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THE SOUND ENGINEERING MAGAZINE

OCTOBER 1973 $1.00

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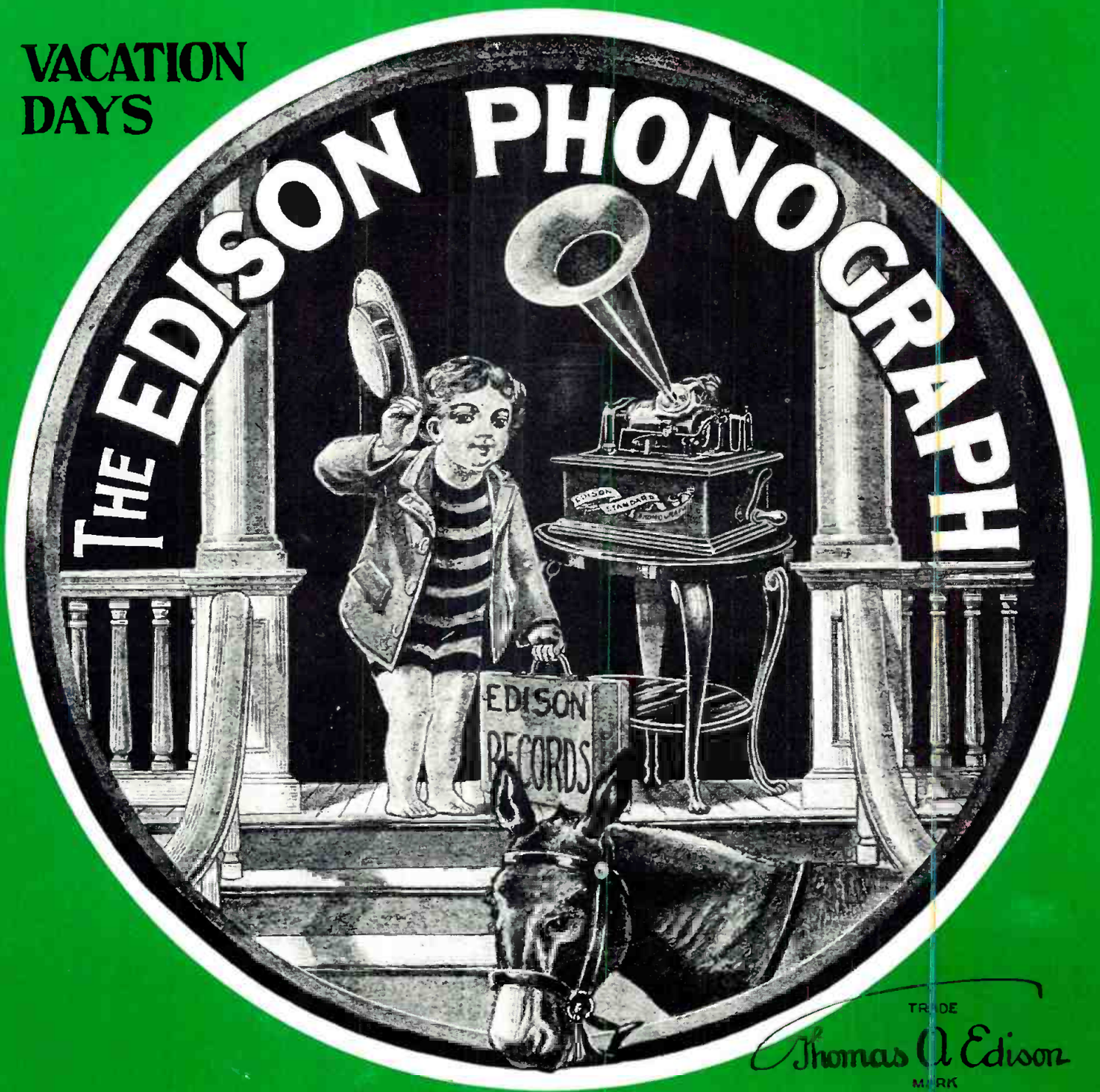

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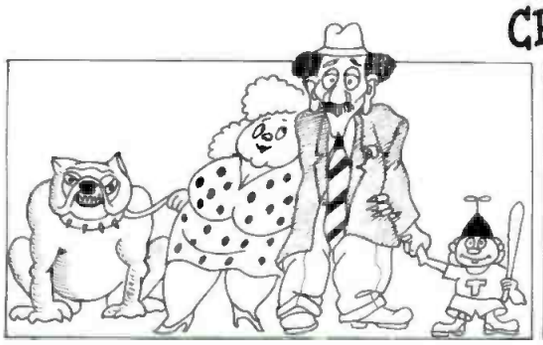

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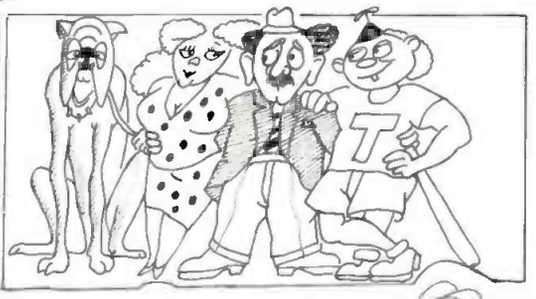

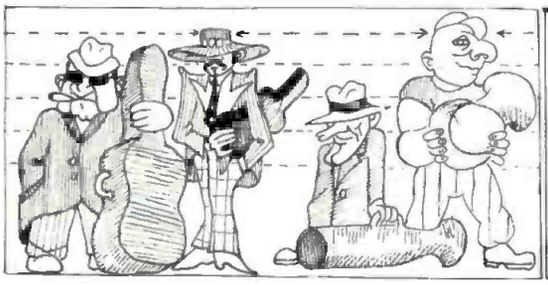

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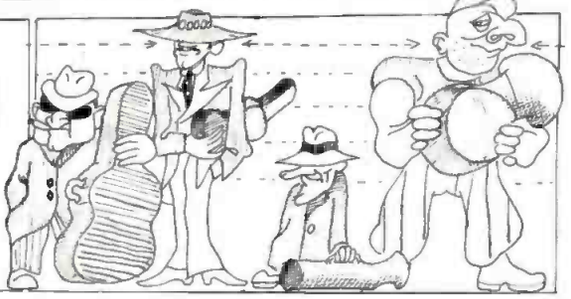

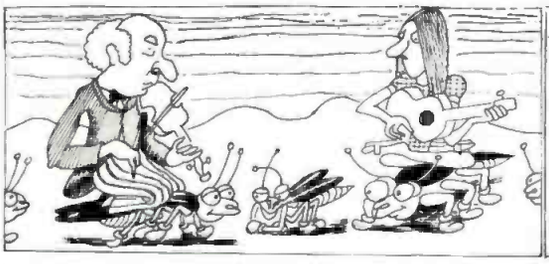

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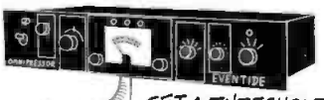

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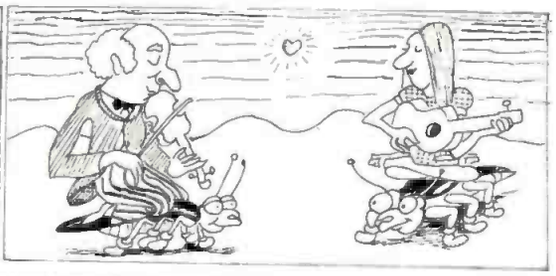

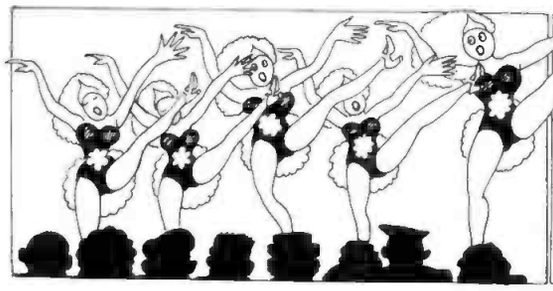

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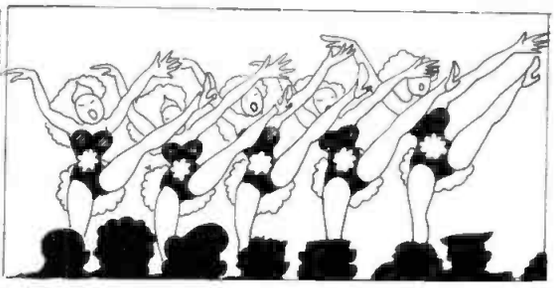

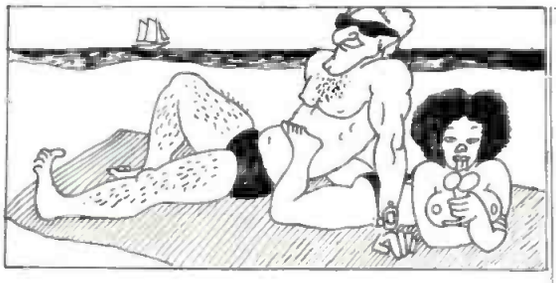

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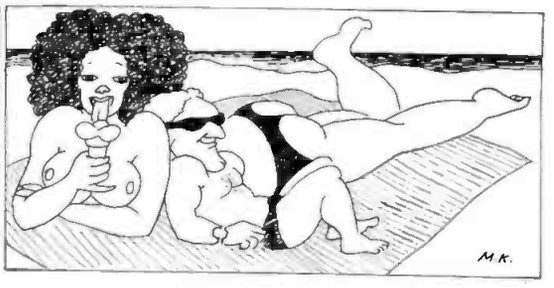

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COMING NEXT MONTH

● Transformers and balanced lines take front and center in this special issue.

George Alexandrovich returns to our pages with a detailing of balanced lines—when to use which, and why. If you have wondered about this question, you'll find answers in this article.

Arnold Schwartz is also a former columnist that returns with an article called TRANSFORMERS. In it he tells what these devices are, what they do, and why they are entirely desirable in certain applications.

To most of us, a miniature transformer is merely a can with some wires extending from it. Steven Temmer has submitted an illustrated article on how Beyer builds its mini transformers and makes them perform as if they were much larger. It's a most interesting view into this "black-box" technology.

And there will be our usual contributors: Norman H. Crowhurst, Martin Dickstein, and John Woram. Coming in **db, The Sound Engineering Magazine.**

ABOUT THE COVER

● This is a continuation of our series on earlier audio ads. What cannot be seen is that there were "Nine styles from $10.00 to $100." What does a well-used Edison Phonograph bring today?

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THE SOUND ENGINEERING MAGAZINE
OCTOBER 1973 VOLUME 7, NUMBER 10

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John M. Woram

THE SYNC TRACK

● Another Audio Engineering Society convention has come and gone as this column is being written. A picture gallery will appear in next month's issue to give those readers not fortunate enough to attend some idea of the goings-on on the exhibit floor.

The AES has recently made some organizational changes that should be of particular interest to our readers who have so far been unable to participate in the society's activities. The changes are for the purpose of encouraging the development and growth of AES sections throughout the country.

As many readers know, each AES member receives the prestigious *Journal of the Audio Engineering Society*, which is published ten times a year. In addition to the technical papers published, the Journal keeps members informed regarding activities within the various sections. At present, there are sections in six locations:

Atlanta, Georgia
Los Angeles, California
San Francisco, California
Midwest (Chicago, Illinois)
New York, N. Y.
Washington, D. C.

At the moment, many additional sections are being formed throughout the country. Here in the east, society members in Boston and Miami are working on starting their own sections. And, there are signs of interest for other sections in Pennsylvania, Northern Florida, and upper New York State.

Now then, why the interest in these sections, and what does it all mean to readers?

Very simple—each section has regular meetings, usually once a month, with guest speakers, forums, demonstrations, and whatnot. It's a great opportunity to get together with others interested in audio, and to keep posted on what's going on in your area. (Who knows, you might even get a job!)

So, with more sections being formed, there's a good chance that there'll soon be one in your area, if there is not one there already. I've mentioned the activities in the eastern region, since I'm involved in this area. But of course there will also be sections forming in the central and western regions of the country, as well as in Europe.

What if you are not yet an AES member? Well, for one thing, you should be. Chances are, if you are reading this magazine of your own free will, you'll find AES membership definitely worthwhile. There are three categories of membership available:

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Bylaws, may be any person who (a) is active in audio engineering, (b) has an academic degree or its equivalent in scientific or professional experience in the field of audio engineering and its allied arts, and (c) who is familiar with the application of engineering principles and data in that field as further defined in the Bylaws.

2. An *Associate* may be any person interested in the objectives of the Audio Engineering Society and, upon election, entitled to all the rights and privileges of the Society except the right to vote or to hold office or chairmanship of standing committees.

3. A *Student* may be any student interested in audio engineering and enrolled in a recognized school, college or university. A student is not eligible to vote or to serve on committees except in his own local chapter.

So, why not join now? All you need is the address, which is: Audio Engineering Society, Inc., Room 929, Lincoln Building, 60 East 42nd Street, New York, N. Y. 10017.

Write and ask for an application, which you will receive in short order. Once accepted for membership, you will be contacted by the section nearest you. In the event that there is not yet a section nearby, the society will make every effort to get one started. Of course, success here depends on how many people in your immediate area are interested. But, it all starts with *you*. If you are interested, apply now for AES membership. If you don't, you're missing out on a good thing.

THE NATIONAL COUNCIL OF RECORDING ENGINEERS

Shortly after the announcement about the NCRE that appeared in the June SYNC TRACK, one of the tenants on our floor moved out of town. In its infinite wisdom, the Postal Service therefore decided that *all* the offices on the same floor would no longer require mail service. Accordingly, some mail addressed to the NCRE has been returned-to-sender, stamped with God knows what sort of explanation on the cover. Lately, we've been able to persuade the Postal Service to put us back on their list of customers. So—if you've written to the NCRE and had your letter returned, this is to assure you that if you try again, we stand a good chance of hearing from you.

The letters that have gotten through have been generally encouraging. A few manufacturers have already written in to express an interest and enthusiasm in working together with

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NCRE on various projects of mutual interest.

