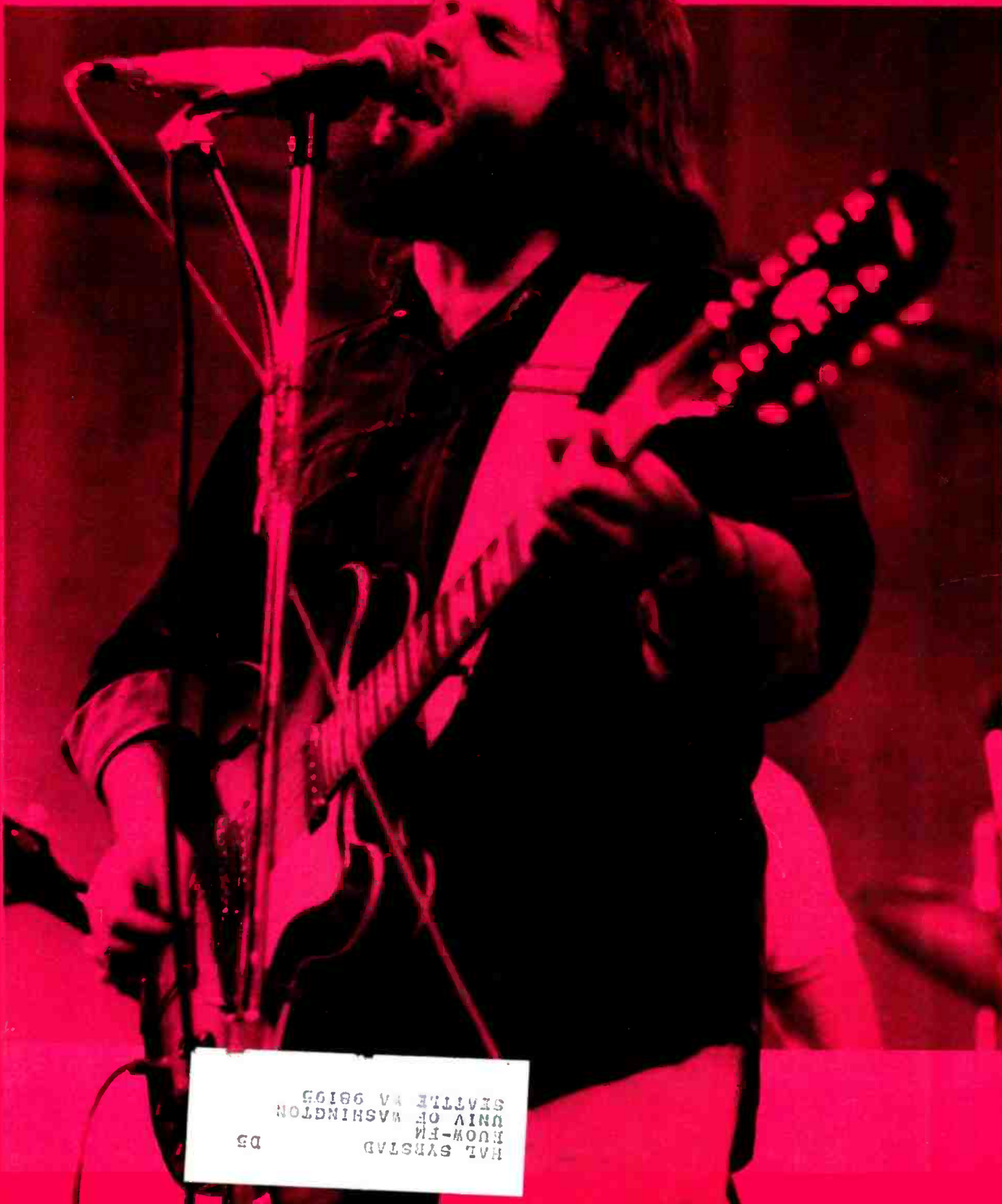


dB

THE SOUND ENGINEERING MAGAZINE

JANUARY 1975

\$1.00



HAL SYRSTAD
 KUOW-FM
 UNIV OF WASHINGTON
 SEATTLE WA 98195
 D3

A-7300

**Just
because
we don't
call it
professional
doesn't
mean it
couldn't be.**

We don't call our A-7300 a professional tape recorder — we make those too, and we know the difference.

On the other hand, the A-7300 is far better than the typical high fidelity component. Consider, for example, some of the professional features... a servo controlled direct drive capstan IC logic control, four balanced mic inputs with XL-type connectors, a flip-up hinged head cover for easy maintenance and editing.

Yet, in the final analysis, it isn't what it's called, but what it does that counts. You'll have to determine for yourself whether or not it meets your specific needs, and you can do that only by examining and operating it for yourself.

You'll find that our retailers are well informed and helpful in general. Rare qualities, so there can't be many of them. You can find the one nearest you by calling (800) 447-4700.* We'll pay for the call.

*In Illinois, call (800) 322-4400.

TEAC

The leader. Always has been.

TEAC Corporation of America,
7733 Telegraph Road,
Montebello, California 90640.



Circle 10 on Reader Service Card

COMING NEXT MONTH

● Milford K. Smith, Jr. chief engineer of WPGC, Washington, D.C. gives an on-the-job report on experimenting with and modifying equipment to create a more distinctive sound, in **FOR BETTER BROADCAST AUDIO PROCESSING**.

● Glenn D. Rogers has made a **db VISIT TO ROBINS-FAIRCHILD** for an inside view of one firm during most of the history of the audio industry.

● Michael Rettinger continues his highly specific series on **RECORDING STUDIO ACOUSTICS**, going into the judicious use of acoustic devices and certain building materials, with resonance the subject of Part 4.

● Norman Crowhurst's column, on room equalization, gives additional depth to Michael Rettinger's architectural discussion. The other columnists will be in their usual places, dispensing information and/or wisdom. Coming next month, in **db, The Sound Engineering Magazine**.

ABOUT THE COVER

● One of the Beach Boys appearing in a live broadcast on Radio Luxembourg, which was beamed all over the world in the summer of '72. Sound system on the European tour was provided by C. S. I. Audio of Highland Park, N.J. Photograph by Marvin Welkowitz.



THE SOUND ENGINEERING MAGAZINE

JANUARY 1975, VOLUME 9, NUMBER 1

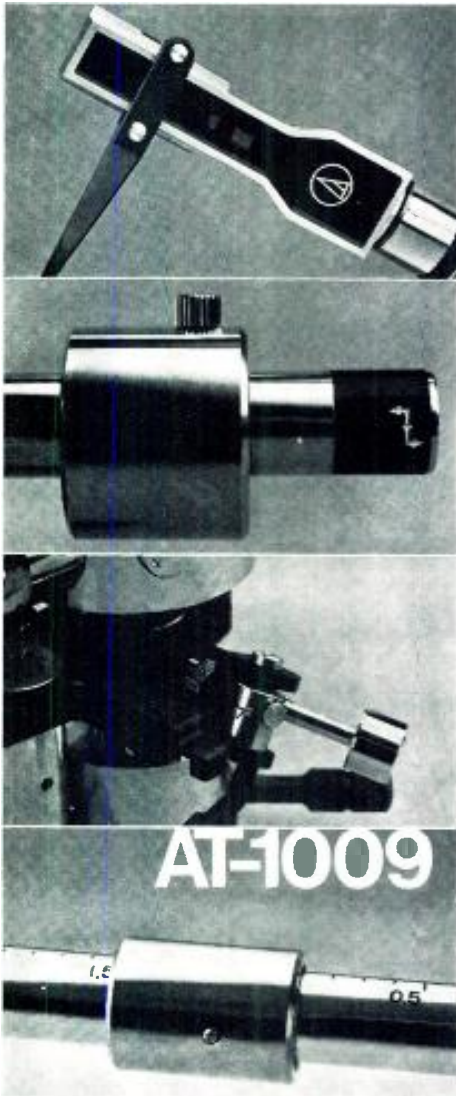
22	SOUND EDUCATION BY THE BAY Ron Ziskin
25	AUDIO GETS BIG BOOST AT SYRACUSE Mark Gander
28	HOW TO HANDLE A SQUARE Marshall King
2	LETTERS
2	CALENDAR
6	THE SYNC TRACK John Woram
10	THEORY AND PRACTICE Norman H. Crowhurst
15	SOUND WITH IMAGES Martin Dickstein
18	NEW PRODUCTS AND SERVICES
33	CLASSIFIED
36	PEOPLE, PLACES, HAPPENINGS

db is listed in Current Contents: Engineering and Technology,

Robert Bach PUBLISHER	Larry Zide EDITOR
Alex Porianda MANAGING EDITOR	John Woram ASSOCIATE EDITOR
Bob Laurie ART DIRECTOR	Hazel Krantz COPY EDITOR
Eloise Beach CIRCULATION MANAGER	Ann Russell PRODUCTION
GRAPHICS Crescent Art Service	

db, the Sound Engineering Magazine is published monthly by Sagamore Publishing Company, Inc. Entire contents copyright © 1975 by Sagamore Publishing Co., Inc., 1120 Old Country Road, Plainview, L.I., N.Y. 11803. Telephone (516) 433 6530. db is published for those individuals and firms in professional audio recording, broadcast, audio-visual, sound reinforcement, consultants, video recording, film sound, etc. Application should be made on the subscription form in the rear of each issue. Subscriptions are \$6.00 per year (\$12.00 per year outside U. S. Possessions, Canada, and Mexico) in U. S. funds. Single copies are \$1.00 each. Controlled Circulation postage paid at Harrisburg, Pa. 17105. Editorial, Publishing, and Sales Offices: 1120 Old Country Road, Plainview, New York 11803. Postmaster: Form 3579 should be sent to above address.

**Audio Magazine
needed a
state-of-the-art
tone arm to test*
the finest stereo
& CD-4 cartridges
on the market.**



*March, 1974 Issue

They chose this one:
The Audio-Technica AT-1009.
We're proud. But not surprised.
\$139.95 and worth every penny.

Write and we'll tell you why.
Or see for yourself at leading
audio showrooms everywhere.

audio-technica.

AUDIO-TECHNICA U.S., INC., Dept. 15BD
33 Shiawassee, Fairlawn, Ohio 44313
In Canada: Superior Electronics, Inc.



Circle 19 on Reader Service Card

db letters

THE EDITOR:

In my article, "Noise Considerations in Audio Amplifiers," which appeared in the October issue of *db*, there is an omission in a mathematical expression which may cause confusion to the reader trying to follow the mathematical progression. The error appears between Equation (7) and Equation (8). The item omitted is 10^4 . Equation (7) should read:

$$E_T = \frac{\sqrt{[3 \times 10^{-9}]^2 + (7.2 \times 10^{-13} \times 80)^2} \times 10^4 + 1.29 \times 10^{-14}}$$

$$E_T = \frac{\sqrt{9 \times 10^{-18} + 3.31 \times 10^{-21}} \times 10^4 + 1.29 \times 10^{-14}}$$

$$E_T = \frac{\sqrt{9 \times 10^{-18} \times 10^4 + 3.31 \times 10^{-21} \times 10^4} + 1.29 \times 10^{-14}}$$

R. S. MINTZ

CALENDAR

March

3-6 **A.E.S. Convention.** Cunard International Hotel, Hammersmith, London W6. Contact: Mr. E. J. Franklin, A.E.S. Convention, Eccleston Road, Maidstone, Kent, ME15 6AU, England. Charter flight information: Mr. Bob Lewis, Mirque Travel Agency, 350 Fifth Avenue, New York, N.Y. 10001.

April

21-23 **ASTM Committee E-33 on Environmental Acoustics,** St. Charles, Illinois. Contact: Mr. Charles W. Rodman, secretary, Battelle Memorial Institute, 505 King Ave., Columbus, Ohio 43201. (614) 299-3151.

May

Two-day Workshop on Children's Television, conducted by the National Association of Broadcasters, Washington, D.C., early May. Contact: Mr. Robert D. Gordon, N.A.B., 1771 N St., N.W., Washington, D.C. 20036.

db

THE SOUND ENGINEERING MAGAZINE

SALES OFFICES

New York

1120 Old Country Road
Plainview, N.Y. 11803
516-433-6530

Dallas

Roy McDonald Associates, Inc.
Semmons Tower West
Suite 714
Dallas, Texas 75207
214-637-2444

Denver

Roy McDonald Associates, Inc.
846 Lincoln Street
Denver, Colorado 80203
303-825-3325

Houston

Roy McDonald Associates, Inc.
3130 Southwest Freeway
Houston, Texas 77006
713-529-6711

Los Angeles

Roy McDonald Associates, Inc.
500 S. Virgil
Suite 360
Los Angeles, California 90020
213-483-1304

Portland

Roy McDonald Associates, Inc.
2305 S. W. 58th Avenue
Portland, Oregon 97221
503-292-8521

San Francisco

Roy McDonald Associates, Inc.
625 Market Street
San Francisco, California 94105
415-397-5377

aengus

sound equipment for really picky guys.

Take your pick.



Eight Band — Graphic Equalizer. Standard equipment in all Aengus console systems. Also available as a "plug-in" replacement for most 1½" x 5¼" equalizers.



"Four-Pack" — Graphic Equalizer System. Four self-powered channels of Aengus Graphic Equalizers housed in a portable fine grain wood cabinet. LED indicator on output of power supply. Available with XLR or terminal strip connectors for instant application.

Aengus offers a complete line of stock modular components available singly or in a wide variety of configurations to suit any application.

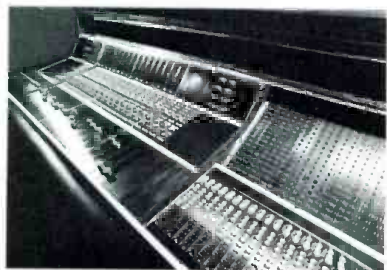
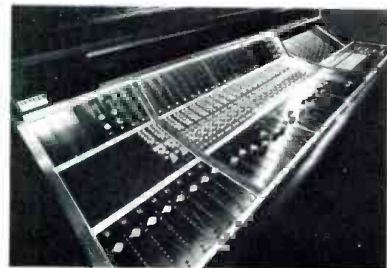
Along with our concept of offering the finest pre-engineered expandable stock console systems and components, ranging in scope from 8 to 24 track, Aengus offers you the benefits of flexibility, reliability and financial growth control.



"Eight-Pack" — Graphic Equalizer System. Self-powered 19" rack-mount equalizer system featuring eight channels of Aengus Graphics with built-in power supply unit.



Plug-In Patchbay Modules. An exclusive Aengus engineering design composed of ¾" plug-in modules for rapid expansion. Another standard design feature in our console systems.



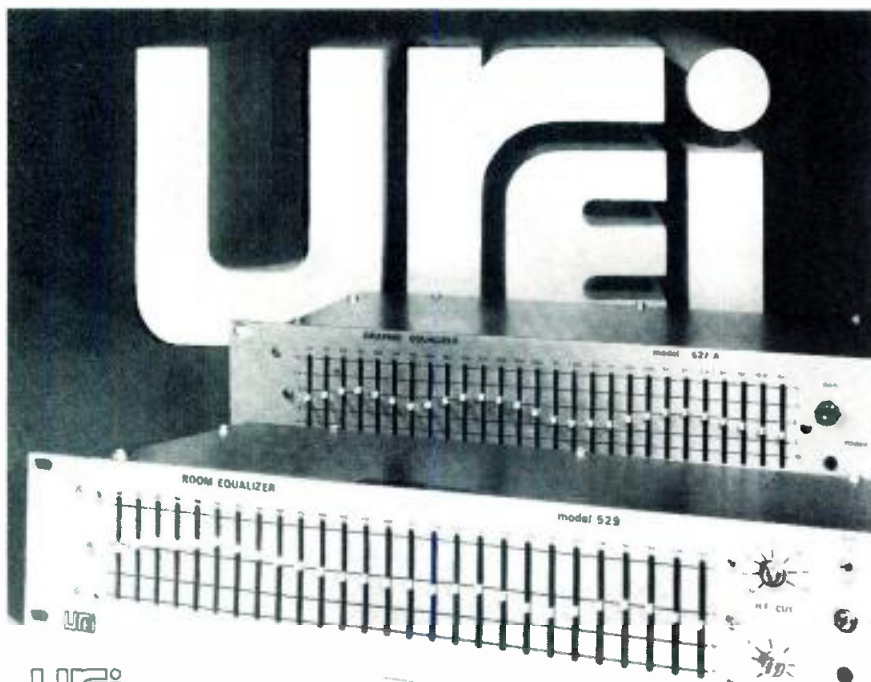
For full information and local authorized dealer, call or write.

T & D INDUSTRIES, INC.

583 Berlin Road, Marlboro, Mass. 01752 Tel. (617) 485-3658

Look alikes? Take a second look!

UREI's new Model 529 1/3 octave Room Equalization Filter set looks like our popular 527A Graphic Equalizer. But, that's where the similarity ends. The new 529 is ideal for those who prefer the "attenuate only" method of room equalization or tuning. 27 1/3 octave active filters, on ISO centers, provide up to 15 dB of attenuation only, to adjust for a desired house curve. Filters combine properly for minimum ripple and phase shift. "Band end" tunable high pass and low pass filters attenuate 18 dB per octave. Gain is adjustable to +10 dB to make up for average level lost in equalization. The 529 is completely self-contained with built-in power supply. UREI quality, of course.



UREI "Instrumental in Audio"

11922 Valerio Street, No. Hollywood, California 91605 (213) 764-1500
Exclusive export agent: Gotham Export Corporation, New York

advertisers index

Aengus	3
Ampex	5
Audio Design	7
Audio Technica	2
Broadcast Electronics	4
Community Light & Sound	18
Electro-Voice	19
Gotham Audio	8
Inst. of Audio Research	31
Inovonics	14
Lexicon	9
Modular Audio Products	21
Orban/Parasound	29
Polyline	14
Ramko Research	11
Revox	12
Rusco Electronics	6
Sescom, Inc.	14
Shure Brothers	cover 3
Soundcraftsmen	17
Sound Workshop	16
Standard Tape Labs	17
Stanton Magnetics	10
TEAC Corp. of America	cover 2
Timekeeper	12. 34
Tycobrahe Sound Co.	cover 4
U.R.E.I.	4
Waters Manufacturing	13

Spotmaster®



100 SERIES MONO CONSOLES

- 5 or 8 mixers
- Identical program and audition channels, transformer outputs
- Cart (high) and mike (low) level inputs switch selectable
- Quiet FET audio switching
- Monitor, phone and cue amps standard
- Muting on any mixer channel
- Usable in remote control applications

FULL LINE INCLUDING 12
OTHER MODELS AVAILABLE
CALL OR WRITE



BROADCAST ELECTRONICS
8810 Brookville Road
Silver Spring, Maryland 10
Phone: 301-588-4983

AMPEX HAS A ONE-WORD ANSWER TO FOUR QUESTIONS ABOUT COMMERCIAL RECORDING EQUIPMENT:

AG-440C

Q ■ ■

Our program material is *monaural*. Our budget is small. What's the best all-around recorder/reproducer for our station?

