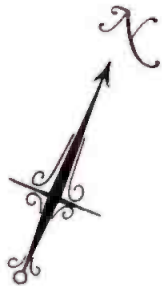


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COMING NEXT MONTH

• The psychoacoustical aspects of audio are the prime thrust of the next issue.

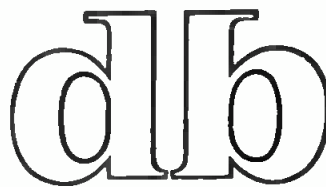
Floyd Toole has written an important paper on **LOUDNESS, ITS APPLICATION AND IMPLICATIONS TO AUDIO**. The title tells it all as the author carries you well beyond Fletcher-Munson concepts, yet keeps the subject most readable.

The dream of the recording producer is the interchangeable studio. This dream may be close to reality, as you will discover in Daniel Queen's article on monitoring and room acoustics. This outstanding acoustical consultant will give you new insights into solving this problem.

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

ABOUT THE COVER

• This issue takes us on a tour of European cities and looks into factories flagged on the cover. Begin visiting on page 33.



THE SOUND ENGINEERING MAGAZINE

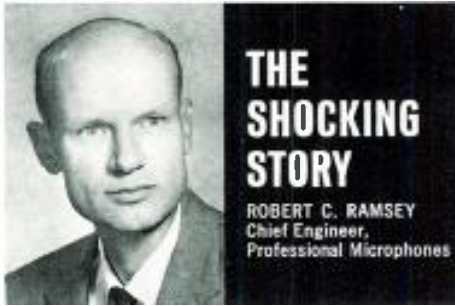
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Making a shock mount that really serves its purpose is no simple matter. One must consider the nature of the expected energy that might be transmitted to the microphone, as well as the sensitivity of the microphone itself to mechanical excitation.

The path of possible mechanical vibration must be carefully considered, including the possibility of multiple paths, the frequency and amplitude of the unwanted noise, and its relationship to the desired signal.

With most professional microphones complete mechanical isolation would be the ideal except that it must be achieved within the limitations of practical size, mass, reliability, and predictability. The new E-V DL42 Cardiline® unidirectional microphone can serve to illustrate how these problems are attacked and solved.

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Write for Bulletin DB-2

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Bill Wertz, VP of WQLR, checks the chronometer, as Dennis Weidler is poised to put the station on the air. Pat Dyszkiewicz and Eric Toll watch.

A new Station, and a new sound hits the air in Kalamazoo, Michigan. WQLR STEREO starts serving the market in June, 1972 with all new equipment and new programming.

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

John M. Woram

THE SYNC TRACK

● Every so often, *db* goes off on a visit somewhere or other, in order to bring its readers up to date on the latest goings-on in the world of audio. Recently, the editor visited Europe to report—so he claims—on the AES convention and on assorted studios and factories located suspiciously near the well-known continental fun spots. (See elsewhere in this issue)

I, on the other hand, stayed at home and wondered—as I rode back and forth to fun city on the Long Island Rail Road—what I might write about that would take my mind off the fun he was obviously having.

The answer was of course right in front of me; the sound system on the new L.I.R.R. cars. Surely, the eighth wonder of the world, it is a system that must be seen to be believed. [This is not a mis-print. No one who has *heard* the system will believe it.]

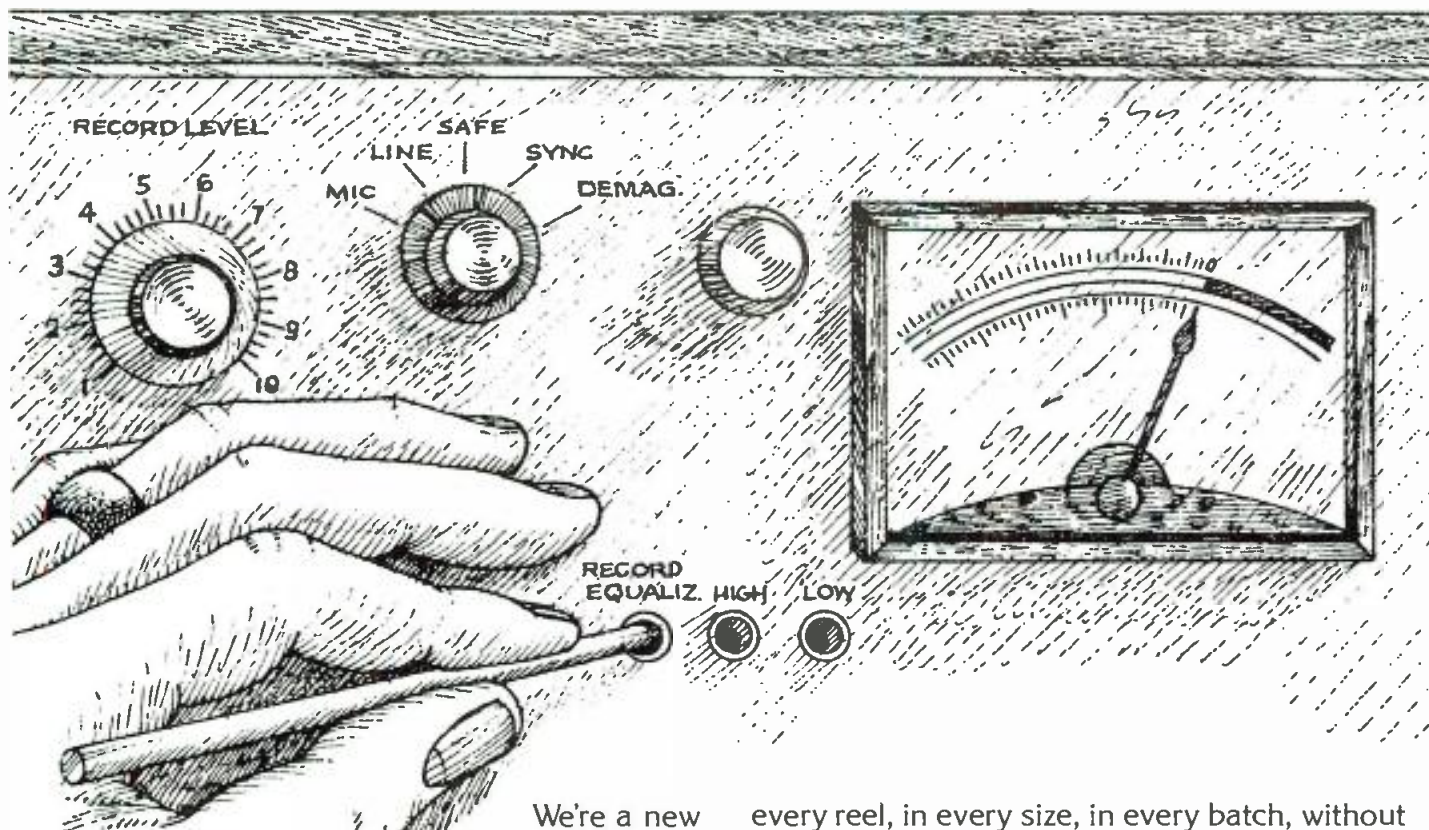
Since so many readers live beyond the grasp of the L.I.R.R., herewith is a first-hand report on this unique system. In order to preserve our journalistic integrity, no railroad spokesmen were consulted, and this report is based solely on impressions gathered and collated while trapped within the radiation pattern of the system. This pattern includes all of Long Island, most of the surrounding waters, and on a still day, parts of southern Connecticut.

Since microphones, amplifiers, and loudspeakers are generally considered non bio-degradable, they can be con-

sidered an ecology problem, as old audio equipment is discarded in the continuing search for better sound quality. Although the railroad will probably modestly deny it, astute commuters have pointed out that the sound on the Long Island Rail Road is constructed in its entirety of discarded parts from old Atwater-Kent radios, children's phonographs, and Oriental walkie-talkies. By using components that are otherwise unfit for human usage, the railroad is effectively keeping a lot of scrap metal out of the nation's garbage cans. As a matter of fact, informed sources have testified that the new blue and silver railroad cars are themselves made from the nation's garbage cans. However, this is probably not true since most garbage cans give a quieter, smoother ride.

Within the total system, all microphones announcing destinations and approaching stations have been modified so that they are relatively insensitive to the human voice. This is an important consideration, since most of the loudspeakers are incapable of reproducing vocal sounds anyway. By tailoring the microphone response *around* the voice frequencies, the system is better able to reproduce the surrounding noises. Thus the passenger—although unable to understand where the train is going—will at least realize that he is on his way there. And, since none of the train's windows can be opened, the p.a. system allows the commuter to hear sounds

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This wide-range, dynamic, boom microphone has a low frequency response to transmit his voice clearly and crisply, and an omni-directional design to pick up colorful crowd noise. The two channel headphone fits comfortably with a padded headband and foam filled earcushions to screen out ambient noise. It is adaptable to any application or equipment by means of non-terminating cordage and features exclusive Telex audiometric type driver elements. And both headphone and microphone are designed to stand up even if the sportscaster has to work in all types of weather extremes and can't avoid some hard bumps. In fact, if the broadcaster doesn't hold up as well as the CS-90, there is a "push-to-cough" switch that mutes the mike when necessary.

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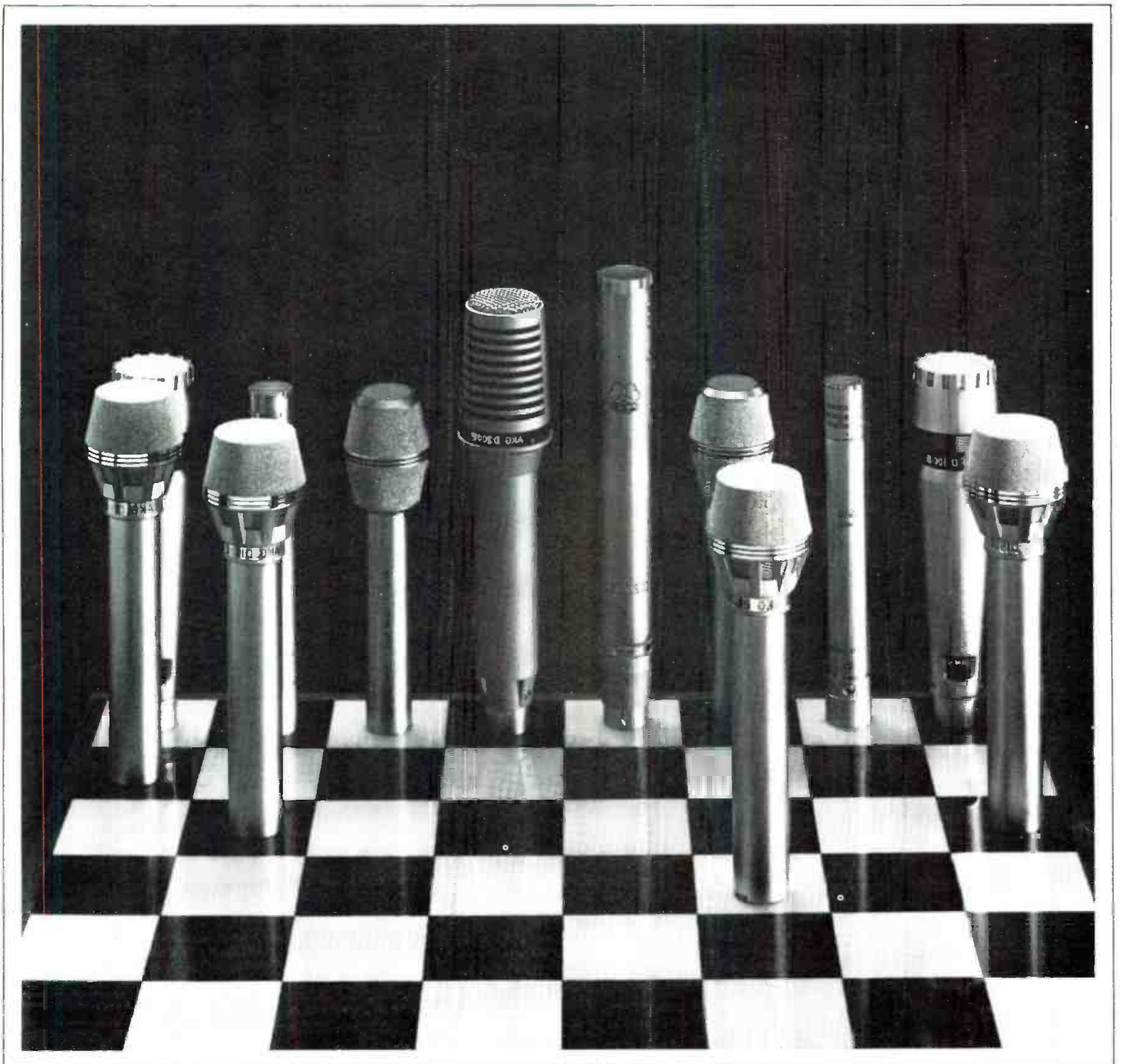
that would otherwise escape his notice, such as wheels scraping along the rails and other assorted motors, generators, and what-not.

Feedback is, of course, an important consideration in this novel system. Since the conductor is certainly not a trained audio man, he has no way of knowing intuitively if the system is functioning within its specifications. Here, feedback provides the answer. The conductor just turns up the system gain until a loud squeal is heard, thus indicating the microphones and speakers are operating as intended. Then, he merely bellows his announcements at a sound pressure level sufficient to drown out the feedback squeal. Announcements feeding back from the most distant cars will return to the microphone after a considerable delay, thus perpetuating the announcement for as long as the system remains on. This compensates somewhat for the loudspeaker's inherent lack of intelligibility, since after the message has been repeated some twenty or thirty times, the passenger may begin to comprehend its meaning.

As an additional commuter service, microphones have been placed within the air conditioning system. This is an important feature, since these units are incapable of cooling a crowded railroad car. If the noise of the air conditioning system was not reproduced over the p.a. system, the passenger would have no way of knowing that the air conditioning was on.

As a safety measure, the p.a. system automatically shuts off in the event of a derailment, or if the train stops for more than thirty seconds between stations. In this way, even if the conductor wanted to inform the passengers of the reason for the delay, he would be effectively prevented from bothering them with such depressing information. Budget-conscious railroad critics have objected to the additional expense of installing this information shut-off measure. They point out that it would never occur to a railroad man to inform the passengers about what was going on anyway, so the shut-off switch is a needless frill.

Long distance passengers on the Long Island Rail Road have often noted that the volume level of the p.a. system seems to decrease steadily over the duration of the trip. There is an obvious reason for this phenomenon which can be easily explained. As mentioned earlier, the windows on the train cannot be opened. And, the passengers use up the available air faster than the air conditioning system can replenish it. Consequently, as the interior of the car approaches a



4-6 33

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vacuum, the sound level apparently diminishes, since sound does not travel within a vacuum. This is a definite advantage, since the airless condition makes the passengers drowsy—consequently, loud announcements would no doubt be a source of some irritation to them.

Another advantage of this unique sound system is that it can be used as an emergency warning device in case the regular train whistle becomes inoperative—a frequent occurrence. In an emergency, the train engineer can shout something like "beep-beep" into the system, thus scaring off right-of-way violators, and at the same time alerting passengers to the possibility of an impending collision.

Some time ago, Governor Rockefeller vowed that he would see to it that the Long Island Rail Road would become the nation's finest commuter system. The unique sound system just described is an eloquent testimony to the governor's effectiveness. It is of course, but a small part of the whole transportation system, a system that justly deserves this unique combination of audio and communications technology. Happy April! ■

you write it

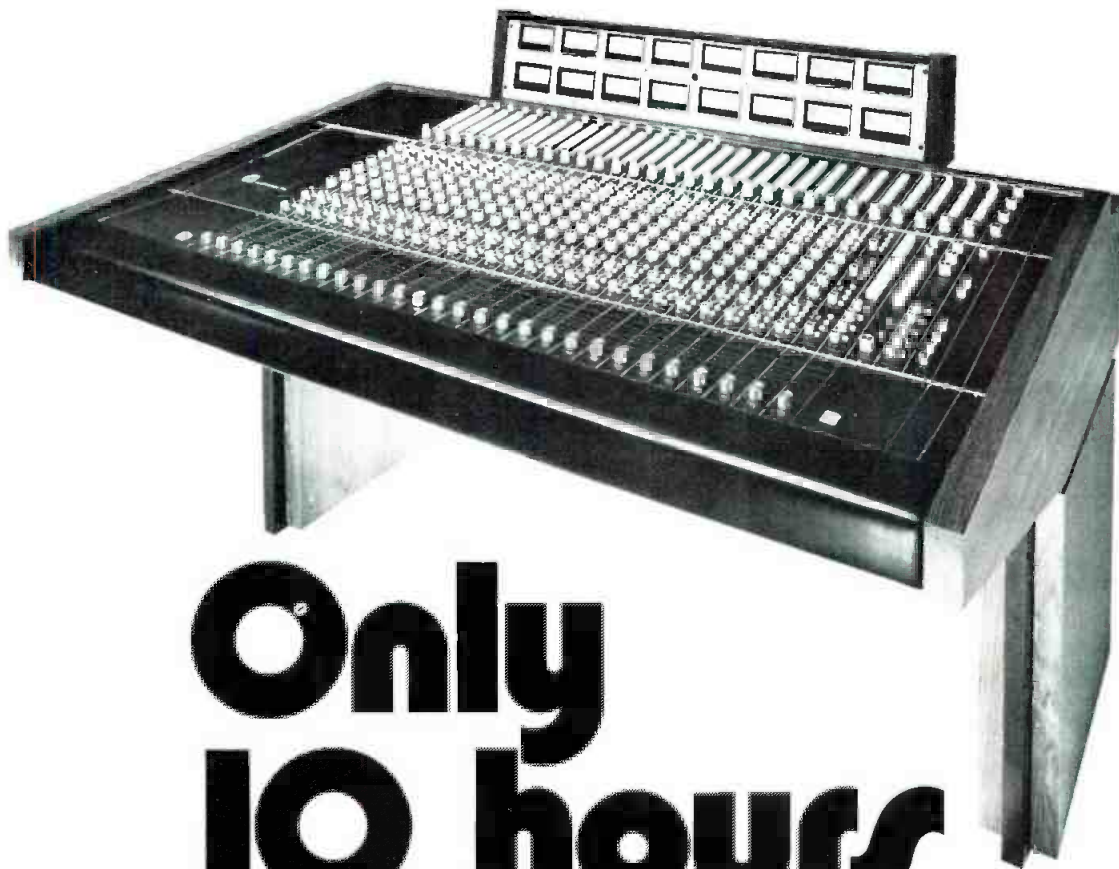
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Norman H. Crowhurst

THEORY AND PRACTICE

● Looking at my last month's mail in response to this column, I see that every letter has, in one way or another, responded to those columns that have addressed non-technical aspects, such as education, or content vs. technique. Some time ago, after I had ventured away from the strictly technical only a few times, your editor intimated to me that some readers were slightly unhappy about this; they wanted technical "meat" in a technical magazine!