But perhaps a little more explanation of what NCRE is—and is not—is in order.

NCRE is primarily an organization of recording engineers who wish to exchange ideas and compare notes. Each of us has something to offer; an experience, a novel approach to a problem, a better method for doing something. Via questionnaires and letters, the NCRE will eventually accumulate a wealth of information—the collective experience of the membership. This information will be fed back to the membership so that all may learn from the experiences of others.

The NCRE will *not* limit its interest to the large multi-track operation. Several letters inquired about this, since our first questionnaire dwelled on 16- and 24-track machines.

However, future mailings will cover as many aspects of the overall recording business as possible. Members have been asked to suggest topics of interest, and the NCRE will attempt to be responsive to the interests of its members while at the same time offering standards information and professional guidance as required.

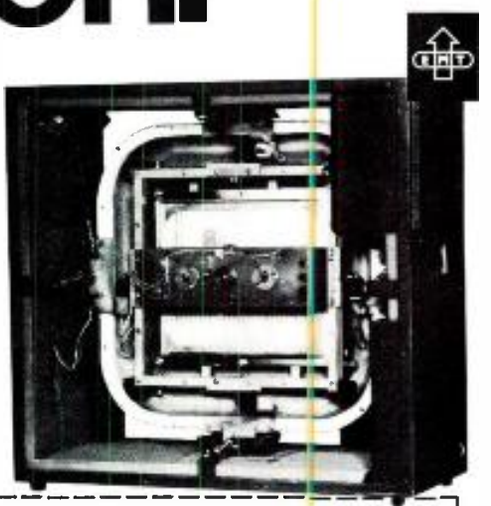
The NCRE cannot offer free consultation service. (For one thing, that's *my* racket.) To further explain, an organization cannot advise its members that a certain piece of equipment is a lemon. Nor can it say that a certain device is the best of its kind. We can, however, put you in touch with equipment users who can give you the benefit of their experience with the equipment you are considering.

And, NCRE can offer a type of communication with manufacturers that may be difficult to find elsewhere. For example, we have already heard from a tape recorder company and a manufacturer of audio connectors. Both expressed interest in participating in NCRE activities. By putting these people in touch with members particularly interested in tape recorder connectors, we may be able to develop the ideal multi-pin plug mentioned in an earlier column.

To conclude, the NCRE is an organization of—and for—the recording engineer. It's primary purpose is to establish a *two-way* communications link between studios throughout the country. Note the emphasis on "two-way." That means the members do at least half the work. *You* tell us what needs to be done, and then help us do it.

Now that the National Council of Recording Engineers has gotten started, correspondence and membership inquiries should be adressed to: NCRE, c/o Larry Levine, A & M Records, 1416 North LaBrea Avenue, Hollywood, California 90028. ■

Sorry, but you'll have to wait for the biggest advance in reverberation.



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Norman H. Crowhurst

THEORY AND PRACTICE

● How far can one go, in reconciling theory and practice? In the May issue, I discussed at some length, which some reader must have thought was still too superficial, practical winding factors in a loudspeaker voice coil. Apparently, I glossed over the space factor for round wire, because this reader sent me a sheet torn from the magazine, with some sketches on it, which I will reproduce here (or the magazine artist will).

In the May issue, I stated that the best winding factor for round wire cannot be better than pi/4, or 78.5 per cent, not allowing for space occupied by wire insulation. As this reader wanted to point out, that assumes what he has designated "unstaggered winding." And according to his calculation, which is also correct, using staggered winding will increase this space factor to 90.7 per cent, which is considerably better than the figure I gave.

There is just one thing wrong with it. Of course, I know that, whether you design it that way or not, turns in one layer will *tend* to lay in the grooves made by the top of the previous layer. So staggered winding tends to happen automatically, which would make the reader's comment appear valid, until you look a little more closely. The "fly in the ointment" is that layers wind in opposite directions, inevitably.

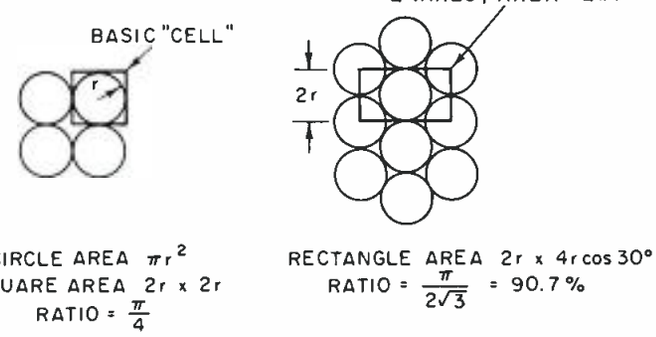

Figure 1. The sketch sent in by a reader, relative to the column in the May issue. At (A) an unstaggered winding, while at (B) a staggered winding.

If every turn is a perfect constant-radius, longitudinal spiral, then as the wire is wound, one layer will have successive turns moving from left to right, and the next will have them moving from right to left. And such uniformity of spiral will mean that twice in every turn, a cross section would have the windings looking like my reader's "unstaggered" diagram, while twice in every turn it would look like his staggered diagram.

So in fact, the winding is neither one nor the other. If the points on the circle where successive layers are unstaggered and staggered respectively line up, then a winding that has a circular inside will develop an elliptical outside. What generally happens is that successive layers "choose" different points at which to change, so the shape remains reasonably circular.

Even so, you might think that the *average* space factor might be somewhere between 78.5 per cent and 90.7 per cent. But we have still left out one consideration. We have considered how turns move their way along successive layers, but we have not considered how they get from one layer to the next.

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If the length of winding allows, say 14 turns, or diameters of the wire gauge chosen, then 14 turns of that wire will fit into that length at only one point in the revolution. As the wire in the last turn moves up toward the end of the layer, it will squeeze the following turn up into the next layer. So at the ends considerably more than the space between individual turns get "lost" because of this effect.

Of course, if a winding has relatively long layers, this effect makes little difference. But if they are short, the effect may knock the space factor considerably below even the figure I gave, of 78.5 per cent. If anyone wants to pursue this topic, he can. I believe I have made my point.

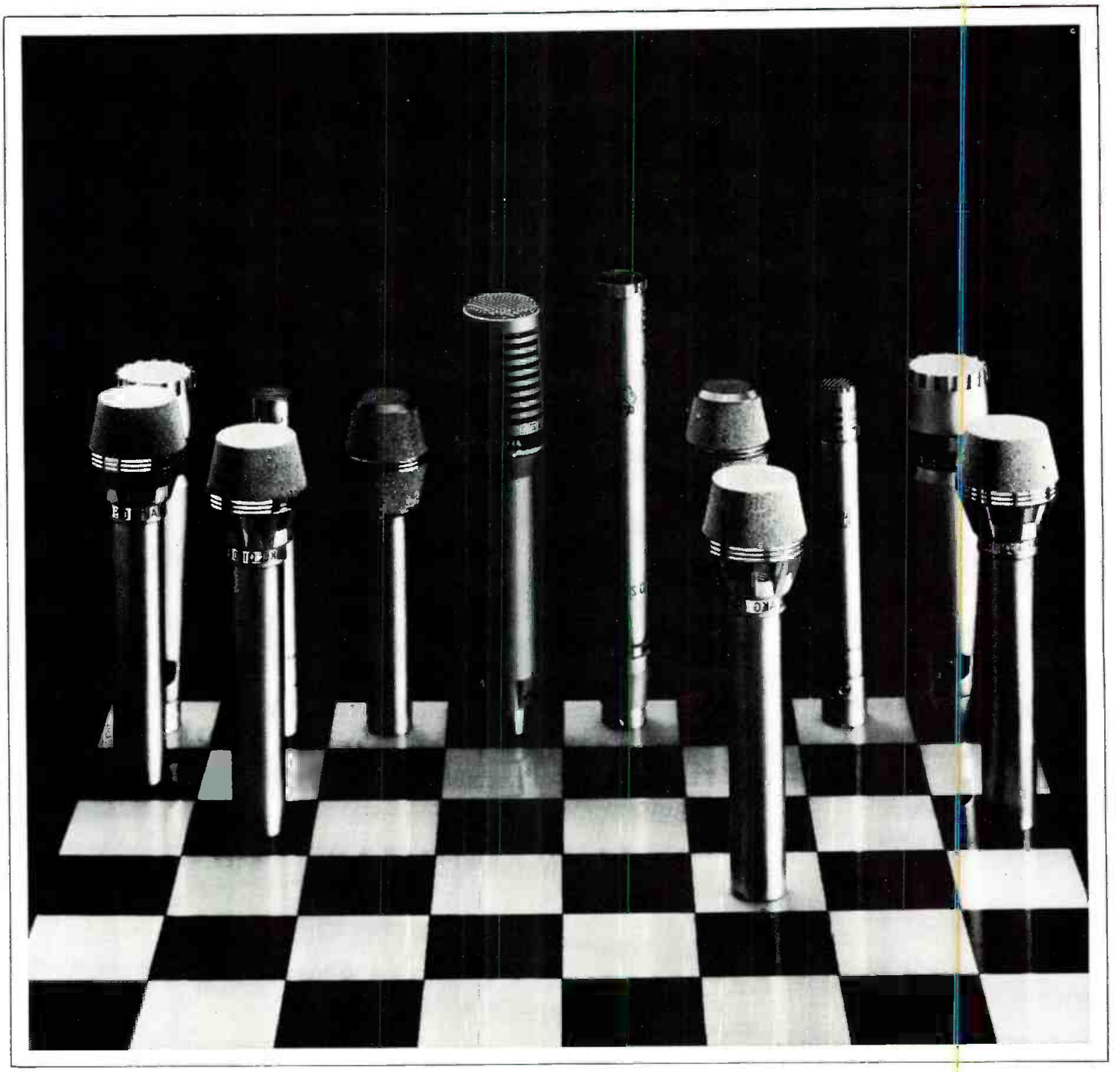
In most mathematics, countless simplifying assumptions of this nature are made. In the assumption that is implicit to my reader's comments, all the turns are perfect circles, which means there would be no winding! What you would have, according to that theory, would be a number of unconnected rings all packed closely together, which would not be very successful at carrying current in the way most voice coils do!

One cannot blame this reader for missing this point. Rather, I blame the method by which such things are taught, particularly the insistence on putting the abstract before the kind of applications that the abstraction serves.

At the National Assiciation of Professional Educators convention I attended in Denver in August, a professor of mathematics at the University of Colorado over in Boulder heard about the convention and came over to see what it was all about. He was impressed by the group's concern with changing education so that the system of teaching can again justify the term "profession."

He was even more impressed when I explained to him how our notions would apply to the teaching of mathematics. His comment, after I had given him a very quick run-down on the proposed approach, was, "Then you would first solve practical problems, then educe the abstractions that allowed them to be solved that way?" He said he believed that was the way mathematics should be approached and that anyone could learn it that way.

That convention brought together a number of people with good news for education, and it created considerable interest as well as showing that the climate is right for change. We learned that the thrust of existing professional organizations, abandoning any semblance of true professionalism and exerting pressure for agency shops so that being a member is more important than being a teacher, much less a good



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one, is being opposed with success.

We heard the stories of teachers who had been fired for opposing this kind of action and who, after long fights, have won reinstatement. The president of the Detroit Federation of Teachers told his story, how the Michigan state agency shop law was used to try to force agency shops on Detroit schools, but they refused, withdrawing from the state Michigan Education Association to pursue the fight.

At the hearing, he said the hearing room was packed and, knowing Detroit to be a "union town," he assumed the voluntary membership advocates were outnumbered by those who pressed for compulsory dues, if not membership. He had a surprise. There were just eight paid union officials who advocated compulsion. Everyone else wanted to see the teachers win freedom of association, which is the American heritage. They won.

Most of the agency shop laws being pressed through state legislatures by lobbyists of the unions (what else can you call the NEA and AFT?) require that teachers not be members of any other organization, and that the designated union have exclusive bargaining rights for every teacher—a teacher is not even allowed to speak for himself, but must "go through" the union representative. And we heard instances where unions are already dictating textbooks and curriculum to the school districts they control under such laws.

What makes the fight tough, of course, is the fact that unions apply a large slice of forcibly collected dues for political pressure. In California, the average price lobbyists pay for a vote in the legislature is $17,000. And come election time, they will spend $50,000 to $100,000 to elect a congressman or senator from each district throughout the state, and to defeat those who will not vote favorably to their plans.

But, as the attorney for NAPE pointed out, offsetting that does not cost nearly as much. All it takes is for concerned citizens—those who will do the actual voting in the next election, to let legislators know what they think.

In all, we got a lesson on the theory and practice of democracy. The way it has been going, votes have been bought at every level, so it has come to appear that money is what does it. Just club the membership for the money and we've got it made, the union organizers think. Buy the legislation, then buy the campaign in the next election to keep it that way.

But we still have legislators with consciences. While it appears pragmatic that "going along with the money" is the only way they can stay in office to do *anything*, they'll do that, salving their consciences by telling themselves

Telex tape duplicating equipment...you start with what you need, but you're never likely to outgrow it.

Every possible thought has been given in the design of the Telex tape duplicating system to make it a modular, step-by-step expandable system with the highest degree of flexibility we know of.

You can have cassette-to-cassette, reel to cassette, reel-to-reel or even cassette to reel duplicating. All this with true professional studio quality and all the commonly required head configurations available.

Simple, push button operation assures consistent top quality reproduction even with non-technical operating personnel.

Plug-in componentry makes the Telex system easily expandable in true "building-block" fashion.

Your Telex dealer can show you exactly what equipment you need and how economically he can satisfy that need.

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PRODUCTS OF SOUND RESEARCH

TELEX®

COMMUNICATIONS, INC.

7302

Circle 27 on Reader Service Card

However, let them receive a few letters—not that many—from an aroused public who knows the facts and these men raise their heads high and tell their colleagues, "I've heard from my constituency on this!" Corrupt as we may sometimes think American politics has become, *that* still speaks more loudly than the money.