A ■ ■

Get an AG-440C. You'll appreciate the way it handles 10½" reels of tape. With capstan servo, end-to-end timing for 30- and 60-minute

programs is always reliable enough to bring you up to the network hour marker, and years after you've amortized the investment, your AG-440C will still be delivering top professional performance. Features and options are the same for all one-, two-, and four-channel machines. It's the best value on the market.



Q ■ ■

We're *mixing down* for stereo releases, and we can't afford to lose the sounds we worked so hard to get. What's the answer?

A ■ ■

Get an AG-440C. It'll handle everything on the master tape, from the lowest frequencies right up through the top. At

15 ips, response is virtually flat to 25 kHz. And the capstan servo will deliver flutter and wow performance that is as close to the original as can be achieved on any commercially available mixdown recorder. Low noise figures, too, assure optimum mixdown/dubbing.



Q ■ ■

Our work involves original production for *quadrasonic* material. We need a recorder that can get us started without making any compromises at all in sound quality. How can we get rolling?

A ■ ■

Get an AG-440C. The four-channel version is a fully professional half-inch multitrack mastering machine with the latest solid-

state electronics for extended high-frequency response. You'll appreciate motion sensing, the easy-to-read VU meters, the large level-setting controls, and the high-visibility record and ready indicators. Your tape will be protected, perform better, too, because the heavy-duty transport has an improved tape guidance system for reduced skew.



Q ■ ■

We've got to squeeze a *multichannel* production recorder out of this year's tight budget, and those 2-inch recorders are just too rich for our blood. How can we expand?

A ■ ■

Get an AG-440C. The 8-channel version with Sel-Sync™, automatic monitor switching, automatic tension

adjustment, capstan control options, transport remote control, and tenth-of-a-second start/stop will make you a big-leaguer in the one-inch circuit. And, of course, when you go all the way with an AG-440C-8, you'll be ready for all of the previously listed studio operations. Just drop in the right head assembly and get on with the profitable activity.



Information about all the Ampex AG-440C models is available from your local Ampex distributor. Many configurations are now available from

AMPEX

Ampex Corporation
Audio-Video Systems Division
401 Broadway, Redwood City, CA 94063, (415) 367-2641

stock. Ask for a demonstration today or send for our literature. Ampex has the answer to every sound recording question, and the answer is AG-440C.

Circle 14 on Reader Service Card

www.americanradiohistory.com

RUSSCO
gives **BIG**
performance

at
little
prices



Good Looks & Great Performance are yours with the **RUSSCO STUDIO/MASTER 505** Audio-Mixers! 5 mixing channels, 4 channels each with built-in preamps, each adjustable for mic, phono or hi-level, and the 5th channel has 5 hi-level push-button inputs! The monaural version has a built-in monitor amp! Built-in cue speaker, cue on any channel! Push button key switching & LED indicators! Built-in headset amplifier, Allen-Bradley Mod Pots, FET monitor muting! Available Now in Stereo or Monaural, Cabinet or Rack Mount!



You get the most "headroom" for the money (+18 DBM) with RUSSCO's New "FIDELITY-PRO" and "FIDELITY-MASTER" phono preamps. 8 models stereo or mono to fit your needs, self-powered and featuring a unique "easy-service" case. Years ahead in engineering with economical prices starting at \$92.00



ELECTRONICS INCORPORATED

1070 Brookhaven, Clovis, Calif. 93612

Phone (209) 299-2167

● It turns out that this issue features some articles on the general subject of education. I've gotten some mileage out of this over the past few months, what with all that business about microphones, books and communicating. So perhaps I should get off the pot and move on to other things, like how to quit worrying and make hit records, or something.

Anyway, what more needs to be said about education? A lot I guess, since there seems to be no slackening of inquiries about "How do I get started in Audio?"

Since I've been involved in answering this question for a long time now, I've developed some thoughts on the subject of educating the audio man. Much of this is just a variation on things I've said before, but I guess it beats reporting.

At the Institute of Audio Research, where I hide out between consulting and recording sessions, I've been teaching a resumé preparation class for a while now. I wonder whether the medical schools teach classes in "how to get a job as a doctor" to the pre-med students? Well, getting a job is no cinch, especially these days, and the resumé class is just an informal guide to getting your thoughts together so as to make a reasonably good impression. One of its purposes is to get the students to realize that they will surely not be hired as recording engineers if their only qualification is a diploma. There are many lower rungs on the recording studio ladder, and the line forms at the bottom, not the top. And since there aren't too many jobs even at the bottom, if you want one you've got to do something to lessen the odds against you. When a job turns up, you've got to be better prepared than the others.

HOW PREPARE?

But since the qualifications are so vague, how *do* you prepare? Do you study music, electronics, noise control, or perhaps the fine art of the "hype"? If you're looking for studio work, you can use your Ph.D. thesis in comparative noise reduction for wall paper if you don't possess a native talent for ego soothing. Musicians who will cheerfully fly around the world with a pilot they've never met,

or place themselves under the knife of a misanthropic surgeon, will go berserk if their recording engineer doesn't have "good vibes." What matter if he thinks multi-track is something that's made with lots of tires; so long as he grooves—that's what's important!!

So, where do you go to school to become groovey? If you're asking the question, studio work isn't for you. (As usual, this column is oriented towards recording studio education). But, assuming you already possess some native instinct for survival in the studio, what else is needed?

Well, if you wanted to be a doctor, there wouldn't be much problem spelling out the formal requirements. They've been spelled out for years. But studio work is quite another thing. There is still no consensus of the formal requirements, or even if there are any. Some studios encourage education, some don't. Some colleges offer courses in recording-related subjects, and so do some studios. Some are good, some aren't. A few colleges know lots about education, but nothing about the facts of life in a recording studio. Some studios know lots about recording, but not a damn thing about education.

And there you are in the middle, wondering which way is up. Sometimes, I think the worst thing to do is ask for advice, since every "authority" has his own treasured opinion, and rarely do they match.

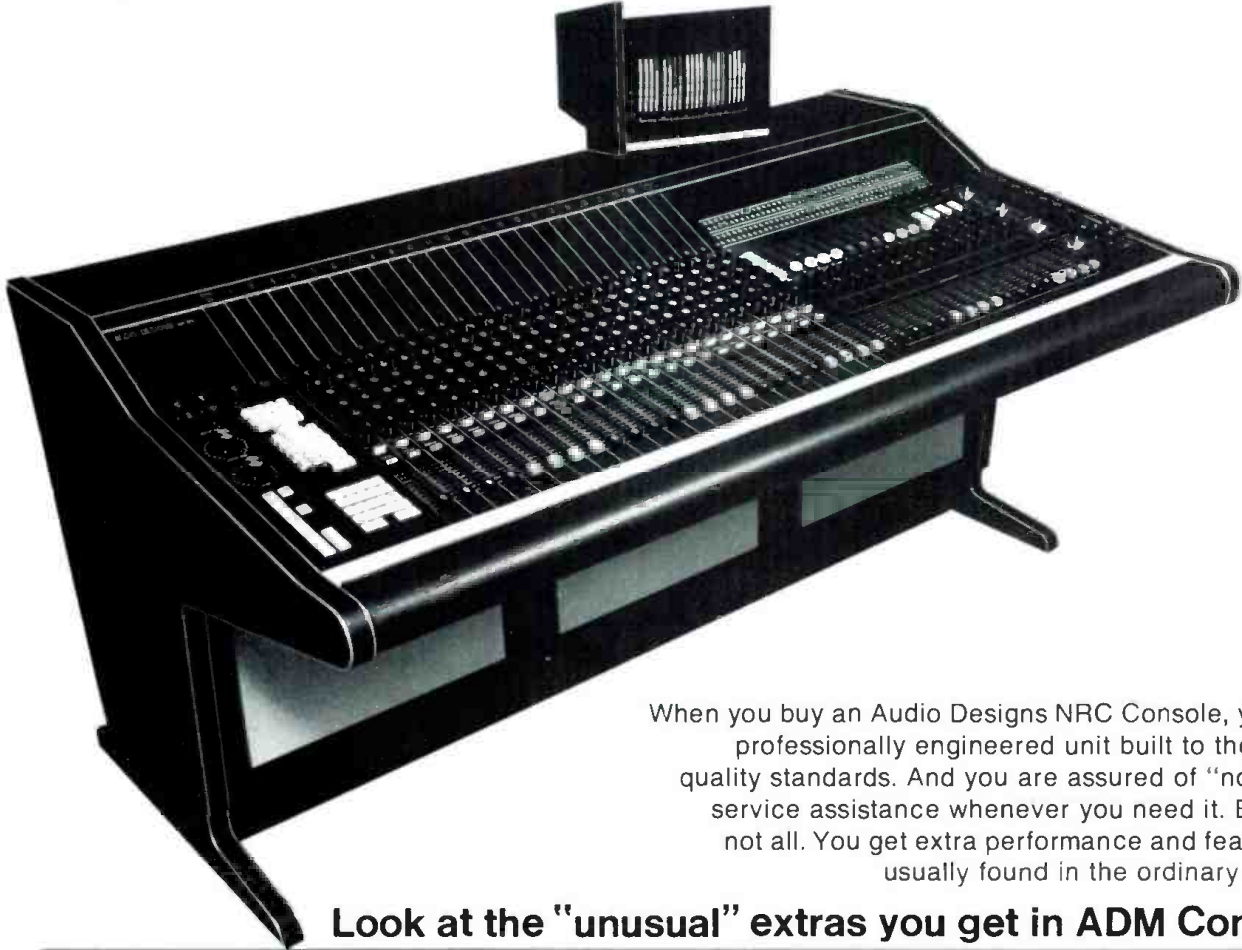
ENTHUSIASM VARIES

Here at the Institute, I stumble across many students who—for whatever reasons—have decided our program is right for them. Or, maybe they haven't made that decision, but have just landed in our classrooms by chance. Well anyway, they're here; and right or wrong, their reactions to the curriculum are interesting, and at times frustrating. If the subject of the day is bias, or some other cliff hanger, their enthusiasm isn't exactly inspiring. In fact, a reasonably paranoid instructor may detect some ill-concealed hostility. But let the subject turn to something with a little built-in entertainment value, and the interest picks up dramatically.

We're now putting the finishing touches on a control room, which has

COMPARE

ADM'S NRC and the "Usual" Consoles!



When you buy an Audio Designs NRC Console, you get a professionally engineered unit built to the highest quality standards. And you are assured of "no hassle" service assistance whenever you need it. But that's not all. You get extra performance and features not usually found in the ordinary console.

Look at the "unusual" extras you get in ADM Consoles

ADM FULL-FEATURED CONSOLES

- AUDEX—solid state audio reed switching system not the "usual" troublesome push buttons.
- SLIDEX—noise-free linear attenuator with elements sealed against dirt not the "usual" open elements (noisy).
- VUE-Scan—bar graph TV screen for monitoring up to 28 audio channels, switchable between peak and average reading not the "usual" mess of meters.
- 4-band, 14 frequency reciprocal equalizer on all inputs not the "usual" 3-band.
- 4 sets of Machine Remotes not the "usual" one or none.
- Full quadraphonic capabilities with 4 joy sticks not the "usual" one or two joy sticks.
- Simultaneous multi-track (8, 16, 24 track), quad, stereo and mono outputs not the "usual" multi-purpose outputs.
- Complete tip, ring and sleeve patching not the "usual" miniature size or limited patching.
- 4 cue channels not the "usual" one or two.
- 2 solo systems not the "usual" one.
- 5-Year Warranty on parts and labor not the "usual" 90 days to one year.

Write or call collect
for further information
on the UNusual
ADM Console.



AUDIO DESIGNS AND
MANUFACTURING, INC.
16005 Sturgeon
Roseville, Michigan 48066
Phone: (313) 778-8400, Cable: AUDEX

In Canada: TELAK
Scarborough, Ont.
(416) 438-3804

Circle 15 on Reader Service Card

www.americanradiohistory.com

the sync track (cont.)

already been used for some seminars, and by the time this sees print, for lab sessions. During the construction stages, we've had to beat the students off with sticks. The same students that have to be tied to their seats when the subject is the hysteresis loop. The enthusiasm is great. I suppose. I don't recall getting so worked up about lab courses back in my student days; but, of course, that was before electricity.

Sometimes the students want to skip all the education stuff completely, and just spend their time in the control room. In fact, if we weren't careful,

it could easily turn into a great big 20 to 20,000-Hz sand box.

I wonder if the sight of adding machines and ledger pads quickens the pulse of accounting students the way consoles and such affects our classes? Probably not. But then, adding machines are predictable gadgets. In fact, they're so damn predictable, they even come with an instruction book. And, if you give the whole Principles-of-Accounting-II class a problem, they should all come up with the same answer. Those that don't are wrong, and their mistakes can be corrected, for

there is a step-by-step right way to solve any problem.

NO 'RIGHT' WAY

But accounting techniques can't be applied to recording. There's no right way to convert music into magnetism. At best, you should know something about music, and something about magnetism, and then work out your own technique. You can waste a lot of time trying to work out that technique in school. Every minute spent at the school's console could probably have been better spent at the blackboard. In other words, there's a time to play recording engineer, and a time to learn.

Of course, blackboards aren't fun and games. But if it's kicks you're after, why not spend your tuition on booze or some other immediate turn-on? It'll wear off in a while and leave you with nothing, but so will show-and-tell at the console. Unless you're actually under fire on an actual session—say, recording the school's band, or broadcasting on the school's radio station, those let's-pretend sessions that let you be the Walter Mitty of the recording industry are more for your entertainment than instruction.

So here we are with a multi-track Neve console, lots of Dolbys, Ampexes all over the place, four different speaker systems, Kepexes, plenty of patch cords, and a man from the Institute who wants everyone to sit quietly in the classroom and marvel at the fine points of the polar pattern. What frustration!

But, if you can't get through the theory stuff, you're not going to get maximum mileage out of all the knobs and switches, either in our lab sessions later on, or in your recording sessions much later on. Speaking of much later on, if you're still just getting started, don't lose sight of the fact that the advance of technology is not going to come to a halt in your honor on the day you engineer your first record. There are a lot of engineers around who really believe they have nothing further to learn. Don't become one of them. ■

QUICK.

HOW MUCH DOES A NEUMANN KM 84 COST?

WRONG.

It's only \$230.

And that's for traditional NEUMANN quality! It's also true for the KM 83 omni-directional and the KM 85 cardioid with built-in low frequency roll-off. The KM 84 and KM 85 feature the NEUMANN "linear admittance" cardioid capsules which maintain linear frequency response even for a sound source as much as 135 degrees off axis. This means that unavoidable leakage from off-mike instruments, while properly attenuated, will remain natural sounding, without that typical low-end boost and high-end roll-off. For extra flexibility the 83, 84 and 85 screw-on capsules are available separately.

So, remember: you never go wrong with NEUMANN. And now, even the price is right: KM 83, 84 or 85, just \$230 complete with swivel, pop screen, and also a genuine leather case.

For more information write

GOTHAM
AUDIO CORPORATION

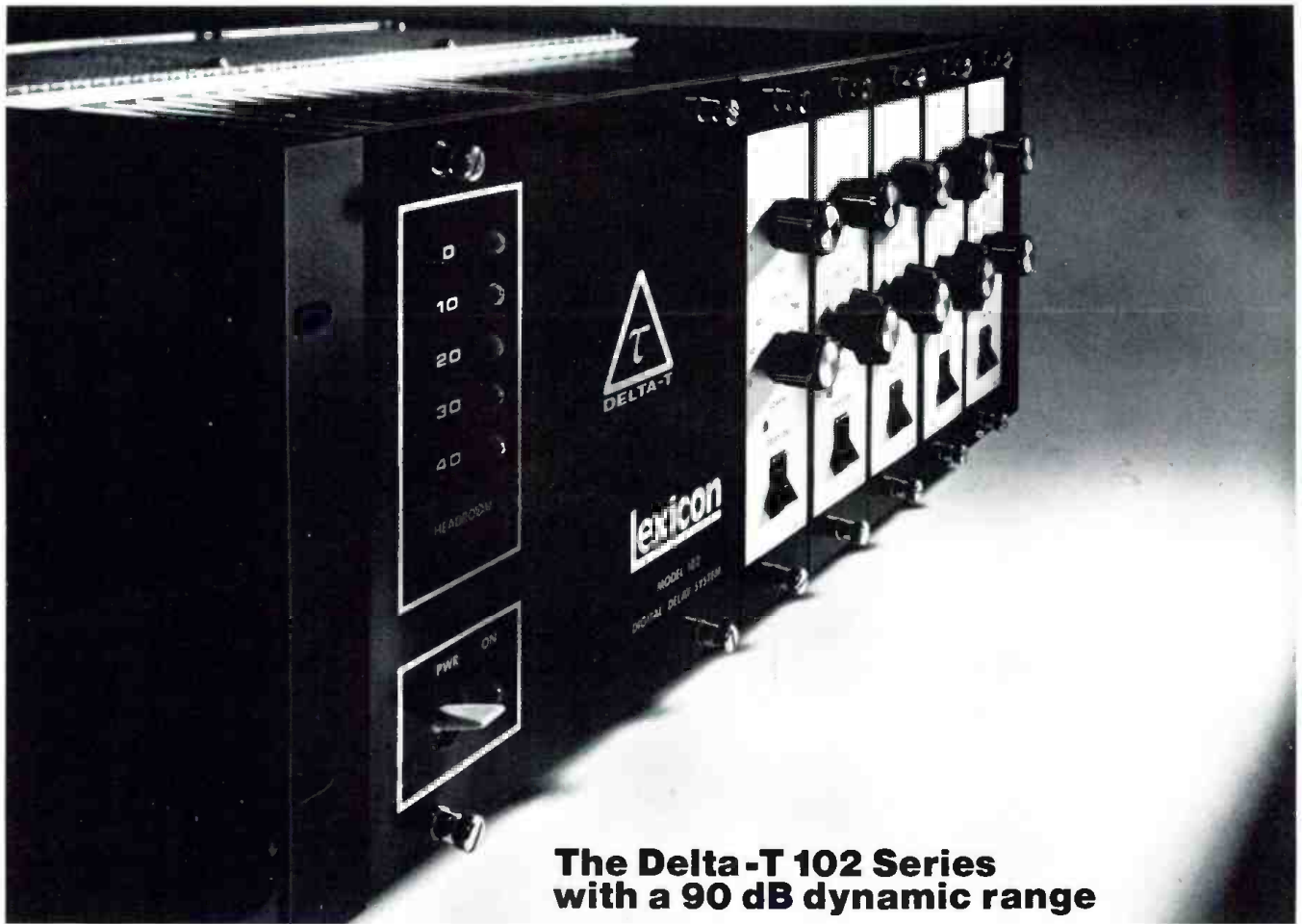
Headquarters 741 Washington Street, New York, NY 10014
(212) 741-7411
West Coast Sales Office 1710N LaBrea Ave Hollywood, CA 90046
(213) 874-4444



Copies of db

Copies of all issues of **db—The Sound Engineering Magazine** starting with the November 1967 issue are now available on 35 mm. microfilm. For further information or to place your order please write directly to:

University Microfilm, Inc.
300 North Zeeb Road
Ann Arbor, Michigan 48106



**The Delta-T 102 Series
with a 90 dB dynamic range**

**Announcing
the second
generation in
digital delay
systems...**

Four years ago Lexicon in cooperation with Gotham Audio introduced the industry's first all electronic audio delay system — the Delta-T Model 101. Practical experience and helpful suggestions from users accumulated since that time have enabled Lexicon to create the Delta-T 102 Series. The 102's offer a new level of performance and flexibility previously unavailable to the industry.

