

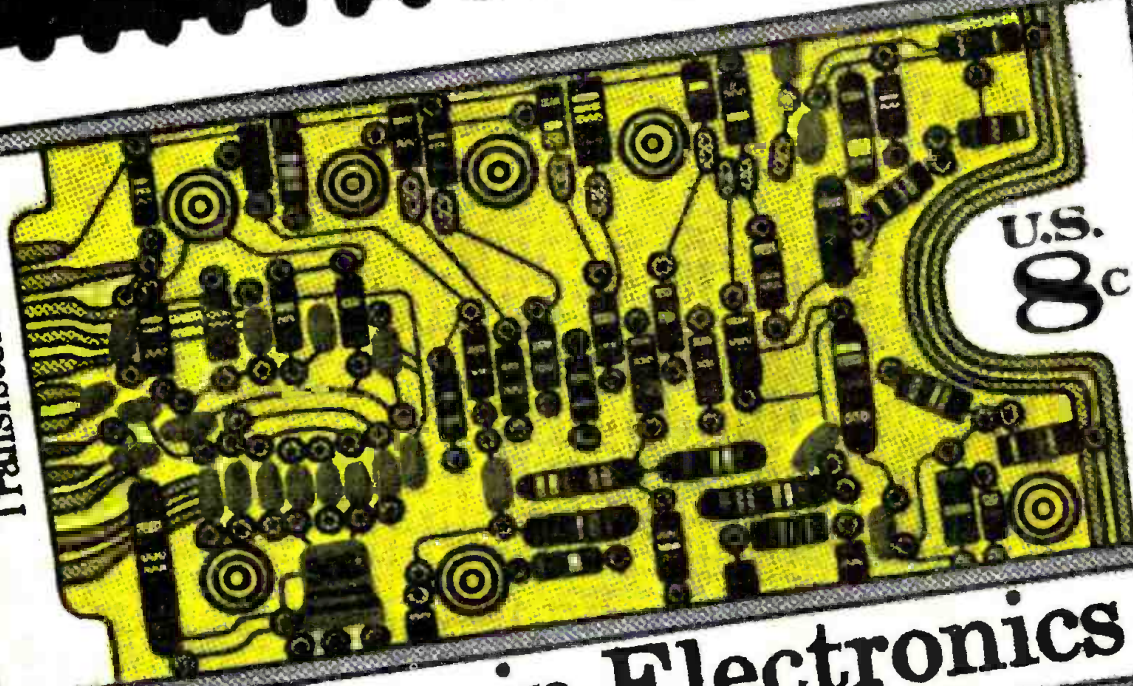
dB

THE SOUND ENGINEERING MAGAZINE

FEBRUARY 1974

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There is a Dolby noise reduction unit for every professional application

Professional Recording and Transmission Applications



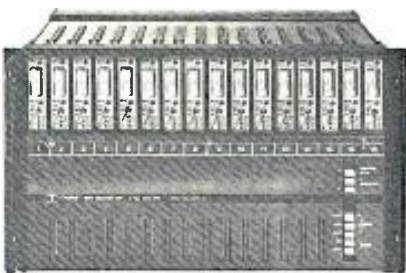
360

The Dolby 360 is a basic single-channel A-type noise reduction unit for encoding or decoding. This unit is normally used in a fixed mode such as in disc cutting or landline sending or receiving; the operating mode is manually selected.



361

The Dolby 361 is similar to the 360, providing a single channel of A-type noise reduction, but with relay switching of operating mode and tape recorder connections. The changeover can be controlled automatically by the recorder.



M-Series

The Dolby M16 A-type unit is designed specifically for professional multi-track recording, and incorporates 16 channels of noise reduction in a compact chassis only 10 1/2 inches high. The similar M8 is an 8-track version, and the MBX allows simple extension of the M16 for 24-track use.

Noise Reduction Module



Cat 22

The Dolby noise reduction module, Cat 22, is the basic functional unit employed in all A-type equipment. The Cat 22 is available as a spare or in quantity to OEM users for factory installation. A half-speed version of the module (Cat 40) is also available.

Motion Picture Industry



364

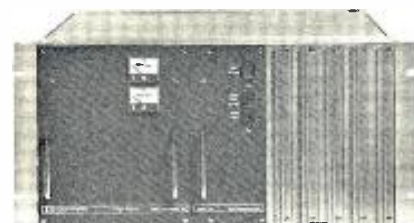
The Dolby 364 Cinema Noise Reduction Unit is intended primarily for use with Dolby A-type encoded optical sound-tracks. The 364 also includes a standard 'Academy' filter for conventional tracks, a clean-up circuit for old or worn prints, and provision for playback of magnetic sound-tracks with or without Dolby system encoding.



E2

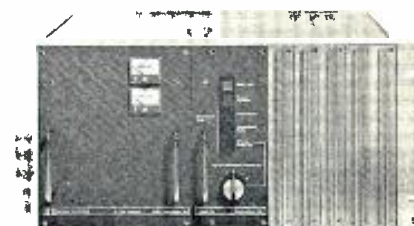
The Dolby E2 Cinema Equalizer is a companion unit to the 364, and has been specifically designed to solve the response equalization problems of cinemas. Used with the 364 and Dolbyized optical sound-tracks, the E2 enables most cinemas to achieve modern sound reproduction standards without replacement of existing equipment.

Professional Encoders for Consumer Media



320

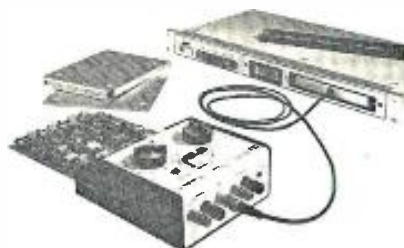
The Dolby 320 Duplication Processor is a professional quality unit with B-type (consumer) noise reduction characteristics. The unit is used for encoding duplication master tapes in the high-speed duplication of Dolbyized cassettes, cartridges, and open-reel tapes. The 320 is a two-channel unit.



324

The 324 Broadcast Encoder allows broadcast stations to encode stereo FM broadcasts with the Dolby B-type characteristic. The unit provides for an optional reduction of high frequency pre-emphasis, reducing the need for high frequency compression, and thus allowing a significant additional improvement of reception quality.

Test Set (A-type)



Cat 35

The Dolby NRM Test Set, Cat 35, permits rapid verification of performance of Cat 22 Noise Reduction Modules without their removal or the need for additional test equipment.



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Telephone (212) 489-6652
Telex 125797

346 Clapham Road
London SW9
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20. The Audio Cyclopeda (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 9¾ 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**

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 pgs. **\$22.50**

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**

39. Reference Data for Radio Engineers. *ITT Staff.* 5th Ed. The latest edition of one of the most popular reference books for radio and electronics engineers as well as libraries and schools. Complete, comprehensive reference material with tables, formulas, standards and circuit information. Contains 45 chapters, 1196 pages with hundreds of charts, nomographs, diagrams, curves, tables and illustrations. Covers new data on micro-miniature electronics, switching networks, quantum electronics, etc. **\$20.00**

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. **\$29.50**

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**

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**

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. **\$15.00**

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. **\$10.25**

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**

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**

37. Television Broadcasting: Systems Maintenance. *Harold E. Ennes.* Covers maintenance of the tv broadcasting system from switcher inputs to antenna. Theory and operation of systems, tests and measurements, including proof of performance for both visual and aural portions of the installation. Many illustrations. A thorough treatment of modern television maintenance practice. 624 pgs. **\$14.95**

41. Modern Sound Reproduction. *Harry F. Olson.* A basic text covers amplifiers, microphones, loudspeakers, earphones, tape systems, film sound, tv and sound reinforcement—the significant elements and systems of modern sound reproduction. Employs simple physical explanations which are easily understood without special engineering training. Highly recommended text and reference. 328 pages. **\$17.50**



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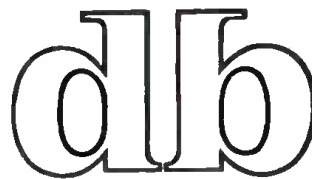
COMING NEXT MONTH

• Oscar Burke has prepared a two-partner that begins next month. In it he explores fully the decibel, what it is, what it does, and how it is used. If you think you know it all, maybe you'll find something you didn't know. And if the decibel is a mystery to you, it will be no longer.

In AN IC HEADPHONE AMPLIFIER, Douglas Myers details the easy construction of a broadcast aid that may just get that d.j. to ride levels on the board that correspond to what he hears in his headset.

db VISITS dbx is another in our trips to interesting manufacturing plants. Several innovative manufacturing techniques are used in their suburban Boston manufacturing facility.

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



THE SOUND ENGINEERING MAGAZINE

FEBRUARY 1974 VOLUME 5, NUMBER 2

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letters

THE EDITOR:

With regard to my article, A SIMPLE
HIGH QUALITY MIC PREAMP printed
in the July 1973 issue here are a few
corrections to minor typographical er-
rors and omissions, which may serve
to clarify some of the questions raised
in trying to build a similar unit, in

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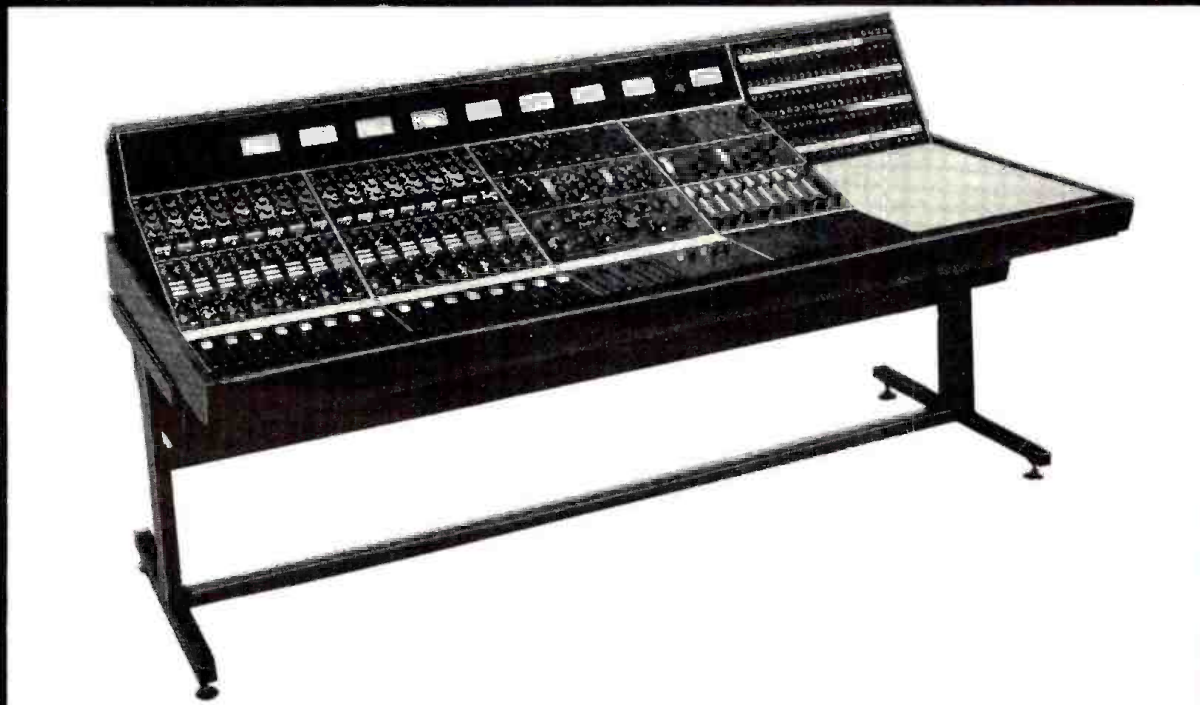
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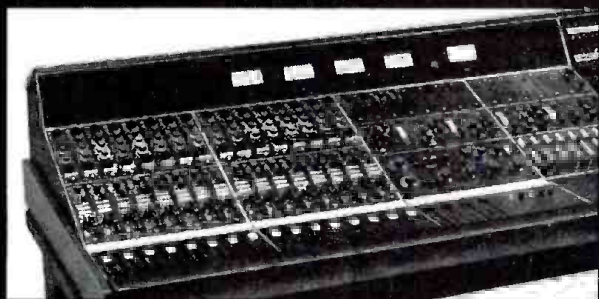
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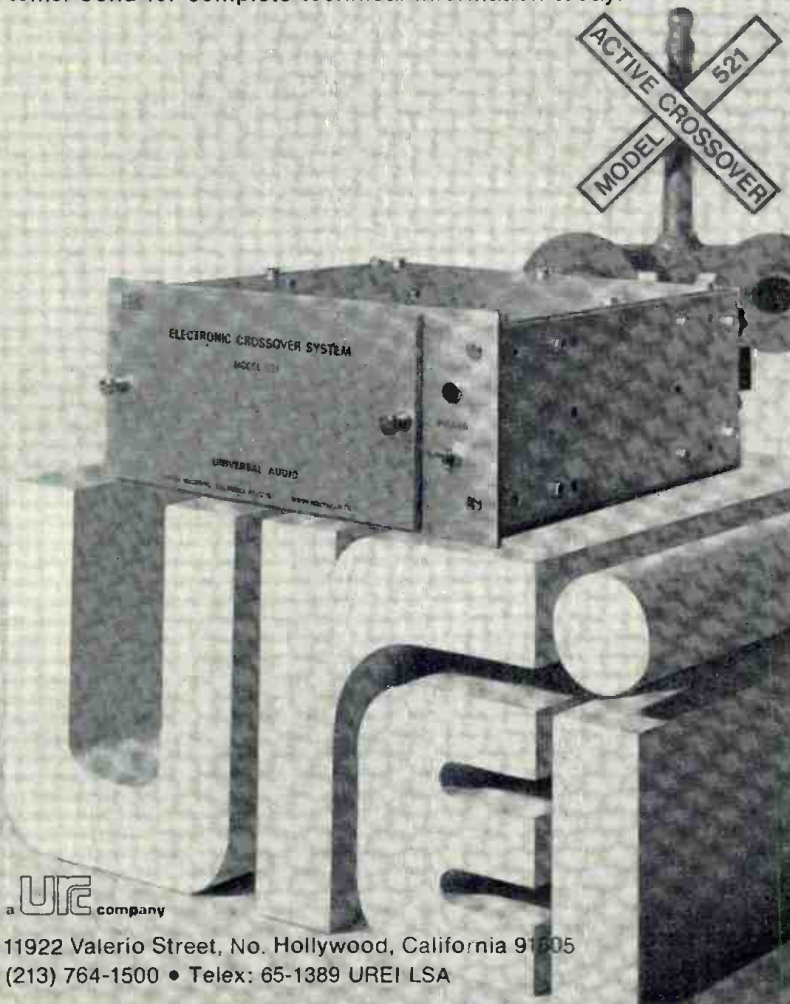
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response to letters received from readers.