The people are still sovereign, but what use is a sleeping sovereign? I know from the letters I get from readers that many of you work for radio and t.v. stations. Maybe you are not in programming, or have no say in *what* gets said over your media. Are you sure you don't? People are people, and you are in there, every day, just as many of the lobbyists are.

You can let the boss know what you hear, too. With each election, there are more "upsets," instances where the candidate who has the big money backing and all the promotion gets defeated by someone who gets the word around without any help from the media. If you notice that, couldn't you drop a hint where it counts that maybe the time has come to change policy a little? That maybe those who have been "guiding policy" (if that's what you call it) are losing their touch? ■

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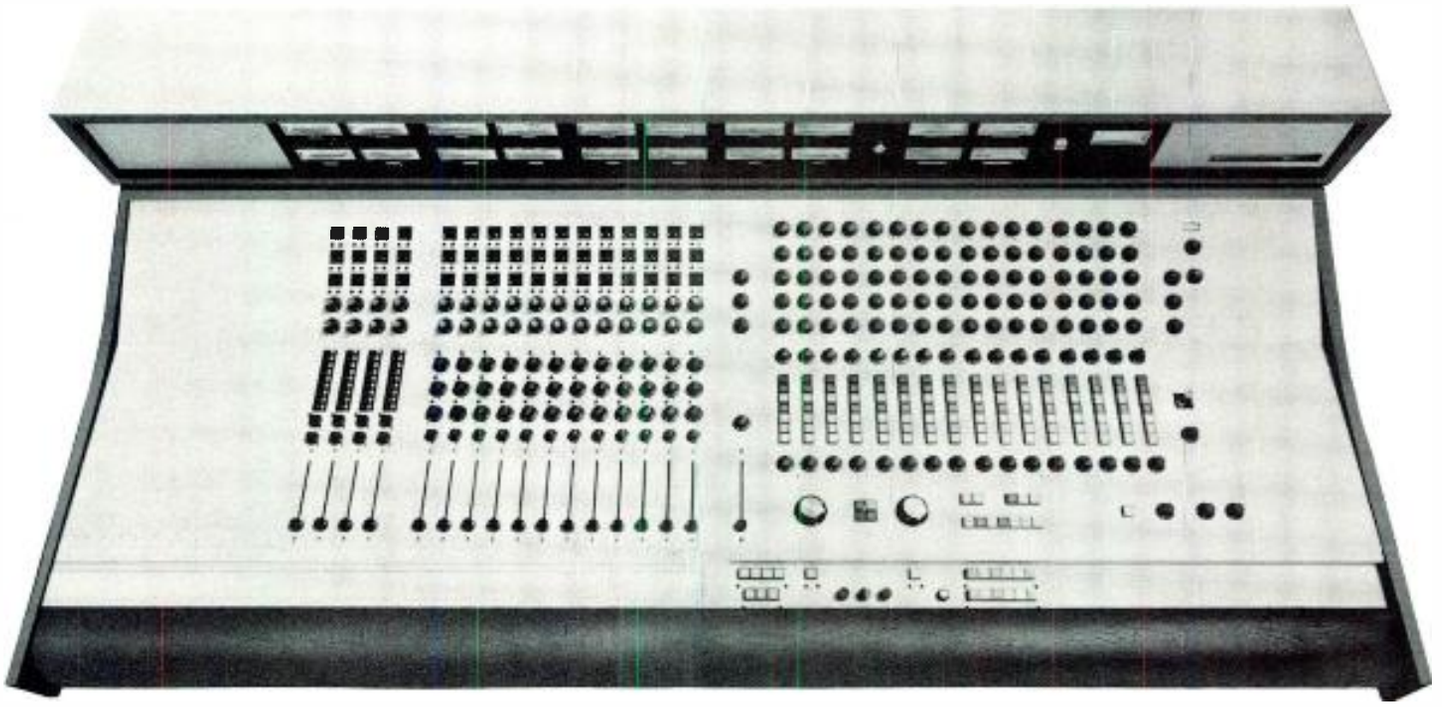

Taping a performance presents enough problems without worrying about being on the right track — that's why the Electrodyne Series 2000 was developed with you in mind.

But don't let that simplified panel layout fool you — A console doesn't have to look like a 747 instrument panel to be functional and effective.

This control board was so arranged that every operation can be reached from one sitting position (No Co-Pilots needed here!) Yet the functions are engineered to fit a man sized hand.

For example, the exclusive Electrodyne SML-20 channel assign switch module incorporates up to 24 assignment positions, 4 echo-send selections, program and echo quadraphonic pan pots and solo button, yet this compact panel is only 1½" by 9". And talk about curves! —

The Electrodyne 712 input module's 9 frequency graphic equalizer will really put your sound in shape.

These and many other characteristics put you in command while freeing you to add the necessary creativity. After all — you're the man behind the board and you want results — not clutter.

That's why we've developed the Series 2000!

Cētec INC.
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Martin Dickstein

SOUND WITH IMAGES

A New Convention Season

● Although there is never really any end, and therefore there can not really be a beginning, the convention season does seem to have heavy and light periods. In the field of audio and video, this is at the least the beginning of what seems to be the busy season.

In the sequence, the American Management Association started the fall season near the beginning of August. Next, the Vid-Expo '73 Conference occurred during the first week of September; the Audio Engineering Society had its convention the second week in September, followed in the middle of September by Video Expo IV, and Vidca '73 (in France) across the September-October changeover; and then the SMPTE in mid-October. Take our word for it, there was plenty to see and hear at each of them for anyone in or near the audio/video field.

The convention of the AMA had as its title the *9th Education & Training Conference and Exposition.* The emphasis was on education, and both the hard and software exhibitions, as well as the talks, were tuned in that direction. In this, the 50th year of the American Management Association, the organization continued its tradition of bringing together management and educators to combine forces and share knowledge. Many thousands of people in both fields have taken advantage of the courses and seminars offered by the AMA to learn how to train others and solve management problems.

In this report on the convention, we must reiterate that selection of companies and equipment to discuss as well as the excerpts taken from some of the talks are not meant to show preference, individual superiority, agreement or disagreement with comments or opinions or in any way to disparage those not mentioned. The choices are made only to show something of what took place, for the benefit of our readers.

Among the exhibitors there were quite a few companies which are normally better known for other than audio/visual equipment. As one example, there is the Singer Co. Recently, Graflex became a division of Singer, and the company known originally to many for various other things found itself in the audio/visual field, quite heavily. Among the items Singer was willing to talk about was their Insta-Load SL film projector, which featured quick loading, a footage counter, fingertip control, and a fast forward and rewind in-path film motion. Other visual devices in their line included a filmstrip slide projector which automatically rewound the filmstrip, ready for reshowing or storing and another model which featured the capability to project microscope slides and to carry out tachistoscopic instruction. A full line of slide rear-projection devices with synchronized cassette sound is also included in the education equipment available from Singer.

Tel-Com, a company which handles private telephone systems, now has a line of remote control units which permits the operation of slide projectors, film projectors, videotapes, tape machines, and accessory facilities, such as lights or draperies or screens or . . . . The consolette unit is made either as a complete desk-top device or on a panel for mounting where convenient.

Montage Productions has developed a nine-channel optical programmer using a single slide projector to trigger the operation of nine other devices or systems. The original master unit is not modified in any way, so it can be used normally as a regular slide projector. The trick is in the molded plastic housing which replaces the lens of a standard Kodak Carousel. It has a nine-photocell arrangement, each connected to a projecting cable ending in a male plug exactly the same as the one on the end of a *pickle,* or remote control unit, which is standard with the Carousel. Each of these cables can either be inserted into the rear of another projector or adapted to trigger any other device needing a closure to activate.

The photocells are operated by the light source of the master projector and special program slides which are supplied with the programmer. The slides are opaque plastic and have nine 3 x 3 preset knockouts which

$1890

You pay for what you need

If you're seriously into music or sound reinforcement you want more than hi-fi products can give you. But full professional studio gear costs an arm and a leg, and you pay for a lot of things you may not really need.

That's why there's a TASCAM Model 10. It's an 8-in, 4-out mixing console, and it's just $1890.

With the Model 10 you get what you have to have. Without sacrificing a single necessary function.

Each input module gives you mic and line attenuation, three bands of peak and dip equalization (two with frequency selection), pre- and post-echo send and receive circuitry, pan function, and a unique straight-line fader.

Each of the four submasters has a meter control switch (line/echo), independent monitor level control, echo receive level control, and a straight-line fader. You also get a master gain module and 4" VU meters with LED peak indicators. Plus pre-wired facilities for up to four additional input modules and other optional accessories including talkback, remote transport control, quad panner, and headphone monitor.

That's what you need and that's what you pay for. Some things, however, you may or may not need, and we leave that choice up to you. For instance, the basic Model 10 is high impedance in and out, but studio line impedances are available optionally. You'll probably want low impedance mic inputs, but you may not need all low impedance line inputs. So we don't make you pay for them. You can order any combination of high and low input/output impedances according to your application.

Details and specs on the Model 10 are available for the asking. At the same time we'll tell you about our new Series 70 Recorder/reproducers.

We've got what you need.

TASCAM CORPORATION

5440 McConnell Avenue
Los Angeles, California 90066

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can be easily punched out with a pencil. By pre-punching the slides, arranging them in a tray in order of required operation, and using the master projector in the normal manner, the nine remote units will be activated as the light illuminates the desired photocell. Changing the program can either mean rearranging the punched slides or punching out replacements to reprogram the other projectors. As the photocells are activated only when the source light falls on them, the blackout during the normal slide change in the master unit does not affect the remote devices. The programmer is called *Media/Matic*. The master projector can still be triggered by *pickle* or tape.

Another interesting slide activator developed by Montage Productions is so simple, yet so unique. In place of the normal remote cord at the rear of the Carousel, a Sonar/Matic receiver is plugged in. This unit is sensitive to a single super-sonic frequency and is activated by receiving a signal from a simple rubber ball with a small plastic tube-and-dish shape. Squeezing the ball from a distance anywhere up to fifty feet will advance the slides. Look, ma. No wires.

Projectors of different kinds were shown by various manufacturers, including Besseler, Kodak, Viewlex, Bell & Howell, and LaBelle. In the screen category, Brandon's of Jacksonville, Florida, had a unique wall-mount unit which permitted the screen to be tilted while in use, thus minimizing the usually troublesome keystone problem, permitting it to be raised out of the way when not in use. These *R & T* (raise-and-tilt, as well as roll-and-tilt pull down models) screens are specially applicable to meeting and class rooms.

Among the video exhibitors, count GTE-Sylvania, Sony U-matics, JVC, Hitachi, and a large display of the TKV-1 Color Tele-Production System by Sound Systems of Long Island City, New York. The total system included two color viewfinder cameras with ⅔ inch separate mesh vidicons, tripods, a console with a monitor for each camera, a special effects generator, a preview monitor, a nine inch line monitor, and a scope. Camera control units for the two cameras, a sound mixer, intercom, color sync generator, phase shift distribution amp, and tally light control are built into the console. The system is made to be portable, too.

There were lots more exhibits, including those of software manufacturers, but those discussed will at least give you an idea of the extent of the display. There was also a lot

to listen to. A few excerpts will indicate the general ideas for the present and future expressed by those most deeply involved in education.

In his talk on *Dynamics Influencing the Future of Education; The Community College*, Mr. H. Bahar, president of the Tompkins-Cortland Community College in Groton, New York, said early in his comments, after a few introductory remarks, "As you can note, education in the year 2,000 will be by far the largest industry in the United States.

"The dawn of the community college in America is just breaking . . . To house an educational program such as the community college, new concepts in architecture and design must be developed. In my opinion, the best community colleges are those which serve the people where the people are. These colleges, via remote-control communication systems, mobile educational classrooms, laboratory units, or strategicaly located mini-campus facilities, will reach all who need to be or want to be reached . . .

"To implement such an exciting thought, one must think of many new building ideas, including, for example, the following:

- Spaces should be designed for convertibility to highly diversified activities. We have designed such rooms which we call *Magic Rooms.*
- Space should be designed for a college-community forum to be used for large group gatherings, workshops, speech and drama activities, and community programs.
- Through use of diversified building products and changeable acoustics, a space can be designed for use as a gym, a dance hall, a theater in the round, a convention hall, a lecture hall, a ladies' sewing circle room, or a room for an auto show. Why not let the community fully use the facilities they have paid for?
- Science labs can be set up to make use of audio-tutorial study carrels, plus wet areas for small group or individual activity. Labs should also be designed to allow convertibility to more traditional situations, if necessary.
- Instructional facilities should be designed to appear less like a classroom and more like a casual living room.
- Art studios may be planned to be open for general student use in addition to class use. Such an open studio will best be used if located where most activities take place.
- All labs can be designed to be converted into ordinary classrooms if needed without taking the equipment outside the designated space.
- Industrial technology programs should make maximum use of local communities' industrial and business facilities.

"We build on the premise that the college's total space is to be used to its possible and logical maximum; a college facility should be designed to leave no square inch vacant from dawn to midnight. We have for a long time enjoyed the gravy train of luxury and waste and have tried the taxpayers' patience to the limit.

"Unless we design our space to fit the dynamic and fluctuating educational needs of our century, I can safely predict the obsolence of our newly built campuses before their dedication date. The community college in the year 2000 cannot be housed on the campus of the 18th century!"

Dr. James A. Sensenbaugh, State Superintendent of Schools, Maryland State Department of Education, Baltimore, Maryland, talked on the subject *The Looming Confrontation: Accountability With Achievement Versus Dedication and Uncertainty.* In discussing how quickly the amount to be learned is growing, he said:

". . . We are told that children born into the world today will find that, when they are fifty years old, 97 per cent of the knowledge in the storehouse (in the year 2023) will be new since this year, 1973. A person in fifty years will be surrounded by practically a new set of knowledge. When the third grade child asked his father to help him do his homework the mother remarked 'You better help him while you can because next year he will be in the fourth grade!' We oldsters are going to have to hustle to keep up.

". . . All of this reminds me of the story of the race horse owner asking the jockey why he didn't pick out an open space between the horses in front and ride up between them. The jockey answered he couldn't because the hole was going faster than he was!