Using proprietary digital techniques the Delta-T 102 Series provides, along with other advances, a 90 dB dynamic range and significantly lower noise and distortion.

The 102 Series has been carefully engineered to meet a wide range of requirements:

For example, the system may contain 1 to 50 outputs, 2 ms to 3.2 seconds of delay, and remote console mounted controls and headroom indicator. Fully modular construction permits simple field expansion and maintenance by module plug-in. Three basic models in the 102 Series allow economic selection of frequency response and delay interval for sound reinforcement, studio and laboratory applications. All models feature a 5 position 40 dB headroom indicator which assures correct level setting.

And the cost of the 102 Series is revolutionary. Although providing the dynamic range of a 15 bit system, the 102's are priced competitively with present 10 and 12 bit units. Delivery is 45 days.

For complete information write Lexicon, Inc., 60 Turner Street, Waltham, Mass. 02154. Or telephone (617) + 891-6790. Dealer inquiries invited.

Lexicon

Circle 16 on Reader Service Card

www.americanradiohistory.com

A Prime Training Ground For Broadcast Engineers of the Future Finds a Stanton Cartridge in Every Head...



Shown above during a daytime session at WCWP are: Michael A. Phillips and Phil Lebowitz.

Not many college radio stations are as fortunate as WCWP of the School of the Arts at the C. W. Post Center, Brookville, L.I., in possessing such a magnificent building and studios. But, college radio stations all over the nation, in common with WCWP, prefer Stanton cartridges for all their turntables.

WCWP has become a well known source for radio stations in search of Broadcast Engineers, for here the young trainees learn what they must know in order to qualify for that position in a regular commercial station.

William J. Mozer, Director of WCWP, and an Engineer at WABC says:

"We have never used anything but Stanton Cartridges on all of our turntables. Currently, we are outfitted with the 681 EE which meets our needs both in terms of reliability and excellent sound quality in on-the-air playback as well as in our production of transfers. We are looking forward to a future step-up to the new Stanton 681 Triple-E".

Stanton is the choice of a great number of college radio stations, just as it is for the great majority of commercial broadcasters. That is because Stanton cartridges are the Professional Standard and possess outstanding ability to withstand rugged handling without sacrifice of audio quality. Their excellence and reliability assure the highest quality sound with minimum maintenance.

Whether your usage involves Broadcasting or Home entertainment, enjoy professional audio quality with Stanton products.

Write today for further information to Stanton Magnetics Inc., Terminal Drive, Plainview, N.Y. 11803



All Stanton cartridges are designed for use with all two and four-channel matrix derived compatible systems.

Circle 24 on Reader Service Card

● Since learning that this issue is to be about education, I have collected some reactions on the subject. While many people agree with my general criticisms of the educational establishment, a few, particularly within the establishment, disagree with me. It seems as if we must be talking about a different world!

The real differences are in time and place. Some have interpreted me as comparing education in today's America with that in my native country. But my knowledge of the situation in England dates back to when it was not so bad there, either, so that is not true. Others see their own efforts as being constructive, and assume that to be representative of the picture as a whole.

The experience at Brigham Young University last summer was enlightening. Everyone there impressed me as having the same kind of insight into the problems as my own. And I receive letters from readers indicating that other institutions possess a quality that, at least as seen from the inside, is at variance with much that I have been criticizing. But the participants of that workshop, who came from everywhere *else*, certainly had needs that would never have developed, had the whole system been doing what it should.

So what is the truth? Is it a matter of picking a good institution? I wish it were that simple. Then we could list the colleges that offer the requisite curriculum, with various "star rating" annotations. But it is not that easy.

We must of course give credit where it is due. But we cannot imply that things are generally improving when the facts are clearly otherwise. Twenty years ago, when I came to this country, I was very disappointed with the lack of preparation evidenced by young engineers, not just in one place, but as an industry standard (or lack of standard).

This condition has changed, only for the worse. My own observations, as well as complaints I repeatedly receive, from many quarters, confirm this. As basis for discussion of the reason, let me refer to something that is currently happening in Oregon's school system.

Last year the legislature, in collaboration with the State Department of Education, introduced a directive that every school district establish new graduation requirements. When you

cut through the volumes of words, its issuance is based on recognition of the need for graduation to be indicative of more than the fact that kids have sat through so many prescribed courses and acquired a certain minimum grade level.

The directive even included mention of the need to introduce a "life-long learner" requirement. In a changing world, people need to be able to keep up with change, so that made sense. But as I have visited various groups working on these requirements, it has become obvious that teachers have no idea what that means.

In discussion with such committees around the state, I constantly encounter the argument that what the law specifies is "survival requirements." My viewpoint is that survival depends on some of us, at least, being able to keep abreast with change. But these teachers repeatedly assure me that, if a person can ask the way to the welfare office, and can write his name on the forms and fill in the spaces, he will survive.

Their attitude is that the government will look after everyone. Whether you believe it or not, that notion prevails among our curriculum designers today. I could not believe it. But I meet it repeatedly.

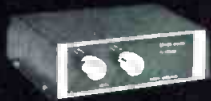
Our nation has embarked on a "problem solving" fad. Now, problem solving is an engineer's specialty, so it sounds, first off, as if our nation is on the right track. But we need to take a closer look at what they mean by problem solving.

In an engineering context, problems are solved, period. A problem solved does not need solving again. Progress results. Not so in our national problems. Everyone has his own problems today, to a far greater extent than a decade or two ago. And what I learned at these school committee meetings reflects the pattern of national thinking: let the government solve our problems for us.

Whatever your problems may be, you are the only person who is fully cognizant with them. So if you set about solving your own problems, you will evolve the best and most direct way to solve the problems of the community (if the government allows you to). But if, as most Americans are now conditioned to do, you take every little piece of a problem to some different government agency, what can you expect?

Each agency knows only a tiny piece of your particular situation and

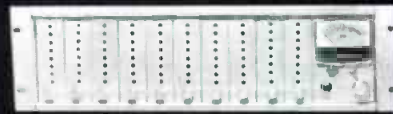
Our new E series audio equipment will improve your sound and cut your costs . . . or your money back!



**TURNTABLE
PREAMPS**



**MIC & LINE
AMPLIFIERS**



AUDIO DISTRIBUTION AMPLIFIERS



AUDIO CONSOLES & CONTROLLERS



**AUTOMATIC TAPE CARTRIDGE
& CASSETTE LOADERS**



**STUDIO MONITOR
AMPLIFIERS**



**REMOTE POWER
CONTROLLERS**

TEN DAY FREE EVALUATION AND 2 YEAR GUARANTEE INSURE YOUR UNCOMPROMISED SATISFACTION

TURNTABLE PREAMPS

Preamps costing almost 3 times more will not compare with these units. RIAA/NAB equalized ± 1 db, 0.5mV sensitivity at 1kHz for +4dbm out, balanced outputs, -75db s/n at 10mv in, 0.05% distortion, +21dbm max. out. Internal power supply.

MP-8E Mono \$86 SP-8E Stereo \$137

MIC & LINE AMPLIFIERS

Dual function and superb performance. Inputs for mic and line, ± 0.5 db response 10Hz-20kHz, 67db gain on mic channel(s) +26db gain on line inputs. Balanced inputs & outputs, +21dbm out max, 0.1% distortion. Internal power supply.

MLA-1E Mono \$98
MLA-2E Dual Mono/Stereo \$139

AUDIO DISTRIBUTION AMPLIFIERS

From 1 in/6 out to 20 in/80 out in one small package. Whatever your distribution requirements we have an answer. All units meet or exceed the following specifications: Balanced bridging/matching inputs, balanced 600ohm outputs, ± 0.5 db response 10Hz-20kHz, ± 3 db 5Hz-40kHz, 26db gain, +21dbm out. max. capability, 0.1% or less distortion, outputs isolated by 80db, hum and noise 90db down referenced to +21dbm out. Internal power supplies.

DA-6/E Table top. 1 in/6 out. \$131
DA-6R/E Rack mount. 1 in/6 out. \$149
DA-6BR/E Rack mount. 1 in/6 out. Individual level controls for each output. \$165
DA-6RS/E Rack mount. 1 in/6 out stereo or 2 in/12 out mono. \$229
DA-16BR/E Rack mount. 1 in/8 out stereo or 2 in/16 out mono. Individual output level controls, selectable metering & headphone monitoring. \$287
DA-2080/E Rack mount main frame with protected

power supply, metering & headphone monitor. Will accept up to 10 slide in modules. Each module has 2 inputs & 8 outputs. Individual output level controls & selectable meter switch. Up to 20 in/80 out.

DA-2080/E Main Frame \$150
DA-2080/E Modules 2 in/8 out \$135 ea.

AUDIO CONSOLES & CONTROLLERS

Our new series 35 audio controller introduces a new concept in audio mixing. Allows separation of controls from the audio functions. Controls can be placed in any convenient location in the studio, while electronics may be mounted anywhere for easy maintenance & hookup. Remote DC control for completely unaffected audio.

This versatility gives you a custom designed console at a standard production model cost.

Features include; 8 channels, mono, dual channel mono, stereo, dual channel stereo, or combinations; paralleling 2 units for quad, fail safe power supply & plug in interchangeable cards.

Performance specifications are; 0.3% or less distortion, 124dbm equivalent noise on low level channels, approximately 25w power consumption, -70db crosstalk, balanced bridging/matching inputs & response within ± 2 db 20Hz-20kHz. Series 35 audio controllers start at \$1200.

AUTOMATIC TAPE CARTRIDGE AND CASSETTE LOADERS

So easy to use & accurate that our largest winder competitor has been using one of these to load their own carts.

Eliminates guesswork. Set the dials to the length desired. The exact amount of tape is fed onto the cart or cassette hub and then shuts off automatically. Also has exclusive torque control for proper tape pack on different size hubs. Winds at 30 IPS.
ACL-25/E \$185

Winders also come in higher speed models (ACL-60 series). Same operation as above but winds at 60 IPS. Accepts 14" pancakes.

ACL-60T/E (tone stop only) \$266
ACL-60B/E (Blank tape loader) \$331
ACL-60BT/E (for both prerecorded and blank tape) \$375

STUDIO MONITOR AMPLIFIERS

Exceptional reproduction! Internal muting, ± 2 db response from 20Hz-40kHz. 25w music power, 20w RMS into 8 ohms. Hum & noise 65db below rated outputs.

Distortion less than 0.25% at less than 20w out, 1% or less at 20w. Works into 4-16ohms. Balanced bridging inputs, variable bass contour, internal overload & short circuit protection.

SMA-50/E Table top (mono) \$125
SMA-500/E Rack mount (mono) \$142
SMA-1000/E Rack mount (stereo-40w) \$196

REMOTE POWER CONTROLLERS (DUAL)

Safe, transient free means of controlling 110V/AC. Turntables, on the air lights, etc.

PR-2 (toggle switch on/off) \$39
PR-2B (momentary contact actuation) \$54

Give us a call or write today for further details. You'll be money and performance ahead.

CALL COLLECT — (916) 392-2100

WRITE — 3516-C LaGrande Boulevard
Sacramento, California 95823

RAMKO RESEARCH

Circle 17 on Reader Service Card

www.americanradiohistory.com

Put your money where your mouth is.



Sharp words But sound ad vice when you re choosing a mi-crophone for voice recording.

And when it comes to faithful voice reproduction in the most demanding recording and broadcast situations, we dont know of any microphone that can compare with our Beyer M 160

The unique double ribbon design of the M 160 can un-erringly reproduce the most subtle nuances of speech and music. And its super cardioid pattern assures superb front to back discrimination while rendering the M 160 almost immune to feedback.

Naturally, this kind of quality and performance doesn't come cheap. The Beyer M 160 costs \$230.

But when you think about it that's a small price to pay for never having to say you're sorry.

Another innovation from Beyer Dynamic, the microphone people.

Revox Corporation
155 Michael Drive
Syosset, N.Y. 11791

Eugen Beyer
71 Heilbronn/Neckar
Theresienstrasse 8
West Germany

Circle 35 on Reader Service Card

theory & practice (cont.)

is quite unconcerned with the other pieces of your problem, telling you to take them somewhere else. So we have a number of departments, each concerned with a mass of tiny pieces of problems from a great many people. Apart from the fact that such a disjointed approach is very inefficient, it also completely misses the relationships between the problems.

Currently, two big pieces of the national problem concern energy and pollution. Anyone with an engineering economics background immediately knows that pollution results from misuse, or waste of resources, a direct cause and effect connection. But we find separate agencies trying to do quite opposite things approaching pollution and waste, as if they were entirely separate matters! The same situation is repeatedly found, relative to people's individual problems.

In the school situation, actual application of the "lifelong learner" principle would streamline existing curricula, cut out duplication and reinforce ways of learning new things. The system would end up doing a far better all around job at lower cost. Instead, what do educators do?

They will not cut out anything. Everything already in the curriculum must stay there. Something mysteriously called lifelong learning must be added as an *extra*. Nobody really knows what it means, but it is an excuse to employ more teachers and that is just fine.

Perhaps this hints at a way to select the better places to learn. What we have been saying applies, quite universally, to institutions that look to government funds for everything they do. Suggest something to them, and their response is, "That sounds good, now how can we use the idea to justify getting more funds?" Maybe you were really talking about getting better and more education for less money, so that makes you wonder if they were even listening to you!

The only hope of breaking away from that will be found at institutions that do not chase government funding. This explained what I found at BYU. They are concerned with doing the right thing, not with doing what they can get funded.

MEDIATED INSTRUCTION

Perhaps we are hopelessly committed to the notion that, before students can learn something, the teacher should already know it. But adherence to that notion is suicide. We are never going to change the great mass of teachers, to enable that to happen. So we must concentrate on reaching



Timekeeper TO-1 Hand-Held Oscillator

Don't let its size or price fool you!

The TO-1 is a new pocket size battery powered test oscillator specifically designed for testing, aligning, and troubleshooting audio equipment, transmission lines and systems. It permits testing of frequency response, distortion, gain, crosstalk and noise for almost any type of equipment. Its performance and specs are of the highest standards, making it an indispensable tool for audio measurements and maintenance, yet it easily slips into your shirt pocket!

TO-1 SPECIFICATIONS

- Switch selectable frequencies:
30 Hz, 400 Hz, 1 kHz, 15 kHz
- Balanced outputs:
+4 dBm and -56 VU into 200 ohms
- Frequency response: ±0.1 dB
- THD (total harmonic distortion):
less than 0.05%
- Frequency accuracy: ±5%
- Frequency stability:
2% for temp. 32-104 degrees F.
- Source (output) impedances:
600 ohms ±5% at +4 dBm,
200 ohms ±5% at -56 VU
- Current drain: 5 mA with 9V supply
- Size: 7¼" x 2" x 1"
- Weight: 6 oz. (169 gm)

Designed to feed a 600 ohm line at ±4 dBm, the TO-1 balanced output can feed any patch bay using a simple patch cord. A calibration curve supplied with the unit indicates the output level for other load impedances as well. An internal trim pot provides an additional variation of oscillator output.

For testing purposes, the TO-1 can be used as any other type of high quality audio oscillator with the additional ability to truly resemble a floating balanced signal source, with distortion and noise levels matching the best available microphone. It is a perfect substitute for any unbalanced signal source as well.

Since it is battery operated, it can be used as a portable test oscillator in practically any field situation. At its low price, it can be an indispensable tool in any studio, shop or station.

The TO-1 carries a 1-year warranty.

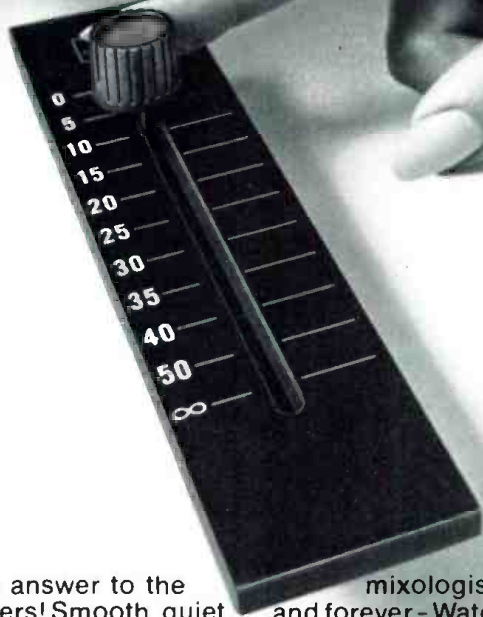
To order, send check for \$59.95 (includes shipping costs) (N.Y. State residents add 7% sales tax) to:

TIMEKEEPER
Box 35, Great Neck, N.Y. 11021

Circle 39 on Reader Service Card

Waters Attenuators

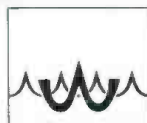
smooooooth



The answer to the mixologist's prayers! Smooth, quiet, and forever - Waters MystR® conductive plastic faders.

The Waters line of professional audio controls covers every need of the professional recording or broadcast studio. Linear or rotary motion, mono, stereo, or quad, all using Waters' glass-hard MystR conductive plastic elements and slip rings and precious metal contacts. Only Waters audio controls are made using our automatic curve shaping to provide linear, modified audio, or logarithmic tapers which really track. Standard impedance values of 600 or 10,000 ohms available right now.

If your thing is mixing, we'll help you. Send today for full information on Waters professional audio controls. Or call us at 617-358-2777 if you can't wait for the mail.



**WATERS
MANUFACTURING
INC.**

Longfellow Center, Wayland, MA 01778

I'd like further information on Waters attenuators and MystR conductive plastic elements.

- Send me your attenuator brochure and "The MystR Story".
- I need additional information: _____

Name _____

Position _____

Company _____ Phone _____

Street _____ City _____

State _____ Zip _____

Circle 18 on Reader Service Card

www.americanradiohistory.com

theory & practice (cont.)

the students, which is where mediated instruction, including audio-visual materials comes into the picture.

