table upon which the monitors are placed. Then by a flick of a switch the monitors can be lowered out of the listening field when not in use, avoiding unnecessary reflections."

**James Mallison on Digital**

James Mallison, well known producer of classical recordings, especially opera, said in the May 1987 issue of **Studio Sound**:

"The more I work in the new medium the more aware I become of how many deficiencies there really are. The process of getting from analogue into digital still leaves an awful lot to be desired in my view. The basic analogue design in commercial digital tape recorders is not even remotely up to scratch and the A/D and D/A converters leave a lot to be desired. I've worked with most of the machines: the Decca in-house system which I still think in many ways is the best, the Soundstream system which is now effectively dead; the JVC system and of course the various Sony ones.

The Sony system in one form or another is the one that most people are using and I think it leaves a lot to be desired. Quite honestly the best sounding Sony digital system is the F1 and its cost a fraction of the price of the 1610 or 1630. I would much rather listen to an F1. It's more musical. It's not perfect by any means but I don't like the 1630 at all. I have had all sorts of problems trying to achieve clarity in sound and texture ..... Quite a lot of recordings made on the 1610 and 1 have ended up with the F1 version on disc."

We measured one of the problems with the Sony 1610 over 5 years ago. See Figure 1 for the ringing from the sharp antialising filter. Could it be that the 1610 has not solved their ringing problem in over 5 years? We have measured the F1. It does not have this sharp antialising filter.

**Toyoshima**

Quoting from an article on Sam Toyoshima, studio designer from Japan, is quoted in the August 1987 issue of **Studio Sound**:

"Currently they (Sam Toyoshime and Hiroaki Suzuki) have developed a design for digital mastering suites that is capable of producing a linear acoustic response with a very high dynamic range. They are claiming a design capable of operating with 200 dB even though there are no monitoring systems with anything like that capability."

Maybe Mr. Toyoshima was misquoted and what he said was 120dB. But 120dB is not a new design criteria for either room or monitor, so perhaps Mr. Toyoshima did say 200dB. We personally heard a studio designer giving a paper at the AES convention in New York say that he knew of rooms with an RT time of 60. Maybe some studio designers have special dispensations from the God of audio.

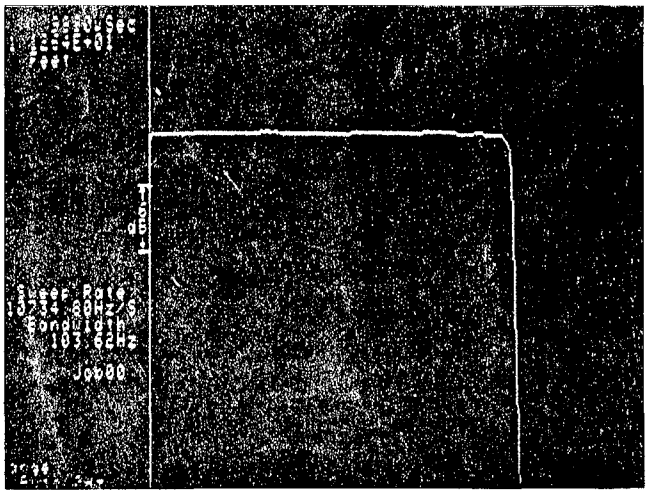


**Figure 1**

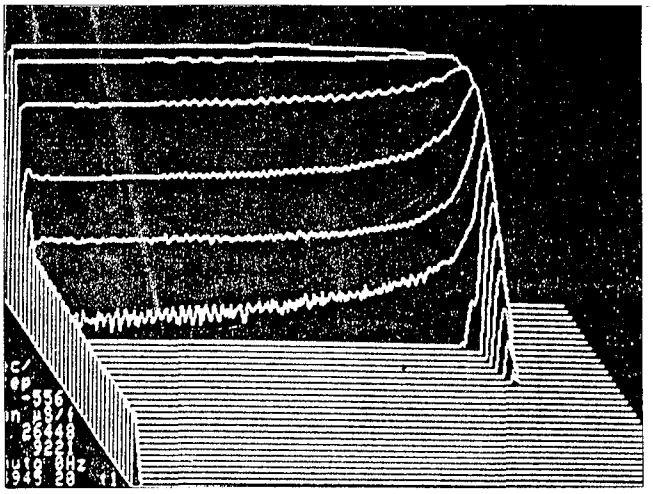


**Figure 2**

## Tape Recording Azimuth

Joe Mitchell took the time to sketch up the following excellent illustration of what tape recorder Azimuth Misalignment is and what it does.