"And with the new gadgets on cars—power-this and power-that, radios, automatic transmissions, air conditioning and anti-pollutors, gasoline consumption is excessive—something we're very alert to at the moment. Down home the other day a Cadillac pulled up in front of our local filling station with everything going. The station attendant said as he was filling up the tank, 'Shut off the damn motor, you're gaining on me.'

"And so it is with knowledge."

The same goes for audio/visual/video specialists.

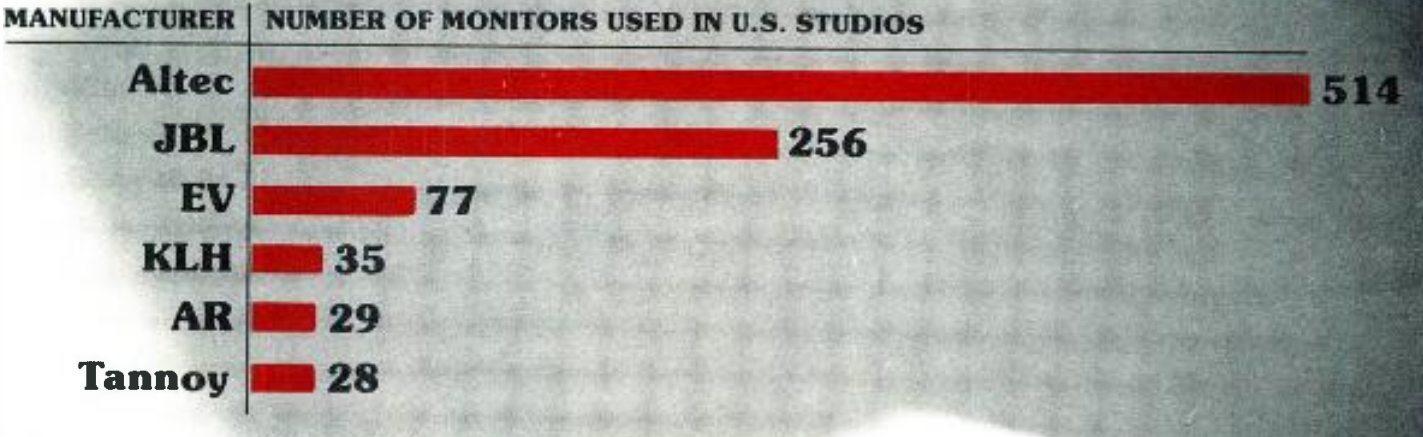
Next time, the AES and VidExpo 73. ■

The hungry leader.

At Altec, we're not taking our leadership position for granted. We're always trying harder—challenging ourselves to develop studio monitor speakers that stay a step ahead of constant improvements in the contemporary recording process.

Throughout the United States, recording industry professionals—engineers, producers, A&R men, musicians—have responded to our continuing ability to produce the finest monitor loudspeakers by installing more Altec systems in studios than any other brand.

And we can prove it. Here's the latest data on monitors installed in U.S. studios, as published in Billboard's 1973 International Directory of Recording Studios.



But we're not really satisfied—even with this impressive track record. We're still trying to better ourselves. In fact, Altec has three all-new studio monitors available right now. They're a whole new generation of speakers designed to meet the whole new range of tomorrow's dynamic recording techniques. Your studio may need them. Why not call your local Altec representative to find out?
Or write us for full details.

Altec gives you the best of both worlds: proven leadership, plus an unrelenting commitment to doing a better job. That's because we've really grown to enjoy being #1 in studio monitor sales during the past three decades. And we intend to stay right there for at least the next three decades by always being our own biggest competitor—in research, in quality, in service and in satisfying the demanding needs of an ever-evolving industry.

Altec. We're the hungry leader.

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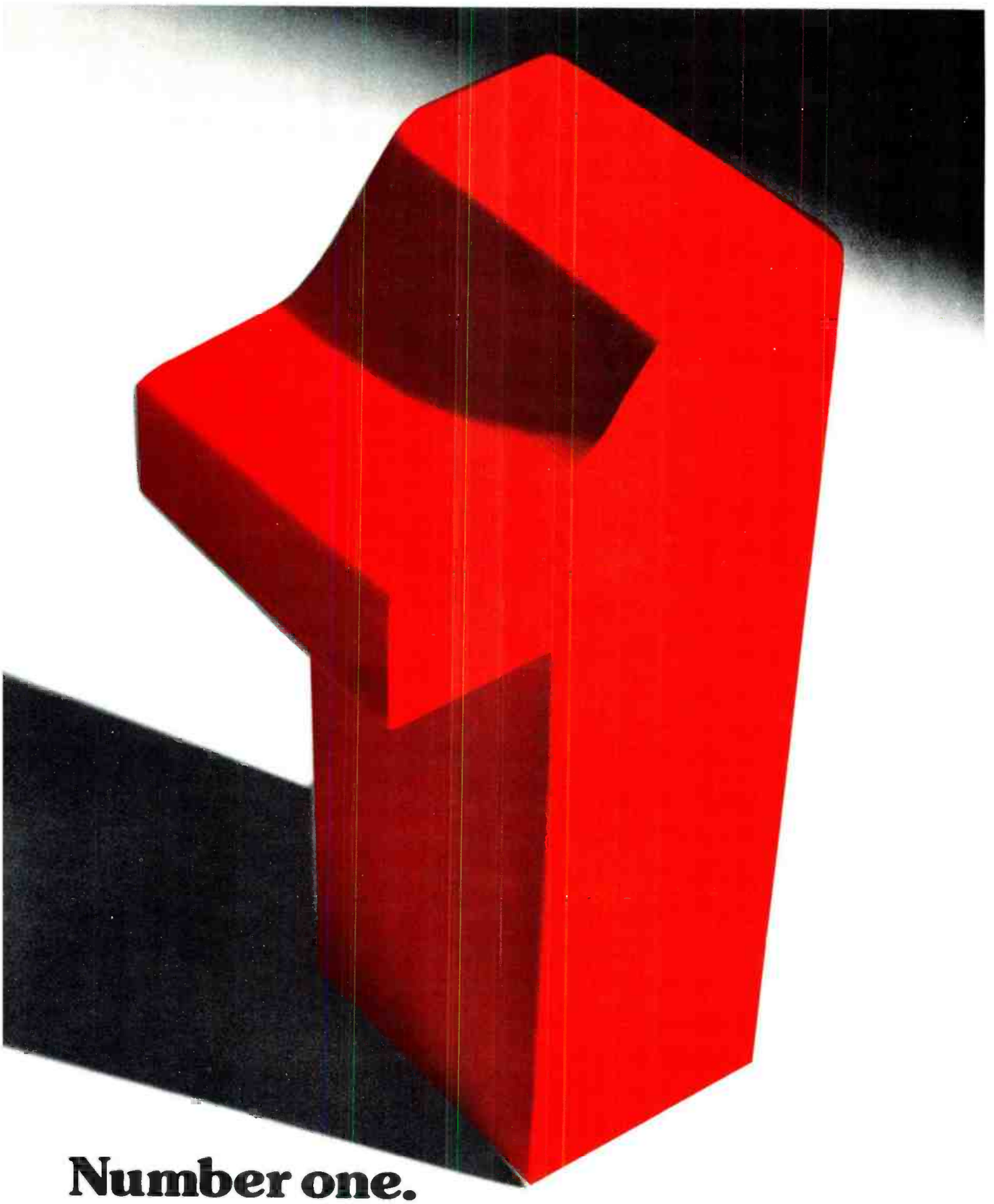

Number one. And have been for nearly 3 decades.

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the sound of experience.

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NEW PRODUCTS AND SERVICES

MAG TAPE MACHINE SYNCHRONIZER

● MagLink® synchronizer is useful for synchronizing, position logging, editing, and indexing of video and audio magnetic tapes. A time code system permits videotape, multi-track audio, and magnetic film machines to be controlled simultaneously. They can be locked in sync, offset in their relative positions, or stopped and started according to a pre-set program. Master and slaves will remain synchronized in all operating modes, including rewind and fast forward. A converter module is available to interface with the time code. The synchronizer can be used for multi-track audio production, video mixing, editing, production of film sound tracks, or foreign language over-dubbing. MagLink® has a sync resolution of 1/3000 of a second and a typical search accuracy of 0.2 seconds at 15 ips. A selectable conversion display enables the operator to convert a position code on the tapes to the format selected by the switch.
Mfr: Automated Processes, Inc.
Circle 51 on Reader Service Card

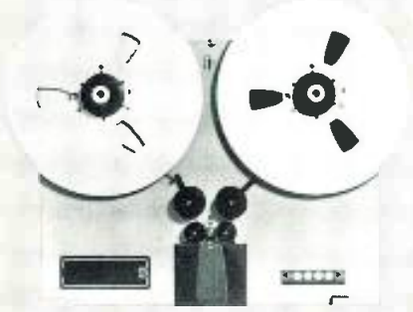
OMNIPRESSOR DYNAMIC MODIFIER

● This versatile machine combines the characteristics of a compressor, an expander, a noise gate and a limiter. In addition to the usual application to gain change, it can generate other effects, such as infinite compression and dynamic reversal, which makes possible unusual effects, such as playing an instrument "backwards" or "talking backwards" when applied to a voice signal. The continuously variable expansion/compression control goes from 5 to 1 (gate) to a compression range of −5 to 1 (abrupt reversal. Gain control ranges from 60 dB to plus and minus 1 dB. A step-variable time constant control adjusts attack/decay times over an approximate 100 to 1 ratio. There is a bass cut switch which limits low frequency response in the level detector, and a metering system using a logarithmic amplifier for fine control.
Mfr: Eventide Clock Works
Circle 52 on Reader Service Card

16 CHANNEL TAPE NOISE REDUCTION SYSTEMS

● Two new 16 channel noise reduction systems, which improve headroom by 10 dB and provide in excess of 30 dB of noise reduction are available. Model 216 provides simultaneous record, play, and bypass functions controllable from the panel or remotely. A spare model 310D two channel module, is supplied. Model 116 is switchable between record and play. These two systems are interchangeable and compatible with other noise reduction systems from the same manufacturer.
Mfr: dbx, Inc.
Price: Model 216—$8,200
Model 116—$6,200
Circle 54 on Reader Service Card

EXTENDED PLAY REPRODUCER



● A drive unit derived from that used in the computer industry is one of the features of LJ-10 reproducer. A closed-loop tape drive improves wow and flutter; the tape is pulled, rather than pushed. Tone sensing circuitry and end-of-music overlap control are built in. In the transport and audio circuitry, the circuitry is solid state. An opening front panel makes these plug-in printed circuits accessible. The unit has up to a 14 inch reel capability and an early warning system for potential malfunctions.
Mfr: L. J. Scully Manufacturing Co.
Circle 53 on Reader Service Card

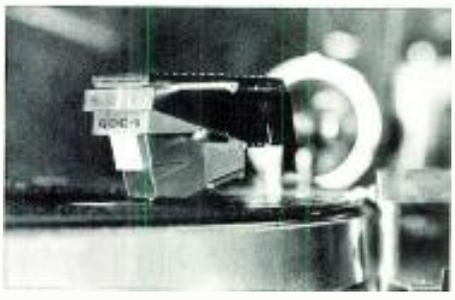
MODULAR RECORDER

● Model SP-7 recorder, through the use of plug-in head assemblies, allows various modes of operation such as monaural, monaural with Neo-Pilot for synchronized filming, stereo, or stereo with third-track Synchrotone for filming, slide synchronization or cueing. The assemblies have plug-in epoxy encapsulated electronic modules with gold plated contacts, completely interchangeable. The compact Stellac motor, operated on 12 AA cells, contains only two ounces of moving mass, has a six brush system on a flat commutator. Accessories include a reel extension system, ABR, allowing up to twelve inch reels, as well as a complete synchronizer with built-in quartz reference, a separate quartz plug-in module for the recorder, speed variator, slide synchronizer, external microphone pre-amplifiers and various head assemblies for monaural and stereo operation from the same recorder.

Mfr: Hervic Electronics, Inc.
(Stellavox)
Circle 57 on Reader Service Card

STEREO/CD-4 PHONO CARTRIDGE

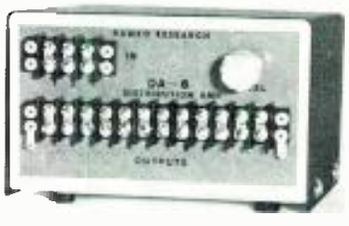
● QDC-1 cartridge features a stylus claimed by the manufacturer to furnish through the virtual elimination of noise of its own, remarkable fidelity in picking up sound. Other factors which have been carefully engineered are the stylus shape, faithfully tracing record groove modulation and the transduction system, accurately transmitting vibrations. Stylus assembly is suspended by two elastic bearings attached in a 45-45 degree configuration. Stylus-bar is directly attached to the transduction i.c., which puts out a perfectly linear signal from 5 Hz to 50 kHz.



Mfr: Micro/Acoustics Corp.
Price: $100 - $120.
Circle 56 on Reader Service Card

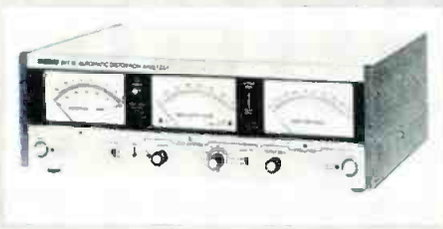
AUDIO DISTRIBUTION AMPLIFIER

● Integrated circuits which allow the outputs to work into any impedance over 125 ohms without affecting either response or distortion are used in DA-6 distribution amplifier. The amplifier will bridge or match a 600 ohm audio line, balanced or unbalanced, and provide six completely isolated balanced outputs. Other available models provide 16 or 32 balanced outputs and 8 balanced inputs, individual line level controls, switchable front panel line level metering and headphone monitor.



