SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY

SOUND ARTS

MERCHANDISING JOURNAL

$2.00

VOL. 3 NO. 6
JULY 1980

BEFORE YOU BYTE:

SURVEYING BUSINESS COMPUTERS

MAKING SENSE OF WARRANTIES, PART 2

SELLING SYSTEM ANALYSIS

TO A BEAT

Two delays, one price.

Since flanging and doubling are important effects derived from time delay, we put them both in a single, cost-effective unit and called it the Flanger/Doubler.

As a flanger, the MXR Flanger/Doubler can add a variety of tonal colors and vibratos, from the subtle to the bizarre. As a doubler, it can thicken textures, broaden stereo images, make a single instrument or voice sound like many, and create spatial illusions.

Many time delay devices offer a time delay range that is enormous but impractical for certain applications. You end up paying for effects that are either inaudible, distorted, or extremely difficult to manage in performance.

By incorporating a concentrated time delay range of .25 to 5 milliseconds in its flanging mode and 17.5 to 70 milliseconds in its doubling mode, and by providing a variable sweep speed of .03 to 20 Hz, we've enabled the Flanger/Doubler to offer, without unnecessary expense, a tremendous range of time delay effects that are clean, musical, and expressive.

With the MXR Flanger/Doubler, you can create everything from fast frenetic quivers to slow pulsating throbs, including hard reverb and numerous chorus sounds, *without sacrificing sonic integrity.*

The Flanger/Doubler switches easily between flanging and doubling modes and provides pre-setting and LED monitoring of sweep speed and range, so musicians no longer have to hunt for correct flanging and doubling settings during performance. And the MXR Flanger/Doubler is an economical and effective way for engineers to free other delay devices (such as a Digital Delay) for longer time delay functions.

The Flanger/Doubler is designed for use in the studio and on stage, with line or instrument levels. Rugged construction and an optional road case enable it to readily handle the punishments of the road.

Like all MXR products, the Flanger/Doubler has been designed as a practical tool for both musicians and engineers. It has been built with the highest-quality materials and the most advanced American musical technology in order to provide creative artists with the freedom to make original and imaginative statements in today's electronic music. See your MXR dealer.

MXR Innovations, Inc., 740 Driving Park Ave., Rochester, New York 14613, (716) 254-2910

MXR Professional Products Group

VOL. 3 NO. 6

SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY

SOUND ARTS

MERCHANDISING JOURNAL

JULY 1980

CONTENTS

THE FEATURES

THE STAPLES

COMING NEXT ISSUE!

Trade Show Tally: Taking Stock at CES and NAMM
Getting the Business Computer on Line

Cover art by Fran Vitrano

Sound Arts Merchandising Journal (USPS 410-410) is published monthly by Sound Arts Merchandising, Inc., 220 Westbury Ave., Carle Place, NY 11514. Controlled circulation postage paid at Piscataway, New Jersey 08854. Subscription rates: $18.00 for 12 issues; $26.00 for 24 issues. Add $7.00 per year for subscriptions outside of U.S. Subscriptions must be paid in American currency. Postmaster: Send Form 3579 to Sound Arts Merchandising Journal, 220 Westbury Ave., Carle Place, NY 11514.

SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY
SOUND ARTS
MERCHANDISING JOURNAL

Editorial and Executive Offices
Sound Arts Merchandising Journal
220 Westbury Avenue
Carle Place, NY 11514
516-334-7880

Editorial contributions should be addressed to The Editor, Sound Arts, 220 Westbury Avenue, Carle Place, NY 11514. Unsolicited manuscripts will be treated with care and must be accompanied by return postage.

A LETTER FROM THE EDITOR

I controlled my temper the other day at lunch when someone assumed I would disagree with him because, as he put it, "You're an editor, Judy; whereas I as a *businessman* think . . ." Of course, an editor who is not also a businessman is printing folding one-shots or is existing on daddy's zillions. But my friend the businessman wasn't businessman enough to understand that.

The situation is analogous to one that many retailers of specialized products meet. You're a musician; ergo, you can't have any business sense. Or, you're an engineer; you obviously don't know how to be a retailer.