Table 1: Frequency response ± 1 dB, 30-20,000 Hz; ± 2 dB, 20-25,000 Hz. Equivalent input noise: -123 dBm, full bandwidth, unweighted ($0.3 \mu\text{v}$). Input overload; -23 dBm at midband; lower at frequency extremes.

Figure 1: (C1, C2) — 23 mFd 15 V tantalum capacitor (Sprague TE-1157.1); larger size, higher voltage required if greater power supply voltage applied.
(T1)—200/800 Ω transformer and shield (UTC 0-25 connected for 150 Ω input and 600 Ω output, and 0-17 shield).
(T2)—30K/200 Ω transformer (UTC 0-10 connected for 30K Ω input and 200 Ω output).

Hoping this information is of assistance, I wonder if anyone has achieved comparable preamp performance (primarily in the $0.3 \mu\text{v}$ input noise specification) with integrated circuits. My recent experiences with the RCA CA3048 and the Fairchild μA739 indicate the possibilities of coming close.

*Anthony A. Benson
Magnetic Recorder &
Reproducer Corp.*

THE EDITOR:

A few comments are in order on the Robert Berglas article AN FET AUDIO MIXER WITH LED GAIN LEVEL DISPLAY that appeared in the December 1973 issue.

Readers who desire to duplicate the power supply of Figure 3 will have problems as it is not drawn correctly. This circuit is adapted from my IC TONE BURST GENERATOR which appeared in *Audio*, December 1971. It will not work at all with a 12 VCT transformer; use 24 V. IC5 should be jumped 4 to 2, not 1 to 2. Also there should be an 8.2 V zener from IC5-6 to -12 V. The original article contains further details.

I hope the information is helpful.

*Walter G. Jung
Forest Hill, Md.*

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John M. Woram

THE SYNC TRACK

● Now that I've been in the consulting-freelance recording business for almost a year, I've accumulated a variety of experiences quite unlike any I had while on the staff of a record company.

I guess most staff engineers eventually take their company's studio for granted and in time learn its little idiosyncrasies and how to cope with them. Although the freelancer may have more flexibility, he is obliged to adjust rapidly to a variety of unfamiliar environments as he goes from job to job. Nothing unmanageable about this, but it does mean trying to keep alert.

And, in the consulting business, any consideration of equipment invariably gets around to discussing studio con-

struction and acoustics.

Having fooled around with recording equipment for more years than I care to admit, I can usually bluff my way through most discussions of that subject, but acoustics is another story. So, I decided to hit the books and become an instant expert. Needless to say, it didn't quite happen that way. However I did come across a few very interesting books that may be of interest to **db** readers.

A better understanding of acoustics—however basic—can help when recording in a new location or planning an equipment package for someone's new studio. The following books should be helpful.

ACOUSTIC DESIGN AND NOISE CONTROL by M. Rettinger, 576 pages. \$22.50 second edition. Chemical Publishing Co., Inc.
(See **db's** *Bookcase*.)

Mr. Rettinger packs a lot of information into this volume, and most of it is actually readable. You don't have to know more about the subject than the author in order to get through it. I have a few books around that are comprehensible only to their authors and God—fortunately this is not one of them.

There is no shortage of math, though most should be no problem to the reader with a reasonable high school education. The little bit of calculus can be skipped if necessary without lessening the book's value.

The book is divided into six sections; *Physics of Sound*, *Room Acoustics*, *Noise*, *Noise Reduction*, *Room Design*, and an Appendix.

Physics of Sound covers the basics: waves, sound velocity, decibel notation, hearing, and so on. Although it may contain a bit more specialized information than the reader wishes to know, it should be read for a general appreciation of what sound is all about. Sabins and phons may not be household words, but they should be no more unapproachable than the word "decibel."

Room Acoustics should be required reading for all those who think that a little fiberglass stuck to the wall is the formula for a great studio. Unfortunately, the sound absorbing characteristics of most materials vary considerably over the audio frequency spectrum. Good design usually requires a judicious choice of materials, construction technique, and a lot of air space thrown in. Even if you're not planning to design your own studio, it's a big help to know a little more about all the variables of studio acoustics.

Noise ". . . can be like wine—good, bad, and indifferent—its usefulness depending on the kind, amount, location, time, and circumstances." (p. 174). This section of the book concentrates on the bad wine of noise pollution. Aircraft racket is given particular attention, and the author presents a detailed argument for offshore airports. This section may be of minimal interest to readers who are not particularly concerned with the problems of noise pollution.

Noise Reduction should certainly give the reader a basic understanding and appreciation of the complexities of noise reduction techniques. Vibration, as well as vehicular, water pipe, and air conditioning noise controls are discussed in some detail here.

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*Patents pending.

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Room Design considers a variety of environments: homes, churches, theaters, and studios. Of particular interest are the surface treatments for recording studios. Slat absorbers and variable acoustic devices are described and illustrated.

ACOUSTIC TECHNIQUES FOR HOME AND STUDIO by F. Alton Everest
224 pages. \$7.95, first edition, Tab Books.

"Some understanding of the strange things a room full of air is capable of doing to audio signals is basic to an informed use of the room for recording or reproduction of sound" (from the preface).

That's what I've been trying to say. This interesting book begins with the obligatory explanations on the nature of sound and the hearing mechanism. Later on, there are chapters on standing waves, diffusion of sound, and a practical treatment of sound absorbers. Poly-cylindrical surfaces, slat absorbers and midrange absorbers are all discussed.

A modular system developed by the BBC (p. 104) might be of interest to the studio man looking for an economical wall treatment. The modules here are 2 feet x 3 feet x 8 inches, can be designed to meet various acoustic requirements, and may be easily moved around for optimum effect. Since even the most carefully designed studio may not behave according to plan, these modules may be worth considering, either as a corrective measure, or for incorporating in new construction.

Chapters on reverb, acoustic design of a studio and adjustable acoustics offer clear treatment of their subjects, and can be read without pain by the non-specialist. Some interesting portable panels (p. 156) might double as goboes or be removed entirely, according to the demands of the session. **CONCEPTS IN ARCHITECTURAL ACOUSTICS** by M. David Egan
200 pages. \$16.50, first edition. McGraw Hill Book Company

This volume contains remarkably little written material. Instead, the information is presented in the form of graphs, illustrations, and tables. Here and there, a page or two of text offers some supplementary information. The format places a considerable amount of data at the ready disposal of the reader who is seeking "how to," rather than "why."

Presumably, these books were not written particularly for the recording engineer. And, the working studio man can probably get through any session without reading them. Yet the perceptive mixer will certainly bene-

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fit from studying one, or all, of them.

Many of us think in terms of microphones, consoles, and monitor systems, and don't give the studio environment the attention it deserves. For instance, goboes may be doing you a lot of good, but the odds are against it. More often than not, they are misused and you'd be better off without them. Now although these books do not get into the art of gobo placement, you may find yourself a bit better informed about such things for having read them.

I visited a studio some weeks ago that strongly resembled a carpet showroom. It was difficult to tell where the floor left off and the walls began. Acoustically, it was about midway between an anechoic chamber and a linen closet. Off in the corner was a spot of wood, where I thought they had run out of carpet. "That's for the string section," said the proud studio manager. "We get a great string sound." I think he really believed it too.

Oh well, maybe he does get a great string sound, but I doubt it. I suspect he'd get a damn sight better sound if he'd get out of the rug business and into acoustics.

Not that these books will turn anyone into an instant expert; I can bear witness to that. But it doesn't hurt at all to learn a little bit more about this end of the business, even if you're not going out to build super studio.

COMING EVENTS

Starting in a month or two, db will begin publishing a list of coming events of interest to our readers. The accuracy of the list will depend on the information supplied to us by various organizations in this country and Europe. To start things off, here is a short list of meetings:

March 26-29
A.E.S. Convention
Hotel Skandinavia,
Copenhagen, Denmark

April 23-26
Acoustical Society of America
Meeting
Statler Hilton Hotel,
New York, N.Y.

May 7-10
A.E.S. Convention
Los Angeles Hilton,
Los Angeles, California

May 18
Midwest Acoustics Conference
Norris Center, Northwestern
University,
Evanston, Illinois
Subject: *The Tape and Disc
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MagLink can be used to keep one or more ATR's perfectly synchronized with a VTR for audio "sweetening", including offsets when necessary, for lip sync.

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You can use MagLink's search function to find any tape position on one or all machines in a group, and AUTOSEARCH automatically returns a tape to a pre-determined point at the touch of a button. You can also pre-program MagLink to operate two or more VTR's and ATR's, permitting spliceless editing, previewing, and subsequent automatic assembly of the original tapes.

times, permitting faster slewing than any machine being marketed today as well as manual positioning. It will read data at fast speeds with the tape lifted off the heads, and no modification to the data track playback electronics is required.

Instant information

The MagLink control unit normally displays the position of the master machine and any of up to six slaves. The display is divided in two sections, each consisting of eight characters. The upper section shows the position of the master, and the lower shows the offset of any selected slave from the position of the master. The maximum possible offset for each machine is greater than 24 hours.

In the search mode, the upper section shows the location being searched for, while the lower half displays the progress toward that location.

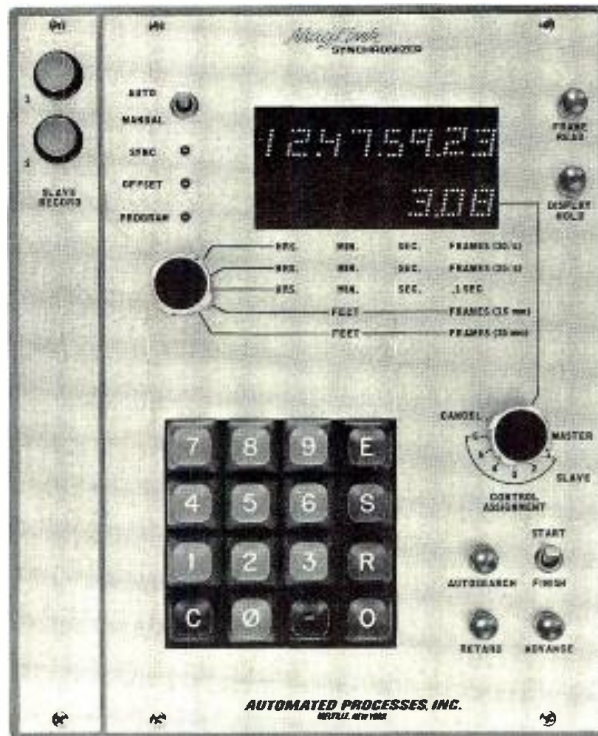
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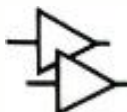


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Norman H. Crowhurst

THEORY AND PRACTICE

● Last May, this column presented a discussion that was intended to relate theory and practice angles related to available impedances for loud-speaker voice coils. For the purposes of that discussion, I had assumed that coils wound with round wire would be put up in layers, which usually are even in number, so the lead-outs end up at the same end of the coil.