Mfr: Ramko Research
Price: $95.00 - $425.00.
Circle 55 on Reader Service Card

AUTOMATIC DISTORTION ANALYZER



● Flexibility and complete automation are the features of BKF10 hi fi analyzer. It incorporates a distortion meter, a sweepable AF oscillator, an amplitude response meter, and a frequency indicator, all operating automatically. This equipment simultaneously determines both distortion factor and frequency response, while the input signal is swept through the four frequency decades from 20 Hz to 20 kHz. Results are continuously displayed on the front panel meters and recorder output signals allow both the distortion factor and the overall amplitude response to be plotted as a function of frequency.

Mfr: The London Company (Radiometer)

Circle 58 on Reader Service Card

PRECISION DISC MASTERING EQUALIZER

● MES-430 parametric disc mastering tracking equalizer is designed to be used with a stereo disc mastering system, equalizing master tapes for disc transfer. It will equalize the preview and program information simultaneously and enable the cutting system computer to maintain accurate pitch and depth control for maximum conservation of available groove area. It is possible to optimize sound characteristics at any point within the entire audio spectrum, using positive detented switches. The equalization in/out function can be automatically controlled by the banding logic in the Neumann mastering system; two units may be cascaded and automatically switched during banding. All operating controls are on the front panel.

Mfr: Gotham Audio Corp.

Circle 61 on Reader Service Card

DEMODULATOR FOR FOUR-CHANNEL RECORDS

● Model QD-240 disc demodulator reproduces discrete four-channel sound from all CD-4 discrete records. It can be connected between a stereo turntable and a four-channel amplifier or receiver, demodulating the signal into four distinct channels. Sound separation is made on the front panel by an illuminated panel meter. A three-position function switch permits a choice between two-channel, four-channel, auto and direct. The four-channel auto position provides an automatic switching function between four-channel and two-channel sound sources.

Mfr: U. S. Pioneer Electronics Corp.

Price: $139.95.

Circle 60 on Reader Service Card

LOW-COST BENCH-TYPE POWER SUPPLIES

● The LPS10-series power supplies are compact, portable units which provide short-circuit protected, fixed output voltages with a tolerance of ±5 per cent. Single output models currently available have ratings of:

Model LPS10-5A: 5 V at 1.2A
Model LPS10-6A: 6 V at 1A
Model LPS10-12A: 12 V at 750 mA
Model LPS10-24A: 24 V at 500 mA
Model LPS10-1515A: Dual-tracking ±15 V at 300 mA

The 12 V and 24 V units have less than 600 microvolts ripple rms. All units operate from input voltages within the range of 105 V to 130 V at 47 Hz to 63 Hz. Specialized units with remote sensing and over-voltage protection are also available.

Mfr: Lamb Laboratories

Circle 59 on Reader Service Card

THREE-HEAD CASSETTE SYSTEM

● Model 700 cassette system permits off-the-tape monitoring and has a factory-set minimum frequency response of 35-20,000 Hz ± three dB (with CrO2 tape). Closed loop driven double capstans with large staggered flywheels maintain stable tape speeds and low wow and flutter performance of less than 0.10 per cent under DIN 45507 weighted peak. Model 700 "Tri-tracer" employs a dual-motor drive system and solenoid-action feather touch controls with i.c. logic system. Other features include an azimuth alignment system for the record head, professional dB peak-level meters, Dolby-B noise reduction system, memory rewind, automatic shut-off and optional remote control.
Mfr: Nakamichi Research
Price: $690.
Circle 66 on Reader Service Card

RECORDER/REPRODUCER WITH ELECTRONIC EDITING

● Electronic editing incorporated into model 1001 recorder/reproducer eliminates the need for splicing tape; the tape moves across the recording heads so precisely it can be made to split musical notes and phrases. This is accomplished by putting the recorder in a balanced torque mode which activates the drive motors of both tape reels simultaneously and in opposite directions. Either reel may be moved manually, in minute increments. 1001 also has tach-controlled motion sensing, which detects motion of the tape when switching from fast speeds to recording or play back, and prohibits tape stretching, breaking, or spillage. The unit has closed loop dual capstan drive, fast tape threading and a pause control as long as the PLAY control is depressed.
Mfr: Tape-Athon Corp.
Price: $1,695.
Circle 65 on Reader Service Card

CUSTOM RECORDING CONSOLE

● Features most in demand by custom-console customers have been incorporated into Electrodyne series 2000 console. The unit has a 9-frequency graphic equalizer input module; a compact channel assign switch module covering up to 24 assignment positions; four echo send selections; program and echo quadraphonic pan pots; solo selector. It is equipped with 8, 16, and 24 output buses, separate quad bus and three mono buses for headphone distribution. A completely independent quad monitor mixdown has quad encode/decode and mono/stereo compatability test functions. Included are a patchbay wing, five frequency test oscillator, talkback and slate controls, and tape recorder remote controls.
Mfr: Cetec Inc.
Circle 64 on Reader Service Card

SPEAKER SENTRY

● A closed loop feedback circuit is used by this electronic control to limit the power dissipated in the speaker. If the power reaching the speakers exceeds a preset level, between one and 100 watts rms, the input signal to the amplifier is reduced automatically to the desired level across the speakers. According to the manufacturer, this reaction occurs within a fraction of a millisecond.
Mfr: Hartley Products Corp.
Price: $35.
Circle 63 on Reader Service Card

STEREO CASSETTE DECK

● A high quality machine, designed for consumer use, model 450 (Challenger) has certain new refinements. It has a transport system with wow and flutter specification of less than 0.07 per cent, switchable controls for both bias and equalization and separated microphone and line inputs. Signal to noise ratio with Dolby is −58 dB. The Dolby circuits can also be used separately to decode any other Dolbyized source.
Mfr: TEAC Corp.
Price: $379.50.
Circle 62 on Reader Service Card

JOHN BORWICK

What is a Tonmeister?

Here is one method of training future sound men that seems to be wanted-at least in Europe. Perhaps it might also be desirable to go this far in this country as well.

WHEN the Department of Music at Surrey University in England recruited its first students to commence studies in October, 1970, it did not only establish a conventional Bachelor of Music degree course. Alongside the three-year B. Music course was inaugurated a four-year course qualifying for an entirely new type of degree to be dubbed B. Mus., (Tonmeister).

This word *tonmeister* takes a bit of explaining to American studio personnel, though it is well enough understood in recording and broadcasting studios all over the continent of Europe. A literal translation from the German produces *sound-master,* not very helpful, but at least implying that a tonmeister is someone skilled in the arts of sound recording, transmission, and reproduction. The complication, and the special delight, of the time-honored sound studio profession is that it calls for a strange mixture of artistic flair and technical knowledge.

How you combine the seemingly incompatible aptitudes of art and technology in a single individual, and in what proportions, has always been a matter for discussion—and even of heated argument. It is easy to point to some of this country's ace balance engineers who are just that—engineers who position microphones and operate control consoles like angels, yet make no claim to musical knowledge. By contrast, there are equally famous sound balancers who know more about the way Wagner, for example, should be played and interpreted than most performing musicians, yet will confess to an almost total ignorance of what goes on behind the knobs and faders that they perform on with such consummate skill.

It seems that you can make a balance engineer, tape editor, or producer from individuals possessing a wide range of art-to-science ratios. The one common factor, since all studio work entails a continuous succession of aural decisions, is what we might call a "golden ear."

A BIT OF HISTORY

In the beginning, the high priests of the recording studio were pretty obviously technicians (though hopefully possessing a keen ear for aural imperfections). They performed mysterious rites with enormous horn microphones and temperamental wax discs, sometimes rotated by Emmet-like gravity motors. They were often keen musicians (they would need to be slightly mad to take up such a trade) but their most needed qualities were the skills of a general handyman plus a gift for improvisation.

The BBC similarly began with a handful of engineering types, recruited from Marconi and elsewhere. Even when their Broadcasting House was built around 1932, all amplifying gear and the main control of levels, routing, etc. was centralized in the engineering control room. If the studios had a control room at all, it simply comprised a cubbyhole with a couple of knobs. a program meter (fed back from the remote control room), and a tiny loudspeaker. The incumbent of this room was a junior engineer, usualy chosen because he wore suede shoes or gave other evidence of being an "arty" type. Sometimes, and I hope some of my old friends will forgive me for mentioning it, he was chosen because he would plainly never make a decent control room engineer, being more interested in the programs than the plugboards.

When I joined the BBC as a *program engineer* in 1947, there was a general state of restiveness. Program engineers

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John Borwick is an occasional contributor to **db**, *headquartered in Britain. For this article he calls on his knowledge gained as a senior lecturer in recording techniques at the University of Surrey (England). This article originally appeared in* STUDIO SOUND MAGAZINE *and is reprinted with their and the author's permission.*

Figure 1. A view of the control room at Surrey University with its Neve board, four-track Scully, Dolby A units, and Spendor speakers.

felt that their artistic contribution to the program outweighed their engineering capability. Shortly afterwards, this feeling was officially recognized. Program engineers were transferred from the engineering division to program operations department and they were re-designated *studio managers*. Recruitment, training, and the ladder of promotion were all re-oriented to take account of this change to a more artistic standpoint. We were witnessing the first manifestations of the tonmeister idea in England and the trend has continued. The name has again been changed—to *program operations assistants*—and there is a clear line of promotion up to studio production. New recruits tend to be looked at closely for their producer potential. It is generally easier to take an artistic personality and teach him enough basic electronics and physics to operate studio equipment than to take an engineer and graft on a sense of program timing, drama, and music.

TRAINING TONMEISTERS

As long ago as June, 1946, the composer Arnold Schönberg, in a letter to the Chancellor of the University of Chicago, was suggesting that the music department should offer classes for *soundmen* (a near translation of tonmeisters): "Soundmen will be trained in music, acoustics, physics, mechanics, and related fields to a degree enabling them to control and improve the sonority of recordings, radio broadcasts, and sound films. I want to mention here only my program for their musical training:

"The student should become able to produce an image in his mind of the manner in which music should sound when perfectly played. In order to produce this image he should not use the corrupting influence of an instrument. Merely reading the score must suffice. He will be trained to notice all the differences between his image and the real playing; he will be able to name these differences and to tell how to correct them if the fault results from the playing. His training in the mechanical fields should help him to correct such acoustic shortcomings as, for example, missing basses, unclear harmony, shrill high notes, etc.

"This can be done and would mean a great advantage over present methods where engineers have no idea of music and musicians have no idea of the technique of mechanics."

It was in that same year, 1946, that the very first Tonmeister Institute was formed at the Hochschüle fur Musik at Detmold in North Germany. Others followed in Berlin, Düsseldorf, Warsaw, and Stockholm. While the same basic philosophy inspires these colleges (and indeed the tonmeister degree course at Surrey University) the style of training, and in particular the relative importance attached to the musical and scientific sides, varies considerably.

I was able to check this in October, 1972 when I attended the Ninth Triennial Conference of the Association of German Tonmeisters. I took part in a panel session on *The Training of Tonmeisters* and soon discovered that, whereas Detmold continues to set itself the highest possible standards, concentrating on the technical subjects, our Polish and Swedish colleagues in particular seemed to share our view that the tonmeister is first a musician and secondly an engineer. My main surprise at the conference was its enormous size. There were some 800 delegates, filling the huge concert studio at the Cologne Radio Center. The Association handbook listed over 400 tonmeister members, most of them graduates from Detmold and now employed in every corner of the German sound industry. This question of employment is vital, of course. A high proportion of tonmeisters on the Continent do follow the expected line and go into studio work on microphone balance, recording, or production. But almost as many develop special interests in electro-acoustic research, for example, or musicology. User/development liaison is thus greatly enhanced because a studio man may find that he has a former classmate working in microphone or mixer development and *vice versa*.

In the same way, the tonmeister students at Surrey are encouraged to develop their own specialist interests and will most certainly not emerge as stereotypes.

THE SURREY COURSE

Recruitment for the degree course at Surrey follows the normal university pattern. Applicants should offer good pass grades at A level in music and physics, with mathematics as a preferred third subject. At an interview, selected applicants are expected to cope well with musical performance (in their chosen instruments, which will often include piano because the ability to read a musical score at the keyboard is a useful part of a tonmeister's skills), aural harmony, and tests relating to knowledge of basic physics and electronics. Entry is highly competitive because work on sound recording and reproduction is attractive to today's young people. Yet, for reasons of space and

Figure 2. In these views, students are seen participating in recording setups and production using various musical sources.

staff limitations, only some half-dozen students are admitted each year.

An equivalent number are recruited to the normal music degree course which runs alongside the tonmeister course. Thus, through a wide variety of musical activities, opportunity exists for students to acquire competence in the practical side of recording as well as the musical and artistic responsibilities of a recording producer.

It is the aim of the course (which is run in collaboration with the physics department) that each student should not only practice and develop his own skills, from the technical point of view, but that he should be thoroughly conversant with music of every period. The department of music contains a music studio fully equipped with modern professional recording gear, including mobile equipment.

We have a sixteen-input, four output Neve control console with up to eight channel monitoring and a comprehensive Calred mobile mixer. Our tape recorders include a Scully four track machine, Studer A80 and B62, a stereo Nagra, and Revox types. We also have a stereo EMT reverberation plate, Dolby A units and several first class Neumann, AKG, and other microphones.

Music-making is a daily part of the life of the department. As well as student performances, the tonmeisters can record concerts by visiting professional musicians who come every week to the university. We also record in the beautiful Guildford Cathedral, which adjoins the university, and other outside locations.

SUBJECTS OF STUDY

Included in the range of subjects studied are the following:

- History of music
- Medieval, Renaissance, Baroque, Classical, Romantic and 20th century techniques
- Free composition
- Mathematics
- Acoustics
- Electronics and electro-acoustics
- Keyboard harmony
- Aural training
- Knowledge of instruments
- General musicianship
- Instrumental studies (including score reading at the piano)
- Rehearsal techniques
- Sound recording techniques

THE INDUSTRIAL STAGE

In the latter stages of the course, tonmeister students pay visits to recording sessions, disc cutting channels, the BBC Research Department, etc., and receive lectures from visiting specialists. In this way, they learn the latest thinking on studio techniques and equipment development and become able to assess several viewpoints rather than that of a single expert.