So now I'm wondering—has that changed? Are the handful of letters I received this month representative of the readership, or are those who want technical content just keeping quiet?

Asking that question reminds me of a recent visit with one of my former colleagues at Teaching Re-

search, who is now with the United States International University. My interest in contacting him was to learn what innovations, if any, USIU people are working on. At the same time, he had a technical query for me, since he knew I have that kind of background.

It appears that one thing they were working on was a new program in which they wanted to stimulate the interest of unmotivated students, by simulating a robot's voice in the presentation. He had noticed how fascinated his own kids were with watching reruns of *Lost in Space*, particularly the robot on that program. So how do you answer a question like that?

Most of us have heard the output from a voice synthesizer, which gives an impression unmistakably like a robot. That would be the obvious solution. So where does one find, or get, a voice synthesizer? I volunteered to find out. Then he told me that they wanted it, like yesterday, and that they had already overspent their budget, so it should not cost more than a few bucks.

Does that have a familiar ring? From where we were, if we could locate a voice synthesizer in, say Hollywood, we could fly down with a script, use the synthesizer to robotize it, and be back, all within the same day. But my friend told me I did not know the organizational problems it would take to set up that kind of arrangement!

As I usually do when confronted with that kind of problem, I asked myself what I would do if I were in his shoes. I would probably disappear into the lab for a few hours, put together some filters and diode networks, until I achieved an arrangement that did what I wanted. When someone spoke in a monotone into a microphone at the input, the output would be something like we wanted.

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and stereo output. Cost is only \$500.

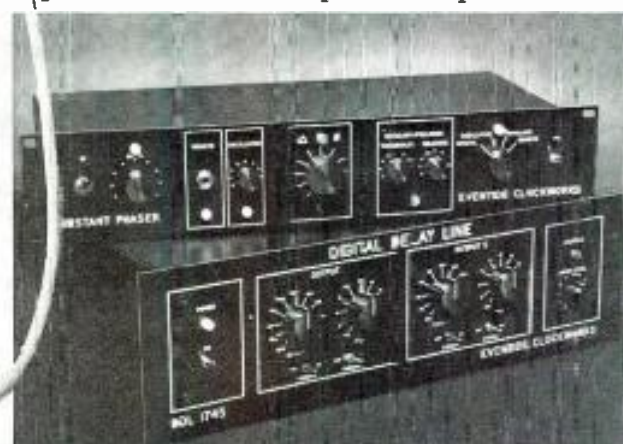
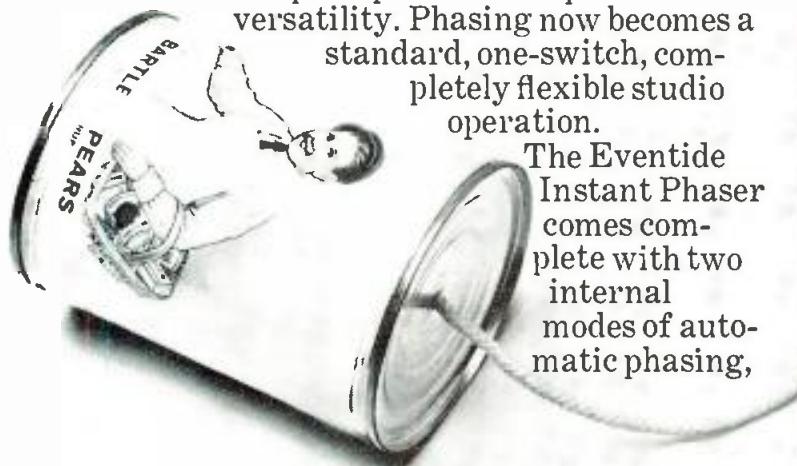
Eventide Digital Delay Systems, unlike other systems and methods that lock a producer into a single inflexible delay period, give you fully variable delay in 2 millisecond steps (up to 800

milliseconds).

With our output options, you can tap an unlimited number of simultaneous delay-varied outputs, each providing an effect of its own.

DDL 5851, for echo delay and sound reinforcement applications starts at \$1795; Model 1745, a complete delay system for recording applications including instrument & voice multiplication, from \$3300.

We've helped over 100 major recording studios. By making the impossible possible and the improbable practical.



Eventide
the next step

A recording engineer relies upon his ears. What is heard at the console determines the final mix.

For successful quadrasonic mixdown, a properly controlled acoustical environment is even more important than for two-channel stereo. Psycho-acoustic effects must be considered in relation to established principles of acoustics when laying out a quadrasonic monitoring facility.

A professional consultant experienced in designing control rooms for quad monitoring can be of great help. He is impartial because he sells no equipment. His function is to assist in solving acoustical problems. Best of all, if called in the planning stage, he can solve potential problems before they exist.



Circle 32 on Reader Service Card

I could probably achieve something at least as "realistic" (if that is the word for successfully simulating a simulation) as the sound of the robot on *Lost in Space*.

But here I confronted a problem: My lab was at least an hour's journey away from USIU, and I did not have the time to give to that kind of experiment just then, anyway. To take time for it, I'd have to charge him what my time was worth, and USIU had already overspent its budget for that project.

I had to think of something he could do himself. I could not give him a fast course in electronic circuit design. Then I realized that the old candlestick type telephones transmitted a pretty narrow audio band that would probably sound at least as much like a robot as the one in *Lost in Space*, if the person speaking over the link used a monotone.

Could we locate one of the old candlestick telephones fairly close nearby? That sounded distinctly possible. The Bell System was just in the course of extending service to the subscribers of some remote exchanges which had been run by small companies for a hundred years or so. Some of these people might still have

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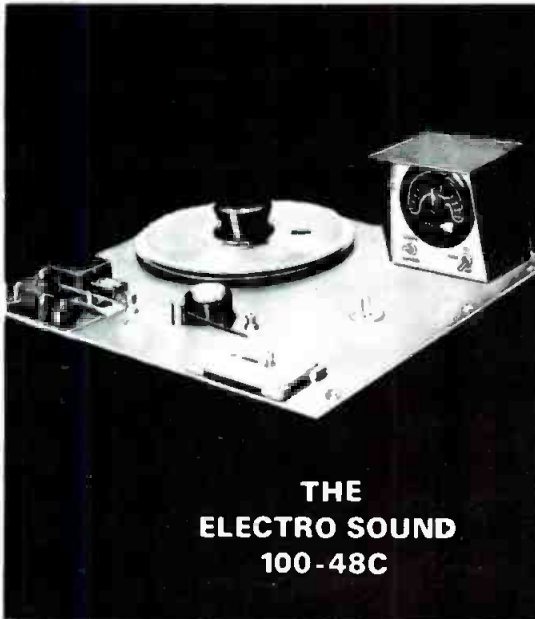
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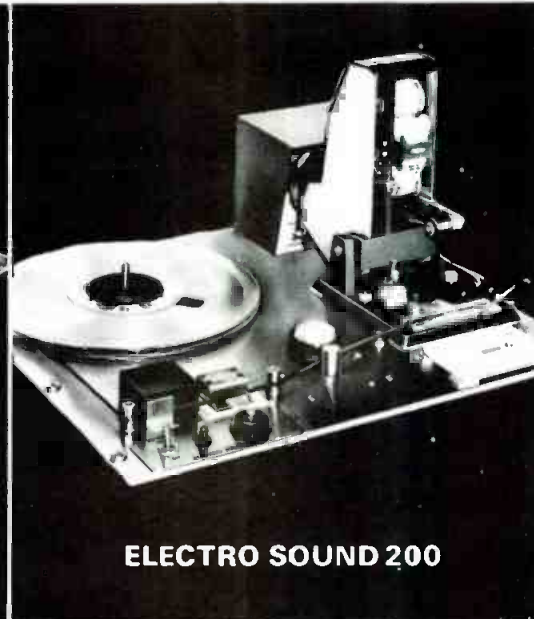
Circle 30 on Reader Service Card

RCA, CBS, EMI,
JAPAN, U.S.S.R., NEW ZEALAND, AUSTRALIA,
AND SOUTH AMERICA...

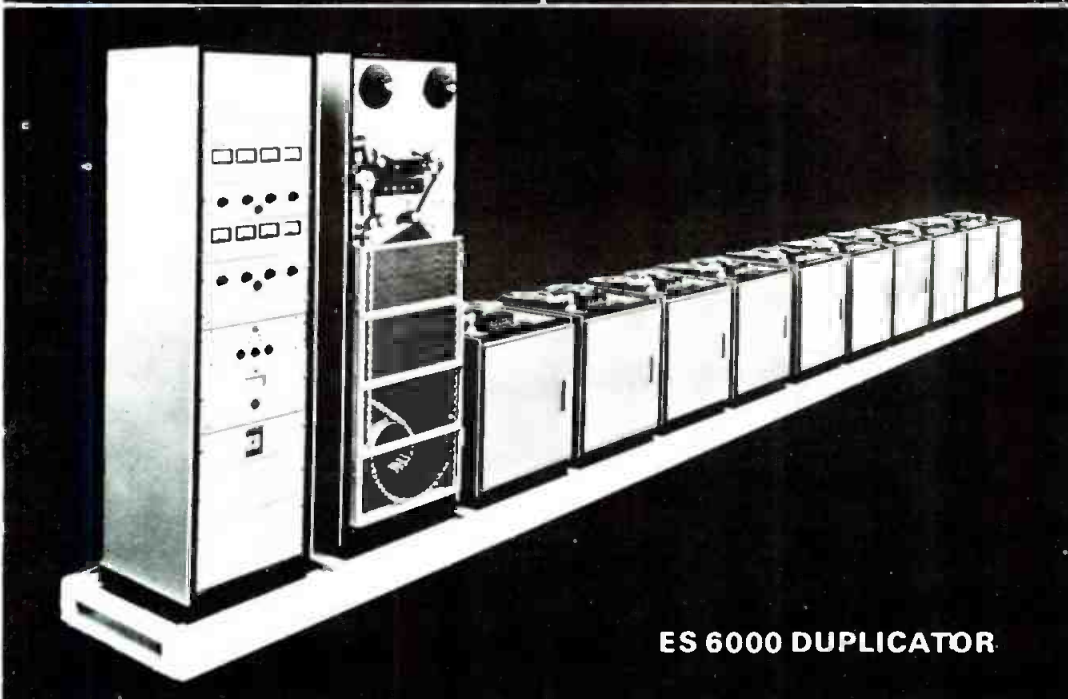
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ELECTRO SOUND
100-48C**



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their old instruments, which had been recently replaced by Bell's latest.

Now my friend could not quite picture what he must do with it. The only way he could comprehend using a telephone was as a telephone, of whatever vintage. You take the thing off the hook and put it against your ear, and speak into the mouthpiece. Where would the robot-like sound come from? So I had to spell it out for him (FIGURE 1).

Connect the wires from the ear-piece to the loudspeaker terminals of a p.a. amplifier, the microphone of which you speak into. Then, using a battery and appropriate components to energize the old carbon mike, connect its input to the mike or phono input of another amplifier. Now, the output of this second amplifier should be pretty much the robot sound you want.

Well, it worked. Even the hum, caused because the microphone leads were exposed, added to the effect. That was really an inexpensive way to simulate a robot—quick and easy, too. I guess what I had used to help him do it was a sort of “know-how,” even though I’d never *done* it before, and he did the actual work then.

But thinking about this experience reminded me of the story about the elevator repairman who serviced a stalled elevator that was creating havoc in a skyscraper. A button boy standing by watched the repairman do his job. All he did was to tap the elevator gently with a hammer at a certain spot, and everything resumed operation.

At the beginning of the following month, the same button boy happened to be in the building manager's office when he was opening the mail, and he saw the repairman's bill for \$100 lying on the desk. He said to the manager, “Do you think that is a reasonable bill? All the man did was to tap the elevator once, very lightly, with a hammer.”

The building manager was a little incredulous that the repair could have been so simple. But the button boy assured him that he had actually watched the man do it. So the building manager wrote to the repairman.

“Dear”

“I understand from a member of my staff, that the ‘repair’ for which you charge \$100 in the enclosed bill, consisted only of a slight tap with a hammer. Will you please amend your bill, to be more in line with the actual work involved.”

A few days later, the repairman's reply arrived:

“Dear Sir:

“In accordance with your request, herewith is my revised bill:

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Of the many Equalizers available today, the ITI ME-230 Parametric Equalizer is the only one that offers you all these truly outstanding recording features—

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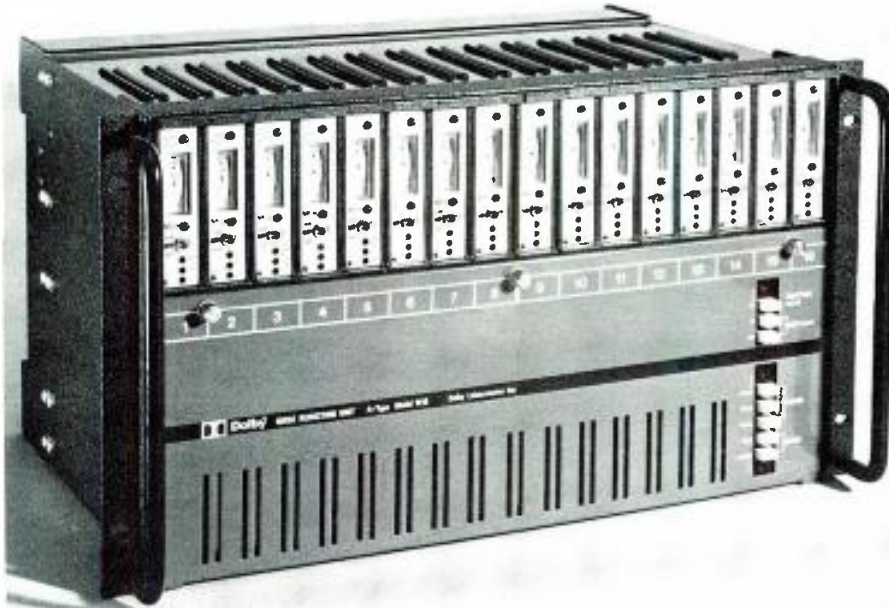
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The M16: a compact sixteen-track noise reduction unit



New monitoring facilities in record, play, and recorder rest modes.

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The Dolby system has become an integral part of modern multi-track professional recording practice. A new unit, the M16, has been developed for these applications and is now in production.

In addition to the obvious economy of space, installation time, and maintenance which the M16 offers, its cost per channel is substantially lower than that of other Dolby noise reduction units.



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Telephone (212) 489-6652

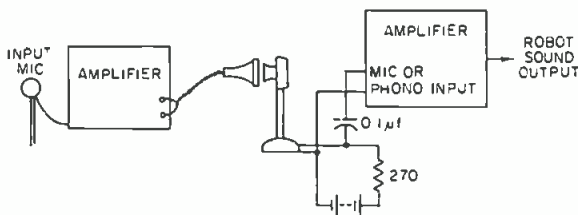
346 Clapham Road, London SW9
Telephone 01-720 1111

Full information about the M16, including accessories, auxiliary and independent eight-track units, and prices, available upon request.

'Dolby' and the double-D symbol are trade marks of Dolby Laboratories Inc.

Circle 14 on Reader Service Card

Figure 1. This arrangement uses an old-fashioned telephone to simulate a robot-like voice. The person reading into the microphone can enhance the robotic quality by using a monotone speaking voice.



"For tapping elevator with hammer:	\$.05
"For knowing where to tap:	99.95
"Total:	\$100.00"

Why wasn't I an elevator repairman? I did not get a nickel for that telephone idea! Perhaps I was born in the wrong era. I could submit a bill, but they were out of funds. So I have to tell the story in this column, to get something for it!

Do you suppose that fictitious repairman learned that trick at the local community college, during a 2-year (or maybe even a 4-year) course on elevator repairs? I find that a little difficult to imagine! And I certainly cannot suppose that his revised bill was derived from instruction received in a course of accounting!

When your doctor charges such high fees, we justify it by saying how much his professional education cost him, making his services that much more valuable than yours or mine. Did that repairman's education cost enough to warrant that charge? The real fact seems to be that his service was *worth* that much to the people in that building, coupled with the fact that nobody *else* knew just what to do.

Education costs, particularly teacher salaries, run very high these days. By any measure, are they really *worth* that much? For instance, after my friend found out how to simulate a robot, did his recordings satisfactorily stimulate the students' interests? And if they were fascinated by the robot, did that fascination follow through to help them learn?

I can imagine my own kids' response to such a thing, and they are not exactly unmotivated kids: "Dad, today we listened to some cool tapes, that had some sort of voice that sounded like a robot, telling us what to do."

To which I can imagine myself asking them what they learned from this "cool" tape. "Oh, I don't remember *that*, Dad. But I was *wondering*, how do you suppose they made the man's voice sound like a robot?" As I say, my kids are not exactly unmotivated. But suppose they were. Their interest was stimulated, let's say. But in what? The subject matter, the funny way the voice spoke, or how that funny sound was made?

Living with me, I suppose it is not surprising that my wife has become interested in how visual and audio effects are achieved. So, when we are watching a TV program that has put together a particularly good mystery story (there are not many worth looking at) she will sometimes ask me, "How do you suppose they did that?" Unfortunately, I am usually too busy thinking about solving the mystery posed in the story to think about the technique of presentation.