Well, as we know, talents aren't mutually exclusive. And the musician who doesn't have a retailer's sense doesn't remain a retailer for long. As we certainly see in this business. Those who can combine marketing talents, knowledge of product, people, technique—and of business practices—are usually both talented and successful. To enhance his position, the businessman investigates technology in both his chosen specialty and in business systems.

The catchword of the moment in both music and business is computers. Installing one in the store can save money and time. How does one go about this? Carefully. As J.D. Sharp found when he started looking into computers for his own retail business. J.D. passes on the fruits of his investigation in this issue, in Before You Buy a Computer. The smart businessman—and all our readers are smart—knows the potential pitfalls as well as the potential advantages of a system before he embarks on one.

Disco's come in for some heavy bad press lately. The fact is that disco had to die. The name was too trendy. But music is still in a dancing way. And since sound systems and recordings are very good, and since bands have to take a break, and since multimedia has become a fact of life, recorded music will continue to be a public entertainment medium. So while we're all floundering around finding a new name for disco, we'll print some conversations on the subject that N.I. Weinstock had awhile ago with some mavens.

I promise this will be the first and last time I say this—Disco Down.

Regards,

Judith Morrison Lipton

PERFECT HARMONY!

Peavey Electronics' transducer technology, in conjunction with our CS Series power amp program, has created what we consider the finest portable monitor package available to keep your onstage sound clean (and closer together).

The "heart" of the system features Peavey's new EQ-27 graphic equalizer combined with the field proven CS-400 stereo power amp to provide a system producing 400 watts RMS with twenty-seven bands of equalization. This combination of power and EQ enables intense sound pressure levels on stage while virtually eliminating feedback.

Add to this the M-400's special DDT® compression to maximize apparent headroom, transformer balanced inputs, electronic crossover, and bi-amp capability. The result is a highly versatile package with more than enough punch to get your vocals above even the loudest stage situations.

To deliver the M-400's punch, our engineers have designed a new series of enclosures with bi-amp capabilities built around our Black Widow speaker and the advanced 22A high frequency driver/horn combination.

The 1245 and 2445 monitor enclosures were created for optimum onstage monitoring, producing tremendous clarity, projection, and wide frequency response. Kick-proof grills and flite case type covers protect the units from damage and road abuse.

See the system at selected Peavey Dealers in your area or write us for more detailed information. You'll see one more reason why Peavey is ahead of its time,....and the competition.

PEAVEY®

PEAVEY ELECTRONICS CORPORATION / 711 A Street / Meridian, MS. 39301

CIRCLE 81 ON READER SERVICE CARD

VMR™... the most talked about new component in years!

"Unbelievable!" "Demo it, and it sells!" "We cranked it up, and smiles were everywhere!" "I never heard high SPL's sound so clean!"

No wonder dealers telling the VMR story have made the Electro-Voice S15-3 one of the best selling single-enclosure PA systems in the country. Instrumentalists, vocalists and sound men all have learned that a VMR in their system means incredibly clean midrange reproduction. Dealers displaying the bold VMR baffle are getting attention – and plenty of it.

The massive 16-lb magnet structure found in the VMR reproduces unmuddied midrange frequencies with the efficiency you would only expect to find with a horn. Plus the integral Thiele-aligned VMR enclosure rids systems of the "honky" sound typical of small horns. Maybe that's why companies like ARP, Oberheim, Moog and Crumar have used the S18-3 stage keyboard

system to demonstrate their synthesizer products.

The VMR is the speaker that has made the B215-M and B115-M bass guitar systems *the* bass systems to own. No wonder companies like Gibson and Kramer have used these systems to demonstrate their basses at trade shows and seminars.