In presenting that, I did not get into the questions such as how individual turns of consecutive layers settle into the spaces, or grooves, on top of previous layers. So a reader who apparently preferred to remain anonymous, wrote in, drawing some neat sectional diagrams, showing how that could be either "unstaggered" or "staggered," which would alter my figures for the space factor of round wire.

In the October issue of this column, I gave the substance of his comments, with a copy of his sketches, and answered it, as I thought, adequately, to show that, by the very nature of spiral winding, which traverses back and

forth with each layer, the turns of a layer being wound on top of an earlier one would alternately drop into a groove and then have to ride over the top of a turn, to fall into the next groove.

As I say, I thought my explanation was adequate. I still feel that it would be, to anyone who has either wound such a coil himself, or watched one being wound, or even to someone who has coiled up his own garden hose. But I guess engineering managers don't get to do or see these operations nowadays, for the *db Magazine* staff forwarded to me a package containing a 2-layer voice coil, wound on a 3-inch former, with a letter that suggested that I examine this coil, to prove I was wrong.

This manager of engineering's explanation states: "The only crossover turn is indeed at the beginning of a subsequent layer of a multilayer coil. Once the wire crosses over the initial turn it lays in the groove between adjacent wires and follows the spiral

pattern, *i.e.* it simply retraces the spiral backwards. If a coil is cut in half and flattened in a representation the retracing of the next layer can be more readily shown.

"Since this is a confusing situation I am sending a large coil along for easy observation of the winding pattern."

True, the sample coil he sent was large, but the wire gauge was fine, which means it is not easy to trace the path of any single wire around a complete turn. So I have drawn an even more detailed drawing than I thought necessary for the column presented in May.

At FIGURE 1, I represent the first layer being wound. The beginning of the winding is at the left, with the wire going onto the former from above, in a downward motion. The dashed lines show the completion of each turn on the underside of the former. Let us hope this representation is plain enough for everybody, this time.

Now, we reach the end of the first



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layer and start back. The wire is still coming down from above, on top of the former, only now successive turns are moving from right to left, instead of from left to right. In the position I have drawn in FIGURE 2, each turn of the second layer drops into a groove between turns of the previous layer at the top and bottom of the sketch of the former, that is, the top and bottom of the page, as you look at it.

If you think of the drawing in three dimensions, as the turn goes over the top of what you are looking at, each turn of the second layer rides over the top of a turn in the first layer, in order to get to the next groove between them. The same happens again at the point on the rotation that is momentarily furthest from you as sketched.

Now, the only way I can see that the second layer's turns would retrace the spiral, resting in the groove all the way, would be to reverse the direction of winding, when you start the second layer, in which case the finished coil would be almost non-inductive, which would not provide very much drive when the coil is put in the magnet gap!

If you continue winding in the same direction, which is what we would assume happens, then the windings in each layer have to move back over the turns in the previous layer.

What puzzles me a little is why apparently responsible people would not only get this wrong, but go to the trouble of trying to "correct" me. I remember a whole series of articles I wrote almost twenty years ago about cathode follower operation. In it I pointed out that although a cathode follower does provide a low output source impedance as well as having nearly 100 per cent feedback to reduce distortion, when you load the output with a matching load, thus utilizing the impedance reducing effect, you have very little of the distortion reducing effect left.

Numbers of readers wrote to correct me. Some of them quoted, or rather misquoted, well-known textbooks, to support their statements. Others named the professors who told them I was wrong. But none of them said anything about actually having set up the situation, or circuit, to verify the truth. Had they done so, they would have found that what I said was correct. But they mysteriously asserted that checking it experimentally was not necessary.

This seems like a repetition of the same kind of situation. Where do these people get the information they are feeding me? And why don't they try actually checking out what happens? If I magnify the coil this engineer sent me to prove his point, and carefully trace the path of each turn, it will show I am right. But it is easier to follow the bigger, fatter turns, like the ones I have drawn to illustrate this.

Whether it is wound with thick wire or thin wire, a round section is the same fraction of the square containing it, and the turns will still have to move from left to right on one layer, and right to left on the next. The misconception that I stumbled on, when I wrote about multilayer coils can only come from someone who has never done it.

I recall a situation when I was in school back in the '20s. As a boy I spent some hours observing the behavior of spiders as they build their

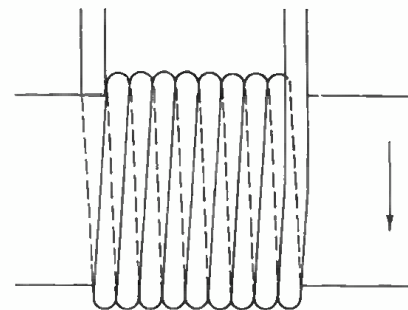


Figure 1. A representation of a layer winding, part way along the first layer.

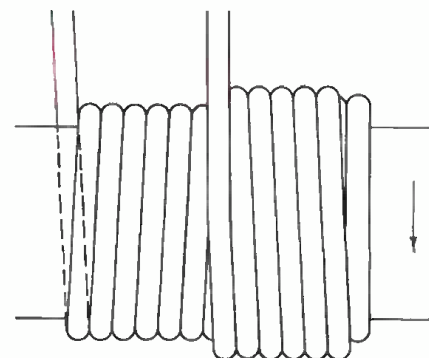
webs, noting the way they set off the spaces that result in such beautiful symmetry in the finished web. Some time later, in biology class, I received an assignment on that subject, so I sought books from the library about the habits of spiders.

I studied all the books the local library had but not one of them described how a living spider actually does it. How could they all be so wrong? I had studied numbers of different spiders, so it was not that they reported what another variety of spider did. No self-respecting spider would build her web the way these books described her as doing it.

Isn't it fortunate that spiders don't read books written by experts? So they just go ahead and build them the way they always have, unaware that they are doing it *wrong!* More seriously, that was perhaps the first instance that led me to distrust the authority of a textbook.

Most educators insist that if the book says something, it must be correct! This whole attitude is pretty closely linked with one of the most vital changes I see as needed to make education truly useful. About 99 per cent of today's teachers and college professors seem to believe that they must *themselves* know every scrap of

Figure 2. A representation of the same layer winding, part way along the second layer.



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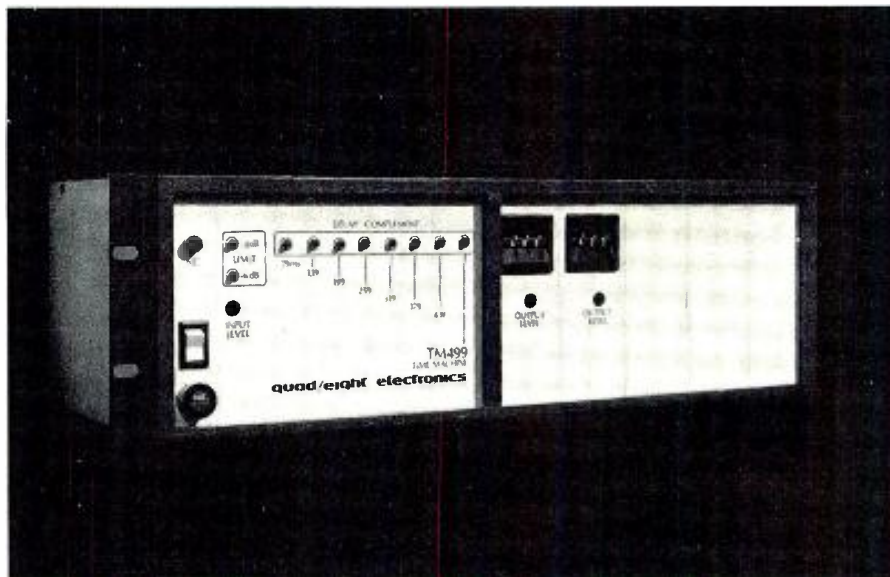
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knowledge that must be programmed into their students' heads.

What a terrible waste of time, even trying to do that; in today's rapidly advancing world, it is a sheer impossibility. What today's students and beginning technicians *really* need is the ability to *find out* what they need to know, or *how* to do what they need to do. In short, they need to acquire the various learning capabilities that will enable them to do that.

If teachers at all levels concentrated on that rather than on millions of facts, more than 50 per cent of which are not even true, our schools would prepare our young people to cope with a rapidly advancing world. I would not have people trying to correct me because they learned it differently when they would only have to check it out to find I was right all the time.

There are many pieces to this. Something never taught in schools is the finding of ways to verify a conclusion by some method other than going over the same deduction all over again. If people were trained to do that, we would not have bridges falling into rivers because design engi-

neers misapplied data, we would not have computers charging us for items we never bought, and collection agencies trying to force payment of what we never owed.

But the zombies our education system produces have been taught that "computers don't make mistakes," so if the computer says you owe it, you'd better pay! And millions of other everyday trials and tribulations that trouble citizens needlessly, because our whole populations has been zombized.

You may talk to teachers, administrators, school boards, state departments of education, legislators, or whomever. The reaction you get is the same. For the most part they agree that the analysis is correct. What I am suggesting, in common with many others, an ever growing number, is the right kind of change. But how can we make it? The educators, too, are zombized, stuck with the concept that the only way to go is by getting funding from Uncle Sam, or some tax-exempt foundation, or whatever.

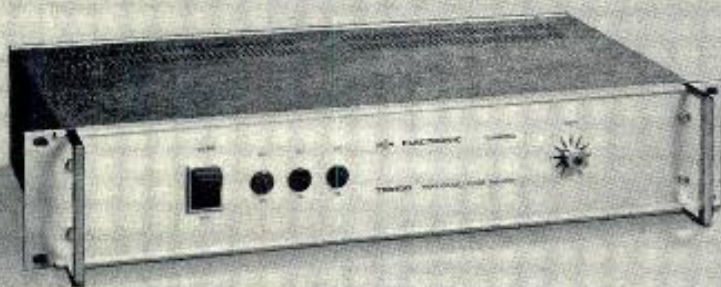
Why? Why cannot teachers just start trying to do the right things, instead of the wrong things? Why are

they so locked in on the system?

I'll tell you why: because they are incapable, for the most part—the same 99 per cent—of thinking things through for themselves. They must be told. With every succeeding generation, a higher percentage of our population is zombized, and the number of people who could tell, if they even knew what to tell, is ever smaller. So everyone is looking for a non-existent *authority* to tell him how he can be his own man, not dependent on being told by someone who must know more than he does.