Perhaps *that's* why I never seem able to get \$99.95 for knowing where to apply the hammer! ■

Learn multi-track recording technology

Summer term at Institute of Audio Research begins July 9th.

Course 101-STUDIO TECHNOLOGY & PRACTICE will meet each weekday from July 9th to August 3rd. This course is an accelerated version of our regular 10 week term. Some of the topics included are multi-track tape recorders, noise reduction systems, microphones, studio consoles, limiters and equalizers.

Course 102-PRACTICAL DISC RECORDING will meet each weekday from July 9th to July 20th. This course teaches the principles and mechanics of disc recording. Some included topics are: RIAA Standards, groove configurations, groove velocity and pitch computation. Guided cutting sessions included.

schedule & fees

101-STUDIO TECHNOLOGY & PRACTICE. 4 week Summer term from 7/9 to 8/3. Registration closes June 18th
tuition \$300.

102-PRACTICAL DISC RECORDING. 2 week summer term from 7/9 to 7/20. Registration closes June 25th
tuition \$175.

301-AUDIO SYSTEMS DESIGN. 4 day seminar. Contact IAR for information about the Audio Systems Design Seminar. A \$75. enrollment fee is payable in addition to tuitions. One enrollment fee covers any number of courses in which you enroll, within any given term.

2 free albums

Early registration permits early planning. We would like to encourage you to register early by offering free, copies of the albums selected to receive this year's Grammy awards for best engineered recordings.

Those who register for the Summer term on or before May 31st will receive a copy of Mahler Symphony #8 on London Records, and a copy of the pop winner, Neil Diamond's "Moods" on MCA Records.

For more information, contact:

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NEW PRODUCTS AND SERVICES

TABERASER TAPE ERASER

● Tapes on reels or in cartridges can be degaussed without the necessity of unpackaging by this new eraser, designed to erase audio, video, instrumentation tape, and magnetic films from 150 mil to two-inch widths. Between 30 Hz and 15 kHz, the depth of erasure is 76 dB below saturation; the field is automatically diminished slowly at the end of each thirty-second cycle, eliminating annoying "thump." An automatic heat limiting circuit, activating an internal blower, keeps heat below 71 degrees centigrade. The unit weighs forty-five pounds and measures 6¼ x 14½ x 16 inches. Power requirements are 95-135 V a.c., 58-62 Hz, 1 phase, three wire. The unit uses less than eight amps under any condition.

Mfr: Taber Mfr. & Engineering Co.
Price: \$395.00

Circle 59 on Reader Service Card.



DISTRIBUTION AMPLIFIER— Model DA 1520

● This new integrated circuit distribution amplifier in a rack-style package only 1¾ inches high, has a power supply built in. Plugged in to 117 a.c., it offers simple, versatile use. Signal is distributed into 15 balanced lines without intrachannel crosstalk. Circuitry is based on an exceptionally reliable i.c. operational amplifier. Output is balanced by direct couple; a transformer used only to balance and isolate input. The output circuit consists of two sets of complimentary symmetry current drivers with heavy negative feedback, assuring low distortion of 0.2 per cent or less and low output impedance needed for channel isolation. Metering of both input and output signals is another feature. Controls consist of an on-off switch, a meter switch and a gain control. Other DA 1520 specifications include: Maximum output +20 dbm/output channel; input impedance, 600 ohms; signal-to-noise ratio, 65 dB or better below the 0 dBm level; frequency response, 20 to 20,000 Hz -0.5 dB; interchannel crosstalk, 70 dB or better, and gain, 0-40 dB.

Mfr: Fairchild Sound Equipment Corp.
Price: \$295.00

Circle 69 on Customer Service Card



POWER AMPLIFIER



● A unique dissipation limiting circuit protects model TPA100D amplifier from load mismatch and short circuits. Total harmonic distortion is less than 0.1 per cent over most of the frequency range, while the absence of an output transformer or coupling capacitor results in an extended frequency response and unconditional load stability. It delivers 180 watts rms into 8 ohms. Recovery from short circuit to normal operation is virtually instantaneous with no thermal cut outs to reset or fuse replacement required.

Mfr: H/H Electronics

Price: \$285.00

Circle 68 on Customer Service Card

HAND-HELD CARDIOID CONDENSER MICROPHONE



● Model ECM-250 microphone features a condenser capsule of the electret design. A uni-directional pick-up pattern eliminates background and other extraneous noise; a built-in wind-screen filters out wind and breath noise. A fet amplifier serves as an impedance translator, assuring low noise, high sensitivity, and stable performance. Powered by an internal AA battery or equivalent; comes with battery, microphone holder, cable, and carrying case.

Mfr: Superscope, Inc. (Sony)

Price: \$44.95

Circle 71 on Customer Service Card

VARI-BAND SWEEP EQUALIZATION SYSTEM

● This stepless, continuously variable band center system permits boosting or cutting 15 dB at any three frequencies in the human hearing spectrum. Each of the three sections has a band width control to allow the slope of the peak or dip to be adjusted from 2 dB per octave to over 16 dB per octave. Examples of the type of control possible are the ability to tune the pitch of cymbals, hidden instruments or highlight frequencies of instruments can be brought up front; instruments can be enveloped to eliminate studio leakage and to keep the spectrum of instruments from clashing with each other in the final mix. Up to 15 dB boost can be applied at the 30-40 Hz range to get a concussion bottom end without muddiness. Phasing effects can be synthesized without tape or additional equipment by boost-sweeping the ranges. This is a super noise attack system when used as a triple curve tunable notch filter.

Mfr: Multi-Track

Price: Under \$350 a channel.

Circle 77 on Reader Service Card.



DIRECT-DRIVE TURNTABLE



● An a.c. servo-motor coupled directly to its turntable platter, eliminating the use of idler wheels, pulleys and belts gives model PS-2251 turntable low levels of rumble, wow and flutter. High motor speeds are not necessary for speed accuracy or to prevent speed fluctuations; the turntable motion generates a frequency signal which is fed back directly to the motor speed control circuit, instantly sensing variations or fluctuations regardless of variations in power line voltage or line frequency. Operates on both 60 Hz and 50 Hz a.c. power without adapters. Speed can be varied ± 4 per cent by the built-in pitch control. The tonearm, which contains a direct-reading stylus force gauge, anti-skating compensator, and viscous-damped cue control, is statically balanced. A gauge for precise stylus overhand adjustment is included with the turntable.

Mfr: Sony Corp.

Price: \$299.50

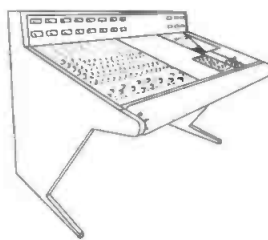
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DO YOU NEED A MIXING SYSTEM

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WHY NOT LOOK INTO GATELY SERIES 7 AND SERIES 8 CONSOLE BUILDING BLOCKS . . . THE MEDIUM PRICE CONSOLE MIXING SYSTEMS WITH

EXPANDABILITY.



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IMPORTERS AND MANUFACTURERS: Ortofon Disc Cutting Equipment, Schoeps Microphones, Jorgen Schou Transformers, C1616/C2424 Mixing Consoles, PROKIT, Series 7 and 8 Mixing Systems.

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PLUG-IN MODULE AMPLIFIER



● TAP40-EC now offers a plug-in modular form, with edgeboard connector supplied with units. The Interphone system, using two wires to carry both audio and power, requires a 24-volt d.c. supply, a retardation coil to decouple the audio from the supply, a headset for each station and external controls for gain and side-tone. Has built-in polarity control and isolated mike pre-amp.

Mfr: Tele-Audio Products

Price: \$35.50

Circle 88 on Customer Service Card

Circle 50 on Reader Service Card

TWO-WAY MICROPHONE

● Model M20AP has two pickup patterns in a single unit. A twist of a ring on the microphone head converts the mode instantly from cardioid to omni-directional. An acoustically matched foam windscreen shields the microphone from wind noise, pop and excessive sibilance. M10AF cardioid microphone features three distinct, switch-selected frequency response curves specially shaped for maximum intelligibility with uniform front-to-back discrimination at all frequencies. The use of a differential acoustic pressure design cancels feedback and suppresses background noises. A special material utilized in the diaphragm attenuates harshness and popping encountered in close-up speech and music. Both M20AP and M10AF units have the microphone pick-up system entirely suspended within the housing. They come with 16-foot shielded two-conductor cable swivel-stand adaptor and vinyl-covered case. Output impedance of each microphone can be converted from 200 ohms to 50 K ohms by rotating the mating plug at the connector receptacle of the detachable cable.

Mfr: Bogen Division/Lear Siegler, Inc.

Circle 73 on Customer Service Card



MASKING NOISE GENERATOR



● Model 3770 Noise Generator is an architectural masking noise source, incorporating a digital noise module which drives a set of selected filters for shaping the desired response. An adjustable shaping filter provides roll-off settings from flat to 12 dB per octave beginning at about 125 Hz. Seven adjustable broadband passive notches on one octave centers from 125 Hz to 8000 Hz allow for compensation in room and loudspeaker acoustics. Output of approximately 0.3V rms is designed to drive a load impedance of 10 khms or greater. The self-contained unit, mounted on a standard 3½ x 19-inch rack, operates from 115 V a.c.

Mfr: White Instruments

Price: \$230

Circle 87 on Customer Service Card.

3311A FUNCTION GENERATOR

● This new product offers sine, square, triangle and TTL compatible pulse outputs from 0.1 Hz to 1 MHz in seven ranges, providing current sinking for up to 20 TTL loads. With a better than 25 nanosecond rise time, the pulses are useful for clocking logic breadboards or as synchronization signals. An external voltage-controlled oscillator (VCO) input is provided for phase-locked loop and swept-frequency applications. With the frequency dial set at 1, a linear ramp of 0.0 to -10 volts will linearly increase frequency greater than 10 to 1. An a.c. voltage can be used to f.m. the function generator. Output is 10 volts peak-to-peak into 600 ohms for sine, square and triangle waveforms. A continuously variable attenuator adjusts output over a greater than 30 dB range. An internal d.c. offset of ± 5 volts into 600 ohms is continuously variable and independent of amplitude control. Complete d.c. isolation between the instrument case and earth ground reduces grounding problems and loops. Outputs may be floated to ± 500 volts relative to earth

ground. Functions and seven decades of frequency from 0.1 Hz to MHz are selectable by pushbuttons. Dial accuracy is ± 5 per cent of full scale. Sine wave amplitude flatness is within ± 3 per cent of 10 kHz reference (maximum output amplitude) to 100 kHz, ± 6 per cent at 1 MHz. Sine wave total harmonic distortion at maximum output amplitude is less than 3 per cent. For triangle waveforms, deviation from the best straight line at 100 Hz and maximum output is less than 1 per cent. Square wave rise and fall times are less than 100 nanoseconds. Pulse output amplitude is greater than 3 volts positive (open circuit) and is TTL compatible. Transition is less than 25 nanoseconds. Operates on 100/120/220/240 volts, -10 per cent, $+5$ per cent and is switchable on the rear panel. Line frequency range is from 48 to 440 Hz and power consumption is less than 12 VA. Dimensions: 3½ width x 6¼ depth x 9¾ inches high.

Mfr: Hewlett-Packard

Price: \$249.00

Circle 76 on Customer Service Card



PORTABLE CONTROL CONSOLE

● This compact item is capable of mastering multi-channel tapes, mix-down, and sound reinforcement. It features plug-in amps, illuminated vu meters with led peak indicators, conductive plastic slide faders, stereo, reverb, pan pots and contour equalizers. Each input channel is switchable between balanced low impedance microphone and line level inputs. All connections are located at the rear of the console and include patching facilities. Hinged panels provide access to the plug-in i.c. amp cards. Options in the number of inputs and outputs are available. Available in a formica shell for studio installation, if desired.

Mfr: Optronics Corp.

Price: \$2,900.00

Circle 62 on Customer Service Card



CAPSTAN-LESS-DRIVE RECORDER



● Model 811D-103 recorder, a capstan-less drive machine, is especially valuable in handling wide-width tape. A patented servo system provides simple tape control in all modes of operation, ensuring against accident. Speed is maintained to within the accuracy of external a.c. line frequency or to a variable built-in speed oscillator, which can vary speed from 10 in/sec. to 80 in/sec. while maintaining 0.03 per cent flutter average, not exceeding 0.05 per cent. Remote v.s.o. package reads phase reference for locking to tape, film, or 60 Hz line frequency. Digital tape speed readout. Standard tape speed is 15/30 in/sec. (Other speeds available at additional cost.) Controlled instant starts and stops; 60 in/sec. scan speed to locate takes; 10½ inch reel size. Any number of decks can be synchronized by a rear connector; an external servo signal can be introduced to lock the machine's speed to exterior control devices. 16-track recorder in cabinet measures 24 wide by 30 deep x 51 inches high. Optional additional equipment: remote control, tape counter, tape locator, noise reduction system.

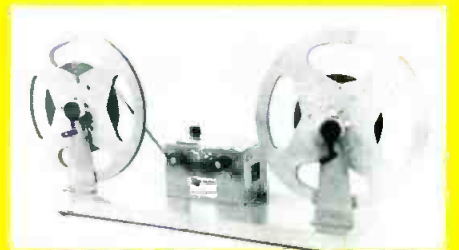
Mfr: Stephens Electronics, Inc.

Price: 16-track in cabinet \$19,600.

Convertible to 8-track \$21,000

Circle 74 on Customer Service Card

SIMPLIFIED TAPE EDITOR



● A ¼-inch tape editor that permits tape editing without using a tape recorder has been announced by the manufacturer. EDIT-A-TAPE is completely self-contained with rewinds, head, amplifier, speaker, and splicing block. Powered by a small 9-volt battery.

Mfr: Satellite Film, Inc.

Price: \$115.00






Circle 83 on Customer Service Card

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CONDENSER MICROPHONES

The Quality Standard Throughout The World



- 
 A compatible microphone for all powering systems
 12V Centerfeed 12V Parallel
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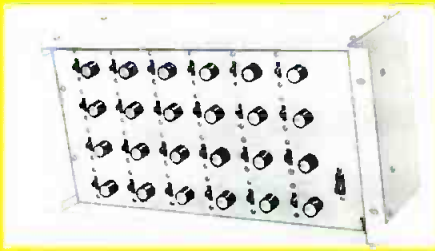
GATELY ELECTRONICS

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... have you checked Gately lately? 215-446-1415

Circle 86 on Reader Service Card

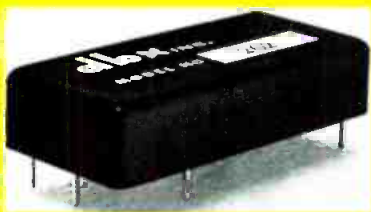
1/3-OCTAVE ACTIVE FILTER SET



● This newly developed 1/3-octave filter set model 3A235, simplifies the equalization procedure, eliminating the necessity of establishing a reference point for the tailored room curve near the lowest point in the raw room curve. This filter set makes it possible to boost as well as attenuate up to ± 14 dB in all the critical 1/3-octave frequencies in a raw room curve, tailoring the electro-acoustic response to an ideal shape almost anywhere between its lowest and highest points without the need for line amplifiers to restore signal strength to a usable level. The active filter set consists of a panel-mounted group of 24 filters, each capable of providing up to 14 dB boost or cut in any or all 1/3-octave bands. The detented filter control provides cut and boost adjustments of 1,2,3,4,5,6,7,9,12, and 14 dB. Frequency range is from 63 Hz to 12,500 Hz in 1/3-octave bands. Each filter has a three-position switch designated *boost*, *out*, and *cut*. Performance specifications include distortion of less than 0.1 per cent and a noise level 75 dB below operating level. The unit is 8 3/4-inches high, 19-inches wide and 8-inches deep and comes with a blank cover panel and a convenient chart making it easy to record filter settings.

Mfr: Dukane Corporation
Circle 55 on Reader Service Card

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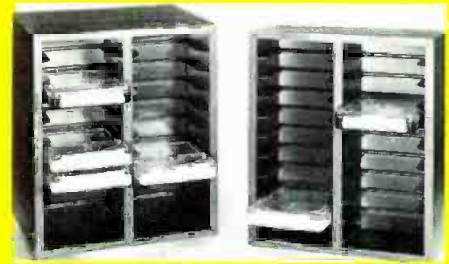
Mfr: DBX Inc.
Price: Model #202 \$47.00
Model #203 \$39.00
Circle 57 on Reader Service Card

CARTRIDGE RACKS

● A new series of cartridge racks of walnut woodgrain finish are designed to hold 20 or 40 A series cartridges. DM-40, supplied with a rotating base, is 8-inches deep. DM-20 accommodates 20 cartridges and is 4-inches deep. Both racks measure 9 1/2 wide and 10 1/4-inches high. They are stackable.

Mfr: Broadcast Electronics
Price: DM-20 \$14.75
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Circle 89 on Customer Service Card



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 Custom Audio Des Plaines, Ill.
 DBM Recording Nashville, Tenn.
 Fireside Recording Studio Nashville, Tenn.
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 Kintel Productions Atlanta, Ga.
 Malaco Sound Recording Jackson, Miss.
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● Full mono capability for up to 19 input lines is provided by this new console, model 5-15. Features include step attenuators, leaf-type telephone switches, 12-watt monitor amplifier and muting relays. All active components are on plug-in modules while external wiring connections are made via barrier-strip screw terminals. Because both the program and audition channel outputs provide identical performance specifications, the console can be used as a mono dual-output console, permitting the program channel to be used for on-air programming while the audition channel is simultaneously used for production and recording.

Mfr: LPB Inc.

Price: \$1,895.00

Circle 56 on Reader Service Card

COMPRESSED SPEECH CASSETTE RECORDER



● Using a tiny solid-state module called Variable Speech Control, smaller than a sugar cube, C-103, a new tape playback system compresses speech up to two-and-a-half times normal speed with no change in pitch or tone, through the elimination of unnecessary pauses and shortening long vowel sounds. The speed at which the listener receives information is comparable to reading rates; with training, the listener can learn to "speed listen" just as he learns "speed reading." By regulating the vsc dial, the speed can be varied to meet the need.

In addition to the vsc feature, this recorder makes duplicates of other cassettes, edits, can make two recordings at once, and serves as a standard recorder/player.