That is an important reason why this publication and its readers need to involve themselves in education. How else will mediated instruction created by the audio industry ever succeed? Leave it up to some teachers, and they will merely use it to continue what they are already doing. That is the only way they can think.

Plastic Reels Shipped from Inventory
Mfrs. of Amerline reels
Polyline Corp.
312/298-5300
1241-Rand Rd. Des Plaines, Ill. 60016



Circle 27 on Reader Service Card

SESCOM'S NEW CABLE TESTER

Tests For: Continuity • Opens • Shorts • Phasing — Professional Net \$21.50/Send for Spec Sheet



Quality Engineered Sound Products
SESCOM, INC.
P. O. Box 590, Gardena, CA 90247 U.S.A.
(213) 770-3510 • TWX-910-3286189

Circle 26 on Reader Service Card

Often, the programmed instruction, following lifeless directives, turns into something arid itself, negating its very purpose.

For example, before I left Teaching Research, the last assignment I was offered was to update a mediated and programmed course in Dental Anatomy. This six or seven part course started by telling the dental students, in very easy bites, (sorry about the pun) what a tooth is.

For example, it would tell them, "The enamel is the hardest part of a tooth." Then it would ask, "What is the hardest part of a tooth?" Then perhaps, "The enamel is what part of a tooth?" If the student could correctly answer those questions, he would proceed to the next piece. In the whole course, there was nothing to promote intelligent thought, such as why teeth, or the jaw they are in, are made that way, to serve the function of eating.

Presumably, a year or two later, as he pushed a drill into someone's tooth, the student would discover how hard enamel is. I asked about the rote fact orientation of the course, because if I revised it, I wanted to change that. There was a reason: students who enter dental college are incapable of creative or intelligent thought, so we must not expect it of them!

AVOIDING THE FUNDING TRAP

My apologies to dentists, but government funded projects are committed to that kind of philosophy. Teaching material can be updated, but not made creative. The only hope is outside of government funding. Let me illustrate what can be done, by briefly telling a little about what we are doing at Educational Research Associates, without a penny of government funding.


The course on *Basic Electronics* prepares the student for continued growth as technology advances by showing him how advances are made, new ideas developing from established concepts, not just feeding him so-called facts, all predigested.

The course in *English* includes all the grammar and syntax anyone would ever need, quite enough to pass the currently administered English tests. But it is organized around the concept of communication: that speaking and writing constitute sending, while listening or reading is receiving. The important thing is a good *connection*, which needs attending to from both ends. The course comes alive with examples of communication gaps, and how they may be overcome.

The *Physics* course tells how we find out about the world around us, starting from everyday observations, too many of which we pass up without thought as commonplace, and proceeding to the last lesson, on "Looking Forward to the Twenty First Century."

The *Problem Solving Arts* course, discarding the wornout old and new math approaches, sets about finding easier and shorter ways to solve increasingly difficult problems, starting with the very simplest. It concentrates on many practical techniques that conventional courses omit, such as tracking down mistakes, being sure of right answers, linking together concepts that enable the student confidently to attack new problems that he has never seen before.

But these courses are only examples, small pieces of the solution to the tremendous need for clarity in education. If we are to revitalize education, once again, matching approach to what is really required, we need to simplify that instead of becoming overwhelmed with top-heavy programs designed to remedy educational deficiencies that should never have existed. In any learning situation, first we must grasp the basics involved and then decide how we can present them in the most efficient, meaningful way. If necessary we can achieve this through, and in spite of, the system. And once we have done it, we need to go to work and to do more of it. ■



tension control

ATTENTION AMPEX OWNERS: TENTROL provides constant tape tension from beginning to end of any size tape reel by controlling the torque of the supply-reel motor Ends pitch change with reels as large as 14 inches Extends head life Improves high-frequency performance Kit is easily installed in the field on nearly all Ampex professional studio recorders and tape duplicators \$270 for Ampex AG-440C kit; \$300 for all others.

INOVONICS
INCORPORATED
1630 Dell Avenue, Campbell,
CA 95008 (408) 374-8300

Circle 25 on Reader Service Card

deal of thought to the improvement of the present and creation of new future instructional aids to keep up with the potential of the technical advances. But that's a whole 'nother subject.)

Audio Visuals in Education

● Most professional educators are aware of the great variety of audio-visual devices and materials available for their use in teaching. But they, as well as their students, may not be fully cognizant of all the latest equipment and applications or aware of those who use the equipment and devise the techniques and related software.

One of the best ways to keep up with what is new in any field is to attend exhibits and conventions devoted to the specific fields of interest. An example, devoted to the educational and training hardware and software, was the 1974 convention of the Association for Educational Communications and Technology. This organization, headquartered in Washington, D.C., provided members and anyone else who was interested, with a very large exhibit of equipment, devices, and materials available for use in education, as well as many discussion sessions related to education, its media, and the latest in concepts and techniques.

The convention took place early in the year, ran a full week, and had about 250 exhibitors of items ranging from stick-on labels to complex video-editing systems. Presentations covered such subjects as education of minorities, teaching the handicapped, uses of various types of equipment, and other education-oriented subjects. Before taking a more specific look at this convention, the equipment, the applications and the possibilities for students in the related fields, here's a brief look at the AECT.

The organization is made up of those directly or indirectly involved with education, training, and related audio-visual materials. That would include teachers, principals, superintendents, curriculum specialists, training directors, librarians, audio-video specialists, graduate students, behavioral specialists, and educators in religious, industrial, military, medical and governmental organizations. There are also business memberships whereby companies and their employees can participate and contribute to the programs of the AECT.

SUBJECTS COVERED

For the educators, the titles of some of the subjects covered in the presentations were: "All About It," an introduction to Instructional Technology by A. C. Wagner of Wagner College,

covering ways and means of modern communication techniques for classroom use, the growth of technology, current practices, and theoretical applications; "Academic Tradition and Instructional Technology" by L. E. Fraley and E. A. Cargus of West Virginia Univ.; "Population Education" by Ralph Wileman of the U. of North Carolina; "Understanding the Black Learner" by Lionel Duncan of Morgan State College; "Today's Community College" by David Jenkins of Bergen Community College; "Producing Multi-Image Presentations" by Douglas Crane of Arizona State Univ.; and "Slide/Sound Techniques" by Steve Cartwright of the American Hospital Association. This very brief listing offers some idea of how wide a range of interest the sessions took into consideration.

Among the exhibitors, about half were involved or directly associated with software. That would include companies which publish text books, instruction manuals, magazines, encyclopedias, catalogues, and charts, as well as makers of globes, models, and maps. Also in this group might be producers of slides, films, transparencies, taped programs, and the makers of the materials on which these audio-visual aids are produced. In this group alone, many of the items shown and demonstrated are usually taken for granted by those that use them. But if consideration is given to the design and making of these educational aids, a great number of present and future careers become apparent. (In fact, it might also be well to give a good

SOFTWARE CREATIVITY

In the software fields, there is great potential for those with creative, artistic and production talents. Among the most widely used materials in any classroom is the educational film. Many of the film exhibitors produce and distribute these to interested schools or institutions and offer possible futures for talented young people.

Let it be said here that no exhibitor made any specific mention of opportunities. But it is quite easily seen that with the number of this type of exhibitor, and the number of applications for their product, here is a field worthy of exploration for the future. Creativity in handling the camera, directing others to do so, editing the film, developing negatives and introducing special color and movement effects can help greatly in the production of an interesting and important educational aid.

There is also a very vital position in the film production area for the audio specialist who is involved with recording sound on the filming site, in the studio, mixing the components, editing and introducing special effects and then re-recording the final sound track onto the final film. It may be true that a picture can be worth a thousand words, but in education the oral portion of the lesson can be as important, if not more so, than the pictures and they (the audio tracks) should be as good as they can possibly be.

There are also creative possibilities for writing talent in the creation of the oral and written material to be used for communicating educational



An example of the sophisticated equipment being used for educational audio/visual programs is this Automated Cassette Duplicator system, produced by Recortec, Inc. of Sunnyvale, California. The system shown has been installed for Educational Sensory Programming (ESP), an Arkansas based corporation producing prerecorded educational cassette programs. The ACD high speed duplicator copies tape at 32 times normal speed and simultaneously loads the recorded tape into cassette shells to produce the finished product in a one-step operation. Near the equipment are Bill Lawless of Recortec (left) and Bob Nelson, executive director of E.S.P.

sound with images (cont.)

information to others. Artistic talent is invaluable in the production of much of the material used in film and slides. Those who specialize in the production of graphics, illustrations, animatics (drawings used in place of live talent for some film material) can also find possible opportunities in software production companies. Incidentally, although film production was mentioned here, there are similar possibilities for those who are interested in slides, another very widely used training material, and also in transparencies which are used on overhead

projectors, and filmstrips which are also widely used either with or without an accompanying sound disc or tape.

HARDWARE POSSIBILITIES

Among the hardware exhibitors, there were the usual manufacturers of film projectors (both 8 mm and 16 mm), slide projectors, various software production devices, makers of tape and technical equipment such as tape recorders and remote access devices, manufacturers of programmed learning and response systems, and companies that offered associated equipment or furniture such as language labs and study carrels.

But the largest and most impressive exhibits (judged in part by the number and interest of passers-by who stopped to look and learn) were those devoted to demonstrating video equipment. Since video has become available to the training and educational fields, it will (if it hasn't already) surpass all other methods of transmitting information, not only in total mass and quantity, but in effectiveness as well. The number of video exhibitors may have been small, but their products have become accepted by so many in their homes before this, that now it has become a most natural carry-over to educate in the classroom.

Among the exhibitors there were manufacturers of TV sets, cameras, video recorders, and complex studio production equipment and systems. Much of this equipment is now being used in schools from the lower grades to the universities, and many educators and students may be aware of the general systems being used. There are, however, some newer units worthy of mentioning, not only for their capabilities and possible applications, but also for their potential to the student interested in getting involved in video as a future career.

ADVANCES IN TAPE

The equipment shown at the convention included the now standardized 1/2-in. tape width (which means that recordings made on any 1/2-in. machine of any manufacturer conforming to the standard can be played on any machine of any other maker also following the prescribed requirements), units using the same 1/2-in. tape width but in cartridges or cassettes, and machines using the newer 3/4-in. tape width in cassettes. In this latter category, it was not possible to edit the tape to produce a clean cut from one scene to another (the cut part of the tape caused a roll-over of the image on the screen) until recently. Now there is equipment and a system for making a professional cut that is totally undetectable if performed properly.

In fact, there are several systems for accomplishing this. One uses a small master console to set up the tapes and then record only those portions that are desired in the final presentation. Another uses a very intricate computer to perform professional editing electronically whereby a complete sequence or showing can be assembled automatically by presetting the proper information in the memory banks. There is also a system for making editing notes with an electronic pen which allows the equipment to make the cuts according to the instructions.

For those interested in the techni-

IT DIDN'T EXIST SO WE DESIGNED IT OURSELVES



AUDIO BY ZIMET IS PROUD TO ANNOUNCE THE SOUND WORKSHOP 882 RECORDING/P.A. MIXING CONSOLE

To fill a need for our own commercial sound work, we at AUDIO BY ZIMET have combined forces with the SOUND WORKSHOP and designed an 8-in/2-out mixing console of superlative performance which is equally at home in the studio, or out in the field for sound reinforcement. Unconventional design and construction have allowed us to maintain professional quality throughout, yet maintain a modest price tag.

All 8 inputs include:

- mic/line switching-transformerless low impedance mic inputs
- wide range feedback-type trim control
- high and low frequency equalization (± 15 dB)
- solo activate switch with provision for monitor buss interrupt
- channel mute switch
- monitor send (pre-fader) for independent monitor mix
- echo send (post fader)
- panning to both main output busses
- calibrated rotary-type fader
- independent channel output for multi-track recording and special effects

Outputs: left & right program; monitor; echo; solo; 8 channel directs.

Meter panels, monitor switching box, and other accessories available.

The SOUND WORKSHOP 882 RECORDING/P.A. MIXING CONSOLE is just one of a growing line of quality professional audio products, which carry a 2-year parts and labor guarantee.

At \$1200, we feel the 882 is a sensible price/function compromise, with no compromise on quality. Write for detailed spec sheet, or send \$3.00 (applicable towards purchase) for complete operations manual.

**AUDIO BY
ZIMET**

↔ **Sound Workshop** ↔

exclusive distribution

1038 Northern Blvd., Roslyn, New York 11576 • 516-621-0138

Circle 28 on Reader Service Card

www.americanradiohistory.com

cal fields, there does not seem to be any end to the possibilities of the future. For those interested in present applications, this newest development allows a complete production facility to be built in a central location from which video cassettes in the 3/4-in. format can be distributed to other locations. Since the 3/4-in. format has become an unofficial standard, tapes can either be sent, or transmitted via a cable system and recorded on matching equipment at the other locations on the system. Cable and microwave transmission have had a very great effect in the distribution potential of television. Within a school, for example, it is possible to show an experiment to any number of classes even when it might be almost impossible for the students in the lecture room to see the experiment clearly without TV.

LINK WITH VIDEO

Now, with color equipment, and the small hand-held camera becoming available for technically acceptable pickups at a fairly moderate price, the video system can go almost anywhere. Whole portable recording systems, in both 1/2-in. and 3/4-in. formats, provide the producers and the schools with a most valuable and effective tool in the education process. Recording on battery-operated units and then playing back (with or without editing) immediately or in some other location provides the educator with a system and technology that can have greater influence in the learning process than almost any other medium. The ability to store programs for future showings or to erase them as soon as desired and to use the tape again can make the video system more widely used than other type of teaching device.

Here, too, the opportunities for career-minded students are unlimited. Production, writing, technical (camera-person, editor, sound man—or woman) are only a few of the possibilities. Here, also, great importance should be placed on the software being stock-piled for teaching and the need to match the potential video offers.

With the speed of technical advances and improvements, it is vital that software keeps up. Perhaps the future audio-visual educators, the present students, will make sure of this. Incidentally, the AECT convention in 1975 will take place in Dallas April 13-18; in Anaheim, Calif. from March 28 to April 2 in 1976; in Miami Beach in April of 1977; and in Kansas City in April 1978. Just thought we'd let you know so you can make your plans.

Our selling premise is

Simple...

STL magnetic Test Tapes are the Most Comprehensive

We offer precision magnetic **in the World** test tapes made on precision equipment for specific jobs in 1" and 2" sizes as well as flutter tapes and all other formats.

When you use STL test tapes you combine interchangeability with compatibility. You know you are using what other leaders in the professional recording, equipment manufacturing, government and educational agencies throughout the world are using.

Make sure your system is in step with the rest of the industry.

Write for a free brochure and the dealer in your area.

Distributed exclusively by Taber Manufacturing & Engineering Co.



STANDARD TAPE LABORATORY, Inc.

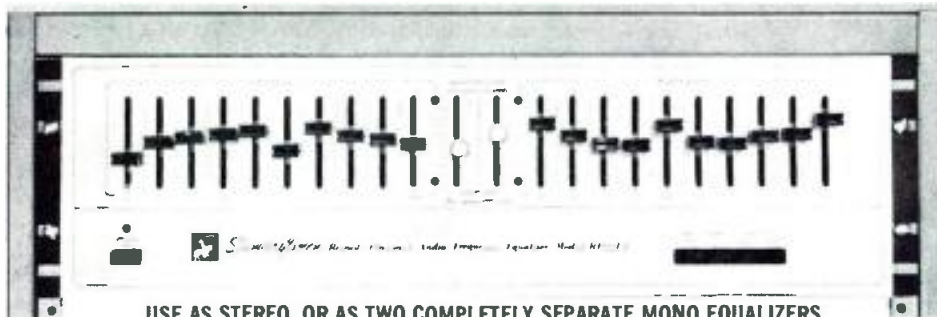
2081 Edison Avenue
San Leandro, CA 94577
(415) 635-3805

Circle 29 on Reader Service Card

EQUALIZATION

by Soundcraftsmen

PERFECT tailoring of octave-wide bands... Infinitely variable adjustment flexibility...
L.E.D.'s for zero gain monitoring... Instant re-setting via Computone-Charts



USE AS STEREO, OR AS TWO COMPLETELY SEPARATE MONO EQUALIZERS

RADIO - TV APPLICATIONS Equalize telephone "talk shows" for voice intelligibility programming • Pre-program tape production for automated or engineered programming • Enhance live and taped broadcasts for optimum frequency balancing • Improve "remote audio-casts" for studio quality performance

RECORDING - STUDIOS Equalize various instruments for proper recording balance • Compensate for difficult microphone placement • Adjust individual frequency ranges for room acoustic inadequacies

SOUND REINFORCEMENT Blend voice and instrumental live performances • Eliminate feedback and reduce the possibility of ringing

FEATURES DISCRETE-OCTAVE EQUALIZATION CONTROL of ten octaves on each channel, ±12db each octave • FULL-SPECTRUM LEVEL CONTROL for each channel • AUTOMATIC CONTINUOUS MONITORING by light-emitting diodes for visual warning of overload in output circuits • VISUAL ZERO-GAIN EQUALIZATION BALANCING on music, white noise or pink noise • LINE OR TAPE equalization selector • AUTOMATIC EQUALIZER-DEFEAT when line or tape equalizer is not in use

SPECS TOROIDAL and ferrit-core inductors • FREQUENCY response: ±1/2 db from 20-20,480 Hz at zero setting • HARMONIC DISTORTION: Less than .1% THD @ 2 v., Typ: .05% @ 1 v. • IM DISTORTION: Less than .1% @ 2 v., Typ: .05% @ 1 v. • SIGNAL-TO-NOISE RATIO: Better than 90 db @ 2v. input.

For information
phone 714-556-6191

RP2212-600 — \$399.50

includes walnut-grain
cabinet or rack mount

Circle 30 on Reader Service Card

db new products & services

ONSTAGE MICROPHONE



● Designed specifically for applications in entertainment, where appearance counts, model 589S Unidyne cardioid mic has a 3/4-inch case, small grille with integrated windscreen and a glare-free metallic finish. The cardioid pickup pattern is symmetrical about the axis and uniform at all frequencies. Other features include dual impedance, frequency response tailored to compensate for proximity effect, and a built-in on-off switch with lock-plate. Hand held or stand-mounted; the stand adapter has a locking ring and a 15-foot hum-shielded cable with a female three-pin audio connector at the microphone end.

Mfr: Shure Bros., Inc.

Price: \$51.00

Circle 46 on Reader Service Card

PROGRAM LIMITER



● Available on a variety of printed circuit board sizes, this limiter was designed to complement the manufacturer's consoles, but is also available individually. It features a "ducking" characteristic, whereby an external voltage applied during announce microphone closure permits "ducking" of the channel level by a preset amount. The unit also produces an adjustable "knee" on limiting curve: 20:1 limiting ratio, 40 dB limiting dynamic range, and 10 dB nonlimited gain. It is suitable for individual channel limiting.