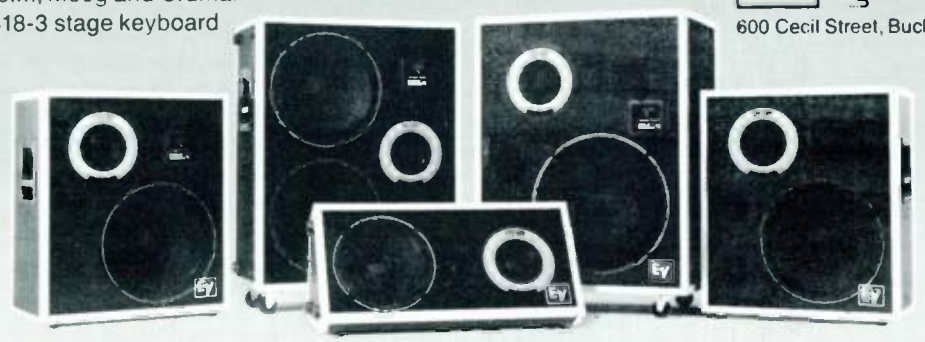
The VMR's basic accuracy is the reason you see the FM12-3 floor monitor so often on television musical broadcasts. When artists hear themselves accurately, they perform better. That's why FM12-3's sell.

If you're one of our dealers who has made VMR-based enclosures sell so well, give yourself a well deserved pat on the back. You've earned it. If you're one of our dealers who is not fully benefiting from this great opportunity, you should learn more about the VMR story. You're missing some great opportunities.

If you're not currently selling Electro-Voice VMR-based speakers, maybe you should be. They're the hottest selling systems around.

For further information about getting on the VMR bandwagon contact Chuck Gring, Music Products Sales Manager at Electro-Voice.

Electro-Voice
a gulton company
600 Cecil Street, Buchanan, Michigan 49107



CIRCLE 90 ON READER SERVICE CARD

TERMS:

JULY 1980

A CONTINUING INDUSTRY GLOSSARY

RECORDING

By Larry Blakely

Hiss: A noise made up of random audio frequencies which will resemble the sound of a leaky steam pipe.

Punch In: A procedure used in multitrack recording in which a tape track has been recorded and part of a recording is desired to be changed. If a vocalist made a mistake and wanted to re-record eight bars of the song, he would listen to the pre-recorded track (with the tape recorder in sync) and when the section to be re-recorded came up, the recorder would be punched into the record mode, thereby recording over the original recording.

Punch Out: The procedure of simply stopping the tape recorder (which will remove it from the record mode) at the point you wish to stop recording over the previous recording.

Ping-Pong: A procedure utilized in multitrack recording in which many of the available tracks are full (recorded) and it is desired to have more tracks than are left available on the tape. Several tracks are routed to the mixing console and mixed together and then re-recorded on an empty track. For example: On a four track recorder, if three tracks are full (1, 2, and 3) and you need to record on three more, you would mix the three existing tracks together and record them on the open track (4). Now tracks 1, 2, and 3 can be recorded on—providing the available tracks desired.

Bounce Tracks: Another name for "ping-pong."

Overdubbing: A procedure utilized in multitrack tape recording whereby a musician can listen to previously recorded tape tracks and record on an additional track or tracks. This can only be done on tape recorders that have a "sync" mode.

Playback Head: The head on a tape recorder that is utilized for playback (reproduction) of a tape recording. The gap of the playback head is typically narrower than that of a record head,

ELECTRONIC MUSICAL INSTRUMENTS & ACCESSORIES

By Wayne Howe

Subtractive Synthesis: Usually thought of as techniques of filtering, this synthesizer approach is the most popular because of its ease of use. Subtractive synthesis depends upon a complex waveform composed of many frequencies as a signal source, so that some of these frequencies or frequency bands may be subtracted or reduced in level from the original input signal. The advantage of subtractive synthesis is that a large number of harmonics can be controlled by a broadband filter that controls an entire range of frequencies. Hence, a significant difference in the output frequency spectrum can be achieved with a very minimum number of controls. These filters are also easily designed so that their characteristics can be voltage-controlled to work well in a voltage-controlled synthesizer format. The disadvantage of subtractive synthesis is that it is extremely difficult to control very narrow ranges of the frequency spectrum. For example, with subtractive synthesis it is very difficult to boost the amplitude of one harmonic while cutting the amplitude of the adjacent harmonic. Consequently, very fine control in subtractive synthesis is difficult or impossible.