Mfr: Magnetic Video Corporation
Circle 63 on Customer Service Card

IRON OXIDE TAPE CASSETTE



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Mfr: Memorex Corporation

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Martin Dickstein

SOUND WITH IMAGES

Some More Catch Up

● Last time, we mentioned that there were four new disc methods for video reproduction (not counting the one used for instant replay on t.v., of course) and that of these, three had been shown that we knew of at the time of writing. Some of the technical details of these systems have become available and it might be interesting to go back to the first disc method shown, by Teldec, back in

1970, to compare notes. A direct comparison is not intended for judging of capability, but just to show what the newer devices have developed in the intervening years.

You will recall that the Teldec system used a specially-designed diamond stylus to sense the hill-and-dale variations in the grooves, riding on top of the record with the minute pressure of 0.02 grams. Since the "reading" of the information was being done on top of the disc and not in the grooves, as in an audio record, there would be no deterioration of signal even at 1,000 plays. The speed of rotation was 1,800 rpm and a twelve-inch disc could reproduce about twelve minutes of video program (that time is being extended). Storage of information was given as 500,000 bits per mm, and about 3,250 grooves per inch were cut into the pvc disc surface. (This is about ten times that of an audio lp.) The spacing between grooves on an audio disc is in the order of 0.004 inch, while on the Teldec disc the spacing was reduced to less than 0.0003 inch. Stop-action, random access, fast cutting, and repeat playback are all available, but not slow motion.

Now, a brief look at some of the data made available recently on some of the newer discs.

The Philips disc is the same size as an lp, rotates at the speed of thirty rps (1800 rpm), the same as the Teldec disc, but the information on the Philips disc is contained in extremely tiny oblong cuts, rather than continuous grooves as on an audio or Teldec record. These minute *pits*, as they are called, are all the same width and are cut to the same depth, but the information is sensed from the length of the cut and the spacing between pits. The pickup is an He-

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Ne laser, which must be kept centered accurately over the "track." For this purpose, a rather complex opti/electronic servo control system is used which also controls the height of the beam source and sensing device above the record at the critical distance. "Reading" of video information is accomplished by a photodiode which picks up the reflected, modulated signal. Modulation occurs as a result of the pit length and spacing.

Several interesting improvements have been made in that the VLP, Philips' name for the disc, each frame is identified during recording by a number which does not appear on the image but can be sensed for identification. Thus, very rapid random access can be achieved to any desired frame of which the key number is known. The sensing is fed to a counter which tracks with the read-out signal and shows up on a numerical indicator. Since the number of images or frames can be upwards of 45,000 (up to 60,000, we have been told), the counter will read the key number directly as the arm is moved across the disc.

Other interesting features of the Philips system, in addition to the laser's capability of reading the information without touching the disc and thus saving wear and tear, is the fact that the signal is derived from the surface reflections. By taking advantage of this fact, it is possible to coat the finished disc, which, incidentally, has an aluminum surface to improve reflection, completely with a top surface of clear plastic. This will keep dust and scratch marks from getting to the aluminum while allowing the laser beam and reflection to pass through unimpeded. (The glass master from which copies are made is cut with a more powerful laser and then acid-bath "etched.")

The fact that the record is impervious to damaging by handling may sit well with the public, who might be less than careful when handling the record, but it will take some time for hi-fi enthusiasts to become adjusted to handling the disc in any other way than by the center and edge. Also, copies can be made on almost anything, such as a pvc foil. This will allow the disc to be folded or rolled without damage to the signal. It is also possible for the disc to contain up to four sound tracks simultaneously, something most video tapes can not even consider at this point.

The MCA video disc system, called *Disco-Vision*, also uses a laser beam to read the video information on the record. The 1 mw He-Ne laser beam

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must also be kept over the track of the record, but evidently a less complex system has been devised for accurate tracking, as the height of the beam off the record is not critical. The unit is similar in appearance to a hi-fi turntable, including the dimensions of the cabinet and the smoke-shaded dust cover. The changer unit, which can stack up to ten discs, and will be demonstrated during this spring, has only a four-second delay during the changing of records.

Of the recent demonstrations given of the video-disc systems, MCA claims the credit for being the first to show a demo of a disc made from the master, not of the master itself. The record is 1p size, made of electroplated Mylar and rotates at 1800 rpm. The information on the disc is read at a speed greater than thirty million bits per second. The disc is cut on only one side, as are the others, and contains approximately 12,500 grooves to the inch.

The Arvin system, called the *Magnetic Video Discassette*, is the only one of the recent developments to use a medium which allows the user to make his own recordings and to re-use the same disc as many times as desired. The record itself is protected by a jacket which permits easy and carefree handling without

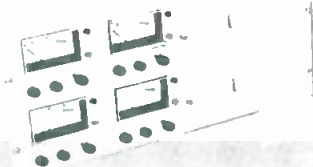
damaging the disc. The record medium is inserted into the machine within the protective cover so that there is no handling even during operation.

Since the recording is done in discrete frames or images, up to 300 per disc, each of these tracks can be erased individually without disturbing the remainder of the material. Editing can be done frame by frame. Replay is possible at one, three, six, ten, and fifteen frames per second, permitting slow motion and stop-action operation. Fast forward and reverse motion is at the speed of fifty tracks per second. A track indicator dial on the front of the machine shows the number of the image being shown, and controls on the front panel permit individual steps or automatic pre-setting of the desired speed. There is also a button for "no step" or freeze-frame.

One of the interesting applications described is in fluoroscopy. The ability of the Arvin device to store X-ray images allows the patient to remain exposed only a very short time during which the picture is stored on the disc. The lengthy examination can then take place after the patient is out of the path of the rays instead of his remaining exposed until the survey is completed.

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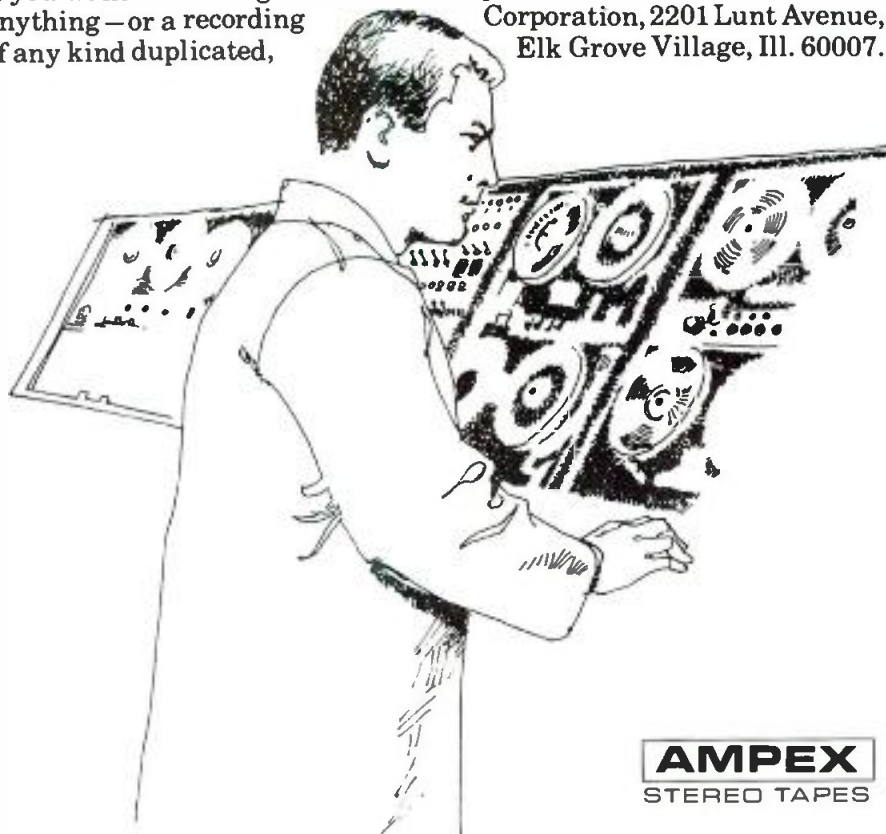
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RAMKO RESEARCH

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During the brief discussions of the video disc systems, you will note that cost was not mentioned. Generally, the pre-cut disc systems will run in the range of \$300-\$400 for consumer use. The latter disc method is not really intended for public use, at least at this time, and is priced at about ten times the cost of the other units. The discs for the home machines will run about the same as lp's when production gets going, while the disc cassette cartridge will be in the range of \$25.00.

One more item of recent development which will enhance the marvels of the video disc (and cassette, and cartridge) is a device to make the image itself life-size or bigger than life, depending on the subject.

Sony recently showed a video projection system which used a special screen and a Trinitron projection device to provide an image that was approximately two by three feet, but the room had to be fairly dark for the image to appear bright, although it never reached the same brightness as a t.v. set. A larger screen was also going to be made but it was not shown.

Soon there will be available a system which will provide an image that is six by four feet, with enough brightness to view in a slightly dimmed room, although the image will not be as bright as a t.v. screen. However, considering that the size is more than ten times that of a large television screen, this is very good. The unit has three color guns, which can be converged by external controls for precise images on a special screen whose characteristics increase the brightness of the reflected image. The brightness, for comparison's sake, will be about five times that of the Sony device, but will also sell for more than twice as much. The tube used employs the Schmidt system for creating the projected image. Resolution of the system is twice the capability of our standard t.v. system, and about equal to the best broadcast quality used in some parts of Europe.

There is one more device presently under development which will also increase the size of the t.v. image. This one uses a laser beam to create the three colors and operates in rear projection. Present estimated cost is very high for home use, but will probably find application in industry or educational institutions. We'll let you know further developments when they become available.

Speaking of the future, there are just two items of which we should remind you.

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associated software will be shown at the Third International Market for Video Cassette and Video Disc Programs and Equipment (Vidca). This column provided some information in the past on these conventions which take place in Cannes, France yearly. This year, the conference will be held from Sept. 28 through October 3. Details are available from Mr. John Nathan, 250 W. 57th St., NYC, 10019. We will attempt to provide you with further details as they become available.

The other convention to keep in mind is VidExpo '73. We also have mentioned this one, and this year it will take place at the New York's Hotel Plaza September 4-7. This will be the Third International Video Marketing Conference sponsored by Billboard Publications.

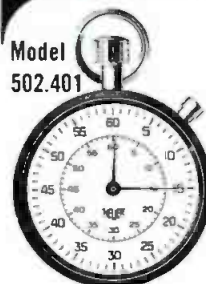
The exhibits and conferences should be of great interest to all who are in, or associated with, the video industry in any of its many facets, and the way they are spaced it is possible for our readers to attend both of them. If you can't, perhaps we will be able to provide fill-in information here and again when your appetite to contact the sponsoring organizations for further details both before and after the meetings. ■

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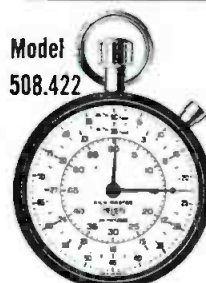
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1/5 second recorder, central 0-60 minute register. 2 crown functions with time-out and locked return. 7 jewels, shock-protected. \$58.00



Model 501.201

1/5 second recorder, central 0-60 minute register. 1 crown function with side-slide. 7 jewels, shock-protected. \$50.00



Model 508.422

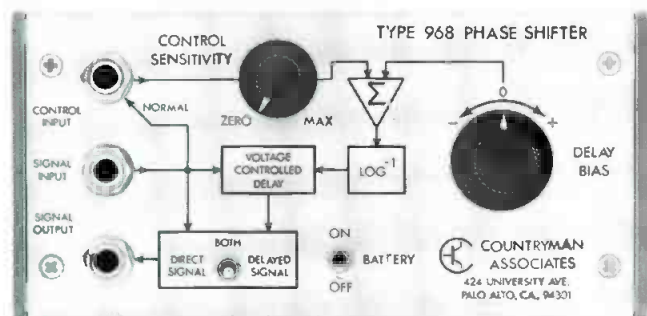
FILM-MASTER. 60 second recorder, central 0-60 minute register. Records on outside scale consumed 35 mm film from 1-90 feet, on intermediate scale consumed 16 mm film from 1-36 feet. Framespeed 24 pictures/second. 2 crown functions with time-out and fly-back return. 7 jewels, shock-protected. \$61.00



Model 502.050

WRIST TIMER for program directors in radio, TV and film. 1/5 second recorder, central 0-60 minute register. Dial reading indicates elapsed time; remaining time can be read on 60 minute turning bezel. 2 crown functions with time-out and locked return button with safety bolt. 7 jewels, shock-protected. \$74.00

THE PHASER



Would you use phasing and flanging effects more often if they were less difficult to obtain? Now you can produce these effects without tape machines, reproducibly and with complete control.

The Type 968 Phase Shifter electronically delays an input signal and then mixes the delayed and undelayed versions together. It allows you to add the striking "turning inside out" effect of Phase cancellation to any audio signal live or recorded, in the studio or in performance, in minutes instead of hours.



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MCI means business. So lower your hands and relax. When we say we can deliver our stock JH-416 console in 10 days, we mean it. Now that we've nearly quadrupled our working space, to 20,000 square feet, MCI has improved production capability with continued uncompromising quality.

MCI's JH-416 mixing console is a phenomenal bargain at \$19,500 for the 16-track model (\$13,900 for the 8-track version, \$25,100 for the 24-). And when you consider how fast we can deliver, it makes the bargain even better.

Stop throwing up your hands at unnecessary delays of professional recording equipment.

MCI has a stock answer that makes a lot of sense.

HANDS DOWN!

this is a stock-up.

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v.p. marketing and product
development, (305) 566-2853



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Operator Engineered

Here's the first really new professional audio recorder to hit the market in years. It's the operator engineered ES-505 from Electro Sound, one of the world's leading manufacturers of tape duplicating, theatre, and professional sound systems. The ES-505 has the kind of performance and operational features that users have been asking for in quarter and half inch machines for a long time, yet costs no more than recorders without these features. Check these advantages:

A disappearing head gate that locks in a fully open position, then closes automatically when you hit the play or record button. A built-in audio

oscillator that provides all the frequencies you need for set up and maintenance. A motion sensing system that prevents tape damage in case of improper sequencing of controls. A third reel option that greatly simplifies editing. A non-slip capstan that improves timing accuracy and capstan life. A viscous damped flywheel that lowers flutter 20 to 25%.

Add to these an extended warranty of 120 days on parts and labor and 1½ years on parts, and you'll realize why the Electro Sound ES-505 is easily the best value in professional recorders on the market today. Call or write for specifications.

See the new ES-505 at AES in Booths 6 and 7.



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Circle 26 on Reader Service Card

LARRY ZIDE

db Visits—Europe

ON THE FOLLOWING PAGES, I detail in words and pictures—lots of pictures—my visit to Europe in February of this year. I started in London where I visited Dolby Laboratories.

From there, a short flight over to Rotterdam, Holland, and a stay at the Rotterdam Hilton for the 44th AES Convention and Exhibition—the first AES European numbered convention, but by its success, certainly a point from which to grow.

From Rotterdam, a long and leisurely drive got me to Heilbronn, Germany where I toured the Beyer factory, and did a little sightseeing of a lovely part of Germany that is not often visited by tourists.

On from there, to Regensdorf, Switzerland and Studer/ReVox. I entered at Basel, drove to Regensdorf and never saw a true Alpien mountain, but the high hills of that part of Switzerland still made for a breathtaking drive from Basel to my destination.

An all too brief visit to all these remarkable places had me heading back to the office in Plainview from Zurich. The individual stories that follow give details of the trip and offer specific thanks to individuals that made this business trip a personal pleasure as well.

● A report on a visit to Neve's English factory made by British author John Borwick was originally scheduled for this special issue. Space forced it out but it will appear soon.

Picture Gallery— 44th AES Exhibition

ROTTERDAM, HOLLAND SUFFERED almost total destruction during the second World War. As a consequence, it today represents one of the most modern and attractive center cities. Huge shopping malls exclude automobiles (and bikes) to the pleasure of strollers.

The Rotterdammers built themselves a grand theater and cultural center right in the middle of the city. It contains a concert hall, large theater, smaller theaters, and exhibition halls. *De Doelen*, it's called. Here, the European section of the AES decided to hold its Convention and Exhibition on February 20th to 22nd. Rotterdam's weather was totally cooperative—pleasant and mild.

The exhibition portion of the Convention was unlike, yet similar, to those held in the U.S. In size it was smaller than recent U.S. exhibitions, but nevertheless, there were many exhibits. Still, you could see the entire exhibition

in a matter of hours.

In the U.S. each exhibitor creates his own booth within the framework of the booth space he has rented. In *De Doelen*, booths came in several sizes, or multiples of a single. But each booth was closed by attractively finished wooden wall sections. Thus, each exhibitor was more alike than different, and one could concentrate on the equipment shown, rather than on the ingenuity of the exhibitor's designer.

In the pictures shown, we present over-all views of the exhibition that points out this aspect well. You will see in other illustrations many familiar faces and some unfamiliar ones. Because even American manufacturers were mostly represented by European reps we have not provided reader service numbers on any of these pictures. Please do not write us for forwarding request for information. We cannot do this.

Views Around the Show



Sansui had its QS system operating with its new Vario-Matrix separation enhancement system.



CBS' SQ system was shown utilizing the latest mix-positioning system for encoding recordings.



JVC had a room to show its four channel CD-4 system.



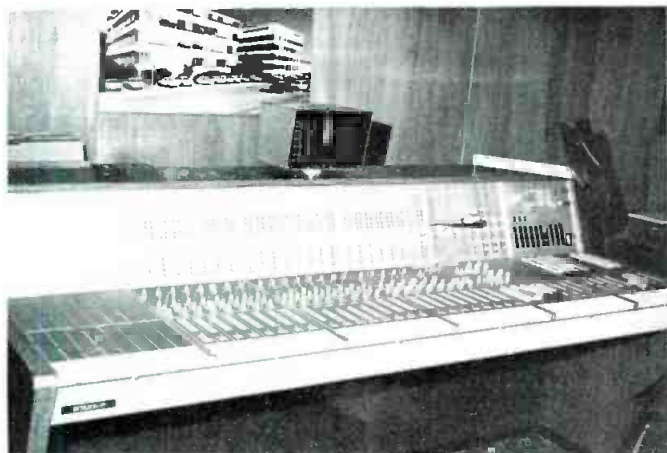
Telefunken sixteen channel recorder.