There have been many varying accounts about what the Bible record means, at Genesis chapters 2 and 3, by "the tree of knowledge of good and evil." It seems to me that tree is the source of today's education: merely accepting what the system offers, without verification, is the knowledge of good and evil, not to be questioned. In contrast, those who accept that God made man in his image prefer to use their own faculties of thought, as St. Paul admonished, "Let every man be fully persuaded in his own mind." (*Rom. 14:5*). ■

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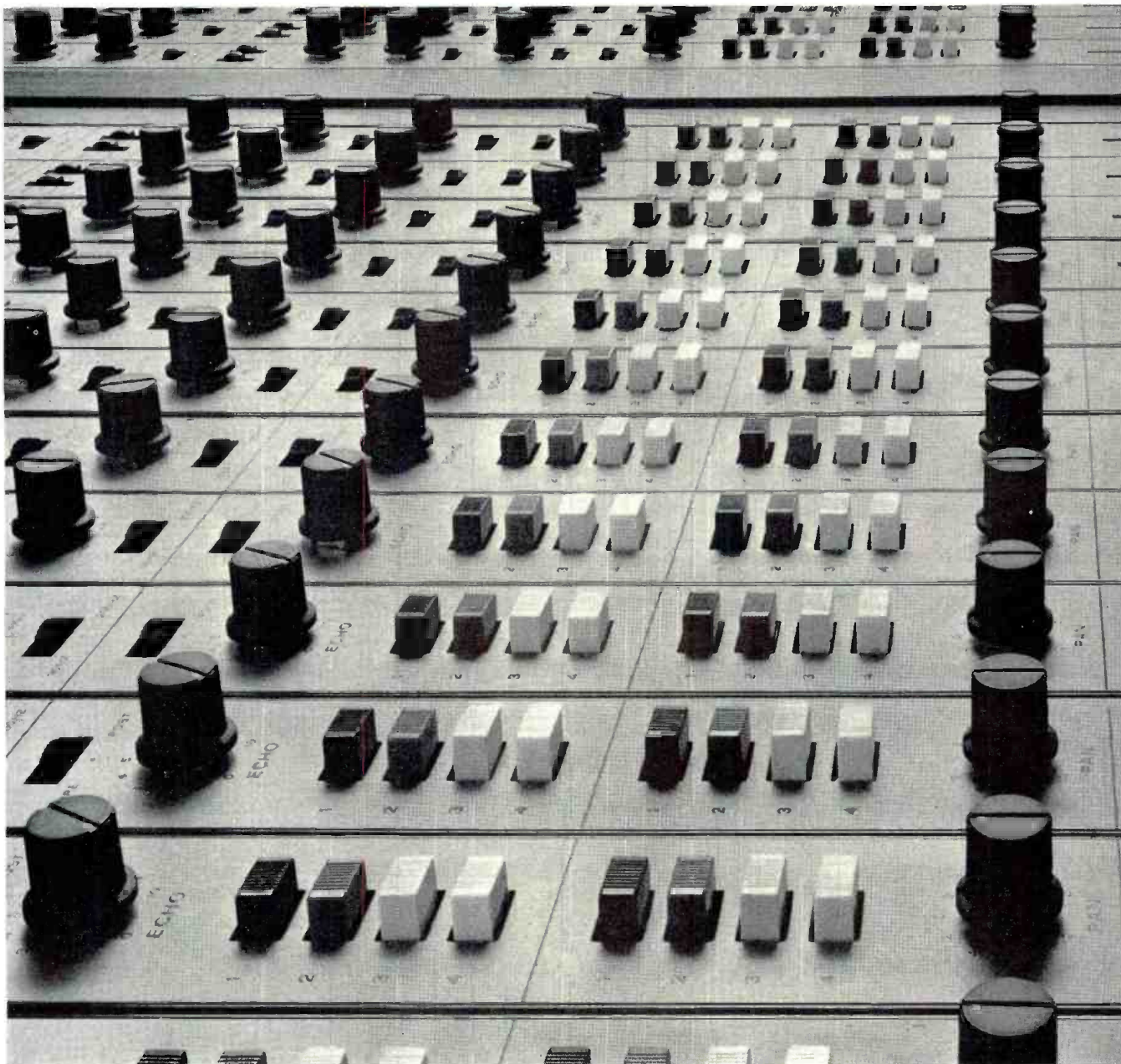
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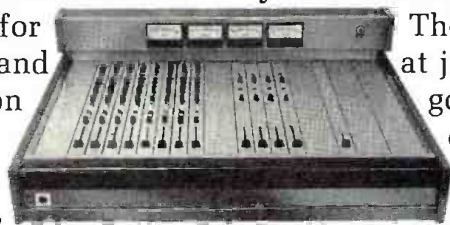
The Model 10 Mixing Console

When you've got more talent than money

Any mixing console is simply a creative tool. Getting the most out of it calls for imaginative insight into music and skill in the practical application of sound.

If you've got the talent but you don't have the money,

you're exactly who we built this board for.



The basic 8-in, 4-out board starts at just \$1890. From there you can go to 24-in, with options and accessories enough to fill a studio.

The TASCAM Model 10. It gets your inside outside.

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SOUND WITH IMAGES

The Film Chain

● With the increased use of in-house television in the latest industrial and educational audio-visual facilities, many organizations are incorporating within their systems a means to transfer film and slides to video tape. It is possible with this device to put complete presentations on tape including both 16mm and 35mm film, as well as slides from a double projector to avoid the long pause between slide

changes. The film chain, or multiplexer, is the interface between the projection systems and the tape recording process.

The simplest of the transfer devices is the direct link between the projector and the video camera. This uniplex film chain consists only of the two main items with a connecting collar between the proper lenses. With no ambient light able to get into the sys-

tem, the film image is picked up on the vidicon and converted to the same type of electrical impulses as in a live pickup.

The next step up is the multiplexer, which can include one or two film projectors and a slide projector feeding into one camera, or up to four projection units into two cameras. Of the projectors, only the slide unit can be any standard model. The film projectors have to be modified for use in the multiplexer system.

In normal operation, the 16mm film projector runs at 24 frames per second. This has to be converted to be compatible with the 30 images per second of the video signal. A special shutter is used on the 16-mm projector in place of the standard one for normal use. It is a 5-blade shutter which shows film frames at the proper intervals to avoid flutter on the t.v. screen. The same is true of the 35mm projector, but on the latter, it is a much more complex conversion. Both the 16mm and the 35mm require other modification, but it is the shutter (in conjunction with the pull-down mechanism) which runs the film through in the proper visual sequence.

The slide projector, when used individually, with a single drum of slides, takes a finite time (depending on the model) for change of slides. To avoid this, there is a unit which has a double drum arrangement, allowing one drum to advance while the other is on the screen. Alternating between drums does make the original setting up of slides a bit more tricky, but the more even transition between slides during the recording makes the presentation flow more smoothly. One of the more common methods for projection of the slides is to have each drum on its own projector and light source, although it is possible to use a split beam from a single light source, or a single lamp for alternating slides.

Since the slide and film projectors are not being used for a bright screen image but for good color in the video system, the illumination source must be such as to provide proper color temperature but not necessarily at the highest brightness. Compensation for different light sources in each of the projectors, and to balance them as closely as possible, there are two methods used primarily, and a third which is not as much in use currently as it was.

In the slide projector, for example, where a high intensity lamp might be required for screen projection, an incandescent lamp might be better for the multiplexer application, and instead of the usual 500 watt bulb, one

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INOVONICS MODEL 355



↑ **SEPARATE EQ FOR SYNC** ↑ **3-SPEED EQ**

DUAL-CHANNEL TAPE ELECTRONICS: \$1200

This high-performance package is ideal for original installations or for upgrading existing systems.

Features include: Conservative design criteria and distortion-reducing circuitry to assure highest quality recordings. Capability for remote control of all recording and monitor functions. Solid-state switching to eliminate punch-in and contact noise. Individual SYNC and reproduce amplifiers for optimum SYNC performance. Versatile 3-speed EQ for all NAB and IEC standards.

Check out the Model 355. You'll love its features and performance!
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of 300 watts might be used. On the film projectors, too, in place of the usual arc or Xenon or other high intensity source of light, less bright means are utilized. Variable lamp voltage or iris control are also in use.

Another way to decrease the light source on the projectors that might be brighter than any of the others is to introduce neutral density filters. These can help cut illumination but do not affect color transmission. They are similar to the filters used on cameras during photography in extremely bright light.

The third method has to do with the internal structure and operation of the multiplexer itself. In order for the proper projector to be picked up by the camera, the method used mostly is by means of front-surfaced mirrors. However, there were at one time multiplexer models which made use of partially transparent glass which also acted as mirrors. Thus, by proper selection of glass, the proportion of light to be directed at the camera could be controlled, and by proper proportion could balance the different projection light sources. This, of course, meant that the required projector had to be turned on at the proper time, or a means had to be found to block the light of the undesired projectors if they were all to be turned on at the start of the session. Present usage of front-surfaced mirrors makes things simpler. All that is required is that the correct mirror be in position for the required projector. The mirror can either be moved into place by horizontal pivoting or moving vertically.

Remote control plays a very important part in the more complex setups. Usually, a console is used to house the switching and control switches. With low voltage circuitry and relays, the proper mirror is placed in position for the desired projector. With front surface mirrors, each of the projectors can be turned on at the start of the session without interference. With remote operation available at the console for each of the projectors, the entire projection process can be directed from the operator's position.

At the receiving end of the multiplexer is a video camera, which can be black-and-white or color. The simplest set up is with a camera without external controls, and not operated with synchronizing drive signals. Even with the camera in black-and-white, the system will function satisfactorily provided this is the only camera in the set up, and there are no other sources. If, however, there are other sources, it is necessary that all these

inputs operate on a single external drive to assure no-roll switching, smooth fades, and the possibility of special effects, should they be desired.

With color, most cameras are supplied with remote controls for shading and color adjustment. This camera control unit allows the operator to adjust for differences in slides or films. It, along with the sync generator, other control panels, and possibly a switcher, special effects generator, and monitors, makes up a console (and sometimes a double unit). In

order to set up the camera properly, it also is well to add a waveform monitor to the console. This then provides a full system to allow complete presentations to be put on video tape, even including live pickup cameras.

With educational institutions and industry so wide spread in their affiliations, it is becoming more and more necessary to distribute informational programs to different offices. Although expensive, a multiplexer film chain is becoming more essential in almost all applications. ■

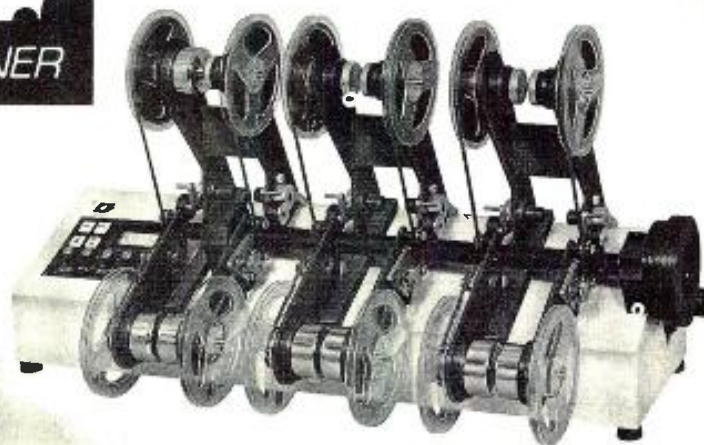
SPEED AND QUALITY

The new GARNER table-top Model 1056, a heavy-duty, precision reel-to-reel copier, makes five quality copies from the master reel. Ideal for mass production of professional quality tapes by commercial or institutional organizations.

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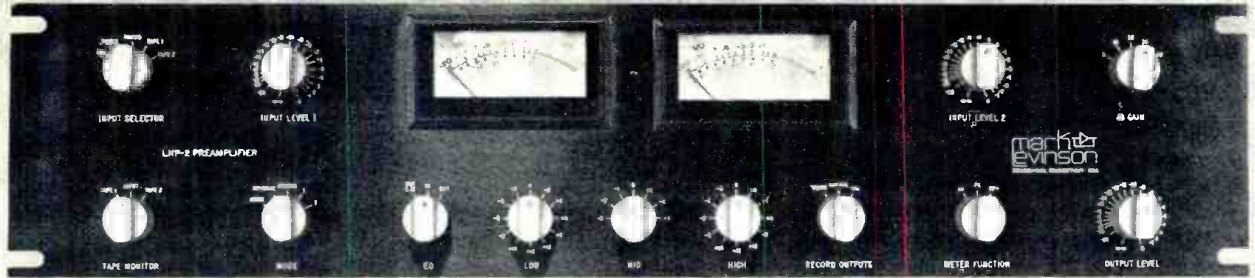
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- Dynamic Range: Greater than 130 dB
- THD: Less than .005% at 1kHz (+18 dBm/600 ohms)
- Weston meters with Burwen Laboratories VU306 electronics modules switchable for VU or peak characteristics
- Peak reading characteristics include:
 - Peak response in 5 microseconds
 - Holds peaks for two seconds
 - High frequency pre-emphasis position avoids tape saturation at slow speed taping
 - Accuracy of reading: 0.1 dB
- Channel Tracking Accuracy: 0.1 dB all functions, all conditions
- Dials read to high accuracy of dial setting, typically 0.1dB
- External power supply reduces hum and noise pickup
- Teflon insulated coaxial leads for all audio circuits
- Switchcraft 3-pin connectors in parallel with phono plugs to facilitate interface of studio with consumer equipment
- Switchable gain allows maximum S/N ratio for wide range of input levels 0 to 40 dB in 10 dB steps

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Circle 16 on Reader Service Card

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NC12, less drivers — \$134.80 List.

It might seem strange that a company that is becoming famous for its fiberglass horns should introduce a pair of bass reflex cabinets — until you stop to think about it. There are applications in which the size of a full range horn system is prohibitive, and a bit of efficiency can be sacrificed for compactness. It is for such applications that we offer the PBL and NC12 cabinets; two fiberglass bass reflex cabinets whose high efficiency, wide frequency range and solid, tour-worthy construction earn them a definite place in our line of professional speakers.