As an integral and vitally important part of the course, students spend a period of six months in selected recording or broadcasting studios or establishments. This industrial stage will normally extend from April to September in the third year. Thus the students will already have completed two years and two terms of their four-year course. They will therefore be able to make themselves useful in the studio situation and develop their knowledge and basic skills, particularly on activities which can best be learned alongside of professionals rather than in the university environment.

The main objective of the industrial stage is to enable students to relate their university studies to the world of industry. As a byproduct, of course, it affords the industry an opportunity to assess at first hand the calibre of students and to participate in this new aspect of sound recording training.

The first batch of students commenced their six months' employment in April, 1973. British studios who would like to participate in this program can contact: Industrial Tutor (Tonmeister Course), The Department of Music, the University of Surrey, Guildford, Surrey, England.

POSTSCRIPT

In conclusion, it may be helpful to reiterate what the B. Mus. (Tonmeister) course is and what it is not. It is an academic degree course but carefully tailored to cater to the requirements of the recording and broadcasting industries where musical talent combined with a detailed understanding of technical matters are continually in demand. It is not a kind of super-engineer course. Nor does it seek to replace any of the traditional modes of entry to studio employment. Music is becoming an increasingly technical art. From June, 1974 onwards, tonmeister graduates from Surrey will be playing an important part in the realization of this art in direct performance and in each of the mass communication media. ■

Electronic editing so precise you might kiss tape splicing goodby!

The new Tape-Athon 1001 Recorder/Reproducer has everything the professional studio demands in a precision instrument, plus some exciting innovations we've added to make the 1001 a must-see-it-before-you-invest. Here are the basics: dual capstan, closed loop tape drive for clean, even tape travel with minimum wow and flutter; tach-controlled motion sensing to eliminate tape breakage, stretching or spillage; newly designed tape head section for easy threading, fast lifting; illuminated push button controls, flush mounted.

Now for the innovations, take a look at this control panel.

With the Tape-Athon 1001 you can initiate a "balanced torque mode" on the tape drive by activating the PLAY (or FAST FORWARD) controls simultaneously with the REWIND control. Both drive motors are balancing against one another, allowing the user to manually move the reels in either direction without drag, skipping or tape stretching. You can actually move the tape so precisely for editing purposes that splicing is virtually eliminated.

Call for complete details and specifications on the professional's professional 1001 Recorder/Reproducer (also now available in Reproduce-Only, 14 Inch Reel, and Logger versions for the broadcast industry) or write to:

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Circle 37 on Reader Service Card

RICHARD L. LERNER and LARRY ZIDE

Build a Six Channel Equalizer and an Echo Unit

In this report, we reveal the construction that was necessary and the products that resulted when the Gately Prokits, models EK-6 and EQ-6, were built.

BACK IN July, 1972 we published a report on the construction of the then new Gately Prokit six-in, two-out mixer, model SM-6A. Not too long ago we received two new kits that significantly add to the versatility of this little mixer. The kits are the model EQ-6, a six-channel equalizer, and the model EK-6, a six channel input echo unit that incorporates a dual channel spring system for its echo effects. Both units are designed to couple to the SM-6A mixer and derive power from it, though we see no difficulty involved in interfacing these units with other mixers since they need a ±18 volt bipolar supply and draw 60 mA for the echo unit and 150 mA for the equalizer.

The equalizer unit is a straightforward unit that adds up to 12 dB cut or boost at 50 Hz and/or at 7 kHz. In many ways the curves that result are those of conventional high-fidelity tone controls. Each of the equalizer chains become a part of the SM-6A mixer once the completed unit is plugged in (via excellent Molex connectors). There are flat response markings on the dials and in this position the gain of the equalizers is unity.

The EK-6 echo unit kit also connects to the SM-6A mixer, bringing each of the mixer's six inputs to the unit. Without further action on your part, nothing is done to this signal—it is simply returned to the mixer. But pushing one or the other of the two assignment buttons (channels A and B) above each echo send pot assigns that input to the reverberation springs. Each output channel contains two springs, one at 30 milliseconds and the other at 40 milliseconds (approximately) and the delayed signal is then controlled by two return pots and sent back to the mixer.

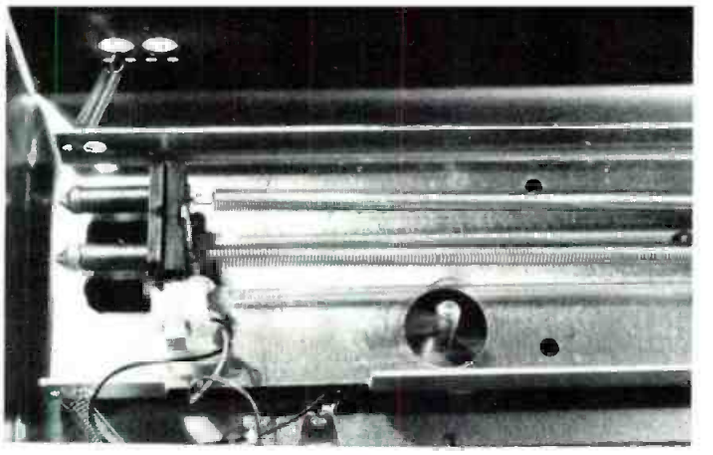
The spring unit itself is a separate module (as can be seen in the accompanying construction photos). Instructions provided permit the alternate installation of the vibration-sensitive unit either inside the EK-6 enclosure or remote from it.

In our construction of both units we found no pitfalls that a professional, or experienced amateur would fall into. The components used by Gately, as with the original kit, go beyond those usually supplied by consumer-type kits. Careful construction will reward you, as it did us, with professional units.

The following photos and captions detail the building of the two kits.

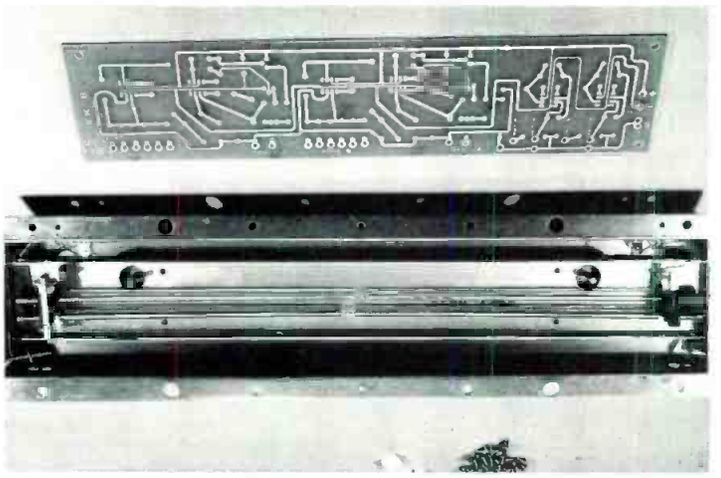
EK-6 ECHO UNIT

Unpacked. The two spring units are in front of the front plate off to the right. Most of the components go on the single circuit board.

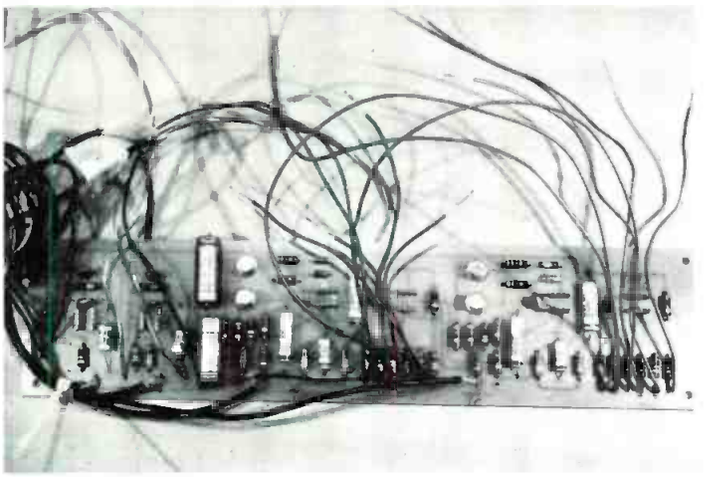


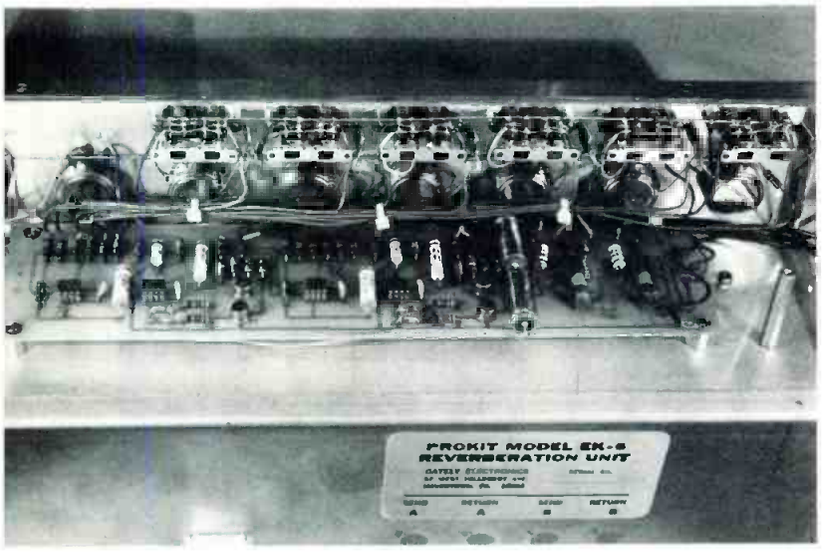
In this closeup the input transformer and terminal of the spring system is shown. This spring system is just for one channel of output.

A closeup of the circuit board and one of the spring units. The board is of fiber glass.



The completed and wired circuit board. Most of the free-ended wires will connect to the front panel controls later on.

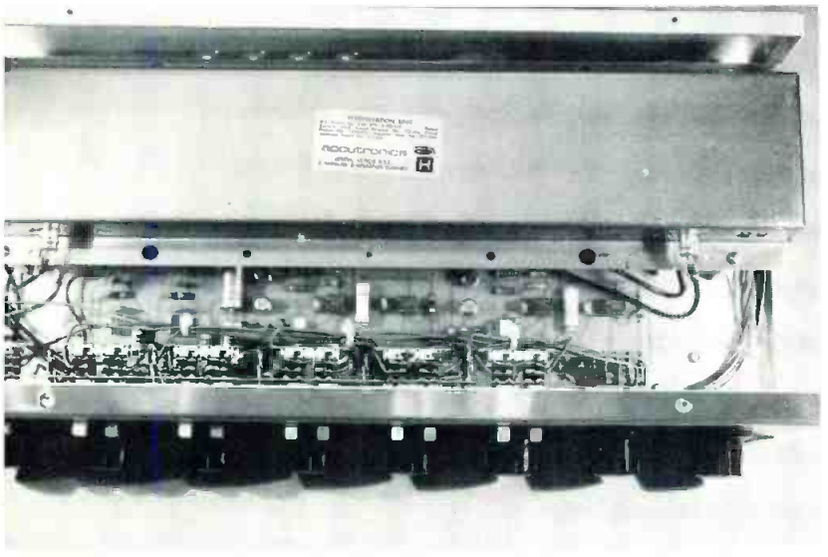




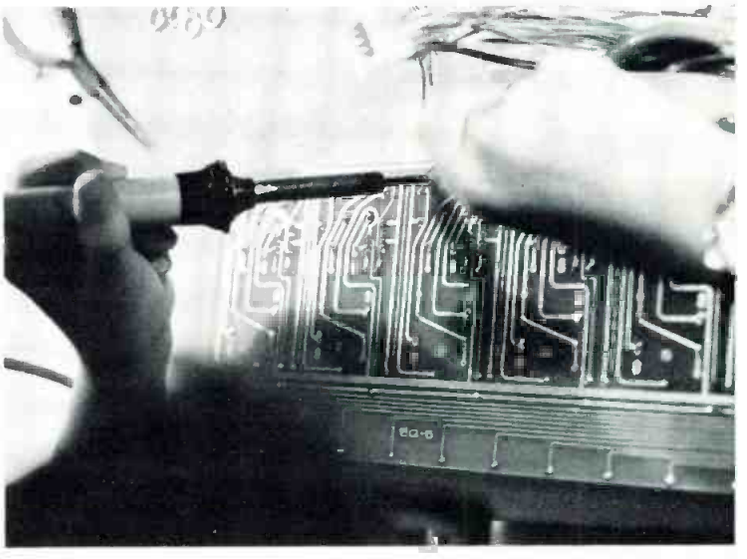
The circuit board is installed on the chassis and hard wired to the front panel's switches and pots.

EQ-6 EQUALIZATION UNIT

This is how it looks when it comes out of the box for a parts check. Most of the components go on the circuit board.

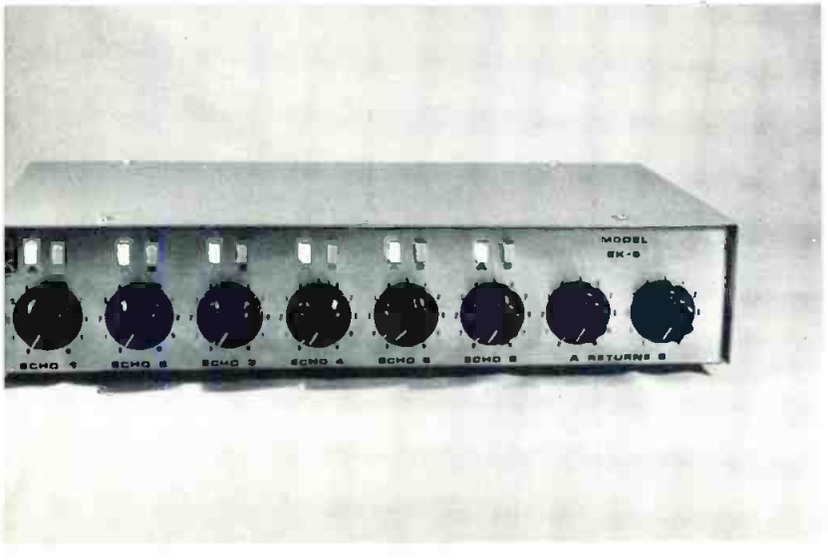


This view from the top of the completed unit shows one channel's output reverb in place and the connectors that join it to the circuits.