Beyer wireless microphone systems.



John Eargle, Altec exec. makes a point about a driver.



This giant Studer desk is for broadcast and is only 2-out.

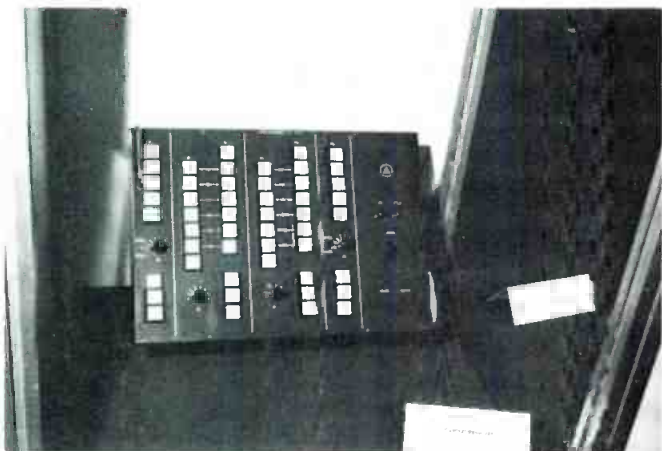


Neve showed this highly versatile programmable stop clock.

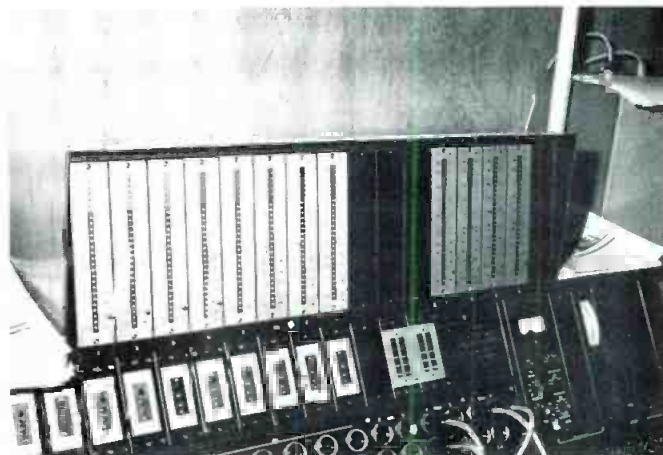
Schoeps showed its new microphone lines at its busy booth.



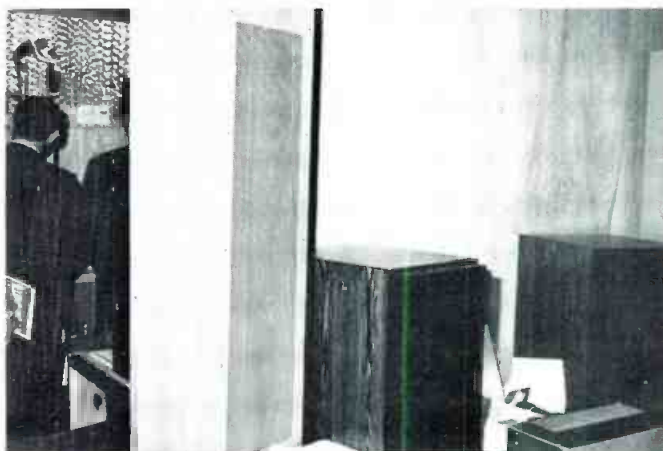
Italtel of Milano, Italy showed this versatile pushbutton universal equalizer.



Peak program meters from Knick Electronics of Berlin.



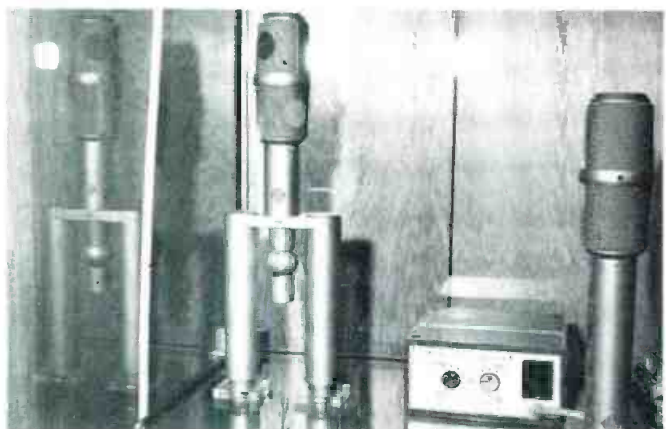
From the U.S. the R. T. Bozak Company with its line of loudspeaker systems.



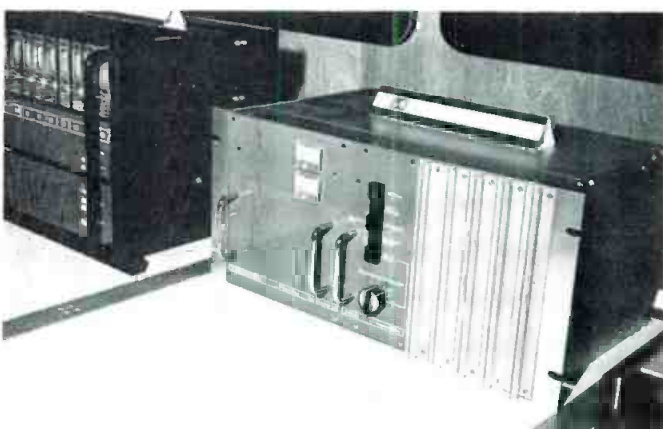
A rare moment at the Shure Brothers booth when no one was there.



Philips Pro 72 is an eight track one-inch machine that is available in the U.S.



One of the newest Neumann microphones is this QM 69 for quad—yes quad.



This Dolby-B model 324 processor is for broadcasters—it permits conversion to 25 μ sec.

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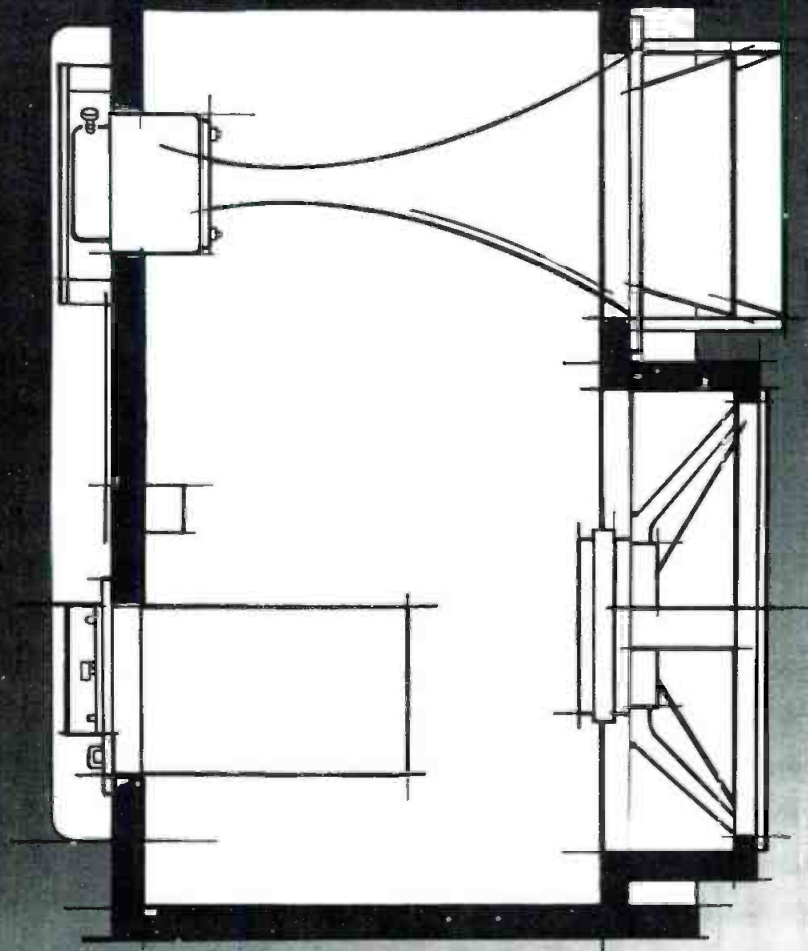
Neil Young Studios
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The Ken Nordine Group
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Sound Labs
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*Maximum
acoustical output.*

112 db SPL @ 4 ft., equalized for flat response (pink noise), 40 to 15,000 Hz, in a free field.

Dispersion:

40° vertical x 90° horizontal.

Bi-amplifier:

Altec Model 771 B. Input sensitivity: .5 VRMS-60 Kohm unbalanced input for full output. .1 VRMS-600 ohm balanced input for full output.

Crossover:

500 Hz, 12 db/octave.

Noise (both sections):

80 db below rated output.

LF section:

60 watts, continuous sine wave power, 0.3% THD.

HF section:

30 watts, continuous sine wave power, 0.3% THD.

Dimensions:

26.5" wide, 31" high, 23.5" deep.

Weight:

112 lbs.

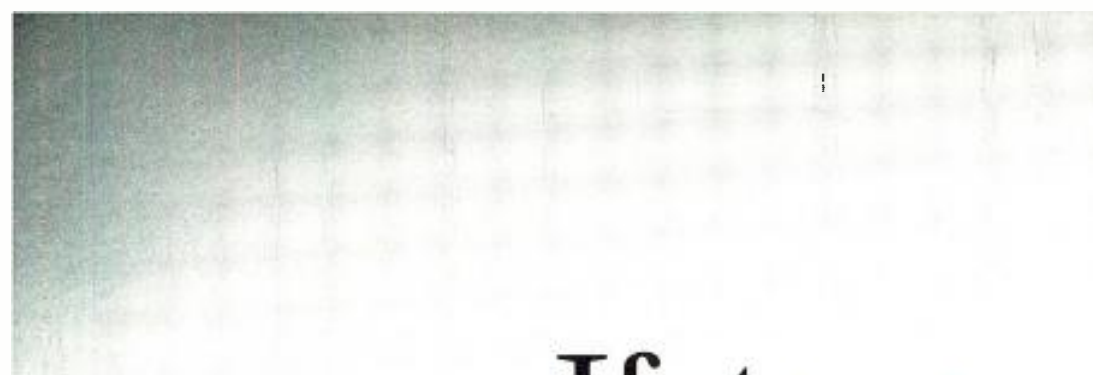
Finish:

Grey epoxy with black grille fabric.



The New Altec 9846 Bi-amplified Studio Monitor Speaker System

Circle 47 on Reader Service Card



If stereo disk cutters go down to 30 Hz, shouldn't the monitors?

Yes. Because the music goes down that far.

You should hear everything when you're laying down tracks or you might not really know what you've got. Why wait till you play a test cut to find out what's at the low end? You don't have to with our new monitors.

What have we done differently to get that low end? First of all we're using sealed boxes. No more ports or bass reflex cabinets. We've gone to a very high-compliance speaker with a big magnet structure. It's well damped so that it responds accurately to signals down to 30 Hz. There's very little distortion. You can't get this with ported boxes.

Above 500 Hz things are different too. There's far more smoothness than in previous designs. Notice the proximity of the woofer and the HF horn. They're within inches of each other. This creates a smooth transition from one source to the other as you go up the spectrum.

Have you ever wondered why good monitor systems are two-way systems? It's because they guarantee transient accuracy. They don't have the inevitable problem of source displacement that occurs in systems with separate tweeters. And they don't burn out, as tweeters in most 3-way systems are prone to do, with the super highs present in much of today's music. Few drivers are capable of such a wide frequency range. Because so few speaker builders use the kind of phasing plug which makes this possible.

To make the system work, power has to be delivered. Biamping is the only solution. So we built a biamp right into the enclosure. It provides more than enough power to make the components produce more than enough sound. Depending on the music, the 90 watts of available power may be equivalent to three or four times that amount when compared to single amplifier systems.

This is truly a new recording tool.

Write for further information on the 9846 Monitor Speaker system. Altec, Professional Studio Products, 1515 South Manchester Avenue, Anaheim, California 92803.

PROFESSIONAL STUDIO PRODUCTS

ALTEC

db Visits— Dolby Laboratories

NESTLED IN A CORNER of metropolitan London area is Dolby Laboratories' building. Clapham Road, on which they are located, is one of those typical middle-class city area main roads. It's a way from central London, but a taxi gets you to the lab quickly and surprisingly inexpensively. London cabs are famous (justly) for that.

Inside the rather ordinary three-story building, labor about 100 people—all dedicated to the job of reducing noise—but not just in tape. Dolby noise reduction systems are now used for optical film as well.

I was the guest of Dr. Ray M., and Mrs. (Dagmar) Dolby and spent a total of three days visiting the labs. I always imagined Dolby's labs to be a small affair, but they're not. I've already mentioned that one hundred bodies inhabit this building during working hours. A good many, to be sure, are involved in the construction of Dolby's professional noise reduction equipment, but I was impressed to see a good many whose job was no more or less than quality control. It's important that Dolby units *work* in the field.

Of the output of this plant (it's the only one Dolby has), 43 per cent comes to the United States, 23-25 per cent stays in Great Britain, and the rest of the world gets the remainder.

The photos that follow show the plant, mostly in detailing the assembly of various Dolby A systems as they were running while I visited. Consumer version Dolby-B systems are not built by Dolby Labs. The licensing of others to do this, and the supervising—as well as technical support, all emanates from offices and labs in this building.

Dr. Ray M. Dolby in his office, and caught unawares by the camera. He is a busy but accessible executive.





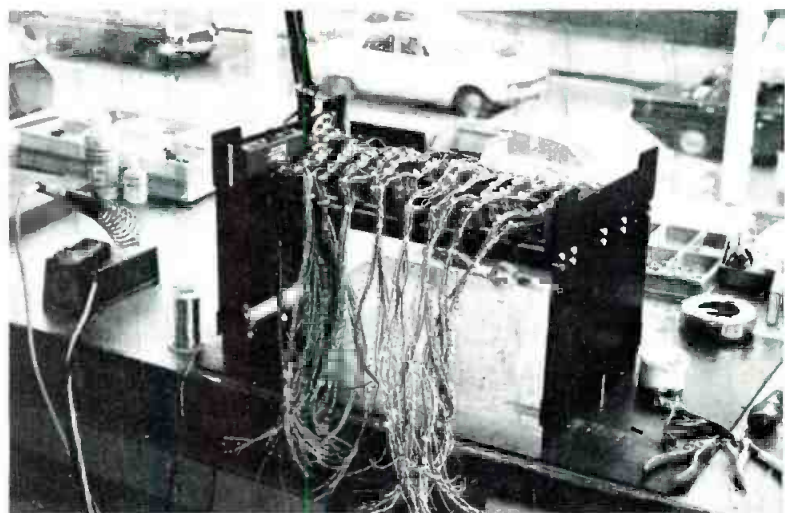
Part of one floor is given to project development labs. Here a project engineer works on circuit developments.



A drafting department is kept busy on new circuits—here a p.c. board layout is being created.

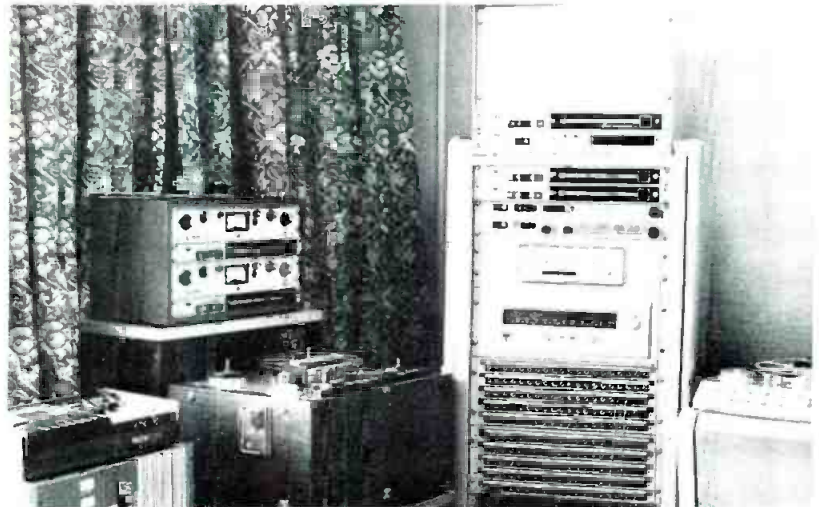


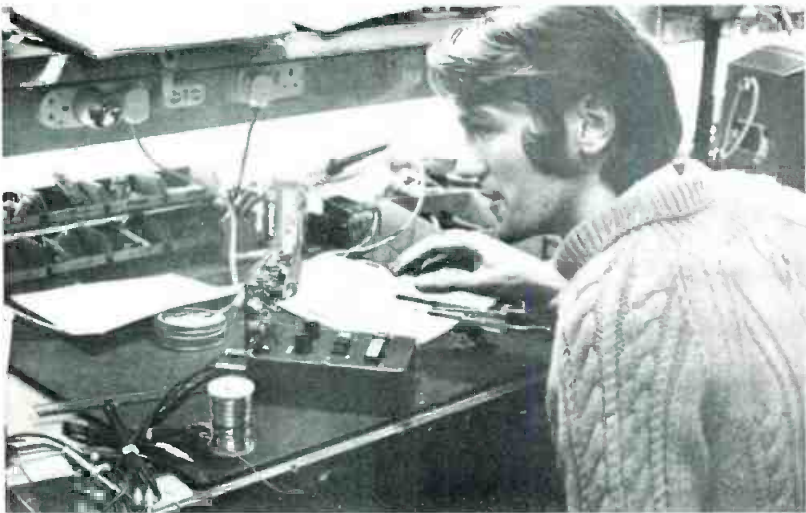
Part of one assembly floor. This line is making the interface section of professional units.