Mfr: Dyma Engineering

Circle 42 on Reader Service Card

HARMONIC ANALYZER SYSTEM



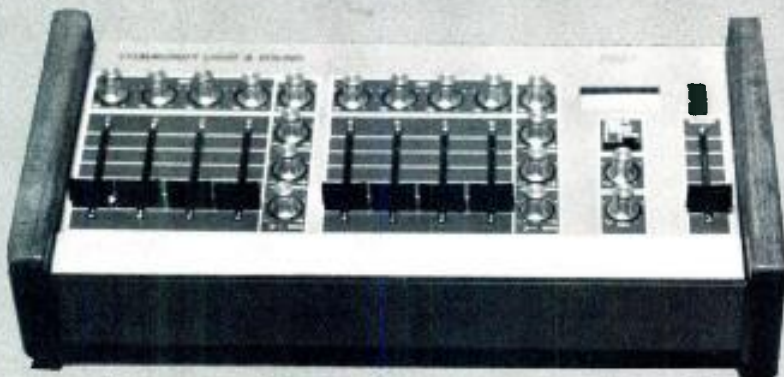
● Speedy calibration, signal-to-noise ratio measurements, as well as frequency response testing, are possible with the compact (5 1/4 inches high, twenty five pound) model 101B harmonic analyzer system. 101B, useful for monitoring tape recorders, tape cartridge, or cassette recordings, contains a continuously variable 100 Hz-5 mHz oscillator, an automatically tracking wave analyzer tuned to both second and third harmonics of the oscillator frequency, and a wide-band voltmeter which ranges automatically to give direct voltage or harmonic distortion readings. According to the manufacturer, the calibration process is reduced to minutes and the device does the work of a rack of calibration equipment, signal patching, and cabling. It's engineered to IRIG standards and measures second or third harmonic distortion of fundamentals up to 1 mHz and voltage up to 5 mHz.

Mfr: Vu-data Corporation

Price: \$3,495.

Circle 43 on Reader Service Card

A TIDY LITTLE PIECE



At last—a rugged, versatile PA mixer at a truly reasonable price. Features of the Z821 include eight mic inputs, two—three position equalizers, two monitor outputs and a separate reverb mix that can be used with the built-in reverb unit or jumped out for use as a separate cue or monitor mix. At \$440.00 Fair Trade List, including its remote power supply, it could fill a lot of your mixing needs.

Community Light & Sound

5701 Grays Ave., Phila., PA. 19143

215-727-0900

Circle 34 on Reader Service Card

PRECISION TEST CLIPS



● Designed to work in extremely small printed circuit boards, integrated circuits, fully insulated 101 series miniature gripper clips feature an "eagle nose" closure which facilitates disconnection. The clips are available in five basic types and six colors, for coding. They accept both cable and banana plug leads. Dimensions are 0.5mm or 1.0mm.

Mfr: SPI/Electronics

Price: \$65.00 for sample set.

5 models in 6 colors.

Circle 44 on Reader Service Card

For sheer reliability, few things can beat our RE15 microphone:



And we're conceding only the slightest of edges to the sun.

Because the RE15 is one mike you can always count on to give you the same reliable response at any distance, any angle. It's a Continuously Variable-D® cardioid microphone—an exclusive E-V design*. Once you've set your equalization, all that varies is the level.

Unwanted noise is no problem, either. Not with a super cardioid pattern that provides maximum rejection at 150° off axis. So when the mike is tilted in its most natural position—30° from horizontal—you'll be sure of getting maximum rejection in the horizontal plane. And there's a 100-Hz cutoff "bass tilt" switch for boom use and

other long reach situations.

Other features abound. Like a "hum buck" coil to supply an extra 25 dB of hum rejection. And a rugged design that stands up to shock and mechanical abuse.

The Electro-Voice RE15. So you can work

with confidence in the most demanding professional applications.

RE15...\$180.00. RE16...(with blast filter) \$190.20. And for slightly less demanding situations, RE10...\$110.10. RE11 (with blast filter)...\$120.00. Suggested Resale Net Prices. Slightly higher in Western States.

*U.S. Patent Number 3,115,207 Trade mark registered

Electro-Voice INC
a **gulton** company

Electro-Voice, Inc., Dept. 151BD
686 Cecil Street, Buchanan, Michigan 49107



Circle 37 on Reader Service Card

www.americanradiohistory.com

**FOR SALE,
USED RECORDING EQUIPMENT
BARGAINS FROM
AUDIOTECHNIQUES, INC.**

Mostly trade-ins on new MCI recorders and consoles, offered in "as is" condition, with lots of hits remaining for the taking.

122-16 . . . MCI JH-8

16-track record/reproduce with auto-locator, in daily use at major label studio, lots of hits recorded and mixed on this oldie but goodie . . . only \$8.6K

124-2 . . . Scully 284-8

8-track with Syncmaster, the most popular 8-track of them all, in good operating condition . . . \$7,550.

124-3 . . .

12 track Scully with 2 transports (one inch and half inch), extra 8 & 4 track heads, in good condition, use as separate 8- and 4-track machines, or together as 12-track, one console mount houses both transports, 12 track syncmaster, original cost over \$22K . . . \$9.8K (pick up an extra 2 track head and you've got it all!)

124-6 . . .

12 track Scully with 8 & 4 track heads, remote and sort of a Syncmaster, rough, but it runs fairly quiet and you can't beat the price . . . \$6.7K. (This is what the real estate folks would call a "handy man" special!)

124-8 . . . Scully 282-4

4-track in console, tape lifters, old style, but still in great shape . . . \$2,700.

124-9 . . .

Scully 100 with every extra available. 16-track with extra 8 track heads, extra remote panel, now in regular operation for rock, a real bargain for \$11K.

124-11 . . . Scully 288-16

Big Scully 16 track that's still the favorite of many major studios (ask A&M), originally sold with Syncmaster for over \$24K, this one's in regular service and a real bargain for only \$12K.

128-3 . . .

Audio Design 12 input 4 output console used in well known 8 track studio, all the standard Audio Design built in quality and performance, good looking board, only 2 years old, cost nearly \$20K . . . \$10,500.

129-4 . . .

18 input 16 output custom built console, with compressors, eq, pots, lots of goodies, patch bay, now in use in well known 16-track studio, cost over \$22K . . . \$7,100.

129-8 . . .

16 input 12 output console (plus 4 onboard outputs) Audio Design faders and line amps, patch bay, loaded with extras, needs some work, but the components alone are worth over \$11K . . . only \$3,700.

Several more 12 track, 8 track and 2 track Scully's offered at great bargain prices . . . call us for your needs and see what we have at the time. All these units offered subject to prior sale, 10% deposit holds for two weeks inspection, deposit refundable if you can't get together with us or the owners.

AUDIOTECHNIQUES, INC.
142 Hamilton Ave.
Stamford, Conn. 06902
Tel: (203) 359-2312

new products & services (cont.)

COMPENSATOR FOR DOLBYIZED BROADCASTS



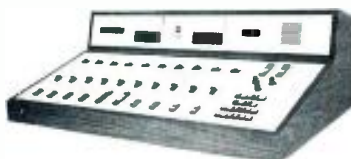
● An increase in the number of listeners getting benefit from Dolby™-ized f.m. broadcasts, which cannot be decoded without special equipment or recorders incorporating such capacity, is made possible by a simple compensator device, model 621. The unit changes conventional 75 microsecond f.m. de-emphasis characteristic to the 25 microsecond characteristic used in Dolbyized f.m. broadcasts; it can be used in either form. In addition to facilitating the pickup of encoded material, the device also makes it possible to record Dolby broadcasts in B-type encoded form. The unit is installed by disconnecting "record out" leads from "line in" jacks or recorder. "Record out" leads are then connected to the compensator input jacks and the compensator is connected to output leads of the recorder or noise reduction unit. The compensator switch is then set to "75" for regular f.m. broadcasts or "25" for Dolby broadcasts.

Mfr: Switchcraft, Inc.

Price: \$12.95

Circle 49 on Reader Service Card

DUAL MONOPHONIC CONSOLE



● Ten channel dual monophonic console MA 31 features an automatic cartridge channel. Four momentary illuminated pushbuttons allow automatic start and audio switching on each of the two cartridge input channels, making it possible to accommodate a total of eight cartridge machines, or, if cross-fading between cartridge machines is desired, duplication of the cartridge machine output

on the individual channels. There are two microphone channels, two turntable channels, automatic cartridge switching on two channels, with inputs for reel-to-reel and remote use. The console also features automatic monitor switching, automatic cue switching—turntables are automatically switched to the cue buss when turned off—and automatic headphone switching. Full six-function remote controls for two tape machines are provided. An elapsed timer with automatic reset and start are incorporated in the console; a realtime digital clock is supplied. Both program and audition channels are identical. The cue channel contains an internal cue speaker and amplifier.

Mfr: Dyma Engineering

Price: \$6,995.

Circle 50 on Reader Service Card

FLEXIBLE PLASTIC CONDUIT SYSTEM

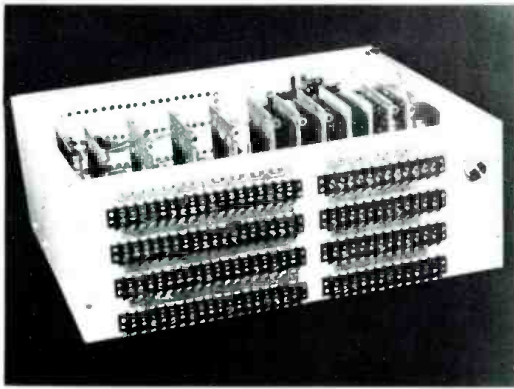


● Simplification of wiring and harness fabrication is aided by the use of Z-Flex, a new flexible plastic conduit system, which consists of a crush-resistant plastic conduit formed in continuous convolutions for maximum strength and flexibility. Used with special Z-Flex fittings, the entire system snaps together instantly with finger pressure; it can be reopened and re-used over and over if desired. It comes either as a solid tube or split longitudinally. When slit, it allows easy slipover installation around the conductor wires without use of fishing-line methods. The accompanying fittings, including "T"s, outlets, etc., come open. When snapped shut at any desired point on the conduit, special ribs on the inside of the fitting lock onto the grooves of the conduit. A simple unlocking movement allows reopening when necessary. Available in a choice of three rustproof materials, including a flame retardant type. Z-Flex comes in six different I.D. sizes, in 100 foot lengths. It can be easily cut to a desired length.

Mfr: Zippertubing Company

Circle 51 on Reader Service Card

AUDIO CONSOLE



● A completely d.c. controlled design permits series 35 console to be used in a standard tabletop configuration, rack mounted, or in custom applications. With d.c. used to control mixing and switching in the main frame, any combination of rotary, slide or pushbutton faders may be used, as well as any physical grouping or arrangement of the controls without hum pickup or ground loops. The unit has eight channels: mono, dual channel mono, stereo, dual channel stereo. It has a fail safe power supply and plug-in interchangeable cards. The manufacturer claims 0.3 percent or less distortion and 124 dBm equivalent noise on low level channels.

Mfr: Ramko Research

Price: \$1,200 up.

Circle 52 on Reader Service Card

MULTI-TWEETER LOUDSPEAKER



● A multi-tweeter array with a full 160 degree dispersion in both the vertical and horizontal planes is distinctive in the FRM-2 loudspeaker. This is achieved by mounting three moving coil tweeters in a trihedron array. The FRM-2 uses a ten inch acoustic suspension woofer with a narrow voice coil gap, which the manufacturer claims provides the efficiency of a vented design without sacrificing low bass.

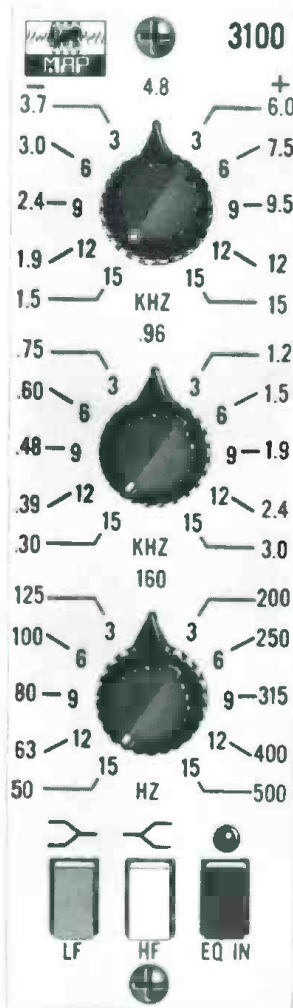
Mfr: Micro Acoustics Corp.

Price: \$129.

Circle 53 on Reader Service Card

MODULAR AUDIO PRODUCTS

Graphic/Shelf Equalizer with REPEATABLE EQUALIZATION



Model 3100 ■ Actual Size

■ Three independent overlapping frequency ranges; 50Hz to 500Hz, 300Hz to 3KHz and 1.5KHz to 15KHz, with 11 detented center frequencies per range.

■ Selectable Bell shaped or Shelf response curves on high and low frequency ranges.

■ -15dB to +15dB cut and boost, 11 detented positions.

■ Silent equalization in-out switch with LED indicator.

■ High output capability, up to +27dBm into 600Ω, TYP THD .05%.

■ Low noise, -90dBm unweighted, 20Hz to 20KHz.

■ Frequency

■ Level

■ Curve Shape

Modular Audio Products is an engineering oriented company providing a complete line of console and studio components. In addition to supplying the finest quality products, we also provide the technical and application backup to go with them.



Call or write us today for information on this and other state-of-the-art units.

MODULAR
AUDIO PRODUCTS, Inc.

A UNIT OF MODULAR DEVICES, INC.

1385 Lakeland Ave. ■ Airport International Plaza
Bohemia, New York 11716 ■ 516-567-9620

Circle 31 on Reader Service Card



Instructor John Barsotti prepares for class session in the main control room, while students set up for the evening

recording session. John is seated at dual Cetec console, to his left is rack mounted Ampex 4-track.

RON ZISKIN

Sound Education By the Bay

With well-equipped facilities, this West Coast university is offering valuable experience in sound recording for film, broadcasting, commercial recording, and live performances.

In addition to his association with San Francisco State University, Ron Ziskin is connected with Creative Media for Children, a firm specializing in educational a/v materials.



During the summer session, a temporary mixdown room is set up, with a Langevin board and two tape machines. Instructor and soundman Vance Frost is at right.



Shot of individual sound laboratory. Through the glass is the instructor's booth for monitoring and observation. Patch bay and 2-track are rack-mounted at left.

SAN FRANCISCO STATE UNIVERSITY has acquired a reputation for producing individuals who are prepared to enter the television and film industries. That is due, in part, to the well-equipped facilities available to the student in three television studios, a large master-control video center, radio station, film editing and projection rooms.

Until now, the philosophy of the Broadcast Communication Arts Department (BCA) at S.F. State has reflected that of professional industry, namely, a greater stress on visual content than on sound. A change in this philosophy is evident with the unveiling in January, 1974 of a completely new audio complex and program designed specifically for the audio student.

The new complex is located underground, in the University's School of Creative Arts. The facilities include a large recording studio, four sound laboratories with a booth for monitoring and observation by an instructor, a combination classroom and film-projection room, and several offices. The program designed for these facilities will enable the student to obtain valuable experience in sound recording for film, broadcasting, commercial recording, and in sound reinforcement for live performances.

CONTAINS VARIETY OF EQUIPMENT

The studio is equipped for 4-track recording, and was designed as such for a specific reason. Several of the above

mentioned areas of sound often require a certain amount of pre-mixing during professional applications. Most complex recordings at S.F. State will also require live mixing, so students will be prepared for such situations once in the field.

The control room of the main studio contains dual Cetec mixing consoles. The left hand console (10 in, 4 out) is for recording, the right hand (8 in, 4 out) for mixdown. There are two AKG echo chambers, four U.R.E.I. limiters, eleven assorted power amps (Altec and RCA), four Altec graphic equalizers and eight Altec monitors. The 4-track tape machines are the new AG440C's and an Ampex 445. There is also a 440A 2-track. The four practice sound labs each contain a Sparta ASC-305B stereo studio control, Sparta stereo cart reproduce unit, and an Ampex AG600 with a remote.

Because the facilities are housed in a state educational institution, some interesting problems arise now and then. The State of California requires classroom lighting in all educational facilities, even in the studio (it is a classroom of sorts). That means an annoying buzz, especially annoying during those quiet, yet critical, recorded passages that occur so often. To overcome this problem, staff engineer Brian Weiner (who to a large degree is responsible for the overall design of the studio) installed the ballasts in a soundproofed microphone locker. For mood lighting, incandescents were also installed in the control room and studio.

(continued)



Audio Coordinator Paul Smith (left) and John Barsotti (seated) discuss setup problems with a student. The rack behind and to the right contains 4-track, patch bay, the limiting amplifiers and graphic equalizers. Everything is color-coded for easy identification by new students.



Recording group for the evening warms up while levels are taken in the studio.

FUNDING WAS A PROBLEM

Another irritation has been, predictably, money. Although Stuart Hyde, chairman of the BCA Department fought long and hard for the facility, it took nearly eight years to procure the funds. According to the State, a sound facility existed. It did. But it was a TV sound facility.

Waiting patiently for the funding to go through was Paul Courtland Smith, Audio Coordinator at San Francisco State. Paul came to the school after a 23-year career in audio. During that time he worked at CBS as a sound engineer for the Bing Crosby, Gunsmoke, Lux Radio Theater, and Suspense radio shows. He also worked at Liberty Records as a sound recordist and editor, and is credited with engineering the King Family, Hollywood Palace, Lawrence Welk and Shindig television shows. One additional note on Paul Smith's background: He learned sound recording on the first two Ampex tape machines, under the guidance of the man who developed them, Jack Mullen.

COURSES—PRESENT AND FUTURE

One very successful feature of the old audio program is being carried over into the new facilities. It is the Stereo Recording Workshop, held every summer. This course provides the student with an intensive experience in recording, studio setup, mixing and music intercutting. Participants also learn to work with musicians and to appreciate the problems encountered by these artists during recording sessions. Instructors for the summer sessions are working Bay Area soundmen Vance Frost and John Barsotti.

Future plans include an interdisciplinary Bachelor of Arts program in Audio Production. Students will be required to cover the necessities, such as acoustics, microphones, solid-state theory, operation and function of all equipment, and lots of production. Courses in music and business management will be required as part of the interdisciplinary concept.