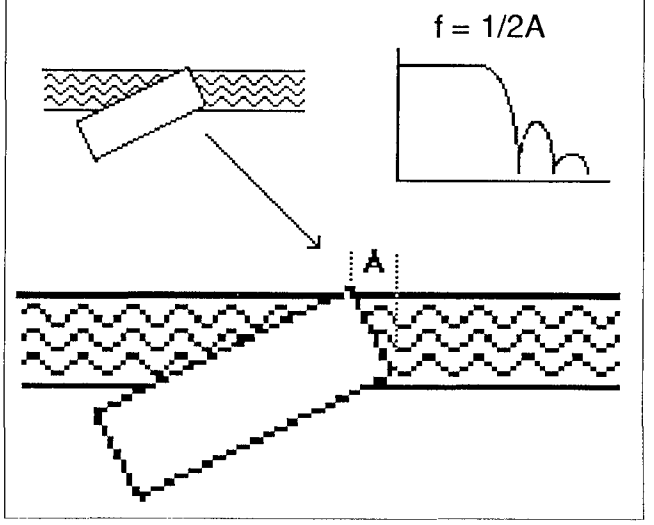
How small must *A* be to allow response to 20,000 Hz?

$$A = \frac{1}{2f} = \frac{1}{2 \times 20{,}000} = 0.000025$$

25 micro inches.

A most useful illustration

**Tape Recording Azimuth Misalignment**
**Mono Full-Track**




# Imaginary Numbers Are Real

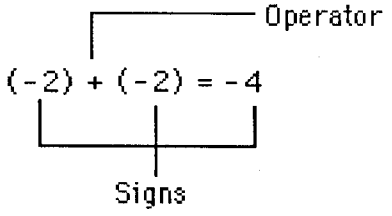
Farrel Becker sent us this cartoon recently just to remind us that the so called imaginary numbers are real even if what the poor soul in the illustration is holding is a "sign" not a number.

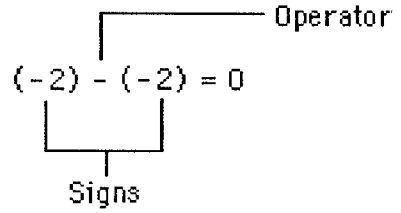
**Numbers**
0, 1, 2, 3, 4, .....

**Signs**
+, -, √T.....

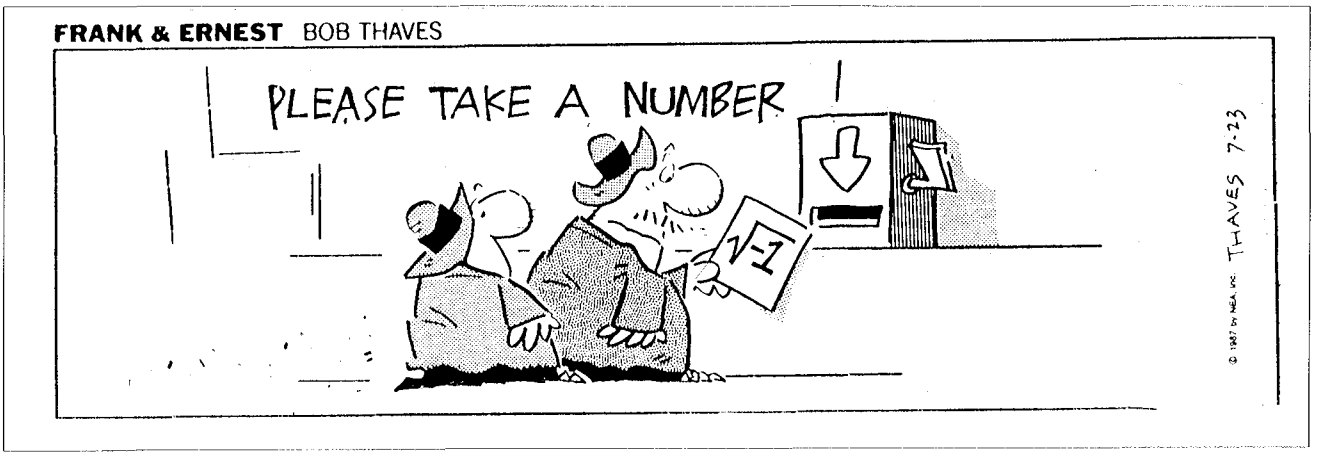
**Operators**
+, -, x, ÷, log, .....