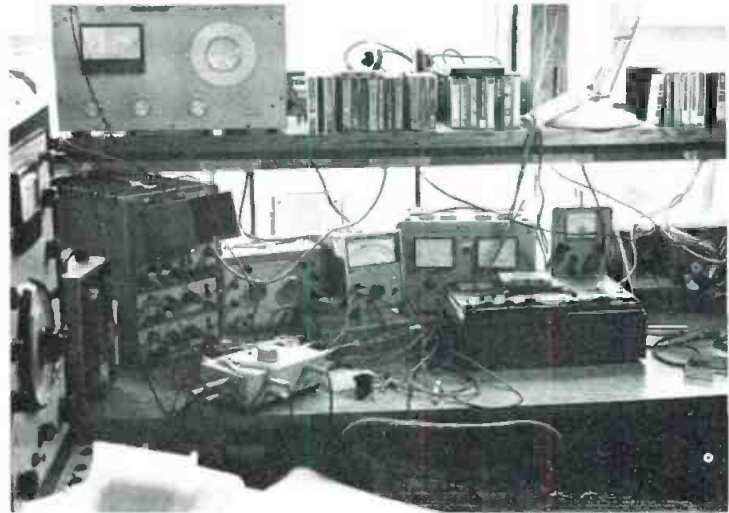
The skeleton of an M 16 cabinet, showing the power supply and the cable harness in place.

In these two photographs you can see opposite end views of the listening room at the labs. In addition to a liberal complement of consumer B-type equipment, all the configurations of A-type are installed and can be fed from Scully and Studer tape recorders. The speakers are KEF-BBC monitors.





Dolby supplies testers to B-type licensees. A technician is here seen checking one such unit.



In this lab, B-type consumer products are checked. A detailed characteristic profile is drawn. Among the equipment shown is a B & K chart recorder, Radford oscillator, Woelke flutter meter, H-P millivoltmeter, Sennheiser weighting filter, and so on.



Lead cutting of resistors and diodes are done on this equipment. The performed result is ready to go into an appropriate place on a circuit board. Dolby uses over 50,000 resistors alone per week in his production.

An ingenious light board is used for component location during assembly of circuit boards—in this case, for the Cat. 22 noise reduction boards. As each different type of component (e.g. 1k resistors) is required, the jig lights up to show the positions for that component at every location. In this way, the over 500 components on this board tend to get put in the correct place the first time around.





This automatic d.c. level checking machine is used in the test department. The device measures sixty test points in four seconds, and stops to signal an out of tolerance voltage whenever one is found.



A binocular microscope is used for 100 per cent inspection of the solder joints of a circuit board. A systematic motion system assures total scanning, and an experienced viewer will spot any hint of a bad solder joint. As some modules contain over 2000 joints, there is need to reduce solder error to as close to zero as possible.

Gotham distributes more than 500 products including:

- STUDER studio consoles
- NEUMANN quad microphones
- STELLAVOX mixers
- WOELKE wave analyzers
- K + H loudspeakers
- LYREC tape timers
- EMT Reverb units
- GOTHAM digital delay systems
- EMT compressors
- DANNER linear attenuators
- EMT turntables
- NEUMANN microphones
- DANNER rotary attenuators
- WOELKE flutter meters
- STELLAVOX tape recorders
- NEUMANN disk cutting systems
- K + H equalizers
- EMT polarity testers
- STUDER tape recorders
- M + W light beam meters

The EMT 140 is the biggest name in reverberation.

Now meet the smallest name in reverberation.

The Reverb Foil EMT 240.

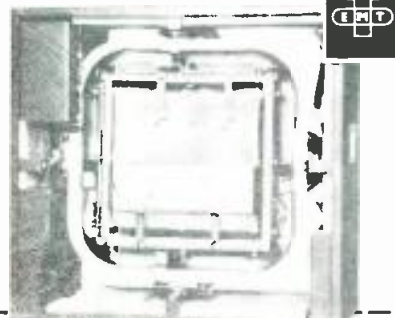
It's bound to be a resounding success, because it's only 1/5 the size of its big brother.

But, small as it is, the EMT 240 represents a big advance.

An electrolytically produced foil of almost pure gold, 12 inches square and 0.7 mils thick (!), replaces the steel plate used in the 140. Which assures less coloration, as a result of significantly increased resonance density.

The EMT 240 is not affected by high ambient noise levels or mechanical shock. This means you can install it in studio or control room, or take it with you on location. The remote reverb time control is standard equipment. And the 240 is delivered to you sealed, pre-aligned, pre-tensioned, ready to go to work.

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I'd like a no-obligation introduction to the EMT 140's little brother, EMT 240. Please send me literature and price information.

NAME _____

TITLE _____

db Visits— Beyer Microphone

THE TOWN OF HEILBRONN, located on the Neckar River in Southwestern Germany surprises one with its modernity. Yet nearby lie tranquil little towns that rest in the hills unchanged since the middle ages. It's an area of such contrasts; of spaetzle and remarkable young Neckar wines.

The modern and sophisticated Beyer Microphone factory belongs in this ambiance. Eugen Beyer, founder of the company was one of the pioneers in electroacoustics. The company began life in Berlin in the '30s. They produced dynamic mics then. The M-19 set a standard for quality. At the same time work progressed in other areas including headphones and transformers.

In 1960 the firm moved to its present quarters, an upgrading the founder failed to live to see. Today, this modern plant produces the ribbon and moving coil dynamic mics, transformers, and headphones that are world renowned.

I would particularly like to thank Mr. Klaus J. Wischgoll, technical director of the firm—my pleasant host for this visit.





Complete electro- and mechanical-assembly of Beyer products take place at these locations.



This typical small production line assembles small parts for insertion later into a microphone, transformer case, or headphone.



This machine automatically winds the correct amount of wire for a transformer onto a coil former.



Wire leads are attached to the pre-assembled microphone element.

An acoustic tube is added during the assembly of this microphone.

Delicate hand operations seal the diaphragm for a moving coil microphone.





The pre-formed wire coils for transformers undergo lamination assembly here.



Finally, the completed transformer assembly is inserted and sealed in a metal case.

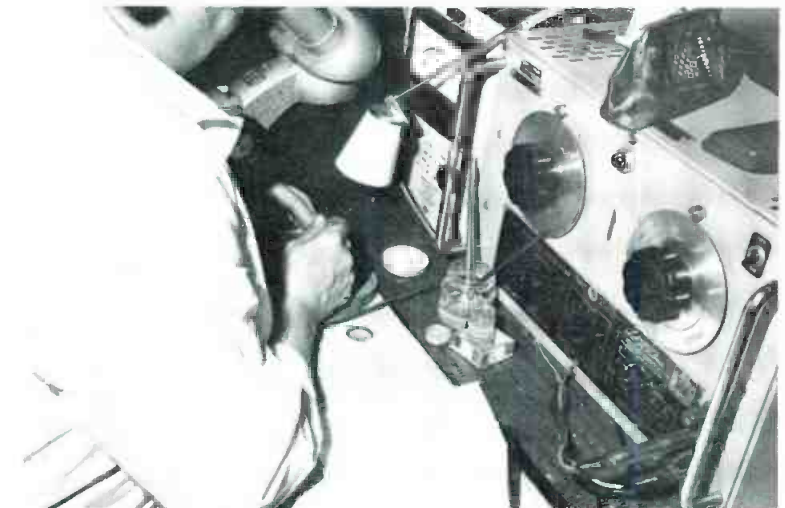


This highly sophisticated coil winder creates mic coils rapidly and with high precision.



Thin metal strips are cut and placed in a pressure jig that forms them into precise ribbon elements.

After the ribbon is formed a microscope is used to assure correctness of size and shape.



The cup in the foreground holds formed ribbons, the hands install one in an M-500 holder.





M-500s all in a row, awaiting only their top protective cover and a final q.c. before packing.



This metal torso talks to microphones in a controlled way—for testing patterns and close talk characteristics.

Historical Beyer microphones and the original D-48 headphone. The M-19 is the large mic toward the left rear.



Gotham distributes more than 500 products including:

- STUDER studio consoles
- NEUMANN quad microphones
- STELLAVOX mixers
- WOELKE wave analyzers
- K + H loudspeakers
- LYREC tape timers
- EMT Reverb units
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- WOELKE flutter meters
- STELLAVOX tape recorders
- NEUMANN disk cutting systems
- K + H equalizers
- EMT polarity testers
- STUDER tape recorders
- M + W light beam meters

GOTHAM'S MASTER PLAN

To help you build bigger profits

The average recording studio owner backs away from mastering. The equipment's too expensive, he'll tell you. And there's not enough business to justify the outlay.

The average recording studio owner is dead wrong.

Stereo mastering is the most profitable area of the recording industry. It provides the highest return on invested capital.

And for many studios, there's a way to avoid heavy cash outlays for equipment.

Gotham's free "Master Plan" kit gives you the facts. It includes: 1) A valuable Q & A guide to the techniques of disk cutting; 2) A color brochure on our complete Neumann Tape-to-Disk Mastering System; 3) An itemized, 4-page price list; 4) A list of Neumann-equipped mastering facilities—so that you can check on user reactions to our equipment; and 5) Information about how you may be able to lease this equipment from our subsidiary Telden Sales Corp.

Send for your "Master Plan" kit today. This could be the most profitable ad we ever ran. For you.



Staple this coupon to your company letterhead, and mail to our New York office.

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I want to know more about the money-making opportunities of mastering. Please send me your "Master Plan." No obligation, of course.

NAME _____

TITLE _____

db Visits—Studer/ReVox

LEAVING SOUTHWESTERN Germany by auto and travelling toward Studer's Swiss plant had me entering Switzerland at Basel and motoring toward Zurich, just before which I found Regensdorf. As a town, this is a nice community, but I stayed in nearby Baden—so named for the natural mineral baths. I never had time to partake, for my hosts for the two days I spent at this factory kept me fascinated with what they showed me.

It should come as a surprise to no one that both professional Studer equipment and ReVox hi-fi equipment come out of the same factory. Actually, there is a second factory across the border back into Germany. That plant makes only ReVox hi-fi equipment—most of the amplifiers and tuners and many of the tape recorders.

All the equipment bearing the Studer label emanates from Regensdorf. An amazing amount of production exists in one factory. Studer machines, mono to 16 track (and soon 24 track) are made here. So, too the Studer desks. And so too, a surprising amount of ReVox machines.

I expected to see an up-to-date assembly plant where sub assemblies made elsewhere are put together. So I was caught unawares when I discovered this one building made not only the finished machines, but milled the capstans, and even made many of the recording and playback heads

used in Studers and ReVoxs. (A subsidiary plant makes motors used in all the machines.) So, a Studer or ReVox machine is truly a product of this company.

Some 400 people work in this plant alone; all told, the Studer works employ upwards of 1000 people. But, there is no feeling of rushed mass production going on. Rather, a meticulous gearing down for attention to detail. And all this in a Swiss plant that employs a staff largely Italian speaking (though in a German-speaking canton) but with smatterings of other languages. And knowing German does not prepare you for the Swiss-German dialect at all!

Studer has a department in this plant that makes test gear used throughout the production and q.c. areas. They make their own transformers that go into machines. They have helped create an integrated circuit, built by Motorola, for tape motion control—that will simplify this feature. They have designed special jigs that automatically test a complex system, duplicating all parameters of actual use. In short, this is a thoroughly modern plant.

I want to thank the two individuals that helped make my stay memorable. One is Eugen Spörri, managing director of the company who worried as much about his English being good as I did about my German. The other is Herr Willi Studer, an extraordinary gentleman and connoisseur. He showed me everything there was to see, and was so patient with my slow German.

The Studer plant in Regensdorf, Switzerland (near Zurich).



MAGNETIC REFERENCE LABORATORY

PRECISION TEST TAPES

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FIGURE 1: REPRODUCER ALIGNMENT TEST TAPE CALIBRATION GRAPH

Tape Speed: 190 mm/s (7.5 in/s)

TEST TAPE CATALOG NUMBER	EQUALIZATION STANDARD	TRANSITION FREQUENCIES/ [Hz]	REFERENCE FLUXIVITY/ [nWb/m]	TRACKS
☒ 21 T 102	IEC	Flat and 2240	200	Full
☐ 21 T 104	NAB	50 and 3150	200	Full
☐ _____	_____	_____	_____	_____
Serial Number: 0726	Date of Calibration: 19721230			

This graph shows the frequencies, levels, and durations of the signals recorded on this test tape.

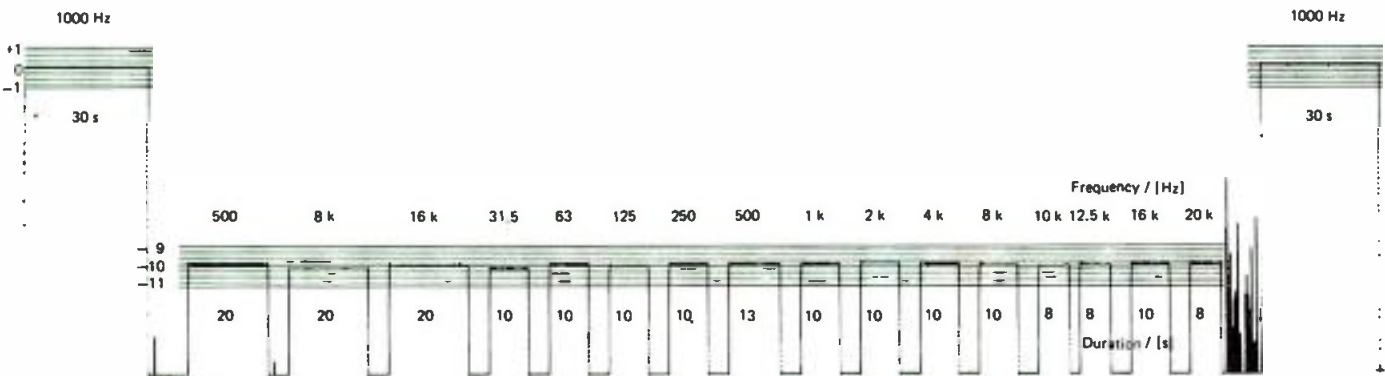
Deviations from the "0 dB" or "10 dB" levels calibrate this tape for deviations from the standardized values of response and reference fluxivity that are given in the Table to the left. In other words, these are the voltage levels that would be measured on a perfect "standard" reproducer.

A properly adjusted reproducer should ideally give the same response as that shown on this calibration graph.

One millimetre on the level scale corresponds to a level difference of 0.2 dB. One millimetre on the time scale corresponds to one second.

The dynamic response of the graphic level recorder used here corresponds to that of the "Standard Volume Indicator" (vumeter) of ANSI C16.5 1964, R 1961.

Tape Fluxivity Level re Above Specified Values/dB



In conventional manufacture of test tapes, the total tape flux is visually monitored and manually corrected. No record is maintained of either the amount of the corrections, or of the actual recorded tape fluxes.

When the recording head becomes contaminated, the "correction" usually results in proper total flux, but an uneven distribution across the tape width. When the monitoring head becomes contaminated, the "correction" results in increased total flux. Thus, the commonly used "correction process" often produces greater error than was present in the "uncorrected" recording.

To prevent this, MRL employs no corrections during the manufacture of the test tape. Instead, a continuous recording of the tape flux is made on a graphic level recorder. If the tape flux varies beyond tolerance, the tape is rejected, and the source of error is determined before production is resumed.

The above chart is a reduction of a typical MRL alignment tape chart-record. The original copy of each tape's chart is shipped with the test tape, noting the date of manufacture, serial number of the tape, and the levels on that particular test tape. Actual signal levels on the tape may be corrected from these charts when extreme accuracy is essential.

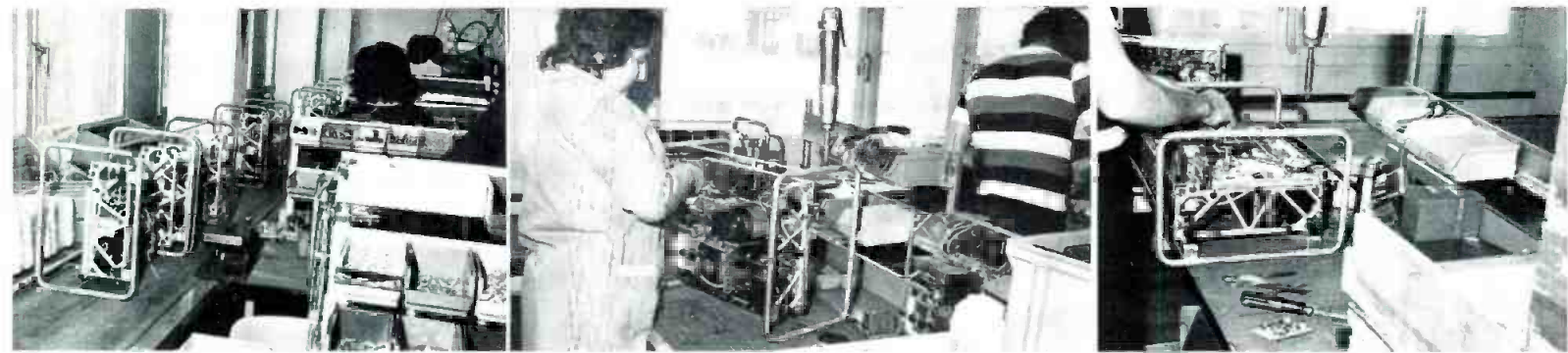
1/4, 1/2, 1, & 2" Test Tapes at 3.75, 7.5, 15, or 30 ips are now in stock. Special tapes for IEC or EIA standards are also available along with MRL's new "Azimuth Adjustment" tapes using the new "Difference Method" and standard test tapes at higher flux levels for use on recorders using the newer low noise tapes.

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Circle 28 on Reader Service Card



In this group of photos, ReVox A-77s progress down a line. A separate part of the Regensdorf operation is given over to ReVox equipment.



Dress panels for ReVox A-77s are checked and pre-assembled at this station.