The PBL, the larger of the two cabinets, is a nicely contoured, compact cabinet for a 15" LF driver and a screw on HF driver. With proper speakers, smooth efficient response is realized from 45 Hz to 16 KHz, with excellent mid range and HF projection provided by the large-mouthed 485 Hz flare rate horn molded into the face plate. Only a few dB less efficient than our large horn systems, the PBL is still several dB more efficient than anything else its size, making it a perfect choice for any application requiring clean, loud sound from a compact system.

The NC12 cabinet, which accepts a 12" driver and a screw-on HF driver, is probably the best high powered/high efficiency stage monitor available today. With its HF horn giving tight directional characteristics to minimize feedback, the NC12 can cut through extremely high ambient levels to deliver clean monitoring in the most difficult situations. Solid fiberglass construction, with steel and aluminum trim renders the cabinet virtually immune to the rigors of professional touring use.

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Circle 20 on Reader Service Card

NEW PRODUCTS AND SERVICES

EXPANDABLE MODULAR CONTROL CONSOLE

● Designed to accommodate up to 16-track recording and on-air applications, Grandson model 110 is expandable to eighteen mixing positions with thirty-six inputs, in only thirty-six inches of width. Grandson offers complete metering, two echo send/receive channels, talkback communications, separate control room and studio monitoring, test oscillator, and a plug-in patch bay. Monitoring functions and muting circuitry are TTL logic controlled and may be reprogrammed by the owner to meet specific requirements. 20 dB headroom is provided over +4 dBm output and each input position may be ordered with a stepped input sensitivity control handling levels from -70 dBm to +20 dBm.

Mfr: Audiotronics, Inc.

Circle 50 on Reader Service Card



FOUR-CHANNEL DECK



● Four-channel record and playback reel-to-reel deck, model 334S, features Simul-Sync overdubbing capability. The unit lends itself to special effects tapes, such as sound-on-sound and echo, cross-echo, backwards recording, and pan-pot effects. Recording speeds are 15 and 7½ ips; wow and flutter tests at 0.04 percent at 15 ips. This is an updated version of model 3340, from the same manufacturer.

Mfr: Teac

Price: \$1,049.50

Circle 53 on Reader Service Card

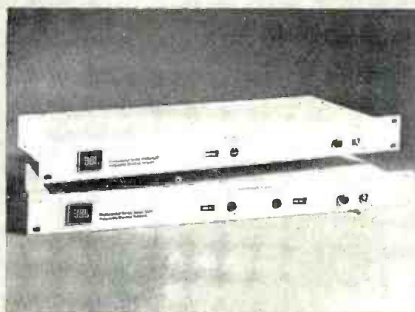
ELECTRONIC FREQUENCY DIVIDING NETWORKS

● These frequency dividing networks, designated 5231 for single channel and 5232 for dual channel applications, are designed for use with studio monitor or sound reinforcement loudspeaker systems where bi-amplification or tri-amplification is desirable. The purpose is to divide the audio spectrum before power amplification, separating treble from bass tones and aiming for a cleaner signal being fed from the power source directly to the individual loudspeakers of the system. Direct coupling to the loudspeakers is claimed by the manufacturer to eliminate the insertion loss typical of most passive networks and to permit realization of the maximum damping factor available from a given amplifier. The crossover frequency use is determined by inserting the proper printed circuit card into each channel's circuitry. Each channel is provided with a level control for high frequency shelving.

Mfr: JBL

Price: Model 5231: \$165.00; 5232: \$198.00; Crossover Card: \$15.00.

Circle 51 on Reader Service Card



DUAL LOW NOISE AMPLIFIER



● Two complete amplifiers in one package makes possible greater flexibility in the operational amplifier configuration, leading to such combinations as microphone preamplifier-line amplifier, phono preamplifier-line amplifier, etc. With the addition of an output transformer, model 2731 can drive a speaker to four watts continuous peak power. Model 2731 features output power of two watts per channel; medium power applications of four watts may be satisfied with a single module. Other features include output short-circuit protection, compact size, dual in-line fourteen pin configuration for PC board mounting and a simplified system wiring.

Mfr: Modular Devices, Inc.

Price: \$39.00

Circle 52 on Reader Service Card

SERVO-CONTROLLED TAPE DECK

● Automatic reverse and a close loop dual capstan system is offered on GX-400DSS, servo-controlled four-channel tape deck. The unit contains four GX glass and crystal heads, two additional motors for reel drive, and a synchronizing mechanism that permits instant overdubbing. It has three speeds and up to 10½ reel capacity. Four channels may be recorded simultaneously. Continuous four-channel playback and continuous two-channel record and playback are provided through automatic rewind, achieved with sensing foil and a repeat circuit. The recording equalization is varied according to signal level to achieve the clearest high frequency reproduction possible at the slower tape speeds. Tape and source monitor switches allow immediate comparison of the input signal and the actual recording being made.

Mfr: AKAI

Price: \$1,495.00

Circle 60 on Reader Service Card



FIRE-RETARDANT ACOUSTICAL FOAM



● Soundfoam is a plastic foam developed to absorb maximum sound energy in a minimum weight and thickness. It is virtually non-burning and in the presence of flame forms a skin which does not burn and cannot be relighted. A patterned surface increases its acoustical effectiveness. A variety of finishes are available, including MicroFilm, with a washable micro-porous skin for external applications, and a combination with metallized Mylar for use around liquid spray equipment. The metallized version also improves low frequency absorption.

Mfr: The Soundcoat Co.

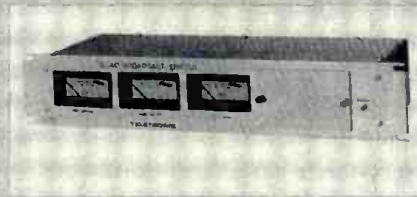
Circle 59 on Reader Service Card

BROADCAST LIMITER

● Independent adjustment of rms compression and peak limiting to prevent overmodulation without clipping is possible with BL-40 Modulimiter, designed for the a.m. broadcaster. Modulimiter gives continuously variable symmetrical or asymmetrical limiting and constant 95 percent plus modulation or a more conservative dynamic approach. It is intended to maximize transmitter power and extend coverage. The limiter uses an electro-optical attenuator and a new f.e.t. peak limiting section with instantaneous attack and triggered release, which prevents distortion at low frequencies. Frequency response is $\pm .25$ dB 30 Hz to 15 kHz, $\pm .5$ dB 20-30 Hz and 15-20 kHz.

Mfr: UREI

Circle 61 on Reader Service Card



UNIDIRECTIONAL DYNAMIC MICROPHONE



● A unique response tailoring system allows users to choose any of four response curves for optimum performance from model SM7. These include: flat response from 40 to 16,000 Hz; response boosted in the mid-range frequencies for additional presence to emphasize voices or certain musical instruments; response cut at low frequencies to produce a bass roll-off; a combination response with both presence boost and bass roll-off. Dual slide switches control not only the response tailoring but also provide a visual frequency response curve readout which graphically shows the response setting of the microphone. SM7 has a pop filter and an internal air suspension shock mount.

Mfr: Shure Brothers, Inc.

Price: \$240.00

Circle 58 on Reader Service Card

MINIATURE OSCILLOSCOPE

● Weighing only four pounds, model 9601A single-trace oscilloscope, also available as dual-trace model 9602A, can be hand-held or hung from a neck strap when used for on-the-site testing. The "mini-scope" contains a 1.5-inch CRT screen that is enlarged to 2.25 inches by a snap-on magnifier. It is powered by an a.c. line or a battery pack that permits up to five hours of continuous service before requiring a recharge.

Mfr: Telonic Industries, Inc.

Price: \$595.00

Circle 57 on Reader Service Card



CONVERTIBLE AMPLIFIER KIT

● A conversion kit can be added to the mono version of TR-3 amplifier to change it to stereo. The 70-watt-per-channel basic power amplifier features push-pull operation of all stages and direct coupling throughout. The unit contains no coupling capacitors, a feature, according to the manufacturer, that permits instant recovery from overload, with no overshoot or ringing. They also claim that the push-pull operation reduces problems of odd-order harmonic distortion, heating, and power supply ripple. A.c.-d.c. feedback loops around the output and driver sections and around the entire amplifier, plus a d.c.-only loop overall.

Mfr: Schober Organ

Price: Stereo: \$194.90; Mono: \$142.00

(Kits); Conversion Kit: \$59.20

Circle 54 on Reader Service Card



FREQUENCY SELECTIVE LIMITER

● Featuring a fast peak limiter and a frequency selective limiter in a single rack-mounted unit, model 210 is useful in mastering applications that require independent control of both high-frequency program energy and broadband program peaks. The limiter has separate controls for peak ceiling and attack and release timing and ripple-cancelling circuits to assure low distortion. Model 210 uses plug-in inserts to complement a variety of high-frequency overload characteristics; both stock and custom-tailored inserts are available.

Mfr: Inovonics, Inc.

Price: \$490.00

Circle 55 on Reader Service Card



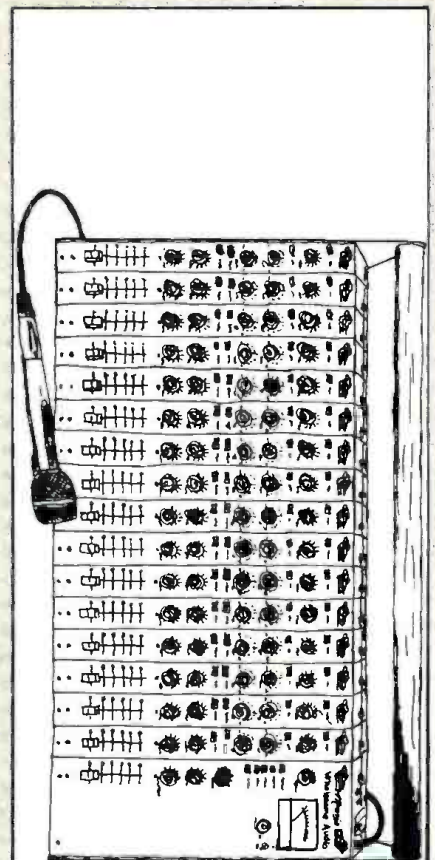
STEREO HEADPHONES

● Permanently polarized electret diaphragms, eliminating the need for separate bias power supply, are featured on TEL-111 stereo headphones. The lightweight phones have foam-filled ear cups and good acoustic seal. The headband is adjustable to fit children or adults. Frequency response is 18 to 24,000 Hz and harmonic distortion is less than 0.2 percent at 115 dB SPL. Supplied with the units are adapters which match their impedance to 4- to 16-ohm amplifiers or receiver outputs. This device contains a plug-in phone jack and a phone/speaker selector switch.

Mfr: Telephonics

Price: \$87.50

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PROUDLY PRESENTS THE **MIXER**, THE WORLD'S ONLY PROFESSIONAL SOUND REINFORCEMENT MIXING CONSOLE. \$2243.00 FOR 16 INPUTS! (MAIN FRAME \$499, INPUT BLDG) A FEW IMPORTANT FEATURES:
● GATE III ● MODULAR ● BALANCED IN & OUT ● LOW FILTER
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Mondo Wholesome Audio



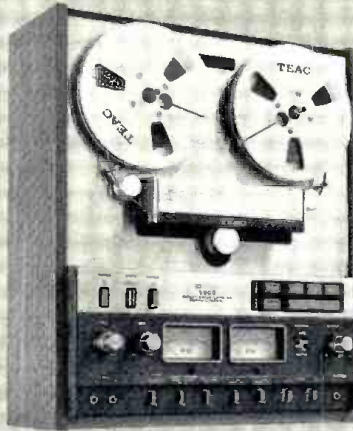
STEREO REEL-TO-REEL TAPE TRANSPORTS

● A direct drive servo-controlled capstan which substantially reduces heat, vibration and controls wow and flutter while eliminating gears, idlers, and belts, is noteworthy in models 5300 and 5500 tape transports. Model 5500 includes a dual-process Dolby noise reduction system. Four separate circuit cards in the 5500 permit simultaneous Dolbyized recording with decoded tape monitoring. Both models have three d.c. motors, adaptable to either 50 Hz or 60 Hz and four stereo heads. A foil sensing circuit responds to foil at the end of the tape and automatically changes the tape direction. Switches are eliminated by a system of i.c. logic transport controls, including fifteen integrated circuits in a touch-computer keyboard-type control board. Other features of the transports include two-step action in the pinch roller travel, dual scale vu meters, meter switch which matches tape type to the proper meter scale, remote control, and plug-in electronic boards.

Mfr: Teac

Price: \$899.50 (#5500)

Circle 65 on Reader Service Card



MAGNETIC TAPE EDITING PEN



● This device, which looks like an ordinary fountain pen, erases small areas of sound and video from magnetic tape or film. Handy for eliminating errors, making changes, or creating fade-in and fade-out effects. Supplied with press-to-operate switch and six-foot line cord. Model number identification, HD-35M.