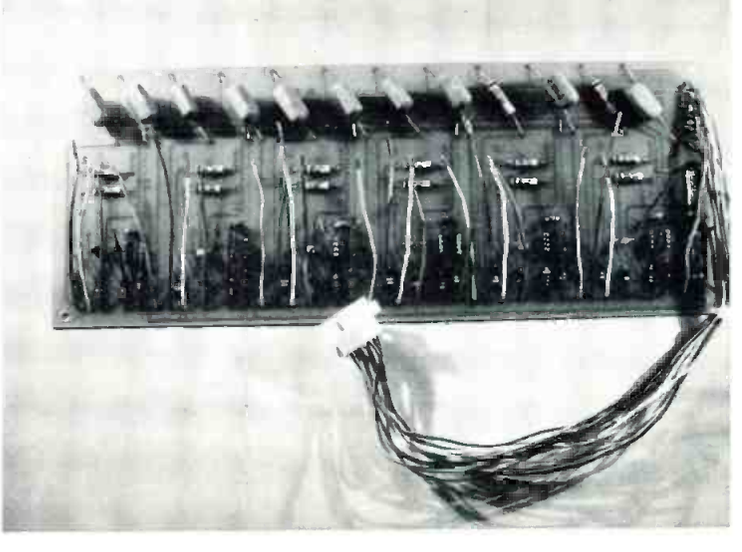


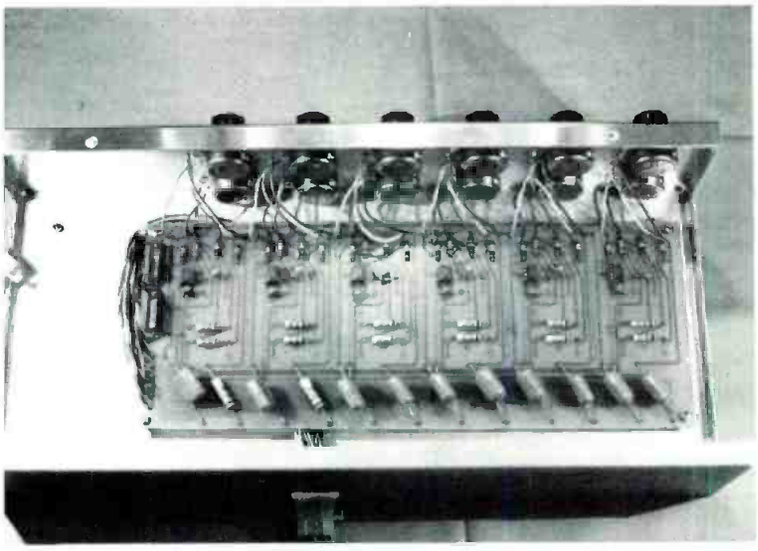
A small pencil iron of low wattage is recommended. A big and hot iron will tend to lift the foil from the glass board.

The finished EK-6 unit. Each input can be channeled to either reverb unit and the output by the switches above the pots.

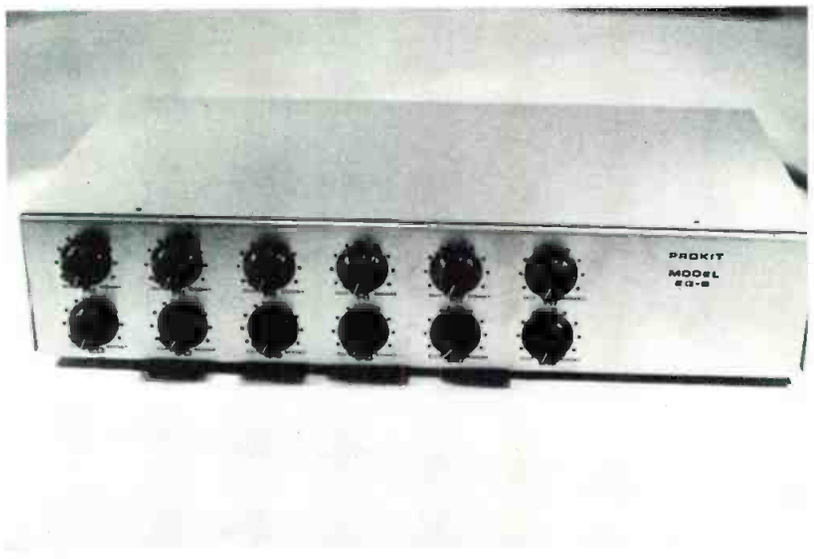


The finished circuit board. Each of the input channels are identical and can be clearly seen in this view. Note the Molex connector.





The finished circuit board is installed in the chassis and hard wired to the previously installed pots—finishing the unit.



The finished EQ-6 unit. Each vertical pair is one low- and one high-frequency control for the respective channels of the separate mixer.

db Visits—Quad-Eight

The Quad-Eight building at 11929 Vose Street in North Hollywood, California.

DURING A RECENT TRIP to Los Angeles, we stopped off at the Quad-Eight plant nearby to find out what was going on there. We knew already that they were making consoles, and were deep into the automation of same. We also knew that they made and sold console components, and that all these products had made a good reputation develop for the company.

Our visit was made cordial by Ron Neilson, Quad-Eight's energetic sales manager and it was from him that we garnered some facts concerning the origins, present situation, and future of the company.

Quad-Eight was founded in 1967 by Bud Bennett who was at the time an engineering salesman with Electrodyne. It was Bud that designed one of the first modular film consoles to appear.

In 1967, Quad-Eight Sound was set up as an independent company to function as a consulting firm for the film industry and sophisticated commercial sound systems. The firm represented Electrodyne and Magnatech systems to those industries. It wasn't too long into 1968 that the young firm found it necessary to begin the manufacture of certain components. However, at this time, the thrust of Quad-Eight Sound was still toward the film industry, and not the recording scene.

In 1968, the company took over its first building, a 6000 square foot location in North Hollywood, Ca. from which they operated over the next three years. During this time, the staff grew from the original three to close to twenty people.

Late 1969 saw the move to their present location, a building of approximately 20,000 square feet—and the staff has grown to its present strength of about sixty people.

As their business gradually moved from exclusivity in film work to recording and broadcast custom work, the proportion of engineering talent increased to its present strength of eighteen people doing just engineering work.

Quad-Eight is now involved primarily in custom consoles and system components for the broadcast and recording fields. They still serve the film industry as well.

In addition to the complete custom consoles, and the plug in components that make them up, Quad-Eight manufactures a card amplifier line, reverb systems, equalizers, and various filters, attenuators, compressors, and mixing modules.

Their most interesting product is perhaps the Compumix system of console automation, but there is also work being done (as well as products involving) a digital delay line and a complete SMPTE code reader/generator synchronizer system.

All in all, Quad-Eight is a busy and active company.

Ongoing engineering work on new projects must be continuous. Quad-Eight maintains a well-equipped engineering lab for this purpose.

No console manufacturer long functions without engineering, and engineering does not long function without an adequate design/dratting area.

Quad-Eight has found it both practical and necessary to do its own machining work. A lot of the fine finishing Is done in their in-plant machine shop.

At last, a studio mastering tape that's better than the one everybody's been using.

A while ago, someone came along with a new tape that, admittedly, was a better mousetrap. But it was not the ultimate mousetrap.

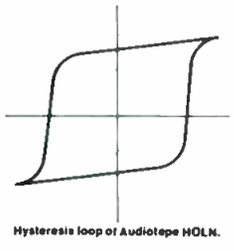
There were problems with that tape, good as it was. Problems which we at Audio Devices have been able to solve.

First problem:

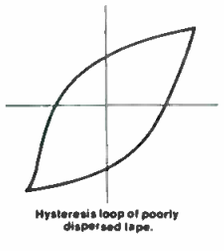
How do you get even more energy out of each particle?

Solution:

By improving the dispersion. Poorly dispersed particles clump together causing magnetic losses due to interaction and energy cancellations. The new Audiotape HOLN has higher output and lower noise than the tape you switched to years ago. The new Audio tape iron-oxide particles deliver more energy.



Hysteresis loop of Audiotape HOLN.



Hysteresis loop of poorly dispersed tape.

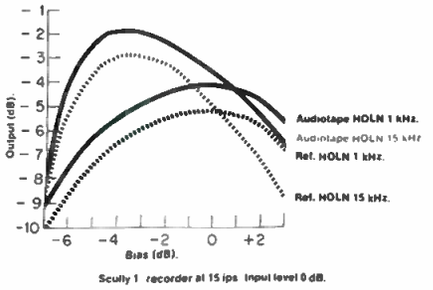
Second problem:

How do you reduce print-through?

Solution:

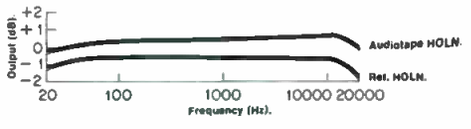
Uniform particle size and dispersion are part of the solution.

Output vs. bias.



Scully 1 recorder at 15 ips. Input level 0 dB.

Frequency response.



Scully 1 recorder at 15 ips. Bias 0 dB. Input level 0 dB.

Audio's secret processes are the other part. The results aren't secret, though: Audiotape HOLN has reduced print through by at least 2 dB, and typically 3 dB over the tape you switched to a few years ago.

Third problem:

How do you reduce headwear?

Solution:

Use a smooth coating surface with a built-in permanent lubricant. That'll reduce your headwear.

Fourth problem:

How do you improve handling and storage reliability?

Solution:

Use a backcoating that's super-durable. Cushion-Aire™ backcoating, with its controlled surface texture, improves high-speed handling and winding, and eliminates the causes of cinching, spoking, and other pack deformities.

Non-backcoated polyester after 1000 passes.

Cushion-Aire backcoating after 1000 passes.

Another problem is maintaining consistency of product. We've solved that too. By having a superior degree of quality control.

For a complete discussion of the improvements Audiotape features over the leading backcoated tape, send for our detailed literature.

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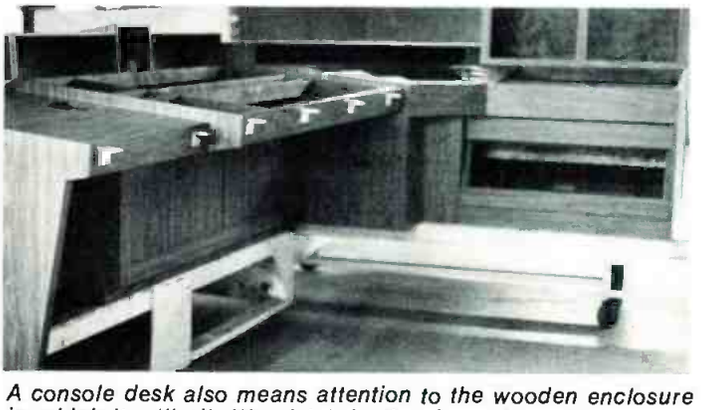
Circle 17 on Reader Service Card

Component assembly lines constitute a large part of the available floor space.

Ron Neilson checking one of the several consoles that were under construction at the time of our visit.

A great deal of individual work must be done on circuit boards and this includes a great deal of quality-control checking.

While the components of a console are largely plug in devices, the sockets and mother board are the real heart of the system.



A console desk also means attention to the wooden enclosure in which it will sit. Wood fabrication is an important operation.

A partially completed console that was on the assembly line. It is awaiting additional components and final test before it will be shipped.

As a service to our readers we are pleased to offer books from prominent technical publishers. All prices listed are the publishers' net. Shipping charges are included.

To order use the coupon at the bottom of the page. Indicate quantity on the special instructions line if more than one copy of a title is wanted. Full payment must accompany your order. We cannot ship c.o.d. Checks or money orders should be made payable to Sagamore Publishing Company, Inc. Because of the time required to process orders, allow several weeks for the receipt of books.