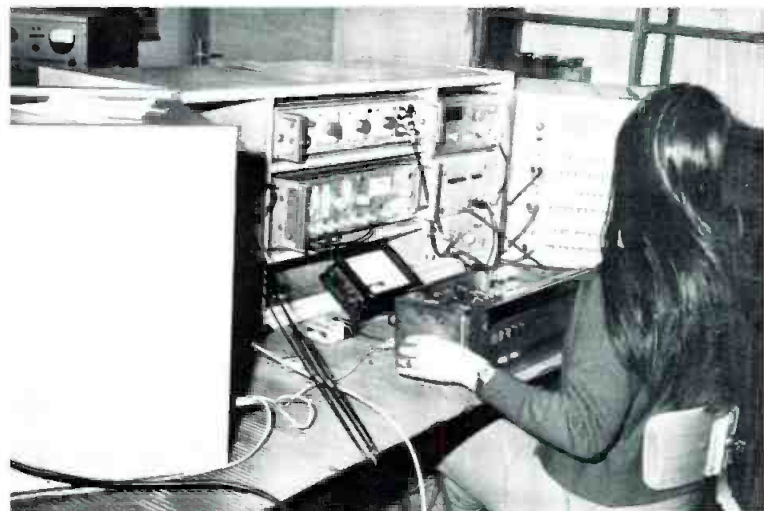
Test and adjustment of finished A-77s. Test and retest is an important part of production.

ReVox manufactures complete language laboratory systems, all built around the A-77 chassis.



Finished A-77 units are run in and cycled on and off on this special jig.

Tests of a completed ReVox tuner are conducted at this station.



StopClock

A New, Accurate, Digital Timing Instrument for Recording Studios, Broadcasters, and Other Demanding Applications

Timekeeper is proud to introduce a new inexpensive *Electronic StopClock*—a compact instrument featuring an easily-read visual display.

Only 5 1/8" wide x 3 1/4" high x 5 1/2" deep, it uses modern digital circuitry to provide accuracy of a very high order with exceptional long term stability. The large 3/8" high, seven-segment numerals can easily be read from a distance of more than 15 feet. Maximum count is one hour (59:59:9).

Three remote-mounted push buttons are used for manual control: START, STOP, and RESET. These buttons may be placed in a console, operating desk or any convenient location. The clock may be remotely located in the equipment, or on a desk or table. (A mounting flange is provided.)

Operation is similar to any conventional stopwatch. The green button starts the clock; the red button stops it. The black button resets it to zero. These may be depressed in any order, or all at once, without damage to the clock. If it is desired to start the clock by releasing a button rather than depressing one, the green and black button are pressed simultaneously. When the black button is released, the clock will start automatically.

The accessory plug on the rear panel may be used for all remote operations. All BCD information is available at this plug for accessory units such as digital printers, slave units, etc.

The Model T-1 is supplied for 120 volt 60 Hz operation, in an attractive simulated walnut grained enclosure with a red lucite face. However, 120-volt 50 Hz operation is available at no extra charge if so specified at the time you place your order.

The Model T-1 is priced at \$185.00. As with all Timekeeper products, it is fully guaranteed to meet with your complete satisfaction, or your money will be promptly refunded. It is guaranteed for one year against any defects in manufacturing.

The Timekeeper Electronic StopClock is a must. More than a high quality timer—it provides the added convenience of full visual display, high accuracy and stability plus operational flexibility. Order one soon. You will be delighted with it.



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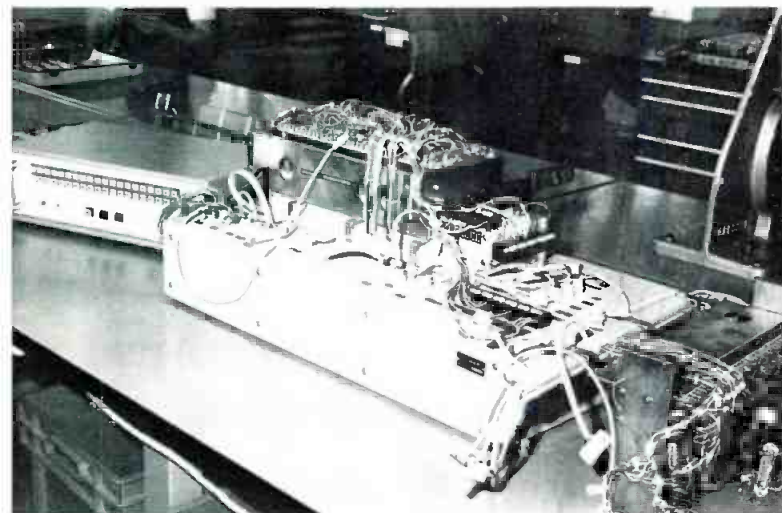
Please send me _____ Model T-1 Timekeeper Electronic StopClock(s) at \$185.00. N.Y.S. residents add 7% sales tax. Add \$1.00 shipping per order. I enclose \$ _____

Name _____

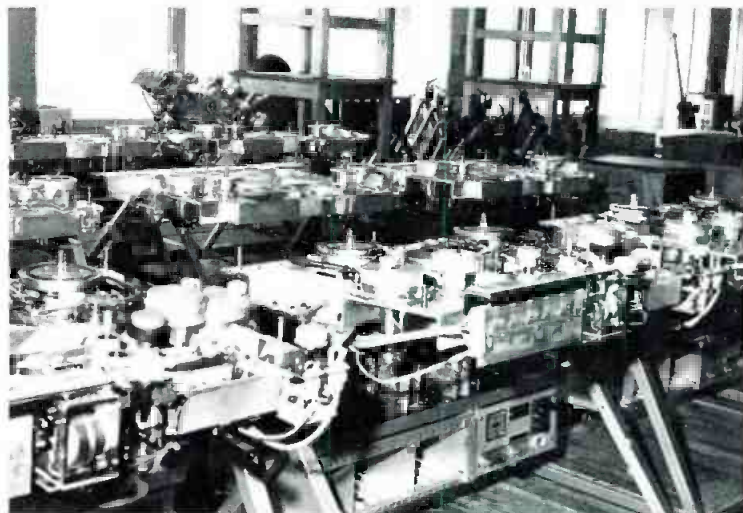
Address _____

City _____

State _____ Zip _____



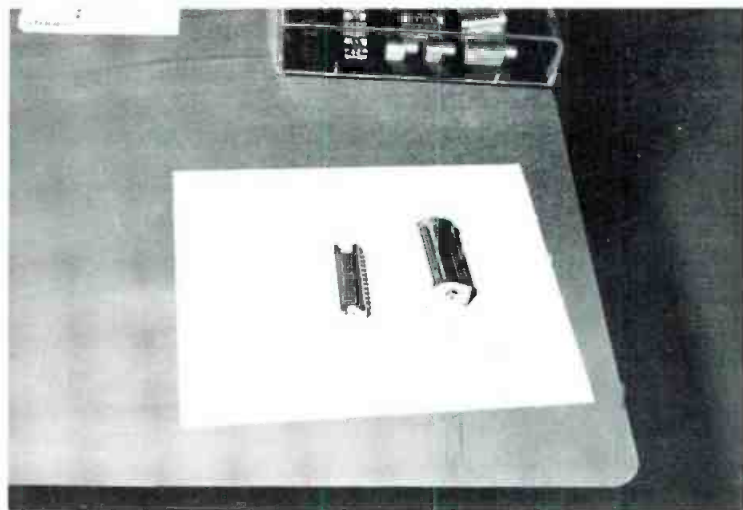
Studer has devised special automated test jigs that rapidly voltage check a finished board—reporting any deviations.



Studer A-80 machines undergoing production assembly; pretesting goes on at every station.

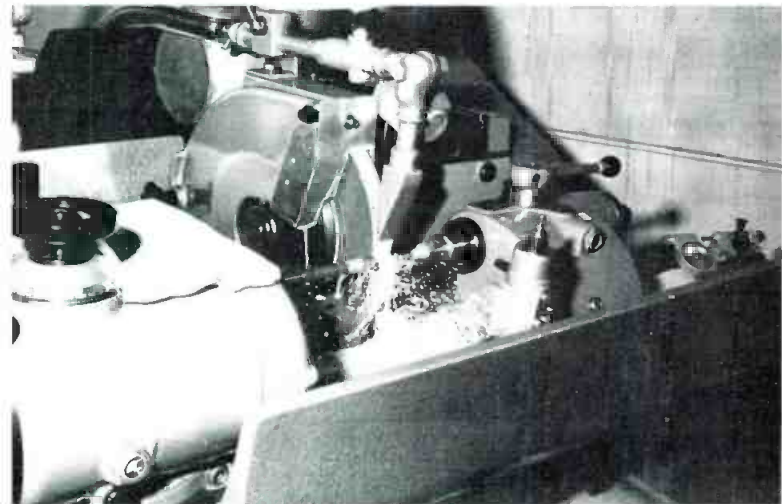


Studer makes most record and play heads for his machine. Here, assembly of one-inch heads.

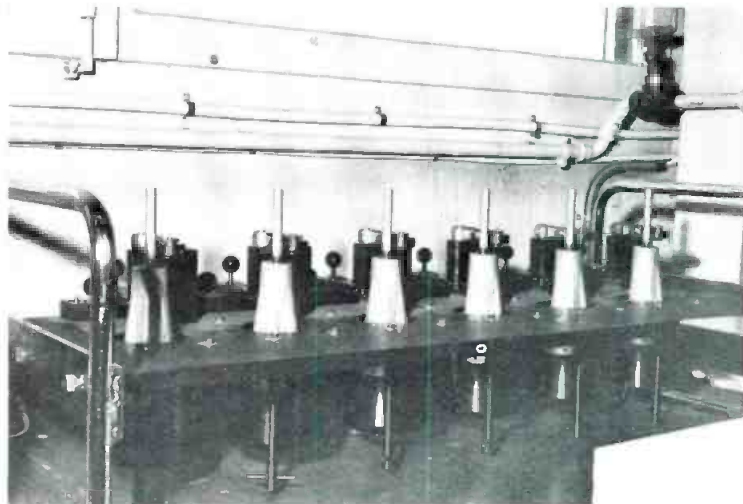


A finished two-inch, sixteen track head next to half an unfinished one. Special vacuum units combine the two halves.

High speed flash captures this capstan milling for an A-80—done to a precision of 0.001 mm.



Motors for two-inch A-80 machines are run in before installation in a deck.





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db April 1973



Circuit boards for A-80s are preassembled and stacked for later plug in to finished units.



Final test and adjustment of A-80 machines. Test is a critical part of assembly taken most seriously at Studer.

Studer B-62 units are still a big part of production. Here a completed one undergoes final adjustment.



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May 15-18-1973
Hilton Hotel
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45th AES Convention and Exhibition

ON THESE PAGES we present the essential program and a map of the Audio Engineering Society's 45th Convention and Exhibition to be held in Los Angeles, California at the Los Angeles Hilton Hotel. The dates are May 15 through May 18, 1973.

Schedule of Events

Registration

Mezzanine of the Los Angeles Hilton
Tuesday, May 15—8:00 a.m. to 8:00 p.m.
Wednesday, May 16—8:30 a.m. to 8:30 p.m.
Thursday, May 17—9:00 a.m. to 5:00 p.m.
Friday, May 18—9:00 a.m. to 5:00 p.m.
Recording Workshop at 7:30 p.m. will be registered gratis at the door.

Exhibit Hours

Tuesday and Wednesday—1:00 to 9:00 p.m.
Thursday and Friday—11:00 a.m. to 5:00 p.m.

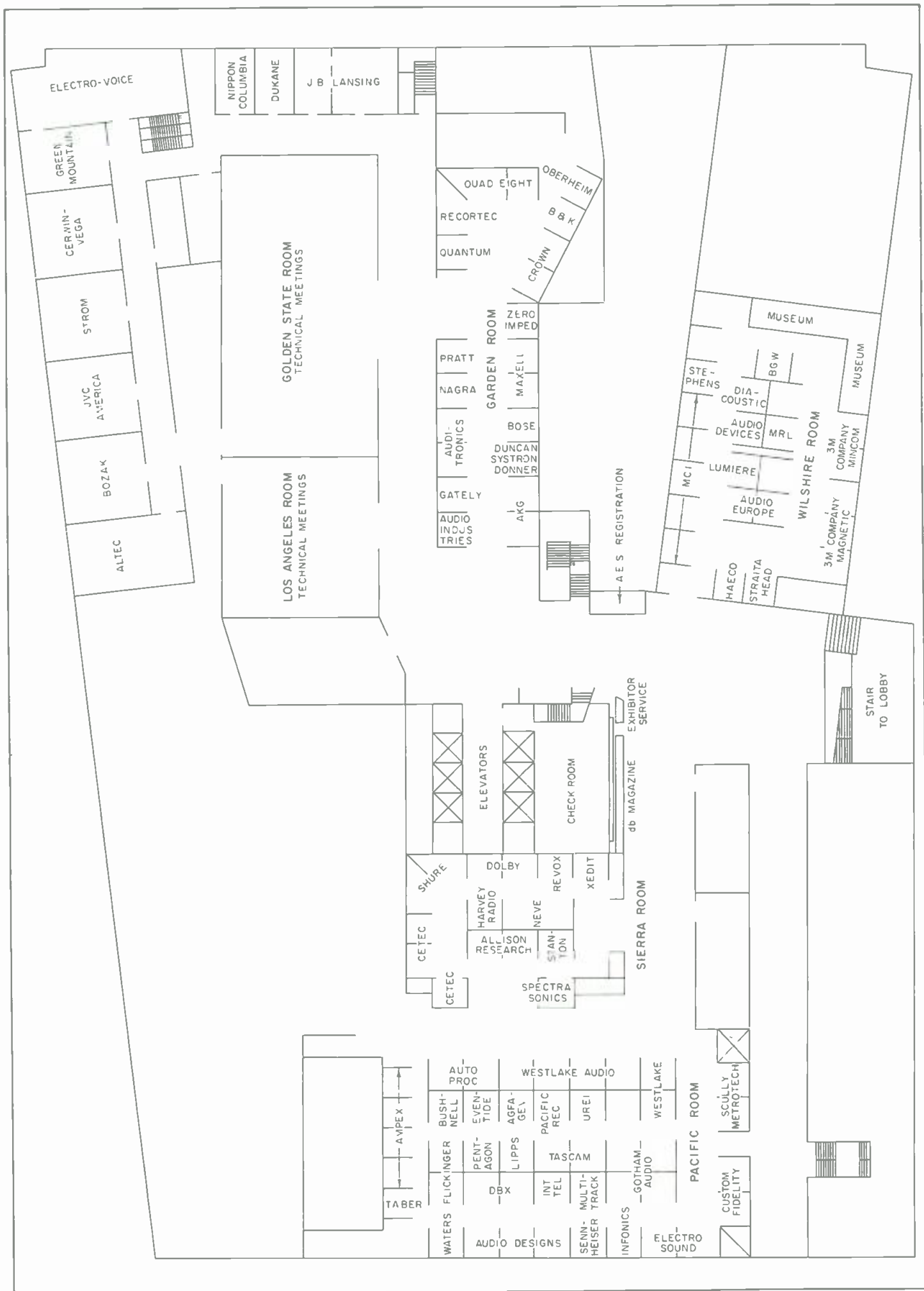
Technical Sessions

Golden State Room and Los Angeles Room

Tuesday	9:30 a.m.—Transducers
	9:30 a.m.—Audio in a.m./f.m./t.v. Broadcasting
Wednesday	2:00 p.m.—Sound Reinforcement
	2:00 p.m.—Audio in Medicine
	7:30 p.m.—Signal Processing
Thursday	9:30 a.m.—Magnetic Recording and Reproduction
	2:00 p.m.—Tape Duplicating
Friday	7:30 p.m.—Digital Techniques in Audio
	9:30 a.m.—Automation in the Recording Studio
Friday	9:30 a.m.—Motion Picture Sound
	2:00 p.m.—Quadriphonics Seminar
	9:30 a.m.—Disc Recording and Repro- duction
	7:30 p.m.—Recording Workshop

Banquet

Thursday—Cocktails in the L.A. Room
7:00 p.m.
Dinner in the Golden State
Room 8:00 p.m.



db Visits—Martin Audio

IF YOU'VE BEEN TRYING to track down some impossible-to-find replacement item, the chances are that you'll find it at Martin Audio in New York City. They stock and distribute over a hundred major brands of professional audio and video equipment, as well as some consumer items and their franchise list sounds like a Who's Who in the pro audio field. Specializing particularly in Ampex and Scully replacement parts, Martin prides itself upon the completeness of its stock, including many items usually hard to get.

Martin Audio was actually started in 1966 by Bruce Martin as a manufacturer and installer of recording studio equipment, perhaps best known for its Varispeed, a low frequency oscillator and 120 V power amplifier used to vary tape speed by varying the tape recorder's capstan motor. This was later followed by a full spectrum program equalizer. Although Martin has expanded in the distribution field, manufacturing has not been forgotten. These two products still enjoy a healthy market acceptance. During the past year several new products, including a portable stereo mixer, were designed and placed in production and an augmented engineering and production staff was added. Martin's products are distributed by thirty firms throughout the world.

In 1971, Bruce Martin was joined by Larry Grossberg and Norman Kassell (both formerly of Sonocraft Corp. of New York City) and the company branched out into distribution in addition to the regular manufacturing business, with Larry and Norman emphasizing the growth of the distribution, service and installation segments of the operation.

To complement this aggressive organization is a group of competent salesmen for fielding customer inquiries and giving advice on various products. Bruce Martin runs a small but complete engineering staff for the design of recording studios as well as other customer audio projects and has recently expanded his service shop staff to seven technicians. Emphasis is placed on complete, fast service in all areas.

All in all, Martin has shown versatility, growth, and success in a very brief time. Their physical plant includes about 8,500 square feet in a midtown New York office building, with indoor loading dock, large accessible shipping elevator (a necessity for consoles) plus ample parking (another New York problem.)

To bring their customers up to date on their latest products, Martin publishes an informative quarterly twelve-page brochure. Although they primarily cover the northeastern part of the country, we doubt that orders from other areas will be refused. If you would like to be on their mailing list, just drop Larry Grossberg a note at 320 W. 46th St., New York, N.Y. 10036. ■



Conference room with Ed Tompkins, Norman Kessel, Larry Grossberg, and Bruce Martin in the usual order.

An Ampex AG 440 and Dolby equipment being checked and aligned prior to shipment.