Mfr: Microtran

Price: \$32.00

Circle 67 on Reader Service Card



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Consultants in Studio Systems
Engineering, Design and Installation

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A COMPLETE CONSULTATION
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16 AND 24 INPUT 8-TRACK MIXERS

● A choice of sixteen or twenty-four input modules is available with Series 300 mixers. Main frames are fully wired, with power and XLR type input and output connectors, plug-in input modules with non-exclusive pushbutton track selection, panpot, echo send, cue (which doubles as monitor-only solo), three octave-wide peaking boost or cut equalizers with a choice of three frequencies on each, adjustable input gain and input pad, line/mike switch, and a six-inch sealed conductive plastic slider. Modules have balanced 200 ohm mike input and bridging single ended line input; their outputs can feed more than eight tracks. Also included are masters and setup oscillator on the output module and up to three mixdown-monitor modules with automatic cue-solo and mixer-playback switch. The talk-slate module includes slate track select and talkback/slate microphone. Entire system uses plug-in integrated circuits and tantalum or computer-grade condensers.

Mfr: Interface Electronics

Circle 66 on Reader Service Card



TAPE HEAD CLEANERS

● These new head cleaners are inserted into cassette and 8-track cartridge units in the same manner as regular tapes and then provide a polishing action, removing dust and oxide from capstans, rollers, and magnetic heads. The manufacturer is also now offering longer length tapes, available on 10½-inch metal reels, running 120 to 240 minutes.

Mfr: 3M Company

Price: Head cleaners: \$1.75 cassette; \$3.00, cartridge. Tape: \$13.40-\$24.25.

Circle 69 on Reader Service Card



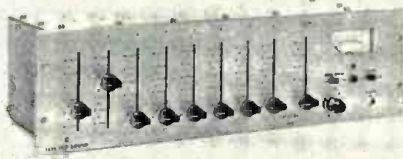
EIGHT INPUT AUDIO MIXER

● This new unit, model 900 mixer/amplifier can be expanded from eight input capability to sixteen inputs by connecting two units together. Features include front panel attenuators; both an earphone jack and vu meter for monitoring; a choice of plug-in boards for each input to customize the unit for a particular application: microphone, phonograph, balanced line (bridging or matching), or unbalanced line; and a built-in 1000 Hz tone generator to quickly set up the proper operating level. The front panel attenuators offer a sliding construction for checking on the eight input settings; there is a ninth attenuator for the master output channel, which has its own separate plug-in amplifier, which includes an output transformer to isolate the unit from the output line. Frequency response is ± 1 dB from 20 to 20,000 Hz, noise level, -120 dB.

Mfr: Electro Sound

Price: \$800-\$1,000 depending on input boards.

Circle 85 on Reader Service Card



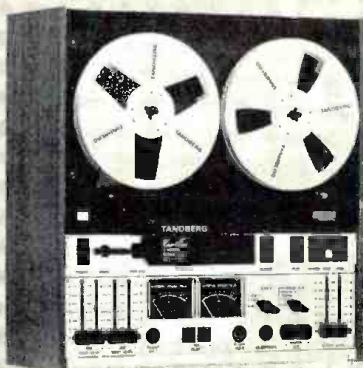
SILENT TAPE RECORDER

● The ultimate in quiet operation has been attempted by this manufacturer, combining the Dolby B noise reduction system with Crossfield. The signal/noise ratio achieved is 71 dB at 7½ inches per second, using UD/SD tape. Called 9200XD, the tape recorder also features one-hand tape threading, computer-like tape handling, stereo mic/line mixing, and balanced microphone inputs.

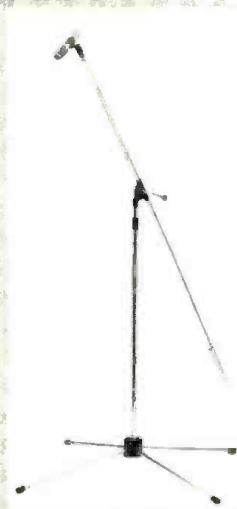
Mfr: Tandberg

Price: \$899.50

Circle 62 on Reader Service Card



MICROPHONE STANDS

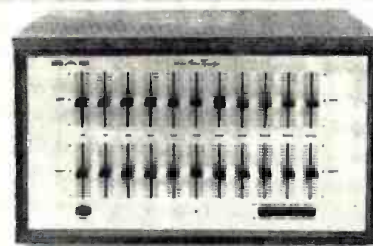


● The convenience of a single lever control for adjusting boom length, boom angle, and rotation makes this line of microphone stands practical. An additional microphone may be mounted, through the use of an ingenious drum boom. Chrome or black finish.

Mfr: KMAL (Audiotechniques)

Circle 64 on Reader Service Card

DUAL-CHANNEL EQUALIZER



● A dual-channel, 11-band equalizer, designated Mark 27, is capable of frequency correction of both room acoustics and program material. The unit utilizes 22 toroidal band-pass filters, low noise coils of better than 90 dB signal-to-noise ratio, and is capable of twenty-two frequency level controls. Each control has a center-detent position which will electronically remove the control from the circuit. Every channel has an equalizer defeat switch to return the outgoing signal to the same as the incoming one without disturbing any of the frequency control levels. A tape monitor switch is provided for use when the Mark 27 is used through a tape monitor circuit on a receiver.

Mfr: Scientific Audio Electronics, Inc.

Price: \$550.00

Circle 63 on Reader Service Card

Symmetrical Design of T and H Pads

Here is a simplified way to calculate the correct values for these needed components.

NOW YOU DON'T have to bother calculating resistor values for T and H pads. By using this convenient nomograph, you can quickly determine both series and shunt resistors by knowing your working impedance and attenuation.

To read the nomograph, find the intersection of your attenuation vertical with the R_1 and R_2 curves. Use the right-hand scale for R_2 and the left-hand scale for R_1 from the intersection point.

I have provided the following example:

Given: $Z = 600$ ohms working impedance and 5 dB is chosen for attenuation.

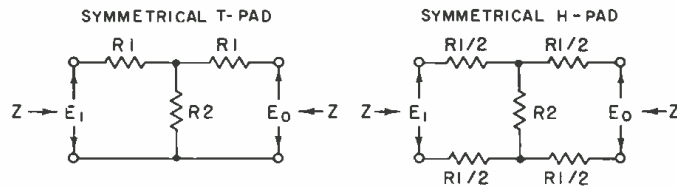
Then for the T pad $R_1 = 168$ ohms and $R_2 = 985$ ohms. The H pad value is $\frac{1}{2} R_1 = 84$ ohms while $R_2 = 085$ ohms, same as for T pad.

REFERENCES

Audio Cyclopedia, Howard M. Tremaine, *Howard W. Sams & Co. Inc.* pp. 235-236.

Audio Systems, Julian L. Bernstein, *J. Wiley Book Co.*, p. 99.

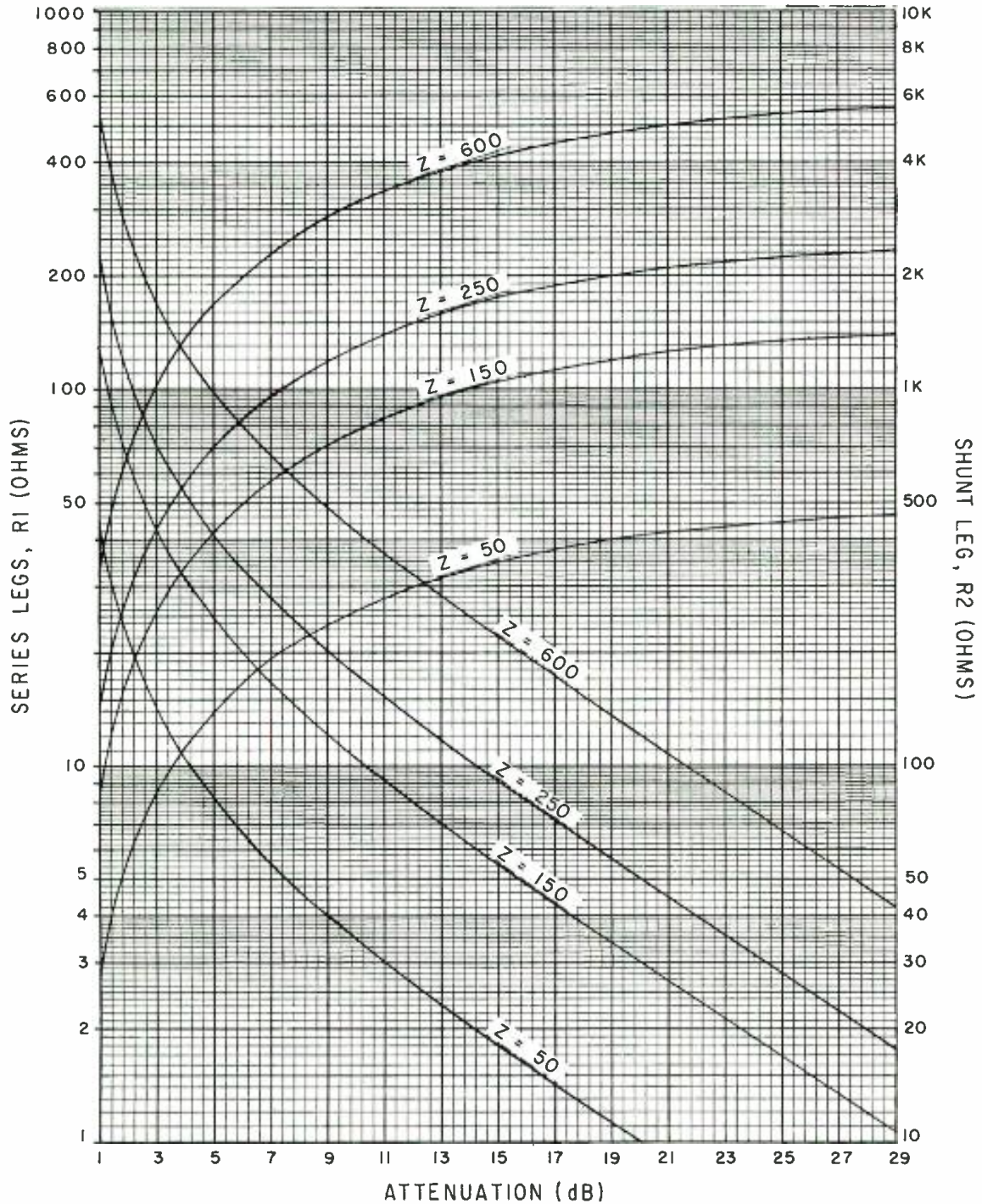
Ronald Ajemian gets quite involved with matching impedances and the like in his position with the New York Telephone Company.



DESIGN EQUATIONS: $R1 = Z \left(\frac{K-1}{K+1} \right)$ $R2 = 2Z \left(\frac{K}{K^2-1} \right)$
 $K = \frac{E1}{E0}$ AT DESIRED ATTENUATION

GUIDE FOR NOMOGRAPH: USE SHAPED CURVES FOR R2 VALUES, AND SHAPED CURVES FOR R1 VALUES.

NOMOGRAPH FOR SYMMETRICAL T AND H PADS



The Flasher

This article is not about a new strobe light nor any other projection device, but is the name of the main character in the first X-rated rock concert.

PUBLICITY and fliers invited one and all to "Spend An Evening With The Flasher." It was billed as the premier of the first such performance, a blend of music, live acts, and film in the tradition of the old vaudeville stage. Barry Karr, producer of the show, placed the X on the rating himself to avoid having anyone under eighteen admitted to this multi-media presentation, in which there were scenes of nudity. While they were strictly satirical spoofs and not pornography, they were not fitting for youngsters.

The Beacon Theater is a regular New York City movie theater during the day but is not used at night, so for the week preceding the opening, the personnel responsible for putting on the show brought in all the material needed in the hours after the movie ended. Everything that could be done behind the screen was done. Lights were set up, a rear scrim was hung, some of the props were put in the wings, with precautions taken so that none of this would be accessible or visible during the normal working hours of the theater.

Not all the talent was able to arrive a full week before the opening, but there was some rehearsing done by a few of the individual acts. By the time opening eve arrived, most of the talent had shown up, but it wasn't until after the closing of the movie theater on the night before the show that the sound equipment was brought in and set up, the slide projectors arranged, a

special 40 foot x 40 foot screen hooked up to one of the stage fly-rigs, and the regular movie screen swung out of the way.