BOOKCASE

20. The Audio Cyclopedia (2nd ed.). *Dr. Howard M. Tremaine.* New and updated, here is the complete audio reference library in a single volume. It provides the most comprehensive information on every aspect of the audio art. This new edition includes the latest audio developments including the most recent solid-state systems and integrated circuits. It covers all subjects in the fields of acoustics, recording, and reproduction with more than 3400 related topics. Each topic can be instantly located by a unique index and reference system. More than 1600 illustrations and schematics help make complicated topics masterpieces of clarity. 1760 pages; 6½ x 9⅜ hardbound. **$29.95**

1. The Technique of the Sound Studio. *Alec Nisbett.* This is a handbook on radio and recording techniques, but the principles described are equally applicable to film and television sound. 264 pages; 60 diagrams; glossary; indexed; 5½ x 8½; clothbound. **$14.50**

7. Acoustical Tests and Measurements. *Don Davis.* Provides solid understanding of the entire subject of acoustical measurements; based on actual field test work, using commercial equipment. 192 pages; 5½ x 8½; hardbound. **$6.95**

8. Handbook of Electronic Tables & Formulas, (3rd edition). A one-stop source for all charts, tables, formulas, laws, symbols, and standards used in electronics. Includes an 8-page, full-color fold-out chart showing latest FCC allocations for the entire frequency spectrum. 232 pages; 5½ x 8½; hardbound. **$5.50**

24. Basic Electronic Instrument Handbook. *Edited by Clyde F. Coombs, Jr. Hewlett-Packard Co.* A basic reference background for all instruments. Offers saving in time and effort by having complete information in one volume on how to get the most benefit from available devices, how to buy the best instrument for specific needs. Reduces chances of costly errors. Ideal reference book, it is an excellent source for the beginner, technician, the non-electrical engineering man, or general non-engineering scientific and technical personnel. 800 pages. Hardbound. **$28.50**

25. Operational Amplifiers-Design and Applications. *Burr-Brown Research Corp.* A comprehensive new work devoted entirely to every aspect of selection, use, and design of op amps—from basic theory to specific applications. Circuit design techniques including i.c. op amps. Applications cover linear and non-linear circuits, A/D conversion techniques, active filters, signal generation, modulation and demodulation. Complete test circuits and methods. 474 pages. **$15.00**

26. The Design of Digital Systems. *John B. Peatman.* Textbook for students desiring to develop a creative approach design capability through digital systems approach. Answers these question: Under what circumstances it is desirable to implement a system digitally? What are some of the components available for implementing the system? How do we go about designing it? 448 pages. **$15.50**

31. Solid-State Electronics. *Hibberd.* A Basic Course for Engineers and Technicians. An extremely practical reference book for anyone who wants to acquire a good but general understanding of semiconductor principles. Features questions and answers, problems to solve. 1968. 169 pp. **$9.95**

32. Circuit Design for Audio, AM/FM, and TV. *Texas Instruments.* Texas Instruments Electronics Series. Discusses the latest advances in design and application which represent the results of several years research and development by TI communications applications engineers. Emphasizes time- and cost-saving procedures. 1967. 352 pp. **$14.50**

35. An Alphabetical Guide to Motion Picture, Television, and Videotape Productions. *Levitan.* This all-inclusive, authoritative, and profusely illustrated encyclopedia is a practical source of information about techniques of all kinds used for making and processing film and TV presentations. Gives full technical information on materials and equipment, processes and techniques, lighting, color balance, special effects, animation procedures, lenses and filters, high-speed photography, etc: 1970. 480 pp. **$24.50**

40. Radio Transmitters. *Gray and Graham.* Provides, in a logical, easy-to-understand manner, a working knowledge of radio transmitters for quick solution of problems in operation and maintenance. 1961. 462 pp. **$16.00**

23. Wide Screen Cinema & Stereophonic Sound. *M.Z. Wystozky.* First published in USSR in 1965 this excellent English translation covers wide gauge films, panoramic films, circular panoramic cinematography; technical fundamentals of stero sound recording for film, as well as details of the Soviet systems now in use. 284 pages. **$15.00**

33. Noise Reduction. *Beranek.* Designed for the engineer with no special training in acoustics, this practical text on noise control treats the nature of sound and its measurement, fundamentals of noise control, criteria, and case histories. Covers advanced topics in the field. 1960. 752 pp. **$19.50**

16. Magnetic Recording. *Charles E. Lowman.* Reference guide to the technology of magnetic recorders used in audio recording, broadcast and closed-circuit TV, instrument recording, and computer data systems. Includes latest information on cassette and cartridge recorders; TV recorders; direct and FM signal electronics from low to wideband; servo-control and signal record/playback circuitry; capstan, reel, and head-drum servos for longitudinal, rotary, helical-scan, and disc recorders. Glossary, index, bibliographical information. 274. pp. **$14.50**

28. Environmental Acoustics. *Leslie L. Doelle.* Applied acoustics for those in environmental noise control who lack specialized acoustical training. Basic information in comprehensible and practical form for solving straightforward problems. Explains fundamental concepts; pure theory minimized. Practical applications stressed, acoustical properties of materials and construction listed, actual installations with photos and drawings. Appendixes illustrate details of 53 wall types and 32 floor plans and other useful data. 246 pgs. **$18.50**

13. Acoustic Design & Noise Control. *Michael Rettinger. 1973.* NEW, revised and enlarged edition covers physics of sound, room acoustics and design, noise and noise reduction, plus noise and its problems. Many charts and graphs. A practical and useful book. 562 pages. **$22.50**

22. Acoustics of Studios and Auditoria. *V.S. Mankovsky.* Basic theory plus a mass of design data covers the field with special reference to studios and places of public performance. For acoustical designers and specialists in sound transmission in cinema and broadcasting. Features exhaustive treatment of studio acoustics by the statistical, geometric and wave methods in parallel. 416 pgs. **$15.00**

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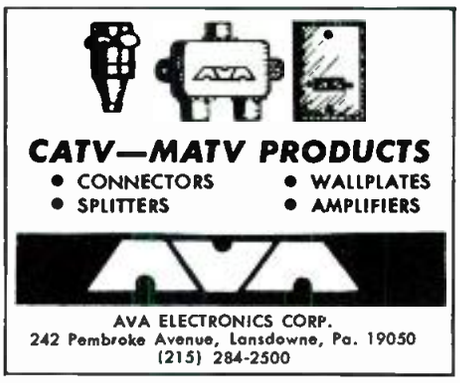

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THE ABSOLUTE SOUND, in its current issue, looks at the Audio Research SP-3; the $1,750 Mark Levinson pre-amp; four Shibata-stylus cartridges from Japan (the Grace, the Satin, the Supex, the Audio Technica AT20SL); the Magneplanar IA; the Quintessence pre-amp; the IMF bookshelf speaker and the Monitor III; the Heil AMT-1; The Dynaco 400; the Shure V-15 III and the Panasonic SP-10. If you haven't yet subscribed, this is some of what you've missed: The Dayton-Wright electrostratic; the Double Advent System; Hegeman's Model One; the Magneplanar I. And if you do not subscribe, this is what you'll be missing: the Magneplanar III; the Phase Linear pre-amp; the Dahlquist speaker; the Daton-Wright pre-amp; the Jecklin-Float headphones; Radford's amp and pre-amp. By the way, we also tell you which records and tapes sound the absolute best. Nor is that all. ($8 per year; four issues.) **THE ABSOLUTE SOUND T. M., Box 115L, Sea Cliff, N.Y. 11579.**

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PEOPLE, PLACES, HAPPENINGS

● **The Institute of Audio Research, Inc.** will be the host at a four day workshop, Thursday, November 15 through Sunday, November 18, at the Institute, 64 University Place, New York City. The workshop will cover audio recording and technology topics relevant to both the producer and arranger.

Experts in the field will discuss automation and quadriphonics in a forum-type conference with the students. Also, the workshop will cover studio technology, monitoring, session preparation, signal processing, control room techniques, stereo tape to disc transfer, and microphones. Discussions on microphones will explore the characteristics, applications, and techniques of recording strings, horns, acoustical, and electronic instruments. One day of the seminar will be spent at **Ultra-Sonic Recording Studios,** the 16-track fully Dolbyized facility in Hempstead, Long Island.

Deadline for registration is October 26. Course outline and schedule are available from **Irv Diehl,** Institute of Audio Research, Inc., 64 University Place, New York N.Y. 10003, (212) 677-7580. Fee for the workshop is $250.

● **George Tillet,** former editor of **Audio Magazine,** has joined loudspeaker manufacturer **Epicure Products,** of Newburyport, Massachusetts, as vice president of engineering. Mr. Tillett has an impressive background in engineering and journalism. He formerly served as executive vice president of **Audio Dynamics,** director of engineering for **Fisher Radio Corporation,** vice president of **Wharfedale** in England, and chief engineer of **Heathkit,** England. He has two degrees in electronics and one in management, is a member of AES, AMA, IMF (loudspeaker standards committee), and the author of numerous articles and books on hi fi.

● The appointment of **Nick Morris** as national sales manager has been announced by **Rudy Bozak,** president of **Bozak, Inc.** of South Norwalk, Connecticut. Mr. Morris was cofounder of **C/M Laboratories,** of Norwalk, Connecticut and has served as director of the vendor engineering test center at **Executone, Inc.** in Stamford, Connecticut.

● **Glenn D. Maxwell** has been appointed director of engineering for the **Scully/Metrotech** divisions of the **Dictaphone Corporation,** in Mountain View, California. Maxwell, who will have responsibility for all engineering programs, was previously manager of mechanical engineering for **Data Handling Corporation.** A professional mechanical engineer, he is a graduate of the University of California and received his master's degree from Cal Tech. Maxwell is the author of Development of a Portable Magnetic Tape Recorder for Precision Data Recording and has lectured at the University of Michigan on guidance and control systems.

● Reassignment of several top executives for greater effectiveness has been announced by **T. Okada,** executive vice president of **Maxell Corporation of America,** of Moonachie, New Jersey. **Gene La Brie,** national sales manager, will add the responsibility for professional studio sales and O.E.M. audio products to those of consumer products. **T. Ozawa,** marketing manager, will work in conjunction with Mr. La Brie. **Fred Zahn** has been made northeastern regional sales manager for professional studio sales.

● **Michael L. Ayers** has assumed the position of director of public relations for the **Ampex Corporation,** Redwood City, California, according to **Thomas E. Davis,** vice president for marketing. Ayers had previously worked from the New York office as eastern regional public relations manager. Prior to joining Ampex, he was public relations manager for **New York Telephone** and did public relations work for the **M. W. Kellogg Company** and **Swindell-Dressler Co.** He has also worked as a newspaper staff writer in New York State.

Correction: In our May issue we printed an item describing Mr. Diederik van Amstel as manager director of Polygram, part of the Philips organization. We have been informed that Mr. Amstel is executive vice president at the Polygram Group, which has two shareholders, Philips and Siemans.

● Two patents embracing techniques for simpler and faster studio conversion of stereo recording mixes into monaural recordings are the subject of a cross-licensing agreement involving **Howard Holzer** of **Holzer Audio Engineering Corporation** and the **Columbia Broadcasting System.** Both patents cover different methods for achieving the same results—the CBS system is called the Quadrature Networks Matrix and uses the compatibility feature, called the CSG Matrix, established by the Holzer patent. Both the Columbia Record Productions and Mr. Holzer will offer their customers the option of leasing either CSG or Quadrature equipment.

● As part of a general broadening of their products line, now including professional audio recorders and loaders for video tape cassettes, **Electro Sound** of Sunnyvale, California has appointed **Ted W. Wuerthner** to a newly created position of vice president for marketing. Before coming to Electro Sound, Mr. Wuerthner held the position of business-group national sales manager and product-line manager at **Monsanto** in St. Louis. Prior to that, he was active in corporate and marketing for California firms **International Decorating Company** and **Schleh Associates.**

● **Auditronics, Inc.** of Memphis, Tennessee, has opened an additional facility at 207 Summit Street, comprising a sales office with demonstration room and consulting office for their consoles and systems and support equipment. The executive offices will also operate from that address. Manufacturing activities will continue at the 180-B So. Cooper Street building.

● A new plant, located at 4007 N.E. 6th Avenue, Fort Lauderdale, Florida 33308, is handling **MCI, Inc.'s** expanded manufacturing facilities, specializing in multi-track recorders and recording consoles. The new plant, according to **G. C. (Jeep) Harned,** president of MCI, consolidates administrative, engineering electronic manufacturing, and precision machine shop operations. The expanded space will also provide more scope for new product development.

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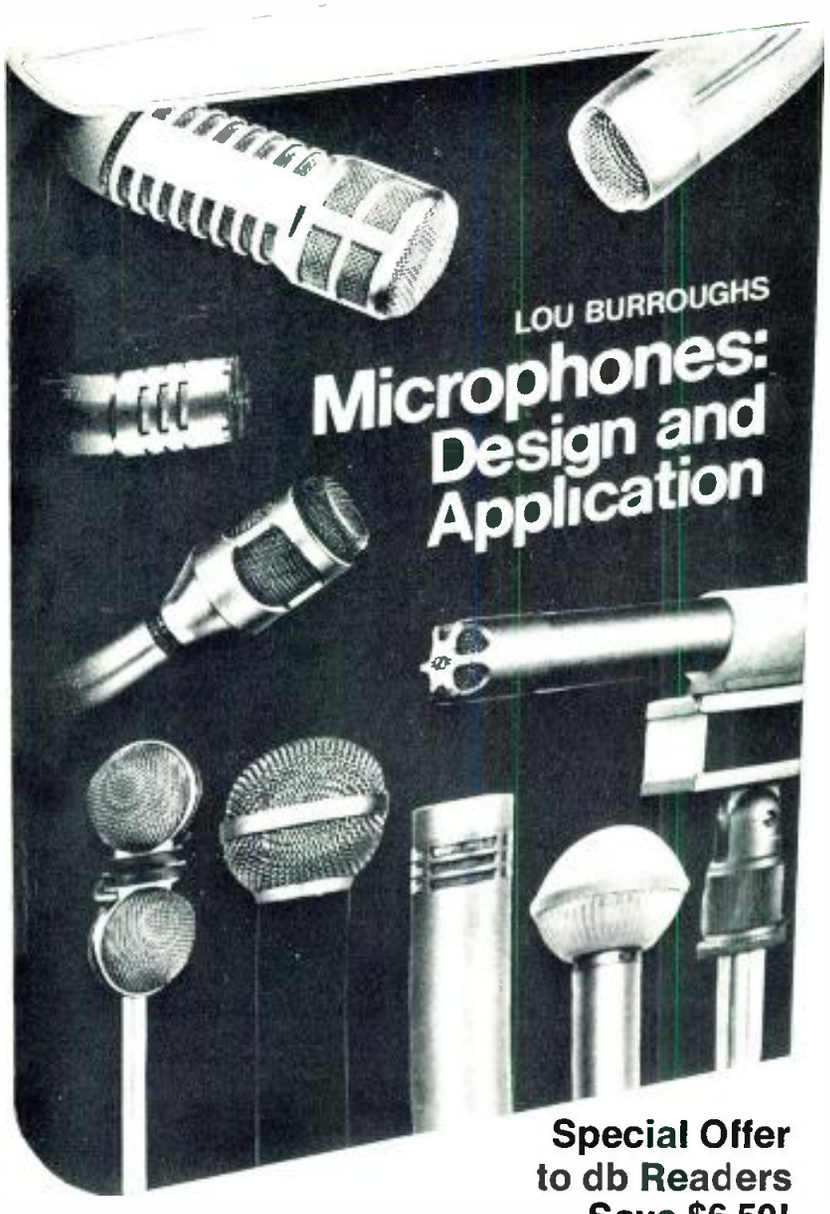

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Lou Burroughs is widely known for his pioneering work with Electro-Voice and is one of the universally recognized experts in the field. He helped design and develop many of the microphones which made modern broadcasting possible. In fact, he holds 23 patents on electro-acoustical products! Lou Burroughs knows microphones inside out. This book is based on his many years of research, field studies and lectures given throughout the world.

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