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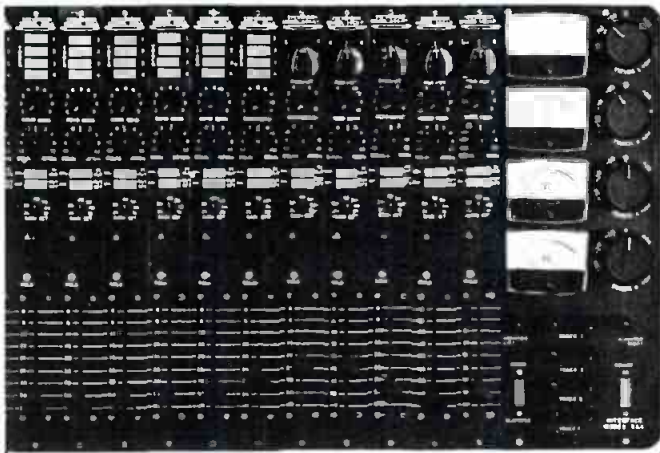
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Series 100 mixers are available in the Model 16X4 prewired frame shown above which accommodates up to 16 modules, and in the popular portable Model 8X4, which takes up to eight modules.

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Series 100 mixers may be had with any combination of seven modules:

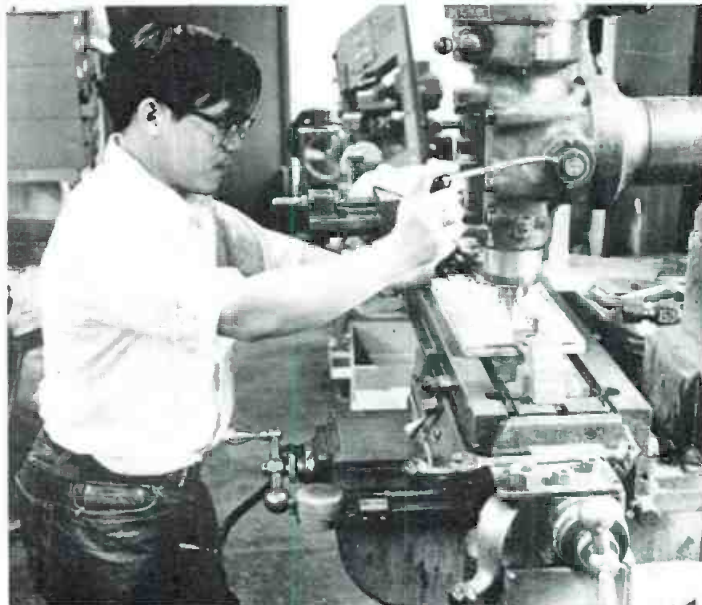
Model 100A standard equalizing	Model 100C compressor equalizing
Model 100AP panpot equalizing	Model 100CP compressor/panpot
Model 100AQ quad equalizing	Model 100CQ compressor/quad.
Model 100B multifrequency equalizing	

Other options include built-in reverb and the C-1 Cover for the 8X4. Call or write for further details, prices, and address of nearest dealer. Dealer inquiries invited.

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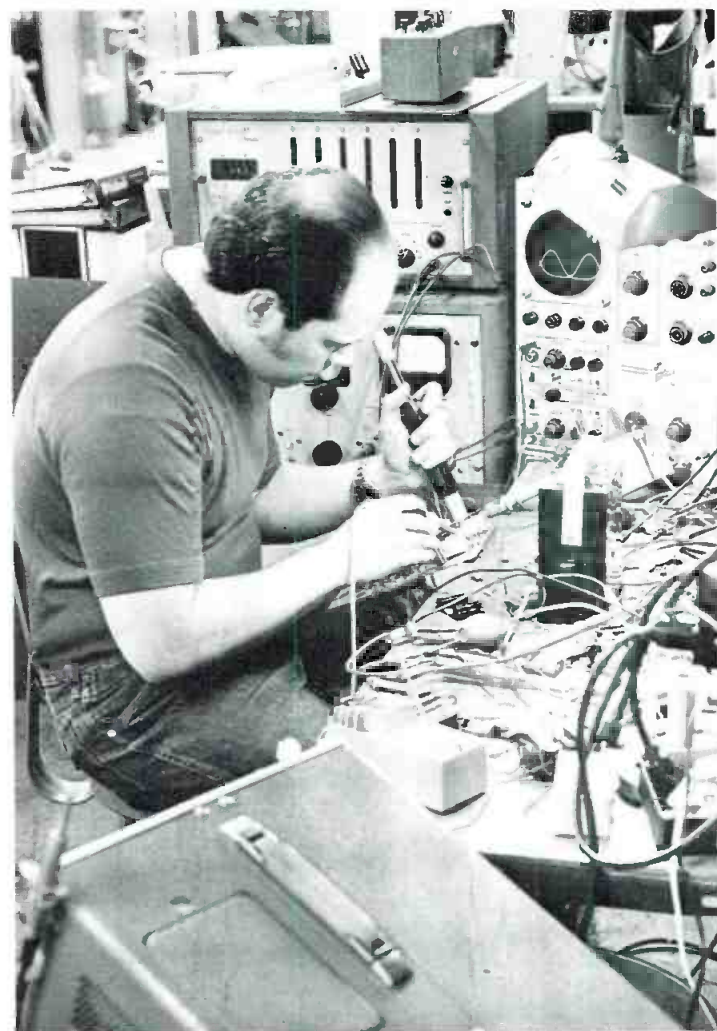


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BOOKCASE

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 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**

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 questions: 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 stereo 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**

21. Acoustics—Room Design and Noise Control. *Michael Rettinger.* 1968. The enormous problems and hazards presented by noise are dealt within an orderly and practical manner. With many charts, graphs, and practical examples, the text covers the physics of sound, room acoustics, and design, noise and noise reduction. 392 pages. **\$17.50**

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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PEOPLE, PLACES, HAPPENINGS

● **John Woram**, associate editor of **dB Magazine**, has joined the **Institute of Audio Research**, the only full time school in the nation specializing in courses and training in professional recording technology, as director of special projects. John, who continues his duties with **db**, has also established an independent professional audio consulting and free-lance recording service. Among his latest projects has been the sound track for the G-E t.v. special **Love and Hate**.

According to an institute spokesman, Mr. Woram will contribute strongly to corporate development and growth, primarily in the area of curriculum development and planning and in the area of publishing. During April, Mr. Woram supervised a four-day producers/arrangers' studio workshop conducted in a multi-track studio as well as in the classroom.

● **Jerry Kalov** has been named President of **Jensen Sound Laboratories**, Schiller Park, Illinois, a division of **Pemcor, Inc.** Mr. Kalov joined Jensen as marketing manager in 1970, and was appointed vice president and general manager in 1971. Prior to joining Jensen, he was a manufacturer's representative and retail electronic executive.

● Enlarged facilities have been acquired by **McMartin Industries, Inc.** consisting of a new building located at 4500 South Seventy-Sixth Street in Omaha, Nebraska. The first operations will be the metal fabrication and printed circuit-board departments. The second phase will be to set up the painting, finishing, and the main production assembly groups, followed by the administration offices. All operations should be settled into the new building by July 15.

● An enlarged operational complex, to be located in Northridge, California, is planned by **Superscope, Inc.**, distributors of **Sony** magnetic tape and manufacturers and distributors of **Marantz** high fidelity stereo components and **Superscope** home entertainment products. This will facilitate the servicing of increased sales volume resulting from new manufacturing techniques. Reorganization of distributorship possibilities has led to an option of going with a duplicator setup or a custom tape duplicator. West Coast demands are filled at **Superscope's** tape duplicating plant located in the Los Angeles area.



● Following the retirement of his associate, **Loren F. Green**, in Chicago, **Ted Pappas** has formed his own rep organization, **Theodore Pappas and Associates, Inc.**, serving both the consumer and commercial sound trades, and covering Wisconsin, Illinois, Indiana, and Kentucky. **Wayne Hrabak**, a former r & d coordinator with **3M Company**, has also joined the new company. They will continue to call on electronic parts distributors and communications specialists.

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db THE SOUND ENGINEERING MAGAZINE
980 Old Country Road, Plainview, New York 11803

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DIRECT BOX, 50k; 150 ohm transformer; 20 kHz \pm 1 dB; XLR phone type connectors; ground switch. \$30.00. **Gately Electronics, 57 W. Hillcrest Avenue, Haverstown, Pa. 19083. (215) 466-1415.**

ONE STOP FOR ALL your professional audio requirements. Bottom line oriented. **F.T.C. Brewer Company, P.O. Box 8057, Pensacola, Florida 32505.**

PRE-EQUALIZED J.B.L. MONITORS; Little Dipper hum/buzz notch filters; Cooper Time Cube echo delay; B.B.C. reference monitors; Lamb "B" Dolby processors; Ortofon ultra-track cart-ridges; Schöeps condensers; Beyer ribbons; U.R.E.I. comp/limiters; Gately pro-kits; Infinity electrostatics; Crown amplifiers/recorders; dozens more. Shipped prepaid/insured from **Music & Sound Ltd., 11½ Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

TASCAM MIXING CONSOLES—\$1,890. Tascam ½-inch recorders — \$1,770. Shipped prepaid/insured including free alignment and calibration. **Music & Sound, Ltd., 11½ Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

SOLID-STATE AUDIO MODULES. Console kits, power amplifier kits, power supplies. Octal plug-ins—mic, eq, line, disc, tape play, tape record, amplifiers. Audio and tape bias oscillators. Over 50 audio products, send for free catalog and applications. **Opamp Labs. Inc., 172 So. Alta Vista Blvd., Los Angeles, Ca. 90036. (213) 934-3566.**

HAECO announces complete repair service and overhaul for all Westrex cutterheads. Conversions of 3D-II and older models to higher performance standards and reliability. Helium cooling systems and hi-temp coils can protect your investment. Repair insurance program available. Rapid service. Lower cost. **HAECO, 14110 Aetna, Van Nuys, California 91401.**

RECONDITIONED PRECISION TAPE REELS, as new; 1 x 10½-inch—10/\$35.00. 2 x 10½-inch—10/\$70.00. Free list. **Wide Response, 2926 Bentley Ave., Los Angeles, Ca. 90064.**

CUSTOM BUILT 4-TRACK STUDIO CONSOLE AND MACHINES (20 in, 4 out); Four Bogen Mxma mixers with transformers; one TEAC TCA40 simul-track 4-track transport; two TEAC RA41 simul-track record amplifiers; one Mag-necorder model #PT6A full-track mix-down and echo machine; two Fisher K-10 space expander echo units; one talk-back microphone; one Bogen cue system amplifier; one Altec mixer; various switching and controls complete in console. Asking \$2,500. Call or write: **L & M Records, 1403 W. Nash Street, Wilson, North Carolina 27893. (919) 291-4035.**

STUDIO TAPE ELECTRONICS. Advanced design incorporates all the desired features for updating or expanding outdated recorders or building new systems. Prompt delivery. **Inovonics, Inc., 1630 Dell Avenue, Campbell, Ca. 95008.**

RECORDING AND REHEARSAL STUDIOS for sale, New York City. Fully equipped; air conditioned; established and lucrative; includes luxurious five room apartment with fireplace and terrace; completely furnished; low rental. Call for details (212) OX 1-6661.

MULTI-TRACK

8 and 16

TRACK RECORDING CONSOLES
THE SOUNDEST DOLLAR SPENT
IN PRO AUDIO TODAY

1965 CHEREMOYA AVE.,
HOLLYWOOD, CALIF. 90028
P.O. Box 3187, Hollywood, CA. 90028
(213) 467-7890

NEW YORK'S LEADING supplier of professional audio/video equipment and hi-fi stereo components. All major brands in stock. Call for quote—sales—service—leasing—trade-ins. **Martin Audio, 320 West 36th Street, New York, N.Y. 10036. Telephone: (212) 265-6400.**

TWO-CHANNEL MONITOR EQUALIZERS for your Altec's and J.B.L.'s are a steal at \$150. **Music & Sound, Ltd., 11½ Old York Rd., Willow Grove, Pa. 19090. (215) 659-9251.**

LOWEST PRICES for stereo masters expertly cut on a Scully lathe with the Westrex 3D stereo cutting system. Stereo: 12-inch—\$33 per side; 7-inch—\$12 per side. Mono: 12-inch—\$22 per side; 7-inch—\$8 per side. We also cut demos—prices even lower. **Trutone Records, 6411 Bergenwood Ave., North Bergen, N.J. (201) 868-9332.**

ALTEC 290 drivers; 1003, 203, 311-60 horns; J.B.L. D-20s. Call (213) 661-3223 in Los Angeles for information. Equipment shipped F.O.B. New York.

WANTED

RECORDER SERVICE ENGINEERS. Several experienced men needed immediately for expanding field service force; opportunity to work with latest developments in recording; equal opportunity employers. **Vince Lopresti, Scully/Metrotech, 475 Ellis Street, Mt. View, California 94040. (415) 968-8389.**

WILL PURCHASE 16-track recorder, console, and other used equipment. **J. R. Adams, Manitou Valley, Ste. Agathe-des-Monts, Quebec, Canada.**

WANTED: 3M MAGNEVIEWER. **T. Halchuck, Box 293, Wilmington, Massachusetts 01887.**

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TIMEKEEPER TAPE TIMERS

NOTE
 Price Increase After May 15, 1973:
 Professional Model \$119.95
 Standard Model 59.95
 If you have been planning to buy
 one of the fine instruments, now
 is the time to place your order.
 Current prices will remain in
 effect up to May 15th. Order now!

The well-known TIMEKEEPER TAPE TIMERS are now available for immediate delivery. Our latest shipment has arrived and we are ready to fill your order.

TIMEKEEPER TAPE TIMERS are easily mounted on any 1/4-inch recorder. They are fully guaranteed to meet with your complete satisfaction or your money will be promptly refunded. At these low prices you can no longer afford to be without a tape timer.

Difference from the Stop-Watch

Since the stop-watch measures time independently of the travel of the tape, its measurement inevitably varies with the elongation or contraction of the tape and with the rotating speed of the tape recorder, subject to change by voltage and other factors. The stop-watch can be stopped during the travel of the tape, but it cannot rewind together with the tape back to the desired position. With the Tape Timer moving in unity with the tape recorder, fast forwarding of the tape involves the quick advance of the pointer, while rewinding of the tape moves the pointer backward by the corresponding time.

Correct time keeping of the Tape Timer is never deranged by continuous repetition of such actions during the travel of the tape, as stop, rewinding and fast forwarding. Unlike the stop-watch, the Tape Timer is not affected by various factors of the tape recorder, and so the editing, reproduction and revision of your recorded tape can be done at will.

Features

- The recorded portion of the magnetic tape can be read at a glance by a scale division of 1/4 second as accurately as a clock.
- The performance of the Tape Timer synchronized with the tape prevents such errors as caused by the elongation or contraction of the tape, and by the variation of speed in the rotation of the machine. Fast forwarding of

the tape involves the proportional increase of the advance on the Tape Timer. When you rewind the tape, the pointer will be automatically moved back by the space of time exactly corresponding to the rewound length. You are free to stop, rewind, fast forward, or forward the tape even continuously and repeatedly without deranging the timing on the machine, thus prohibiting errors. These excellent characteristics will enable you to simplify the most complex procedure of editing, revising and otherwise processing your tape recording.

- Every fast rotating part is provided with a precise ball bearing, so that the Tape Timer can be employed at high speed with no need of lubrication.
- This trouble-free, high precision Tape Timer, within an error of 2/1000, can be simply fitted to any recording or editing machine.

Two models are available:



The Standard Model is calibrated for 7.5 and 3.75 ips and can also be used at 15 ips. Dimensions are 1 7/8" x 3 1/4". It is priced at only \$49.95.



The Professional High Speed Model is calibrated for 7.5 and 15 ips. It measures 2 1/2" x 3 1/4" and is priced at \$99.95.

TIMEKEEPER P.O. BOX 835 GREAT NECK, N.Y. 11021

NOTE: THESE PRICES APPLY TO ORDERS RECEIVED PRIOR TO MAY 15th, 1973.

Name _____
 Address _____
 City _____
 State, _____ Zip. _____

Please send _____ Professional Tape Timers at \$99.95 each.
 Please send _____ Standard Tape Timers at \$49.95 each.
 Total for Tape Timers \$ _____
 N.Y. State Residents add 7% Sales Tax \$ _____
 Add \$1.00 shipping per order \$ _____
 Enclosed is check for \$ _____



**At last someone
has made another
PA speaker like the unique,
distortion-free CDP.[®]**

It had to be us.

EY There's a good reason why only Electro-Voice has produced the compound horn. That reason is U.S. Patent No. 2,856,467. And though several have tried, there's just no equal to this ingenious design.

The difference made by a compound horn is easily heard. Distortion is lower, particularly at or near full power. Response is smoother, flatter, with extended highs for better intelligibility. And with no peaks in response, the chances of feedback are greatly reduced.

This improved performance is gained at no loss in efficiency. In fact, in many installations fewer compound horns are needed to do the same job as reentrant horns. So, costs are lower, installation time is shorter, and main-

tenance is easier.

Until recently, the advantages of compound design were available only in the wide-angle CDP (FC100)—the fiberglass horn that started the trend to high fidelity response in public address. Now you can have a choice.

Our newest compound horn is the round AC100 horn. It puts more useful energy on axis than much larger reentrants. And the AC100 concentrates its energy with the same high quality that has made the wide-angle CDP famous. Smooth response, low distortion, extended highs—all advantages that every audience will hear and appreciate, and all exclusive with E-V compound horn design.

Both the AC100 and the FC100

require E-V convertible drivers. And now there are four from which to choose. Rated at 30 and 60 watts, with and without 70.7-volt transformers. Every driver offers the efficiency of E-V ceramic magnet design, combined with utter reliability. Even so, diaphragm assemblies are field replaceable (after all, accidents will happen).

Find out for yourself how our compound horns can improve your next sound installation without compounding your problems. For complete catalog information, write today.

SHOWN ABOVE: Left, 848A 30 watt CDP speaker, \$101.25 list; or FC100 horn only, \$63.00 list for use with any E-V convertible driver. Right, AC100 horn only, \$112.50 list. Not illustrated, smaller 847A 24 watt CDP speaker, \$70.50 list. Normal trade discounts apply. Zone 2 prices slightly higher.

**a Gulton
COMPANY**

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