The entire program was originally set up to run like any other Broadway show, for as long as it could support itself. Mr. Karr originally intended for the show to draw the same people who would go to any Broadway theater to see a rock show, but complications arose and the show was rescheduled for only one night. The cost for this night was between \$70,000 and \$100,000, depending on the source of the information. Tickets ranged from \$4.50 to \$6.00; it was estimated that over 1,500 paying customers attended. There were also quite a few in the audience from the press, some on free passes, and some who were just allowed in as friends. Anyway, the orchestra section was filled and the balcony was almost full.

The show consisted of interspersed film segments with live skits and rock music, provided by an eight-man group called *Pool-Pah*. This was the same group who performed the sound track for the film *Forbidden Under Censorship of the King*, a hard core porno film produced by Mr. Karr several years ago as a spoof of pornographic movies and used in this special night's program in segmented form as the basis of the show's film portions.

Quick changes from the film (on the large front screen) to live music (from the group sitting between the screen and the scrim 30 feet back) and slides (shown on the scrim during musical selections) was accomplished quite smoothly. As each film segment ended, the screen would move up, the slides would begin, and within a few sec-

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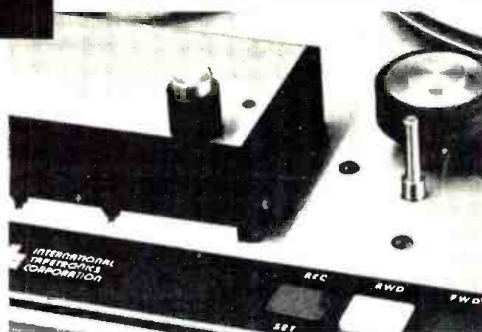
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onds, the band picked up from the film sound and a live act or musical number would be under way. The transition back to film was also done smoothly.

The film, which cost somewhere around \$50,000, was 35mm and ran 46 minutes. It began with the Flasher, who was also played on stage as the show's MC, and then included segments which will never appear on any children's t.v. programs, followed by some film portions which were taken through a microscope, and some which were made specially with an air brush and ink in different colors. Sound for film segments was distributed by over 175 watts of power through a speaker combination of the huge Altec 210 bass unit and a 15 segment multi-cell horn.

Slide projection, technically and artistically created by Gemini, made use of twelve slide projectors connected to a master console which had remote controls for all the units and auxiliary special devices. The projectors were set up at the front of the lower mezzanine section and arranged so that Richie Bordens, who made and provided all the slides and ran this portion of the show, was able to reach each of the units to change slides by hand when desired, according to the mood and pace of the music.

Each of the projectors was equipped with an added device or special control at the console. Some of the units had polarized wheels in front of the lens, and slides were specially prepared so that when this combination was used, the slide seemed to have motion. When the projector was fitted with a normal slide, the wheel was not turned on and the projection was a stationary image.

Some of the projection units were set up with special lenses so that several images could be projected together within the screen and in a predetermined configuration. Other units had on/off switches at the console which permitted the slides to be flashed on the screen in any desired pattern at any speed.

The console, designed by Larry Kahan, also had rotary controls which permitted the operator to fade up and down the lamps of each of the desired projectors which were hooked up to the controls. Presetting the slides in the projectors and then controlling the dimmers allowed the operator the option of dissolving between any combination of slides at will without the slide change that would occur if a normal dissolve setup were used. Whenever he found it necessary to change any of the dissolve slides, the operator manually selected any of the 400 slides available to him and changed during the dark time of the proper projector while still controlling the other units without loss of image motion. A recording engineer used to working with rotary faders will appreciate the design of the dimmer control panel where one hand could slide from one fader smoothly to another, keeping control going continuously.

Several other visual effects were originally scheduled to be used in the show. One was similar to the arrangement used in some discotheques where an overhead projector is used with a plastic dish and a mixture of colored oil and water. The other was a large screen t.v. projector. However, neither was used during the performance. The effects that were created with the many slides, the projectors, and the controls, all under the supervision of Betsy Stang of B. Bird Productions, who had charge of all the audio-visuals, and Lily Purcell, seemed to be busy enough.

Live performances by male and female impersonators, burlesque-like acts, and rock music by the group portrayed individual capabilities and talents. The band was even dressed uniquely, each one in a costume of a particular type, cut, or color to best fit the personality of the musician. Although the group had previously been brought together for a film track and a record, they actually had had only a month of rehearsal, which is relatively long when compared with a single week for the lighting man (all working at night with limited time to set up and see the stage portions of the show), two days for the follow-spot man, and one day (the evening before the show) for the slide and sound people.

Sound mixing and distribution was set up by Astro-sound. A double-section console was set up at the side of the orchestra section. Four Altec 1567 mixers, 4-way SAE splitters, SAE Mark III amplifiers and equalizers, a limiter-compressor, and crossover were all included. The SAE custom console also contained 10, 20 and 30 dB pads, and bass rolloff filters. The frequency dividers in the console set up three separate feeds (40-500 Hz, 500-7kHz., and 500-16kHz.) at line level to the speakers on stage. The feed at line level permitted better control and cleaner sound according to the operator. At the speakers, the power amplifiers boosted the sound level to distribution requirements.

The console also contained Binson premix echo facilities for use on any desired microphones. In this show, echo was added to the voice microphones only. A total of 22 microphones were used, including SM 56, 57, 58, Sennheiser, and others. By use of dividing networks, mic. feeds were split to go through the main distribution mixing system and separately to the monitor mixer. In this way, it was possible to control separately the balance for best sound in the theater and for those situations which needed special monitoring mixing. The mixer also had a feed from an external Sony ¼-track tape unit on which synthesizer music was played, in stereo, during certain portions of the program.

Stage monitor speakers, Altec A-7s, were located at the sides of the stage to provide both singers and musicians with the mix they needed. These units were dwarfed, however, by the speakers used for general distribution.

For the high frequencies, 500-16,000 Hz., 60 per cent radial horns were used, and for 500-8,000 Hz., 90 per cent radials were utilized. For the bass horns, instead of the usual huge wooden boxes, a horn section with four layers of Fiberglas over balsa wood was provided. Each of these, with two JBL 2220 speakers, was capable of producing a sound level of 131 dB at 4 feet with a frequency response, with an additional extension, of 50-800 Hz. This unit, produced and furnished by Community Light & Sound, Philadelphia, Pa., is 33 inches by 33 inches across the mouth and 44 inches deep when fully assembled. The horn weighs 75 pounds and the driver cabinet weighs 40 pounds without drivers.

The New York showing was the premiere of what was to be an extended run. Although the New York show opened and closed on the same night, it was scheduled for a series of performances in various cities. Whether the entire performance will remain the same in each of the shows was not known, but it is pretty certain that there will be slides, film, live acts, and big rock sound. Whether the X rating will remain was also not sure. It will most likely depend on the city involved. ■

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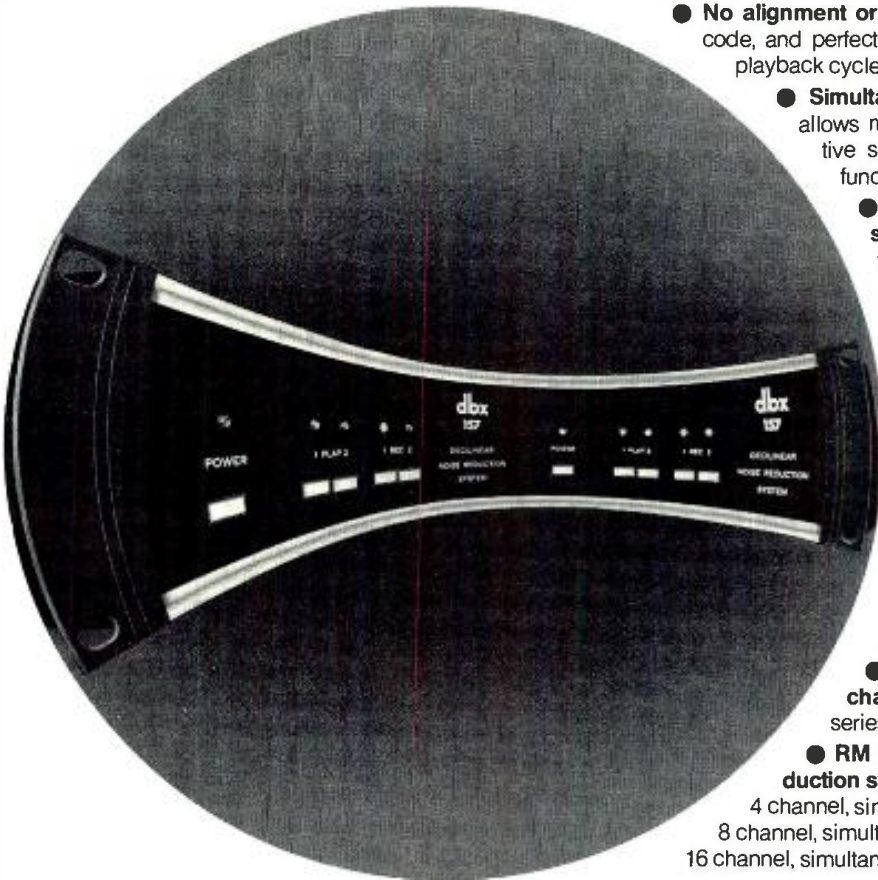
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db Visits— Gately Electronics

IT'S A PLEASANT DRIVE from our suburban New York offices to the suburban Philadelphia offices and factory of Gately Electronics. We took this journey not too long ago (when gas was still available) to see the plant from where products flow at an ever increasing rate.

Gately Electronics gets its name from Ed Gately, genial boss of the place. Ed began the company in a very modest way, working in a basement shop to produce a suitcase mixer. In 1966 mixer sales justified an expansion into OEM sales of specialized audio products that ultimately evolved in 1968 into the Gately line of products. In this same year, Gately also got into the distribution business by acquiring a local Ampex franchise.

In some ways, Gately Electronics is still a basement operation—not in concept but in location. From the original basement, the company has slowly expanded into adjoining buildings—sometimes going upstairs, sometimes downstairs. They now occupy a group of buildings within which we met Ed Gately and his sales manager Bill Hamilton.

The 1968 Gately line was created with the modular series 8 console components. In 1970 development work was begun on a professional-grade kit line that culminated in the first showing in early 1971 of the Prokit line. The first product was a mixer, the following year had echo and equalization kit components added. A Prokit limiter is currently in development.

In the meantime work was being done on development and expansion of console and component systems. So in 1972, the C-1616 and C-2424 console systems were introduced—Gately's prime package console systems.

While this was going on, the original involvement with distributor sales of other products was reactivated and increased. Today, Gately Electronics is the U.S. exclusive distributor for both Schoeps microphones and Ortofon professional disc recording equipment. Gately also both distributes and uses in its products transformers made by the Danish firm of G. Jorgen Schou and has most recently become exclusive U.S. distributor-importer of the MSR disc recording lathe system.

Among the lines that the firm continues to distribute

on a regional basis is the original franchise for Ampex, but today you can also buy Scully-Metrotech and Crown equipment from them. In addition to the exclusive Schoeps mics, they are local distributors of Electro-Voice. They are also distributors of Dolby equipment. They have become close to—but not fully—a turnkey operation.

As if all this is not enough, two former employees, John Buffington and Lance Strickland, developed public-address type mixing systems and under a Mom's Wholesale Audio trademark have licensed the exclusive manufacturing and distribution to Gately Electronics.

With all this, Gately Electronics remains in many ways a small company. There are under 20 regular employees in about 6200 square feet of total space and Ed Gately is still sole owner. ■



A separate art and design department occupies a tight corner in which new products to new advertisements are created. The work being done in this photo resulted in the advertisement that has been run in our pages for some months.



In this group, various stages of component assembly are seen. The skilled women workers handle a large part of the individual assembly, rather than strictly working on a pass-along basis—though this technique is also used.

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Reducing noise pollution with the Burwen dynamic noise filter may prove to be the most profitable aspect of your programming...

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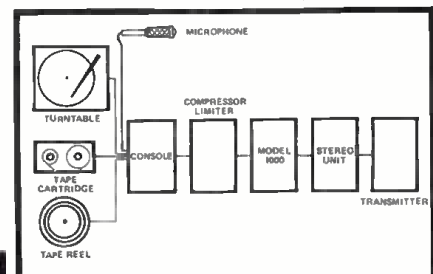
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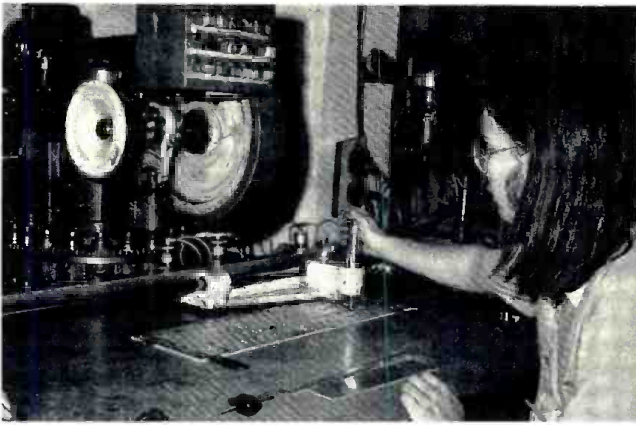


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Chris Gately operates this highly sophisticated metal punch machine which turns out panels and chassis according to the way it has been programmed.