Modulation Synthesis: Modulation synthesis is usually used to generate complex non-harmonic signals. Modulation synthesis describes the results of what happens when one kind of audio signal is controlled or "modulated" by another kind of audio signal. Modulation synthesis works very well in voltage-controlled synthesizer systems as it is relatively easy to modulate one signal with another. The three types of modulation synthesis are amplitude modulation, frequency modulation, and pulse-width modulation.

Carrier Signal: The carrier signal is the main audio signal that is being modulated or controlled. It is the basic

SOUND REINFORCEMENT

By Glen E. Meyer

12. Calculate hump or dip in frequency response: The hump or dip in dB =

$$20 \log \left[2.6\, Q_{TS} \left(\frac{V_{AS}}{V_B} \right)^{0.35} \right]$$

+ dB indicates hump in pass band.

− dB indicates dip in pass band.

13. If the hump or dip is acceptable, the design is complete. If the hump or dip in response is too great for your application, go to Step 9 and try again. (Note: A hump may be desirable with certain types of music reproduction.)

Minimum Vent Area: The smallest acceptable vent area needed to minimize vent windage noises and turbulances when the box is "pushed" with near maximum power. If only small or low signals are being applied to the box, this minimum vent area does not apply.

Vent Design: To calculate the proper vent size for a Thiele-aligned box, three parameters are needed: driver peak displacement volume, V_D in inches cubed; box volume, V_B in cubic feet; and box resonance frequency, F_B in Hertz. V_D is one of the Thiele parameters given by the manufacturer. V_B and F_B are obtained as described in the section under "Vented Box Design."

The first step in vent design is to calculate the minimum vent area, $S_{V(min)}$ in inches.

$$S_{V(min)} = 0.02\, f_B\, V_D$$

The second step is to calculate the ratio of vent area to vent effective length or α.

$$\alpha = V_B\,(2\pi\, f_B/C)^2 = 3.7\times10^{-4}\, V_B\, f_B{}^2$$

Once this ratio α has been determined, calculate the vent length, L_V.

$$L_V = \frac{S_V}{\alpha} - 0.83\sqrt{S_V}$$

Start by letting $S_V = S_{V(min)}$. And, then, $S_V = 2\, S_{V(min)}$, $S_V = 4$ times $S_{V(min)}$, etc. Select S_V and L_V so that L_V does not get too close to the rear of the cabinet. Good

A CONTINUING INDUSTRY GLOSSARY

RECORDING

which will give it a more extended high frequency response. The record head does not need a narrow gap to provide excellent high frequency response. Some recorders (three head type) utilize a separate playback head which only performs the play function. Two head tape recorders utilize one head to perform both the record and play functions.

Frequency Response: An indication of the highest and lowest frequencies which a piece of electronic equipment will pass or reproduce as well as the accuracy of the frequencies within its range. It is common to see a frequency response of a given piece of equipment specified from 20 Hz to 20 kHz. This specification alone is relatively meaningless in as it only gives you the outside parameters of the response and tells you nothing about its accuracy within these parameters. The whole story is told in the specification 20 Hz to 20 kHz ±2 dB. This tells us the outside parameters and also that the variation in response between these two extreme frequencies will not vary more than +2 or −2 dB.

NAB: An abbreviation for the National Association of Broadcasters. It is also a playback curve used on some models of tape recorders.

Line Input: A high level input which will accept signals that are much larger than that of microphone level (which is typically very small). The input levels (voltage) which these inputs will accept are normally specified by the manufacturer and are typically nominal operating levels somewhere between −10 to +8 dBm, depending upon the make and model of equipment. Some types of equipment have both microphone and line level inputs while other types have only microphone or line level inputs.

Bridging Input: An input on a piece of electronic equipment that has an impedance which is 10 times or more than the signal source impedance that is feeding it.

ELECTRONIC MUSICAL INSTRUMENTS & ACCESSORIES

signal that is *being* altered.

Modulator: The modulator is the signal that is controlling the main audio waveform. It is the signal that is *doing* the altering.