Very likely, postgraduate programs will also be designed for those interested in pursuing specialization in any one area. And for those who might feel that all of this is not enough, consideration of the following is strongly advised: location. San Francisco has to be a beautiful place to learn just about anything. ■



This is the combination classroom and film projection room. Large screen pulls down over the blackboard, speakers and television monitors are built in for sound and video tape playback in the classroom.



Studio 1, where students are instructed in the basics of audio production, and student recordings are made.

Audio Gets Big Boost At Syracuse

In addition to offering audio and audio-related courses, Syracuse University boasts a modern communications center that houses nine studios with finest equipment, as well as a student-run FM station.

MARK R. GANDER

Mark R. Gander is associated with Syracuse University Audio Services. He is a member of the Audio Engineering Society, and is currently completing work on a degree in Audio Technology.

STUDENTS OF AUDIO need both diversity of knowledge and experience with facilities to prepare them for work in the industry. The many schools and departments at Syracuse University offer a variety of disciplines which are involved in audio as well as the facilities to obtain actual experience in the aesthetic, production, and scientific aspects of audio art.

The heart of audio activity on campus is the recently completed Building II of the Newhouse Communications Center. This is the home of the Television-Radio department of the School of Public Communications. In addition to video, film, and office facilities, there are on the fourth floor nine audio studios, geared for a variety of applications.

Studio 1 is a medium-sized studio/control-room/an-

Studio 3 is a fully equipped multi-track recording studio, with the versatility for a wide variety of needs.



Various tape configurations, as well as mag film, can be accommodated, depending on the particular production.



nounce-booth complex where students taking Production for Electronic Media are taught basic audio production technique. Audio projects are produced here, and also in the four individual audio production carrels. All the studios are equipped with a control board, two turntables, two tape machines, a cart machine, microphones and monitoring equipment.

CHANCE FOR ADVANCED LEARNING

Students also have the opportunity to learn more advanced audio at various levels. This activity is centered around Studio 3, an acoustically isolated studio/control room designed for multi-track recording work. The control room is equipped with top-quality professional audio gear; Neve console, Dolby noise reduction, 8-, 4-, 2-, and full-track tape machines, Altec and JBL monitors, and a variety of ancilliary equipment. In addition, there are 16mm magnetic film dubbers, recorders, projector, and sync equipment for film sound track work, and audio lines for recording of productions originating from the video studios downstairs. Principles of sophisticated audio engineering as well as emphasis on the aesthetics of sound are taught here, and students have the opportunity to do actual recordings and mix-down as part of their course work.

Audio Services, part of the university's support services, operates an office and studio on the floor, where faculty- and university-related projects are produced. Responsible for the design, construction, and maintenance of the facility, Audio Services also furnishes technical support to student projects.

A STUDENT-RUN FM STATION

A combo studio with news-announce booth, and master control with its associated production studio are the center of operation for WAER, the student-run FM radio station. Because the station trains its own engineering staff, this affords excellent opportunity to learn basic audio and broadcast engineering. Remote work is an integral part of station programming, and many live activities are brought to the air from campus, including live concerts by professional musicians, originating both from the halls on campus and direct from the Newhouse studios.

Elsewhere on campus, the University Union also offers a chance to get practical experience with audio work. U. U. Audio runs a portable sound reinforcement system, as well as providing sound in the Jabberwocky Club and Watson Theatre. All professional music concerts on campus, as well as many other activities, are provided with top-quality audio support, run entirely by students.



The Moog room in the School of Music provides both facilities and stimulation to creativity.



Combo control is the heart of the 24-hour broadcast operation of WAER-FM.

In the more formal areas of study, the School of Music offers Electronic Music Composition, instruction in the use of the Moog synthesizer at the beginning, intermediate, and advanced levels. A Survey of the Recorded Music Industry is being given, in which executives, producers, engineers, and artists from the industry are procured to speak on various aspects of the recording business. This is a first-course offering in a proposed degree program in the recording industry.

OTHER COURSES OF STUDY

The Physics Department, in addition to its traditional disciplines, now offers a course in Physics and Music, in which the physical principles of sound production and

reproduction are explained. And, the Engineering School offers lecture and laboratory in electrical science, as well as course work in acoustics.

Currently, there is no formal degree program offered in the audio field. Students interested in these areas register in a school with a related major, such as Engineering or Television-Radio, and take courses as electives; or, they define their direction and career goals and create a major through the Selected Studies program in the College of Arts and Sciences. Hopefully, with great enough student interest and faculty support, a formal degree program in the audio field can be developed in the future to fully exploit the facilities and resources available at Syracuse University. ■



A CASSETTE/SLIDE SYNCHRONIZER FOR THE STUDENT

The learner sets the pace, with the aid of Instructomatic's Super/Sync cassette/slide synchronizer. A section of the program can be repeated, or the student can skip ahead, all without losing synchronization of sound and picture. The device also has facilities for listen-only of standard mono or stereo programs without synchronization pulses. SuperSync is available

for carrel mounting or classroom use, operating with a continuous duty bi-peripheral beltless drive mechanism and featuring three button solenoid remote control. It uses the standard separate audio and cue track format to insure compatibility with existing materials and equipment. Instructomatic is in Sunnyvale, California.

How to Handle a Square

When you square a certain amount of something, what have you got, and why? You can avoid errors in thinking and make squaring meaningful.

AUDIO MIXERS are not necessarily mathematicians; they handle many of their calculations from rote memory, from applying rules, from remembering short-cuts, from trial-and-error, or from cookbook application of formulae. There is nothing wrong with this, for a mixer's first job is to deliver an end-product that is *sound quality* of the highest order. Nowhere does it say that a meticulous knowledge of engineering math is a prerequisite for this feat.

Nevertheless, cropping up in a mixer's life, usually at the most inconvenient times, are instances where certain concepts he has taken for granted suddenly seem false. It is even more frustrating when he has occasion to prove arithmetically some of the simplest ideas with which he has lived for years. All of a sudden the proof is as evasive as smoke, and he wonders if all along he has been stealing money from his employers.

A typical example is the business of *squaring* a certain amount of something and then honestly realizing what we've got, or why we got what we got. Even if we do come up with the correct answer arithmetically, it is sometimes questionable whether or not we truly understand what we have done in the practical world of physics or electronics.

To wit: Our very first exposure to the mathematical process of squaring whole numbers showed us that if we have a certain amount of something, and if we square that amount, we get a rather good deal more of that something. Without giving it a tremendous amount of thought, we think we remember that 3 calves squared gives us 9 calves. Yet, there is a warning here. We also remember from our early days that if we square something less than 1 we get a smaller number. That is, $(\frac{1}{2})^2 = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$. But the seldom-asked question is: less than one *what?* One number or one thing? Or does it make any difference?

For example, we feel sure that squaring three pieces of candy gives us nine pieces, which is a lot more than three. But what if those three pieces were all that remained of a box of candy that originally contained 30 pieces? Now, instead of saying that we are squaring three pieces of candy, we can say that we are squaring 1/10 of a box of candy. This gives us 1/100 of a box of candy, which is 1/100 of 30 pieces, which is a lot less than three. What happened? In one case we squared a certain amount of something and got more, and in the second case we

squared what is surely the same amount but got less. Obviously, something has gone wrong. Perhaps we have victimized ourselves by careless thinking.

MATH IS SHORT-HAND

Herein lies our first reminder that mathematics is not a process in itself so much as it is a short-hand form of language. When someone says something in ordinary language we may have cause to wonder, "What did he mean by that?" Before language can have any value as a means of communication we must understand intended meanings. Being an extension as well as a short-hand form of language, mathematical statements must be understood before we can take a proper action upon them. To make a false assumption, as we did in the example above, is to lead ourselves directly to an incorrect answer.

Such a false assumption can easily be made, probably unconsciously, when we try to give ourselves an answer to the practical question: Does the size or the name of the object being squared have any effect on the truth of the process? Putting it another way, does squaring large objects involve the same process, and get the same kind of results, as squaring small objects?

Intuition, if not observation, tells us that it makes no difference whatever. We almost know without proof that the process of squaring must be independent of the thing(s) being squared. We can visualize 3 cows as



3 cows squared as



And, it takes very little effort to imagine that we get the same kind of result when we change the object to one of a different size—cows to calves, for example.

Our thinking so far may not be called rigorous and our

semantics unimpeachable, but this has been deliberate, for it represents many of the assumptions with which we proceed during much of our working life. I shall continue in this manner until we determine further along whether or not our work has been correct.

When we say "three calves squared is nine calves" we almost never stop to remind ourselves that we have done nothing to the calves to make them square, they are still very roundish and we have squared only their number, 3, to get 9. The word *calves* is merely carried along in order that we will know the name of the object(s) which the number 3 refers to.

SQUARING IN OUR THINKING

And our thinking usually goes along these further lines. Since what we are squaring is three calves, we often visualize the expression as "squaring three calves gives us nine calves" so that $(3 \text{ calves})^2 = 9 \text{ calves}$. This notation is the beginning of our trouble, but since it represents the path our thinking often takes, we shall continue with it for a moment.

By taking an object smaller than a calf, squaring three of them should, by the same process, give us a larger amount of this commodity, namely, nine of them. That is, we feel no reason why squaring, let us say, three *baners*, should not give us nine baners—and that's without even knowing what a baner is, for I just made it up. In fact, it appears that we can use *any* word if we believe that the process of squaring is independent of the thing being squared. For now I'll use the undefined word *baner*, although in a moment we'll give it a definition.

First, however, it is important that we go one step further and take a still smaller object, which I shall call a *ryon*, so that we can be consistent in saying that "squar-

ing three ryons gives us nine ryons" or $(3 \text{ ryons})^2 = 9 \text{ ryons}$. Now we have set the stage for an investigation.

In our mind's eye we can now see something like this:

3 calves as



= 3 calves, and

$(3 \text{ calves})^2$ as



} = 9 calves, and

3 baners as



= 3 baners, and

$(3 \text{ baners,})^2$ as



} = 9 baners, and

"Indispensable"

That's how more and more users are describing the Orban/Parasound Dynamic Sibilance Controller. For the first time, the conflicts between the vocal EQ you really want and the sibilance problems that arise are eliminated. EQ for optimal vocal timbre and let the Orban/Parasound DSC hold sibilants to levels that sound natural and right.

Forget everything you know about de-essers—how they pump; how they're fooled by certain low frequency information; their relatively high noise and distortion. The Orban/Parasound DSC is a new breed. Its dynamic response has been optimized for inaudible action. Control filter selectivity exceeds 18 dB/oct. Overload/noise ratio is an amazing 107 dB, and worst case harmonic distortion is under 1/4%. And it's amazingly easy to use. Just set one control for the sibilance balance desired, and that relative balance will be maintained even if the input level varies as much as 20 dB.

It's ideal for recording studios, cinema, TV, and radio—anywhere that excessive sibilance is a problem. Price is another piece of good news—the O/P DSC comes with three independent channels on a 1-3/4" rack panel and costs less than \$200/channel.

Find out for yourself what many major recording and film studios have already discovered: that today the Orban/Parasound Dynamic Sibilance Controller is *the* de-esser. For further information, contact

orban/parasound

680 Beach Street, San Francisco, CA 94109
(415) 776-2808, or your local Orban/Parasound distributor.



**ORBAN/PARASOUND
DYNAMIC SIBILANCE CONTROLLER. THE DE-ESS SPECIALIST.**

Circle 32 on Reader Service Card

www.americanradiohistory.com

3 ryons as

• • • = 3 ryons, and

(3 ryons)²

• • • } = 9 ryons.
• • •
• • •

Now let's identify these things. I decree that a baner is 1/1,000 of a calf. Call it a veal cutlet if you like, but for our purposes here we should drop all other names and call it a millicalf since the prefix *milli* means 1/1,000 or 10⁻³. I also decree that a ryon is 1/1,000 of a baner, or 1/1,000 of that veal cutlet. Call it a bite if you wish, but we should properly call it a *microcalf* since the prefix *micro* means 1/1,000,000 or 10⁻⁶. Now let's see if anything has happened to our process of squaring simply because we seemed to have replaced one object-name with another.

If (3 baners)² = 9 baners, and if a baner is a millicalf, then we expect it to follow that (3 millicalves)² = 9 millicalves. But mathematics shows, as we shall see in a moment, that three millicalves squared is nine microcalves, which is only .009 millicalf. This is a far cry from the nine millicalves we expected; in fact, it is exactly 1,000 times smaller.

What happened? Before, when we replaced one object-name with another, we got nine of them by squaring three of them. But after the change, squaring three of them gave us a smaller amount. Again we must wonder; does the name of the object being squared have an effect on the mathematical process or not? If squaring three millicalves gives us .009 millicalf, how can we possibly believe our earlier conclusions that, before we know what a baner was, squaring three of them gave us nine? And if that does *not* give us nine baners, how can we further believe the thing which we knew absolutely was true: (3 calves)² = 9 calves?

At the beginning when we said that "three calves squared is nine calves" we were attempting to convey the idea of taking three calves three times. (Squaring would require us to take four calves four times, five calves five times, etc.). Lazy thinking led us to form the expression (3 calves)². Maybe we think we know what we mean by this, but it is an improper notation, for we have included "calves" as an entity to be squared, and "square calves" is a meaningless expression.

WHAT IS SQUARED AND WHAT IS NOT

The idea to remember is that in any expression involving the squaring process we have to understand which part is to be squared (the *root*) and which is not (the *basic unit*). As mentioned, we are not striving for square calves, but for (3)² somewhat roundish calves. So the expression should have been thought of and written as:

$$(3)^2 \text{ calves} = 9 \text{ calves.}$$

where 3 is the root and calves is the basic unit. It should *not* have been written as

$$(3 \text{ calves})^2 = 9 \text{ calves}$$

which is mathematically wrong, nor

$$(3 \text{ calves})^2 = 9 \text{ square calves}$$

which is semantically wrong.

To repeat, we square the root and do not square the basic unit, and our responsibility is to identify each in any expression involving squaring. In forming mathematical

expressions we must be careful to put the sign of squaring ()² around only those factors of the expression which are to be squared, and this becomes the *root*. We exclude from this notation the *basic unit*, which is carried along into the final answer as an identifying term.

Now let's look at the options we have in the expression, "three millicalves squared."

Option I

(3)² millicalves = 9 millicalves, where the root is 3 and the basic unit is *millicalves*.

Option II

(3 millicalves)² = 9 microcalves where the root is 3 *milli* and the basic unit is *calves*. This answer is developed from:

$$\begin{aligned} (3 \text{ millicalves})^2 &= (3)^2 (\text{milli})^2 \text{ calves} \\ &= (3)^2 (10^{-3})^2 \text{ calves} \\ &= 9 \times 10^{-6} \text{ calves} \\ &= 9 \text{ microcalves} \\ &= (.009 \text{ millicalves}) \end{aligned}$$

Which of the above two options do we use? It depends on what it is we intend to say. If we grab up three things called "millicalves" (our basic unit in this case), and if we want to do this three times, we'll have nine of the little rascals and we'll notate our intentions mathematically as

$$(3)^2 \text{ millicalves} = 9 \text{ millicalves,}$$

giving us 9 basic units.

On the other hand, if we divide a calf (our new basic unit) into a thousand pieces and take three of these pieces, and if we want to repeat the process on each of the three, we'll have nine pieces, each of which is one one-millionth of a calf, and we'll notate our intentions as

$$(3 \text{ millicalves})^2 = 9 \text{ microcalves,}$$

giving us 9 × 10⁻⁶ basic units.

Thus, two different semantic statements give rise to two different mathematical problems, which in turn give us two different answers.

SQUARING WITHOUT ERROR

Here are three steps we can remember to keep us out of trouble in expressions where squaring is involved:

1. Think or write the problem as a spoken statement.
2. Identify the *basic unit* and the *root*.
3. Bracket the root with the sign of squaring and proceed arithmetically.

It will pay to note that almost any term can be used as either a root or a basic unit, depending on what the expression is intended to say, but one entity which must always be treated as a basic unit is an *object-name*. The following table may illustrate this idea:

Terms which can be Roots or Basic Units:

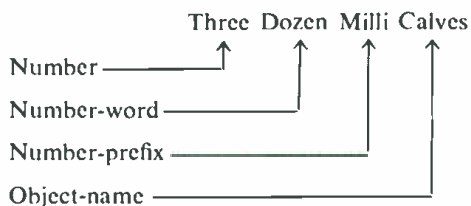
1. Numbers, such as 3.
2. Number-prefixes, such as milli.
3. Number-words, such as dozen.
4. Dimensions, such as inches.

Terms which must be Basic Units:

1. Object-names, such as pieces, ideas, calves, amps, and boxes.

The more terms or factors our expression contains, the more options we have in squaring. While such additional arithmetic may not be an obstacle, the additional available semantic meanings *may* be. Therefore, it may pay us to expand on what we have done so far to see if we can pave the way for our handling unlimited possibilities.

Let's change the expression to "three dozen millicalves" and note that we have considerable more latitude in deciding which factors can be the root and which can be the basic unit. Bearing in mind the examples of roots and basic units just given, we may see the new expression as:



Before squaring, this expression may be visualized graphically as shown in FIGURE 1.



Figure 1.

OUR OPTIONS IN SQUARING

Now, what are our options in applying the squaring process to the expression "three dozen millicalves"? Again, it depends on what it is we want to say.

OPTION I. If we consider that *calves* is our basic unit, the expression, when squared, becomes

$$(3 \text{ dozen})^2 (\text{milli})^2 \text{ calves.}$$

This is a mathematical instruction that tells us

- a) from $(\text{milli})^2$ to divide one or more calves into a million parts each, and
- b) from $(3 \text{ dozen})^2$ to take three dozen of these parts three dozen times,

giving us 1,296 microcalves, or $1,296 \times 10^{-6}$ basic units.

In FIGURE 2 is shown the mathematical derivation as well as the graphical representation of what we are instructed to do.

Derivation:

$$\begin{aligned} & (3 \text{ doz. milli})^2 \text{ calves} \\ &= (3 \text{ doz.})^2 (\text{milli})^2 \text{ calves} \\ &= (36)^2 (10^{-3})^2 \text{ calves} \\ &= 1,296 \times 10^{-6} \text{ calves.} \end{aligned}$$

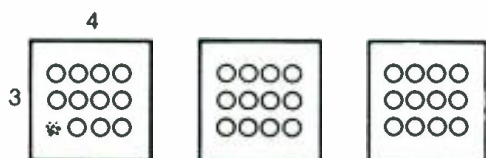


Figure 2.

OPTION II. If we consider that *millicalves* is our basic unit, the expression, when squared, becomes $(3 \text{ dozen})^2$ millicalves.

This is a mathematical instruction that tells us

- a) from *milli* to divide one or more calves into a thousand parts each, and
- b) from $(3 \text{ dozen})^2$ to take three dozen of these parts three dozen times,

giving us 1,296 millicalves, or 1,296 basic units.