People are often confused because +, and - are also used as operators (i.e. add, subtract, etc.)




Artists also usually show the moon's cusps pointing the wrong way and reveal in other ways that engineers and artists use different cerebral hemispheres.



# Gallons, Liters, $IN^3$ and $dM^3$

A lot of the current litter is in liters. What marvelously clear terms like cubic decimeter. Locomotives in France are said to be designed in millimeter. It is with joy that I realize that the US measurement flag is not too likely to be trampled underfoot in my lifetime. Using John Humble's phrase, *the usefulness of S.I. underwhelms me.*

1. Given:

A 636 $in^3$ engine displacement. Find the displacement in liters. (1 liter has a volume of 1 $dM^3$.)

$$636\ in^3\left[\left(\frac{2.54\ cm}{1\ in}\right)\cdot\left(\frac{1\ m}{100\ cm}\right)\cdot\left(\frac{1\ L}{0.1\ m}\right)\right]^3 = (636\ in^3) \times 0.016387064 = 10.42\ liters$$

*and*

$$8.2\ liters\left(\frac{1}{0.016387064}\right) = 8.2\ liters \times 61.02 = 500.39\ in^3$$

2. Given:

A five gallon gas can. Find the capacity in liters. (1 US gallon has a capacity of 231 $in^3$.)

$$10(231)\ in^3\left[\left(\frac{2.54\ cm}{1\ in}\right)\cdot\left(\frac{1\ m}{100\ cm}\right)\cdot\left(\frac{1\ L}{0.1\ m}\right)\right]^3 = (10(231)\ in^3) \times 0.016387064 = 37.69\ liters$$

*and*

$$1\ liter\left(\frac{1}{0.16387064}\right) = \frac{1\ liter \cdot 61.02}{231} = 0.264\ gal/liter\ \textit{or}\ \frac{1}{0.264} = 30785\ liter/gal$$

## Electrical Circuit Equations

Most electrical work having to do with sound systems other than level and impedance use three basic laws.

**Ohms Law E = I x R**
**Joules Law W = E x I**
(W = Joules per sec.)
**Kirchhoff's Law**

A. KCL Kirchhoff's Current Law

The algebraic sum of the currents at any junction of conductors is zero.

B. KVL Kirchhoff's Voltage Law

The algebraic sum of the EMF's and voltage drops around any closed circuits is zero.

When you have these laws and their variations in hand, understand logarithms and complex numbers as used to describe impedance and phase plots you than have all the mathematics you must have to handle any and every system problem that might occur. This is not to say that the integral and differential calculus is not fascinating instructive and useful. It's just that for even the most complex system work the basic will get you through.

*Helpful study:* SSE 2nd Ed. Page 45, Fig. 3-7 and Page 74, Fig. 4-11.

## Setting up TEF® Sweep Rates (S)

**ETC Sweep Rates**

$$T = \left[\frac{400}{F_2 - F_1}\right]$$

$$S = \left[\frac{40}{T^2}\right] \quad or \quad S = \left[\frac{20}{T^2}\right] \quad \text{Super Conservative}$$

$$H.F._{Meas.} = F_2 - S(I)$$

**EFC Sweep Rates**

$$T = \frac{B}{S} = \frac{1}{F_R}$$

$$S = \frac{B}{T} \qquad B = S(I)$$

$$H.F._{Meas.} = F_2 - S(I)$$

Because $B = S(I)$

$$H.F._{Meas.} = F_2 - B$$

# *Frequency, Wavelength & Period*

In audio, the solution to many systems problems lies in observing the interrelationships between an observed effect and a probable cause. Seeing a large reduction in reverberation time at a frequency whose wavelength matches the dimensions of the parallel ceiling with an attic above is a typical example. Listed here are some of the most basic relationships that are called on daily to deal with in audio.

Sometimes the very simple things are what get overlooked. I remember one very skilled R.F. engineer who kept looking at me in class as if I had just said some extraordinary thing and who finally challenged me about the wavelength I had just mentioned. It turned out that he simply had not considered how slowly sound travelled compared to R.F. Since, in audio, we deal with both electrical transmission lines and acoustic transmission paths, keeping track of their similarities and differences would seem worthwhile.