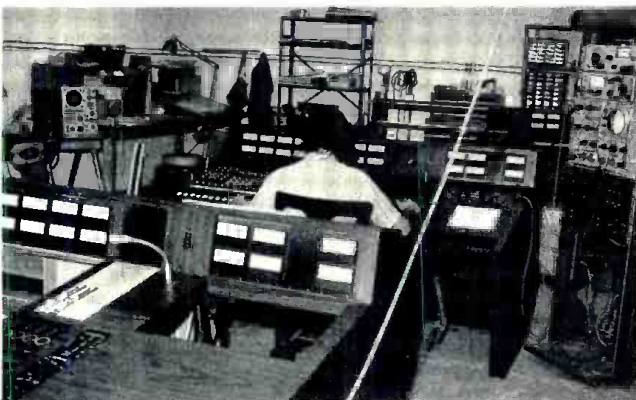
Steve Hemphill occupies a corner of the office area in which he builds Prokits to be sold as wired units, but also repairs customer problems that come in.



Here's an overall view of the sheet metal shop. All sheet metal work is done in-house including plating and etching of panels and components.



Gately consoles are constructed with standardized modular design. Each module can be slipped in and out as shown. Also seen is the module's single board. A master mother board is in the console.



In these two photographs the console construction area is shown. Gately makes even the cabinets in his woodworking shop. With modules and components inserted, each console is given a painstaking shakedown before it goes out the door. We were told that it takes an average of seven men working one month to create a finished console.

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PRO SALESMAN wanted by prominent manufacturer of professional audio products. Must be heavyweight, willing to travel fastest growing territory in market; excellent fringe benefits and commission plan; unusual career opportunity with high income potential. Send resume to **Box 21, db, 980 Old Country Rd., Plainview, N.Y. 11803.**

RECORDING/MIXDOWN ENGINEER. Plenty of qualifications. **Mike Kuehl, 1418 N. Stevens, Rhinelander, Wis. 54501.**

FIELD SERVICES ENGINEER; large sound engineering and contracting firm engaged in the manufacture and distribution of sophisticated sound and communications systems; travel limited to 50 miles from Paterson, N.J.; good pay, permanent position. Send resume in full confidence to **Frank Carbone, Telexov Electronics Co., P.O. Box 217, Park Station, Paterson, N.J. 07513.**

PEOPLE, PLACES, HAPPENINGS

● The **New York Record Plant** recording studio complex has obtained additional space at their W. 44th Street, New York City facilities, where they are building a 24-track overdub quadriphonic mixing room, adaptable to the installation of a fully automated and computerized mixing system. The studio also offers a 24- and two 16-track mixing facilities and master cutting capabilities.

● **Victor Brociner**, one of the pioneers of the high fidelity industry, has joined the **Avid Corporation** of E. Providence, R.I. as vice-president of engineering, stereo products. Mr. Brociner was one of the founders of the **Philharmonic Radio Company**, the predecessor to **Fisher Radio**. He has developed a line of high fidelity systems and amplifiers under his own name. An active member of the **Audio Engineering Society**, Mr. Brociner is currently chairman of the Loudspeakers Measurements Committees, and vice-chairman of the Committee on Distortion.

● **Synergetic Audio Concepts** (Syn-Aud-Con) has named **Dobbs-Stanford Corporation** of Irving, Texas and **Fleehart & Sullivan, Inc.** of Seattle, Washington as representatives for their sound system design, installation, equalization, and maintenance seminars. Dobbs-Stanford will cover Arkansas, Louisiana, Oklahoma, and Texas and Fleehart & Sullivan will be responsible for Alaska, Idaho, Montana, Oregon, and Washington. Synergetics, founded by **Don Davis**, inventor of the Acousta-Voicing equalization process, conducts three-day training seminars in major U.S. cities. Enrollments are open to sound contractors, consultants, architects, telephone company and transportation company engineers, and multi-media technicians. Further information may be obtained from Synergetics, P.O. Box 1134, Tustin, California 92680.

● The **AKG Division of North American Philips Corporation** has announced the appointment of **Geoffrey M. Langdon** as products manager for professional products. Mr. Langdon comes to AKG from the **United States Marine Band**, where he served for four years as chief engineer of the audio and recording department.

● Regular production of **VideoBeam** color television sets is now under way by the **Advent Corporation**, of Cambridge, Massachusetts, after an extensive marketing survey. **VideoBeam** is a two piece color projection television system which receives conventional television programs or other video sources and displays them on a screen 4¼ feet high by 5¾ feet wide, opening possibilities for group presentations. The suggested user price is \$2,495.

● Memories spanning seventy five years were marked at a celebration tendered by **Deutsche Grammophon Gesellschaft**, attended by 1,600 guests, in Hamburg. The guests of honor at the anniversary of the venerable company were **Dr. Gustav Heinemann**, President of West Germany, and **Oliver Berliner**, representing the descendants of **Emile Berliner**, founder of the company and inventor of the disc record and player (originally called the gramophone) and the method of mass producing discs from a single master. Emile Berliner also invented the microphone and created the famous *His Master's Voice* trade mark from a painting by Francis Barraud. To mark the occasion, a gold replica of Berliner's first disc player was presented to his grandson, Oliver Berliner. The premier performance of a specially commissioned musical work by **Mauricio Kagel**, entitled *1898*, commemorating the year in which the company was founded, highlighted the evening. DDG is now a part of **Polydor** and owned jointly by **N. V. Philips** and **Siemens Electric**.

● **Rensselaer Polytechnic Institute**, of Troy, N.Y., in cooperation with the Albany Medical center, will conduct a three-day course on Audiometry and Hearing Conservation in Industry, to be held at the Institute April 1-3, 1974. Designed for doctors, nurses and technicians responsible for hearing conservation programs, the course will cover the basic anatomy of the ear, causes of hearing loss, hearing protection and noise control, fundamental acoustics, audiometric measurements and their interpretation, and the medico/legal aspects of hearing loss. Further information may be obtained from the Office of Continuing Studies, Rensselaer Polytechnic Institute, Communications Center 209, Troy, N.Y. 12181.

● The research and development area of **Tascam Corporation**, Los Angeles, announces that **Johan van Leer** has joined their staff. Mr. van Leer, who has twenty four years of experience in sound, audio and musical engineering, holds patents on a rotary ceramic magnetic phonograph transducer, magnetic phonograph pickup, a one octave alternator tone generator, reverberation unit magnetic assembly, and a variable decay reverberation unit. He was formerly a project engineer at the **Marantz Company** and was also associated with **Philips Electronics Industries** in the Netherlands, where he participated in pioneering the modern magnetic phonograph cartridge. At **Shure Brothers**, he specialized in mono and stereo magnetic phonograph transducers and worked on slow speed, fine groove disc cuttings and other projects at **CBS Laboratories**. He was also associated with **Hammond Organ**, where he specialized in the development of advanced electromechanical reverberation and acoustic delay systems.

● **N. V. Philip's Gloeilampfabrieken**, of the Netherlands, has signed an agreement with **Dolby Laboratories, Inc.** which licenses Philips to manufacture and sell products incorporating the Dolby B-type noise reduction system. Philips, originators of the compact cassette, is a significant addition to the number of recording companies now issuing pre-recorded musicassettes made with the Dolby B process.

● **Howard M. Durbin** has been appointed vice president for research and engineering for **James B. Lansing Sound, Inc. (JBL)**. Mr. Durbin's twenty-nine year career in the audio industry has included work at **RCA** on audio transducer designs and twenty-six years at **Electro-Voice**, where he participated in original developmental engineering in cartridges and microphones. Mr. Durbin will take over the duties of **Jim Barthell**, vice president of engineering administration at JBL. Mr. Barthell is moving to general administration, working with **Sterling Sander**, executive vice president of operations and **Arnold Wolf** on a number of long-range corporate programs.



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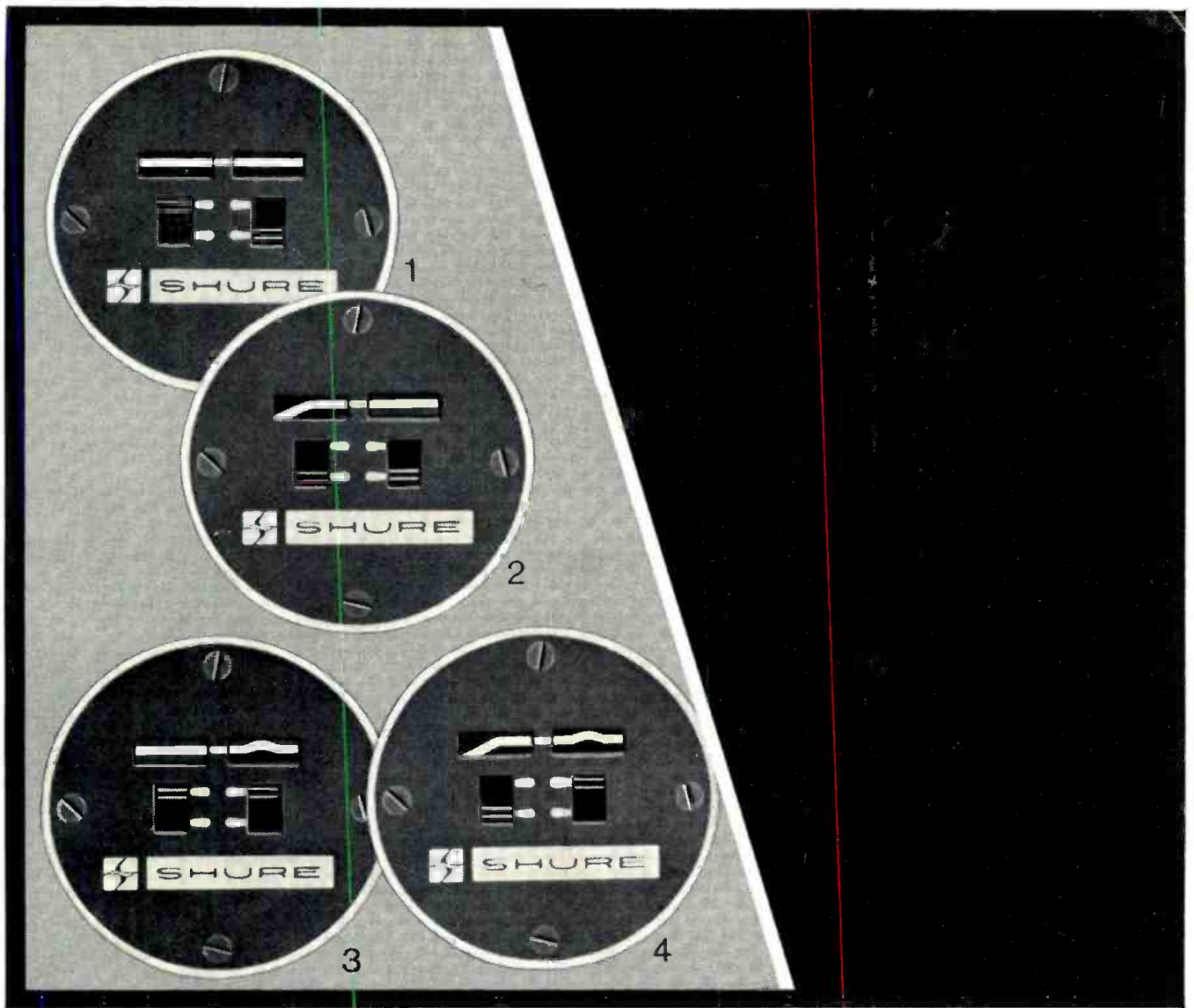
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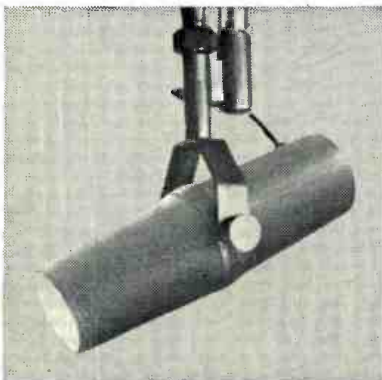
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