In FIGURE 3 is shown the mathematical derivation as

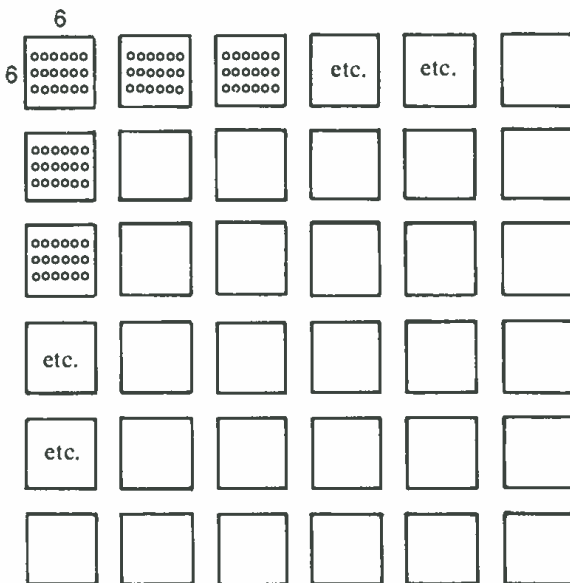


Figure 3.

professional development SEMINARS for studio engineers

audio systems design — Introduction to advanced techniques in the electrical design of audio systems. enrollment/tuition fee \$325

producer's/arranger's workshop — A survey of state of the art in recording technology for the artist-producer/arranger. enrollment/tuition fee \$250.

digital logic design — An introduction to digital logic with applications to audio technology. enrollment/tuition fee \$250.

c.r.a.m.* courses — One day, 8 hour professional development seminars for the working engineer at a modest fee.

a. Multitrack Tape Recorder — Care & Maintenance — Jan. 25th — fee \$100

b. Audio Amplifiers — Checking & Maintaining Performance — March 1st fee \$100

c. Elements of Equipment Interfacing — March 14th — fee \$100.

Your Choice — A, B, or C or all of the above —

*Continuing Review in Audio Methods

announcing a new resident program

In addition to the new professional development seminars now available we offer a new program of courses in Multitrack Recording Technology. By adding new courses to existing courses we created a

complimentary series in a program consisting of 160 class hours. Write for a complete catalog and information

institute of audio research, inc.
64 University Place, New York, NY 10003
(212) 677-7580



well as the graphical representation of what we are instructed to do.

Derivation:
 $(3 \text{ dozen})^2 \text{ millicalves}$
 $= (36)^2 \text{ millicalves}$
 $= 1,296 \text{ millicalves.}$

OPTION III. If we consider that a *dozen millicalves* is our basic unit, the expression, when squared, becomes $(3)^2 \text{ dozen millicalves.}$

This is a mathematical instruction that tells us
 a) from *milli* to divide one or more calves into a thousand parts each, and
 b) from $(3)^2 \text{ dozen}$ to take one dozen of these parts nine times,
 giving us 9 dozen millicalves, or 9 basic units.

In FIGURE 4 is shown the mathematical derivation as well as the graphic representation of what we are instructed to do.

Derivation:
 $(3)^2 \text{ dozen millicalves}$
 $= 9 \text{ doz millicalves.}$

Graphic Representation:

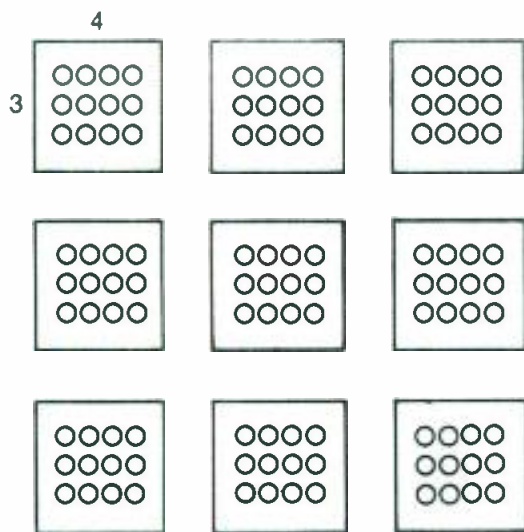


Figure 4 Each square = 1 doz millicalves.

THREE CRITICAL FACTORS IN SQUARING

From all of the above, our conclusions should be that we have at least three critical concerns in squaring:

1. *Our mathematical language must be precise.*
 "Three milliamps squared" is not the same as "three squared milliamps."
2. *We must distinguish roots from basic units.*
 In $3^2 = 9$, the root is 3 and the basic unit is 1.
 In $(3 \text{ ma})^2 = 9 \text{ microamps}$, the root is 3 *milli* and the basic unit is *amps*.
 In $(3)^2 \text{ ma} = 9 \text{ ma}$, the root is 3 and the basic unit is *milliamp*.
3. *For a forecast of the magnitude of our answer, we must compare the product of the factors to be squared with the number 1.* If their product before squaring is less than 1, as in $(999 \text{ ma})^2$, the answer will be smaller than before squaring. If it is larger than 1, as in $(1,001 \text{ ma})^2$, it will be larger.

Now, what about those three pieces of candy coming from a box which contains thirty pieces, mentioned earlier in this article? We said that if we squared three pieces of candy we'd get nine pieces, but that if we called those three pieces a tenth of a box and squared that, we'd get $(1/10)^2 = 1/100$ boxes of candy which is only three-tenths of a piece. Why didn't we get the same answers when squaring the same thing?

The answer to that is, we were *not* squaring the same thing. In one case the basic unit was *pieces*, in the other it was *boxes*. In one case we had no number-prefix such as "milli" or "deci" to square, in the other we did.

ANSWER DEPENDS ON BASIC UNIT

It all boils down to the principles we now understand so well from our problems with calves and millicalves. In short, our answer depends on what our basic unit is. It's either millicalves or calves; it's either pieces or boxes. These two parallel problems and their solutions are shown side by side:

I. Where the basic units are *pieces* and *millicalves*:

<i>Pieces</i>	<i>Millicalves</i>
$(3)^2 \text{ pieces} = 9 \text{ pieces}$	$(3)^2 \text{ millicalves} = 9 \text{ millicalves}$

II. Where the basic units are *boxes* and *calves*:
 (NOTE: 3 pieces of candy = 1 decibox)

Boxes
 $(1 \text{ decibox})^2 = (1)^2 \text{ (deci)}^2 \text{ boxes}$
 $= (1)^2 (10^{-1})^2 \text{ boxes}$
 $= 1 \times 10^{-2} \text{ boxes}$
 $= .01 \text{ boxes}$
 $= \frac{.01 \text{ boxes}}{1} \times \frac{30 \text{ pieces}}{\text{box}}$
 $= .3 \text{ pieces}$

Calves
 $(3 \text{ millicalves})^2 = (3)^2 \text{ (milli)}^2 \text{ calves}$
 $= (3)^2 (10^{-1})^2 \text{ calves}$
 $= 9 \times 10^{-6} \text{ calves}$
 $= .000009 \text{ calves}$
 $= \frac{.000009 \text{ calves}}{1} \times \frac{1,000 \text{ millicalves}}{\text{calf}}$
 $= .009 \text{ millicalf}$

If you still want that 1/10 box of candy, when squared, to give us the same 9 pieces, what you are asking, effectively, is that we change our basic unit from *boxes* back to *pieces*. It can be done (as follows) providing we remember we're back to dealing with pieces, not boxes:

$$\left(\frac{1}{10} \text{ box of candy}\right)^2 = \left(\frac{1}{10}\right)^2 (\text{boxes})^2$$

$$= \left(\frac{1}{10}\right)^2 (30 \text{ pieces})^2$$

$$= \frac{1}{100} \times \frac{900}{1} \text{ pieces}$$

$$= 9 \text{ pieces}$$

Is everybody happy? Now that we have this perfectly clear, no longer will we wonder why six milliamps, when squared, does not give us thirty-six milliamps. And we know what to do with three pieces of candy—even if they're round! ■

Closing date is the fifteenth of the second month preceding the date of issue.

Rates are 50¢ a word for commercial advertisements.
 Employment offered or wanted ads are accepted at 25¢ per word.
 Frequency discounts: 3 times, 10%; 6 times, 20%; 12 times, 33%.

FOR SALE


B.B.C. REFERENCE MONITORS, pre-equalized J.B.L./Altec monitors; Dahlquist phased arrays; I.M.F. transmission lines; Infinity electrostatics; Crown/McIntosh 16Ω/bridged bi-amps; Scully/Revox A-700 recorders; Micmix reverbs; Eventide phasors/omnipressors; Lexicon digital delays; dbx/Burwen N.R. compressors; Little Dipper hum/buzz notch filters; Cooper Time Cube echo send, moving coil Supex/Ortofon; B & O straight line arms/cartridges; Schoeps/ AKG/Sennheiser condensers; Beyer ribbons, U.R.E.I. comp/limiters/crossovers; Gately pro-kits; Q.R.K. t.t., 1,000s more. **Music & Sound, Ltd., 11½ Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

→ All Shipped Prepaid + Insured ←

ONE AMPEX 300-top plate MCI electronics, two-track, in console, 7½-15 ips, \$1,850; Ampex 351-top plate MCI electronics, two-track, in console, 7½-15 ips, \$1,750; Ampex 351-top plate MCI electronics in Scully portable cases, two-track stereo, 7½-15 ips, \$1,650; MCI 16-track tape machine with matching 8-track heads and guides, autolocator, in console, 15-30 ips, \$11,500. **Criteria Recording Studios, 1755 N.E. 149th St., Miami, Fla. 33161. (305) 947-5611.**


COHERENT CONCERT SOUND—not just P.A.! We work with musicians to create an aural environment in concert that matches studio production. **(212) 947-1271.**

WHATEVER YOUR EQUIPMENT NEEDS—new or used—check us first. We specialize in broadcast equipment. Write for our complete listings. **Broadcast Equipment & Supply Co., Box 3141, Bristol, Tenn. 37620.**



CATV—MATV PRODUCTS

- CONNECTORS
- WALLPLATES
- SPLITTERS
- AMPLIFIERS



AVA ELECTRONICS CORP.
 242 Pembroke Avenue, Lansdowne, Pa. 19050
 (215) 284-2500

TASCAM REVERBS—\$500; Tascam mixing consoles—\$2,350; Tascam ½-inch recorders—\$2,750; Tascam 8-track recorders—\$4,600. All shipped prepaid/insured, including free alignment/equalization/bias/calibration. **Music & Sound, Ltd., 11½ Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

AMPEX, SCULLY, TASCAM, all major professional audio lines. Top dollar trade-ins. 15 minutes George Washington Bridge. **PROFESSIONAL AUDIO VIDEO CORPORATION, 342 Main St., Paterson, N.J. 07505. (201) 523-3333.**

REEL SPECIALISTS: 14-inch new NAB Ampex metal flanges, in original box of 10, \$8.75. 10½-inch x ¼ NAB and Precision reels bought and sold. New Precision 10½ x ¼, \$6.00 each (add \$.60 for new box) plus 10% postage. **Soundd Investment Co., P.O. Box 338, Dunwoody, Ga. 30338.**

CLEARANCE SALE

W.A.L. 804-4 audio console, \$6,400; Spotmaster 500AR-114C mono record/play cart. machines, \$269.00 each; new Crown recorders and amplifiers in stock; Ampex 350 F.T., \$895; Ampex 350-2-C, new heads, in console, \$1,250; Ampex 351-2, console available, \$1,395; Ampex 354-2, \$1,195; Ampex 300-4 w/sel. sync, new heads, \$2,595; Ampex 300-4 w/sel. sync., metal console, \$2,050; Ampex PR-10-2-P, 7½ & 15 ips, case, \$495; Ampex 351-8 or FR-1100-8C w/new heads and new Inovonics model 355 electronics in Scully type console, \$7,450; Ampex 300-8C Accurate Sound 351 electronics w/remote sel. sync. and Formica console, \$4,995; Ampex AM-10 transistorized mixer w/case and meters, \$335; Magnacord 1022P transistorized two-track, 7½ & 15 ips w/fourth quarter track play head, cases, \$595; Telectro F.T. mono, 7½ & 15 ips, new heads and case (like Ampex 351), \$850; Ampex FR-100 & 3M Isoloop Mincom instrumentation decks, \$395; Univac ½" digital decks, \$75; Presto 8N lath and Gotham Grampian head & amplifier, \$1,150 (other lathes and heads available); new and used Atlas stands and booms at discounts. All used equipment checked and guaranteed, some rebuilt. **Wiegand Audio, R. D. 3, Middleburg, Pa. 17842. Phone for details (717) 837-1444.**

NEW YORK'S LEADING PRO AUDIO/VIDEO DISTRIBUTOR for audio, video, broadcast, public address, and hi-fi systems; representing over 130 audio/video manufacturers, featuring such names as Ampex, Scully, Tascam, Sony, J. B. Lansing, Neumann, Altec, McIntosh, AKG, Dynair, T.V. Microtime, UREI, 3M, and other major brands; the largest "in stock" inventory of equipment, accessories, and parts; competitive discount prices; factory authorized sales, service, parts, systems design, installation. Write for free catalog! **Martin Audio/Video Corporation, 320 W. 46th St., New York, N.Y. 10036. (212) 541-5900.**

LINE DISTRIBUTION TRANSFORMERS: ± .25 dB, 30 Hz-15kHz @ 27 dBm; p.c. or panel mount; 30 ohm pri. 150/600 CT. Sec. \$4.00. 300 available. **L. A. Krause, 107 W. Walnut, Chanute, Kansas 66720. (316) 431-6232.**

TARZAC PROFESSIONAL CASSETTES—Custom Cassette Labels. Complimentary samples. **TARZAC, 638 Muskogee Avenue, Norfolk, Virginia 23509.**

PROTOTYPE/FABRICATION SERVICES: Any project or installation, from bread-board to complete studio. **Box 210, Locust Valley, L.I., N.Y. 11560. (516) 759-0174.**

AMPEX 300, 352, 400, 450 USERS—for greater S/N ratio, replace first playback stage 12SJ7 with our plug-in transistor preamp. For specifications write **VIF International, Box 1555, Mountain View, Ca., 94042. (408) 739-9740.**

WE HAVE A FEW competitively priced used Revox A77 decks available. These have been completely reconditioned by Revox, are virtually indistinguishable from new, and have the standard Revox 90-day warranty for rebuilt machines. One example is an A77/Dolby for \$675, plus shipping. Satisfaction guaranteed. Please write, stating your requirements to **ESSI, Box 854, Hicksville, N.Y. 11802. (212) 895-9257.**

SCULLY 280 ELECTRONICS, \$350; Scully 4-channel playback electronics, \$575; Altec Graphic EQ, \$295; Spectra Sonics 22-in/8-out remix console, \$3,950; 1 Dolby M-16, \$7,800. **Sound 80, Inc. Minneapolis, Minn. (612) 721-6341.**

AMPEX SERVICE COMPANY: Complete factory service for Ampex equipment; professional audio; one-inch helical scan video; video closed circuit cameras; video systems; instrumentation and consumer audio. Service available at **2609 Greenleaf Avenue, Elk Grove Village, Ill. 60007; 500 Rodier Dr., Glendale, Ca., 91201; 75 Commerce Way, Hackensack, N.J. 07601.**

Continued next page

TAPCO Professional Audio Mixers



Model 6000RCF

This is the best sounding, most rugged and all around finest mixer we have yet found for use by musical performers, sound systems operators and all others who require a superb mixer at a reasonable cost.

A unique combination of special input circuitry and studio type mixing results in unusually fine performance under actual concert conditions. No channel interaction, no overloading. Each channel has its own volume, bass and treble controls.

Provisions for stacking two or more mixers make this exceptionally versatile where more than six channels are required. Accepts either high or low impedance mic inputs without switches or transformers plus a unique microphone equalization circuit that compensates for high frequency microphone loss.

Best of all its price is reasonable. Model 6000CF is only \$219.00 complete

with Cannon and phone jack inputs. The Model 6000 with phone jack inputs only is just \$188.00.

Model 6000RCF (with reverb and and effects control) is priced at \$326.00. All prices include shipping costs. A two year parts and labor warranty applies to all TAPCO units. A bulletin describing all models is available upon request.

SPECIFICATIONS

6000 STANDARD MIXER

Response: 10 hz to 40khz ± 1 dB
Distortion: Below .3%, typically .08%
Overall Gain: Over 120 dB
Bass & Treble: ± 15 dB
Input Impedance: Mic 150-200 ohms (low) to 50k ohms or higher (hi);
Aux-Tape input 82k ohms
Outputs: Hi level, up to 10 volts r.m.s. or +16 dBm into 600 ohms;
Adjustable level, 0-10 volts r.m.s.
Size: Chassis, 15.5" w, 3.25" h, 7.25" d;
Overall, 15.5" w, 3.25" h, 7.75" d
Power: 117 volts A.C. 60 hz
Weight: 7 lbs.

WHO IS TAPCO?

TAPCO (Technical Audio Products Corp.) is a young group of musically oriented and technically skilled people in Edmonds, Wash. who started building guitar amps in 1968. Their close association with other musicians and their knowledge of their needs and requirements led into more advanced systems. It is this background that enabled them to develop and produce a series of mixers that are especially meaningful. They really care about the equipment they make.