**The Four Basic Properties**

The velocity of the media $c$, the primitive period $t$, the wavelength $\lambda$, and the frequency $f$ are the four basic parameters. If we choose dimensions of feet per second (ft/sec) for $c$, seconds (sec) for $t$, feet (ft) for $\lambda$, and $f$ in Hertz (Hz) for frequency, then we can write the following set of relationships:

$$c = f\lambda = \lambda/t$$

$$t = 1/f = \lambda/c$$

$$\lambda = c/f = tc$$

$$f = 1/t = c/\lambda$$

Where $c$ = 1130 ft/sec for the acoustical path and $c$ = 982,080,000 ft/sec for the electrical path. For a signal of 1000 Hz we can write:

| Acoustical | Electrical |
|---|---|
| c = 1130 ft/sec | 982,080,000 ft/sec |
| t = 0.001 sec | 0.001 sec |
| $\lambda$ = 1.13 ft | 982,080 ft |
| f = 1000 Hz | 1000 Hz |

From this it can be seen that a long electrical line would be on the order of 186 miles for one wavelength at 1000 Hz, whereas one wavelength acoustically would be 0.0002 miles.

We know that at microwave frequencies the wavelengths electrically are similar in size to acoustic wavelengths. What microwave frequency would be the wavelength equivalent of 1000 Hz acoustically?

$f = c/\lambda$
$f = 982{,}080{,}000/1.13 = 869.097$ MHz

Whenever we see a problem frequency in a room, we always immediately translate it into a wavelength in order to attempt to observe a physical spacing that could be the cause of the effect observed. A comb filter with nulls spaced every 1000 Hz can result from a misalignment in the vicinity of one foot. Notches in acoustic response can also be caused by diaphragmatic absorption by a thin panel some wavelength multiple of the frequency being lowered in level.

These relationships are useful, easy to remember and quite often lead to the solution for a problem at hand.

## Diogenes Can Put Out His Lantern

Diogenes can put out his lantern, we've found an honest architect who unfortunately didn't find an honest acoustician, if this quote is to be believed.

"I have nothing to say except that, as the architect who designed the theater the first time around 20 years ago, I have to admit what architects seldom admit, that theaters are much too important to be left to architects.

I picked an acoustician, who shall at this point remain nameless, and we had many good years of - ballet."

*Philip Johnson,*
*commenting on the New York State Theatre*
*New York Times*
*August 25, 1982*

## Basic Power Equations

$$W_e = \frac{E^2}{R} \qquad L_{dBm} = 10 \log\left(\frac{W_e}{0.001\,\mathrm{W}}\right)$$

$$W_a = \frac{(P_{rms})^2 (\mathrm{AREA})}{\rho c} \qquad L_w = 10 \log\left(\frac{W_a}{10^{-12}\,\mathrm{W}}\right)$$

$$I_a^* = \frac{(P_{rms})^2}{\rho c} \text{ at } r \qquad L_I = 10 \log\left(\frac{I_a}{10^{-12}\,\mathrm{W/m^2}}\right)$$

$$* \boxed{I_a = 4\pi^2 A^2 \rho c = \left(\frac{W_a}{4\pi r^2}\right)}$$

$$P_{rms} = 2\pi f A \rho c \qquad L_p = 20 \log\left(\frac{P_{rms}}{0.00002_{\mathrm{Pa}}}\right)$$

# Simple But Important Definitions

1. VI - Volume Indicating Instrument
2. VU - (what a VI is calibrated in)
3. On a sine wave only: O VU = dBm
4. On a program material (speech or music) O VU = + 10 dBm (by universal agreement)
5. What is read on a VI scale is called the instrument indication. The *level* is the instrument indication plus the *attenuator* setting ± any impedance corrections *if* required.
6. 0 dBm is one milliwatt (0.001w) period! Any voltage across any resistance that results in a power of 0.001w is a power *level* of 0 dBm.
7. There is output power level $L_{OUT}$ and available input power level $L_{AIP}$. $L_{OUT}$ is actually developed at the output of the system. $L_{AIP}$ is what is *theoretically* available from the output of one device at the input of the following device.
8. Gain or loss is the difference in level between the input of a device and the output of a device. The input will be the $L_{AIP}$ of the previous device. The output will be the $L_{AIP}$ of the device itself relative the the next device. When the device is the final electronic device in the chain, then the $L_{OUT}$ is *measured* and used.

   Gain is the term used to describe the change in *level* expressed in decibels at the *listener's ears* upon the insertion of a device into the system in place of a piece of wire.

   If you have these definitions solidly in mind, you should be a handy man around a sound system installation job.

## Special Fee For Grads

We are often asked by Syn-Aud-Con grads if we have a special price for those who would like to attend a Syn-Aud-Con Sound Engineering Seminar more than once. We have given it careful thought and we would like to start the program again. (We had a special price for grads several years ago).

Syn-Aud-Con grads with a current subscription to the Syn-Aud-Con Newsletter may register for $325 per person. $300 if you bring your copy of the new edition of **Sound System Engineering** to the class. (No additional discounts available for multiple registrations or advanced payment.)

If it has been a few years since you have attended a Syn-Aud-Con Sound Engineering Seminar, you will find much that is new and of special interest to you. The maximum number of grads attending at this special fee will be 10 per seminar, so register early if you know you want to attend a seminar in your area.

## Recipe for a Perfect Garden

Glen Ballou shared this recipe for a perfect garden. Our only additional observation would be that those who cultivate and eat from such gardens become like it — perfect.

**A Thought**

Here is a recipe for planting a perfect garden:

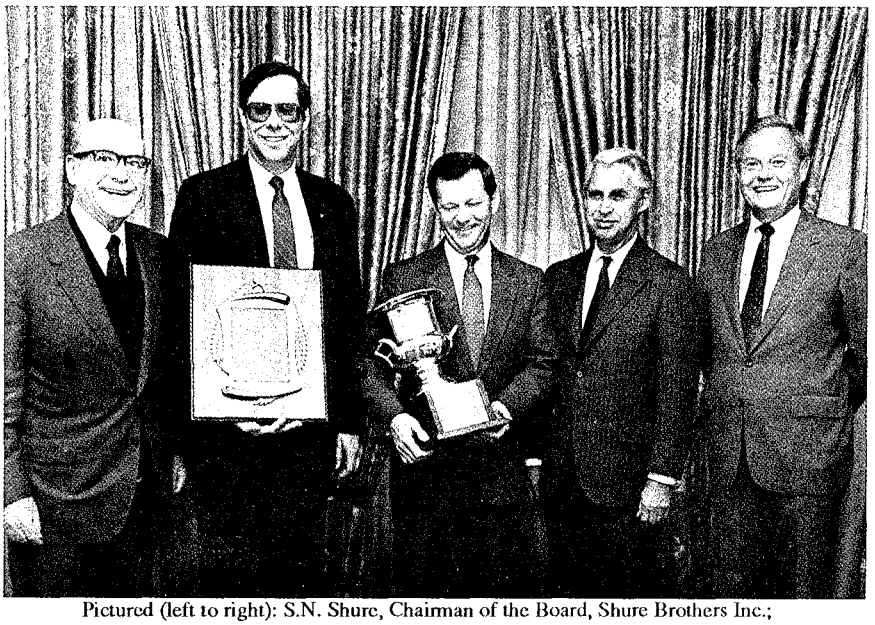
First, plant five rows of peas;
- Prayer
- Perseverance
- Politeness
- Promptness
- Purity

Next, plant three rows of squash:
- Squash gossip
- Squash fault-finding
- Squash indifference

Then, four rows of lettuce:
- Let us be faithful
- Let us be unselfish
- Let us be truthful
- Let us love one another

Finally, no garden is complete without turnips:
- Turn up for church
- Turn up with a smile
- Turn up with new ideas
- Turn up with determination

(Thanks to Pilgrim Pines Conference Center Newsletter)



Pictured (left to right): S.N. Shure, Chairman of the Board, Shure Brothers Inc.; Les Fleming, Vice President, S.K. Macdonald; William Hartmaier, General Mgr., S.K. Macdonald; James Kogen, President, Shure Brothers Inc.; Richard Murphy, Vice President and General Mgr./Hi-Fi and Microphone Div., Shure Brothers, Inc.

## *Mr. S.N. Shure*

Sixty-two years of audio excellence! Mr. S.N. Shure (left in photograph) has been in the audio business since 1925. Next to him are two principals of the S.K. Macdonald firm, a manufacturer's representative firm that has represented Shure Brothers for 54 years.