To order send check to:

TIMEKEEPER

P.O. Box 35, Great Neck, N.Y. 11021
N.Y. State residents add 7% sales tax

Circle 36 on Reader Service Card

www.americanradiohistory.com

FOR SALE

ONE OTARI PROFESSIONAL tape machine, excellent condition, \$1,400; one Gately PM1 mixer, \$500; 2 Shure M67 mixers, \$90 each; 2 Beyer M360 ribbon mics, excellent condition, \$175 each; 3,000 feet of two-conductor cable, \$200; joblot Atlas stands and spare parts, \$100. **R. Waterstradt, 50 S. Penn St., Hatboro, Pa. 19040. (215) 674-3214.**

ONE WAY NOISE REDUCTION for cutting rooms/tape copies; retains highs, rids hiss/surface noise & clicks/pops by a full 10-14 dB and costs \$150 up per channel! **Music & Sound, Ltd., 11½ Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

FOR SALE: 8 A301 DOLBYS with automatic changeover, built into rack and power supplies, \$8,500; 4 A301 Dolbys, each \$850; 1 3M model 64 4-track recorder/reproducer with sync line amp cards, 15/30 ips, \$4,800; 1 3M model 64 2-track recorder/reproducer, 7½-15 ips, \$2,500; 1 3M model 64 full-track recorder/reproducer, 7½-15 ips, \$2,000. **Crystal Industries, Inc., 1014 N. Vine St., Hollywood, Ca. 90038. (213) 466-6452.**

SPlice FASTER, BETTER, BY SHEARING; replaces razor; attached splicing tape dispenser; quality workmanship; reasonably priced; endorsed by professionals. \$24.95 prepaid. Guaranteed. Distributors wanted. **NRP, Box 289, McLean, Virginia 22101.**

SCULLY, ELECTRO-VOICE, Neumann, Shure, Spectrasonics, Quad Eight, Masterroom, ARP, Crown, Microtrak, Russco, dbx, Interface, EMT, and others. **The Audio Marketplace, Div. United Audio Recording, 5310 Jockwood, San Antonio, Texas 78238. (512) 684-4000.**

FOR SALE: AMPEX 16-track master recorder; excellent condition; non-servo, 2½ years old; low cost financing available; assume our low interest loan (if you qualify): \$3,500 down and \$368 per month for approximately 31 months. Will accept \$12,000 cash. Reason for sale: going 24-track. **Studio West, California. (714) 277-4714.**

FOUR TRACK SERIES Tascam ½" tape recorder; good condition. **Moon-Hill. (512) 472-1618.**

FOR SALE: PROFESSIONAL TAPE RECORDER, OTARI model MX7000, 2-track stereo, in table top console; 3 speeds, electrically switched; brand new, with one year parts warranty. \$1,600. **Box 11, db Magazine, 1120 Old Country Rd., Plainview, N.Y. 11803.**

**ONE STOP
FOR ALL YOUR PROFESSIONAL
AUDIO REQUIREMENTS**
BOTTOM LINE ORIENTED
F. T. C. BREWER CO.
P.O. Box 8057, Pensacola, Fla. 32505

AUDIO DUPLICATING EQUIPMENT; high speed, quality systems for cartridge or cassette duplicating. Duplicators, loaders, QC checkers, master recorders, electronics. **Audio/Tek, Inc. 503-F Vandell Ave., Campbell, Ca. 95008. (408) 378-5586.**

AUTOMATED QUAD PANNING

THE UNIQUE AQC SYSTEM (PAT. APPLIED FOR)
CAN DO WHAT HANDS CANNOT
4, 8, 16 & 24 INPUTS
VIDEO & AUDIO ARTISTRY CORP.
p.o. box 4571, boulder, colorado 80302
(303) 499-2001

MONITOR EQUALIZERS for your Altec & J.B.L.s are a steal at \$75/channel

+
FREE ROOM EQUALIZATION with purchase of 1/3 octave filters. This is not a misprint. **Music & Sound, Ltd., 11 1/2 Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

→ **S.M.E. Damping Mods—\$30.00** ←

CUSTOM CROSSOVER NETWORKS to your specifications: 1 or 1000. Power capacities to 1,000 watts. Networks duplicated. High tolerance air and iron core inductors. Outline your needs for rapid quotation. **TSR ENGINEERING, 3673 W. 113th St., Inglewood, Ca. 90303. (213) 678-1979.**

TUNED ROCK P.A.s. Customized high intensity touring/permanent installation sound systems, including narrow band (5 Hz!) feedback suppression, detailed regenerative response Acousta-Voicing/environmental equalization (± 1 dB at your ears), room design/measurement/treatment, $\leq 15\%$ articulation loss of consonants; 1000s of customized professional products, including . . . fiberglass horns, consoles, comp/rms/peak limiters, 18 dB continuously variable electronic crossovers, digital/acoustic delays, omnipressors, phasors, reverb, echo, doubling/tripling effects, P.A. noise reduction; **piezo transducers**; frequency shifters from . . . J.B.L./Altec pro., Tascam, U.R.E.I., Eventide, Gately, Schoeps, Beyer, Crown, Community Light/Sound, Mom's Audio, McIntosh, Bozak, Allen & Heath, etc. etc. All shipped prepaid/insured. **Music & Sound, Ltd., 11 1/2 Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

Inventors/Engineers

FOUR-TRACK RECORDER: Ampex AG-500 with sel/sync; brand new with warranty, \$1,995.00. **Gately Electronics, 57 W. Hillcrest Ave., Havertown, Pa. (215) 449-6400.**

ONE WAY NOISE REDUCTION for cutting rooms/tape copies; retains highs, rids hiss/surface noise & pops by a full 10-14 dB and costs \$125 up per channel! **Music & Sound, Ltd., 11 1/2 Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

ORTOFON

DYNAMIC MOTIONAL FEEDBACK mono disc cutting system. Complete amplifier system: drive, feedback, and feedback-playback monitor preamp; rebuilt, original factory parts. Guaranteed. **Albert B. Grundy, 64 University Place, New York, N.Y. 10003. (212) 929-8364.**

DYMA builds roll-around consoles for any reel-to-reel tape recorder. **Dyma Engineering, Route 1, Box 51, Taos, New Mexico 87571.**

ONE AMPEX 440-4; includes two-track stereo head block IN CONSOLE; 7 1/2-15 ips, \$2,950.00. One Ampex 300—top plate MCI electronics; two-track; IN CONSOLE; 7 1/2-15 ips, \$1,950. Ampex 351—top plate MCI electronics; two-track; IN CONSOLE; 7 1/2-15 ips, \$1,850.00. Ampex 351—top plate MCI electronics in Scully portable cases; two-track stereo; 7 1/2-15 ips, \$1,750.00. MCI 16-track tape machine with matching 8-track heads and guides; autolocator; IN CONSOLE; 15-30 ips, \$12,500.00. **Criteria Recording Studios, 1755 N.E. 149th St., Miami, Florida 33161. (305) 947-5611.**

DYMA builds custom studio consoles, desks, enclosures, studio furniture. **Dyma Engineering, Route 1, Box 51, Taos, New Mexico 87571.**

THE LIBRARY . . . Sound effects recorded in STEREO using Dolby™ throughout. Over 350 effects on ten discs, \$150.00. Write, **The Library, P.O. Box 18145, Denver, Colorado 80218.**

CASSETTE DUPLICATION; 25 or more pieces—C-60 or shorter; monaural. **TARZAC, 638 Muskogee Avenue, Norfolk, Virginia 23509.**

WANTED

WANTED: TIRED BUT REPAIRABLE 8-track duplicating equipment. **P.O. Box 764, Holly Hill, Florida 32017.**

EMPLOYMENT

AUDIO ENGINEER/MIXER seeks employment, preferably in music recording, especially rock/blues & electronic. Will consider commercials. Will relocate. For further information & resume, write or call: **Joe Tierce, 2129 Central, Memphis, Tenn. 38104, 1-901-754-8058.**

POSITION DESIRED: Recording experienced on A.P.I. and Ampex. Career position desired; willing to relocate if offer secure. References. **Mario J. Salvati, 271 Third Ave., West Babylon, N.Y. 11704. (516) 893-0266.**

PROFESSIONAL RECORDING PERSONNEL SPECIALISTS. A service for employers and job seekers. Call today! **Smith's Personnel Service, 1457 Broadway, N.Y.C. 10036. Alayne Spertell. (212) WI 7-3806.**

WANT TO GO BI-AMP?
DeCoursey Electronic Dividing Networks are available from \$89.10 (monaural bi-amp) to \$205.00 (stereo tri-amp). Price includes plug-in Butterworth filters; 6, 12, or 18 dB per octave at any desired cutoff frequency. **DeCoursey Engineering Laboratory, 11828 W. Jefferson Blvd., Culver City, Ca. 90230.**

SOLID-STATE AUDIO MODULES. Console kits, power amplifier kits, power supplies. Octal plug-ins—mic. eq., line, disc, tape play, tape record, amplifiers, Audio and tape bias oscillators. Over 50 audio products; send for free catalog and applications. **Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, Ca. 90038.**

BROADCAST AND RECORDING EQUIPMENT: Scully; Metrotech; Langevine; Electrodyne; Q.R.K.; Micro-Trak; M.R.L.; Nortronics; McMartin; U.R.E.I.; Revox; Crown; Byer; Lamb; Master Room; Stellavox; E.V.; A.K.G.; Sennheiser; Atlas; Ferrograph; HAECO; Stevenson; Gately; dbx; Advent; Altec; Fairchild; Audio Designs; 3M; Magnacord; Telex; Inovonics. Disc recording systems; package deals; installations; service. **Wiegand Audio, Middleburg, Pennsylvania 17842. (717) 837-1444.**

MULTI-TRACK

- ★ **SERIES "B" MIXING CONSOLE**
- ★ **VARI-BAND 5 SECTION PARAMETERIC EQUALIZER**
- ★ **DUAL EQUALIZED REVERB**
- ★ **LONG & SHORT THROW SLIODE FADERS**
- ★ **HIGH BALLISTIC VU METER**

**P.O. BOX 3187
HOLLYWOOD, CA 90028
(213) 467-7890**

db people/places/happenings



BELL



GALBURT



LINK



KLEIN

● Filling a newly created position, **Rod Bell** has been appointed vice president, consumer products, at **James B. Lansing Sound**. Mr. Bell, national sales manager for the company, will focalize long range planning and promotion of all JBL consumer products. He will continue to function as sales manager, directing all marketing programs and supervising dealer training programs. Prior to joining JBL in 1971, Mr. Bell was associated with **Roland Olander & Company**. Another appointment of interest at JBL is that of **Richard A. Bloom**, who will serve as manager of the Michigan audio office, at Southfield. Mr. Bloom comes to JBL from **Superscope**.

● Appointment of **Paul Galburt** as senior project engineer has been announced by **Automated Processes, Inc.**, Melville, N.Y. Mr. Galburt will work on the development of the company's line of consoles and audio components. He was formerly with the **Digiac Corporation**.

● Three new appointments have been announced at **Electro Sound, Inc.**, of Sunnyvale, California. **Charles Link** has been promoted to the post of vice president and general manager. **Mort Fuji** has undertaken responsibility for the firm's research and development activities as vice president of technical operations. Coming to Electro Sound from **CBS**, **Robert W. Cochran** has joined the firm as vice president of marketing and sales.

● A program for the establishment of marketing avenues and distribution channels for dictation and telephone answering systems in Mexico, Central, and South America has been embarked upon by the **Dictaphone Corporation**, Rye, N.Y. **Jerry A. Klein** has been named to the new position of vice president, international development. Mr. Klein joined the com-

pany in 1970 when **Dictaphone** acquired **Ansonics International Corporation**, which he founded in 1967.

● In a recent ceremony in Switzerland, **Toshiya Inoue**, managing director of the **Audio Engineering Research Center of the Victor Company of Japan, Ltd. (JVC America)** was awarded the **Diploma d'Honneur**, the **Seventh Annual Montreux International Award**, for his work with the **CD-4 discrete quadriphonic disc**. Most of Mr. Inoue's work on advanced disc transfer technology has been done during the five years he has been associated with the research center. He was responsible for the first LP cutting systems in Japan and also introduced **45/45 stereo disc technology** to that country. He has made a number of contributions to technical journals, describing his work.

● With executive responsibility for marketing **RCA broadcast systems** in Europe, the Middle East, and Africa, **John M. Boatman** has been appointed as manager, field sales by **RCA International Marketing S.A.** in Geneva, Switzerland. Mr. Boatman comes from a previous position as sales engineer. He has been with the company since 1959.

● A new state-of-the-art, 16-channel recording studio has been added to the facilities of **Accurate Sound Company**, Redwood City, California. The firm hopes that the new studio will increase their capability in recording music for their area. They also plan to design and build turnkey multi-channel recording facilities.

● The first stereo signal to reach Malaysia will be sent through twin transmitters installed on top of a mountain near **Kuala Lumpur**, using equipment purchased by the **Malaysian Ministry of Information** from the **Sparta Electronic Corporation**. The transmitter will be fed by a Sparta-

supplied composite **STL** situated in the **Ministry's** modern studio in the nation's capital. On-site instruction in operation and maintenance will be provided by **Sparta Transmitter Division engineers**.

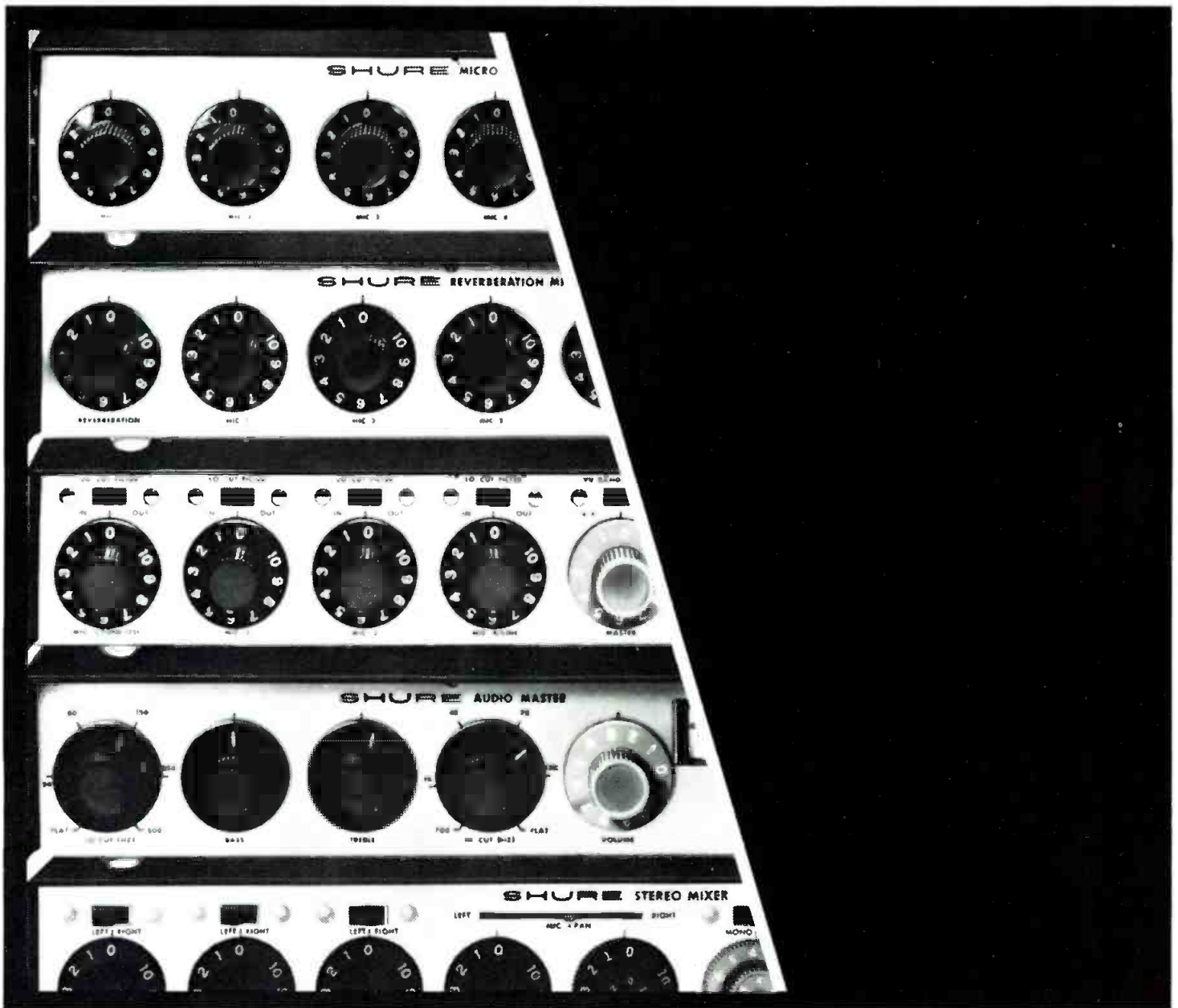
● **Laurence Malkin**, specialist in electronic equipment financing, has joined **Advanced Leasing Services, Inc.**, New York as vice-president. He will work primarily with electronics firms and radio-t.v. recording studios in arranging equipment financing. Mr. Malkin comes to **Advanced Leasing** from **National Equipment Rental**.



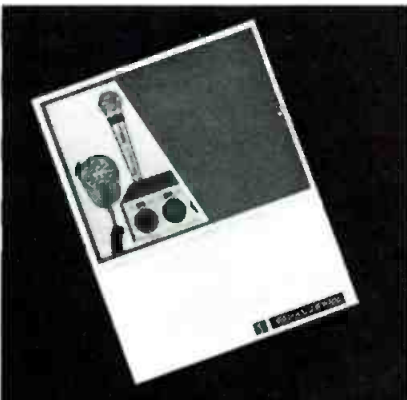
NOTRE DAME CONTROL CENTER

● Modernization and increased flexibility of the public address system at **Notre Dame stadium**, **Notre Dame University**, in Indiana was recently completed. Equipment used was **Crown DC-300A amplifiers**, **Spotmaster 5 BEM-2005 audio console**, a **Crown VFX-2 filter** and **Electro-Voice speakers and microphones**. A simple wiring change converted the four stereo amplifiers into eight monaural amplifiers, six used to drive the speakers and the others kept as spares. Ten access channels allow the system to pick up sound in all areas of the stadium simultaneously. **Phil Casey**, of **WSBT-TV** at Notre Dame, designed the layout which was installed by the **Koontz-Wagner Electric Company** of South Bend, Indiana, under the direction of **Ken Kempf**.

● Appointment of **Randy S. McCallister** as a product analyst for **RCA Broadcast Systems**, of Moorestown, N.J. has been announced. Mr. McCallister will be responsible for product management of **RCA's** line of a.m. radio transmitters and audio equipment for radio and t.v. broadcasters. Prior to joining **RCA**, he was chief engineer for **WCIR-AM/FM** in **Beckley, W. Virginia**.



Panel full of miracles.



Shure mixers, audio level controllers, and feedback controllers are all designed to deliver more audio control, more features, and more performance dollar for dollar than any other components with similar audio features. Their compact size and modular "stackable" design mean they can be easily combined in various configurations in even the smallest spaces. And they're versatile—their input-output flexibility equips them for an extremely wide range of audio applications, giving you control you never thought possible without bulky, expensive installations. You can easily put together a system that's exactly right for your precise needs without putting extra dollars into built-in features you really don't need. For the details on our entire line of miracle workers, write:

Shure Brothers Inc.
222 Hartrey Ave., Evanston, IL 60204
In Canada: A. C. Simmonds & Sons Limited



Manufacturers of high fidelity components, microphones, sound systems and related circuitry.

Circle 11 on Reader Service Card

After 7 Years of Providing Concert Sound Reinforcement for the World's Major Groups, Tycobrahe' Creates the Mixxing Link

Tycobrahe's MXL 24-4. A 24-channel in, 4 out, Portable Mixer (weighs only 85 lbs.!)

Designed for the ultimate in live sound reinforcement this remarkable board has 3 Stereo Submasters, 2 Monitor Busses, 9 Frequency EQ on all 24 input channels, and Dual-Band Limiters on the main channels.

Orders for the MXL are now being taken. Call or write for complete specs and prices.



665 Valley Drive
Hermosa Beach, Cal. 90254
213/376-8801

© 1974, Tycobrahe Sound Co

The Tycobrahe MXL 24(-4)

Perhaps the World's most practical and reliable 24-channel mixer.
Circle 12 on Reader Service Card