When people talk about the "good old boys" they rarely can produce an example to match this one. When I see pioneer entrepreneurs of audio I feel like Daniel when he replied to Darius, "O King live forever".

## From Radio World: Watts?

Dear RW:

Re: "Daytime Face Low Power" (RW, 15 November), I refuse to discuss signal levels and powers with anyone who cannot think of power in "comparative decibels". If they quote **watts** to me, I ask them, "How much is that is dB?"

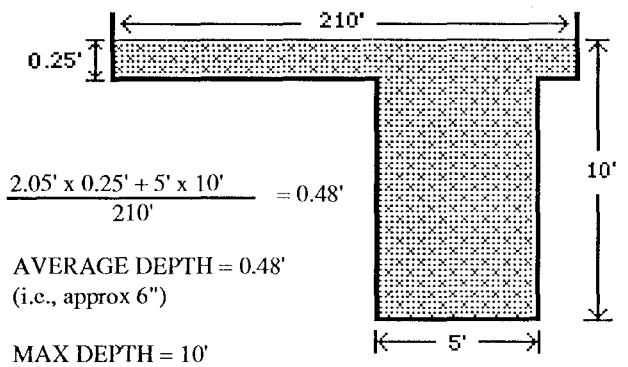
If they do not have an answer, I break off right there.

*-George Bonadio, Watertown, NY*

RW: Good point.

## How to Drown in a Stream With an Average Depth of Six Inches

Dick Heyser describes the drowning of a man in a river with an average depth of 6" (see diagram). This same guy, before wading this average depth river, wrote the following statistical analysis:




$$\frac{2.05' \times 0.25' + 5' \times 10'}{210'} = 0.48'$$

AVERAGE DEPTH = 0.48'
(i.e., approx 6")

MAX DEPTH = 10'

TYPICAL DEPTH = 0.25"

# TANGENTS

*If you look up "tangent" in the dictionary you will find Don's picture.*

- Allen Schultz, Listen Up Audio, Denver Class 9/87

# Syn-Aud-Con Management Forum

From time to time Syn-Aud-Con graduates bring our attention to the latest in professional management practices. We sometimes feel like renaming some of the less effective techniques such as "management by objectives" to "mismanagement by objectors" when we watch five year plans rule out serendipity that could save a company simply because "it's not in the plan".

Government bureaucracy has:
FOFs - Faithful old followers
PO POs - Pee'd on and passed over
Golden Boys - The boss' son, nephew, etc.

Now we learn that the computer industry has established formal lines of identity which we present herewith:

**Data Processing Job Descriptions**

Data Processing Manager:
Leaps tall buildings in a single bound,
Is more powerful than a locomotive,
Is faster than a speeding bullet,
Walks on water,
Gives policy to God.

Assist D P Manager:
Leaps short buildings in a single bound,
Is more powerful than a switch engine,
Is just as fast as a speeding bullet,
Walks on water if sea is calm,
Talks with God.

Senior Systems Analyst:
Leaps short buildings with a running start and favorable winds,
Is almost as powerful as a switch engine,
Is faster than a speeding BB,
Walks on water in an indoor swimming pool,
Talks with God if special request is approved.

Systems Analyst::
Barely clears a quonset hut,
Loses tug of war with locomotive,
Can fire a speeding bullet,
Swims well,
Is occasionally addressed by God.

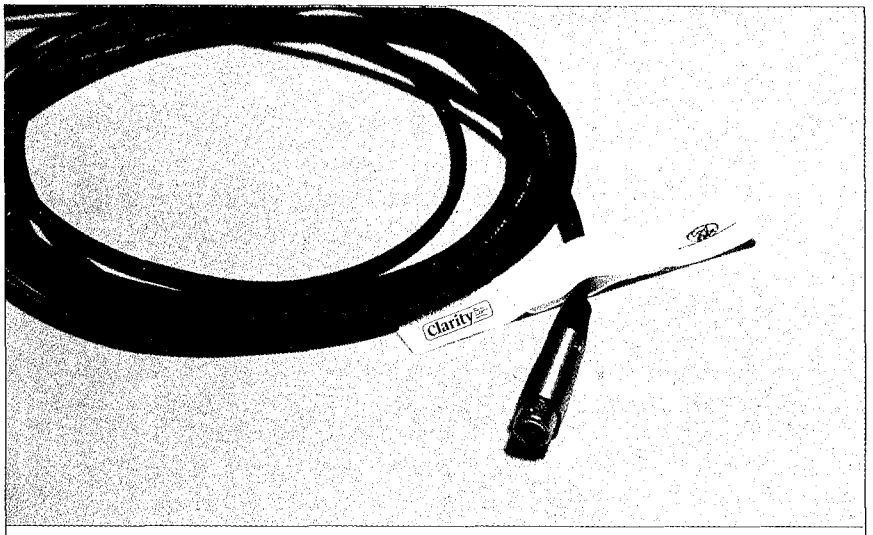
Lead Programmer:
Makes high marks on the wall while trying to leap building,
Is run over by locomotives,
Can sometimes handle a gun without hurting himself,
Dog paddles,
Talks to animals.

Senior Programmer:
Runs into buildings,
Recognizes locomotive two out of three times,
Is not issued ammunition,
Talks to walls.

Maintenance Programmer:
Falls over doorstep while trying to enter building,
Says, "Look at the choo choo",
Wets himself with a water pistol,
Plays in mud puddles,
Mumbles to himself.

Programmer:
Lifts buildings and walks under them,
Kicks locomotives off the tracks,
Catches speeding bullets in his teeth and eats them,
Freezes water with a single glance,
He IS God.

*Courtesy Ken Wahrenbrock*




## *Introducing CordLox™... The best invention since the paper clip!*

•You've tried masking tape, and that doesn't work!
•You've tried duct tape, and that doesn't work!
•You've tried leather shoestrings, and they don't work!

**Nothing** you've ever come up with to tie off your microphone and speaker cables has been able to do the job cleanly, without a sticky mess and always falling apart.

**Until now!** Taipale Media Systems, Inc. is now offering the new Velcro cable ties from Toleeto. Each Cordlox cable tie is crafted for years of carefree use, and is marked with a sharp looking *Clarity* magazine logo.

**Easy to use!** Simply slip the XLR or phone plug connector through the large Velcro loop and then press the loop together to lock the tie into place around the cable. You'll wonder how you ever got along without them.

**To Order:**
*Clarity Cordlox* come standard in a 7" length, perfect for most microphone, guitar and speaker cables. They are available in white, grey, red, yellow, and black & white. Other lengths and colors are available by special order.

| **Prices** | 1 - 9 | 10 - 24 | 25+ | 100+ |
|---|---|---|---|---|
| | $1.25@ | $1.05@ | $0.95@ | Call |

| Quantity | Color | Price |
|---|---|---|
| | | |
| | | |
| | subtotal | |
| (MO residents add sales tax) | | |
| | shipping & handling | $1.50 |
| | Total | |

***Taipale Media Systems, Inc., 1471 Colgate Drive***
***St. Charles, MO 63303 (314) 946-4360***

# Classifieds

**Wanted: Sound System Designer**
Contact: Peter Tappan
Kirkegaard & Assoc.
5 S. 323 Beau Bien
Naperville, IL 60540
(312) 810-5980

**Wanted: Crown RTA 2**
Contact: Jay Richmond
Elmbrook Church
777 S. Barber Road
Waukeska, WI 53186
(414) 786-7051

**For Sale: Cetec LM20 Console**
16 x 4 x 2 As is
Asking $2,000
Contact: Robert Haworth
(816) 833-1000 ext. 308

## *Corrections for Intelligibility Tech Topic*

Tech Topic Volume 14 Number 8 contained a few typos that we would like to correct:

**Page 2, Figure 5 :**
Now reads: Mid-Q-Bose 801;
Should read: Mid-Q-Bose 802.

**Page 5, Peutz's Comments on MTF & RASTI**

The last line was deleted in the printing. The last sentence should read: If an electroacoustical system is incorporated in the transmission chain, a reliable result can be expected if, (1) the frequency characteristic of the whole chain is almost flat, (2) no signal modification is present, and, (3) the speech level at the output is not too high to give an indication — not higher than 75dB

**Page 8, #7**

Now reads: Modulation is not a valid measurement of speech intelligibility.

This is an incorrect statement. See letter from Dr. Hume on page 6.

# SYN-AUD-CON SPONSORS

Syn-Aud-Con receives tangible support from the audio industry. Sixteen manufacturing firms presently help underwrite the expense of providing sound engineering seminars. Such support makes it possible to provide the very latest in audio technology while maintaining reasonable prices relative to today's economy and to provide all the materials and continuing support to all graduates of Syn-Aud-Con.

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

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

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