Amplitude Modulation: This type of modulation can be most easily understood by realizing that one common type of amplitude modulation is the tremolo effect found on most guitar amps. By turning up the tremolo knob, a very low frequency sine wave slowly varies the volume of the guitar notes. In this case the guitar's signal is the carrier wave and the low frequency sine wave is the modulator. By varying the amplitude of the sine wave, you can vary the intensity of the tremolo. By varying the frequency of the sine wave, you vary the frequency of the tremolo.

However, a very interesting phenomenon occurs to the frequencies involved in amplitude modulation. If a sine wave modulator (f_m) modulates a sine wave carrier signal (f_c), three frequencies appear in the output modulated waveform. The first frequency is the sum of the carrier frequency and the modulating signal frequency (f_c+f_m). The second frequency is the carrier frequency (f_c). The third frequency is the carrier frequency minus the modulating frequency (f_c-f_m). If the modulating signal is a complex waveform (such as music), and the carrier wave is a sine wave, then a sum and difference frequency is produced for each frequency component in the complex waveform.

In the example of a tremolo circuit, the modulating sine wave is below the audio frequency range. However, if the frequencies of the carrier signal and the modulating signal are both in the audio range, a weirdly dissonant audio signal results. An example of this is the voice sounds of the alien robots on the Battlestar Galactica TV series. Amplitude modulation can be used to make weird computer-like vocal effects or other dissonant types of sounds.

SOUND REINFORCEMENT

values would be that area and length corresponding to S_V = 2 times $S_{V(min)}$ if usable. If L_V comes out negative, increase S_V until L_V is equal or greater than the thickness of the baffle.

Maybe at this point we should run through a quick example. Assume you have a woofer that has a V_D of 31 inches cubed. The volume of the box you are going to put it in is 6.5 feet cubed and your calculations indicate the box resonance frequency, F_B, to be 45 Hertz.

1. $S_{V(min)} = 0.02\,(45)\,(31) = 27.9\ in^2$
2. a. $\alpha = 3.7\times10^{-4}\,(6.5)\,(45^2) = 4.9\ in^2/in$
   b. $L_V = \frac{27.9}{4.9} - 0.83\sqrt{27.9} = 1.3$ in

Vent Length L_V	Vent Area S_V	
1.3 in	27.9 in²	← $S_{V(min)}$
5.2 in	55.8 in²	← 2 $S_{V(min)}$
13.9 in	111 in²	← 4 $S_{V(min)}$

← A good choice here would be where L_V is equal to 5.2 in.

It should be noted that within reason the vent may be square, round, triangular, as long as no single dimension is too narrow to cause wind noise.

If you find you need a vent that has an area of 32 inches squared and 5 inches deep, the vent may be divided, as an example, into two 16 square inch, 5 inch deep vents if this would facilitate construction.

Calculating Box Resonance Frequency Knowing Vent Dimensions: Sometimes it is nice to find out where a vented box is tuned.

$$f_B = \frac{C}{2\pi}\sqrt{\frac{S_V}{(L_V + .85\sqrt{S_V}\,V_B}}$$

Where S_V = Vent area in ft²; L_V = Vent length in ft; V_B = Box volume in ft³; C = Velocity of sound (ft/sec); $\frac{C}{2\pi} \approx 180$ ft/sec.

It is hoped that you can bear with me just a little bit longer with all these formulas I have been throwing at you. We will soon return to normal less complicated terms.

TEAR HERE

10 to 1 you'll like ours!

Every studio needs a $1,000 microphone. It tells everyone they're serious about good sound, and it impresses the talent.

But when the session gets under way, all that counts is results. Not price tags. And judged *only* by what you hear, the new AT813 Unidirectional Electret Condenser from Audio-Technica is going to truly impress you...at about 1/10 the cost you might expect.

Recently a recording engineering class at a major university made simultaneous multi-track tapes comparing our AT813 side-by-side with some of the best microphones money can buy. The informed and critical students did the judging. Surprisingly, in many cases they couldn't find a nickel's worth of difference. And some preferred the AT813 sound to the expensive competition.

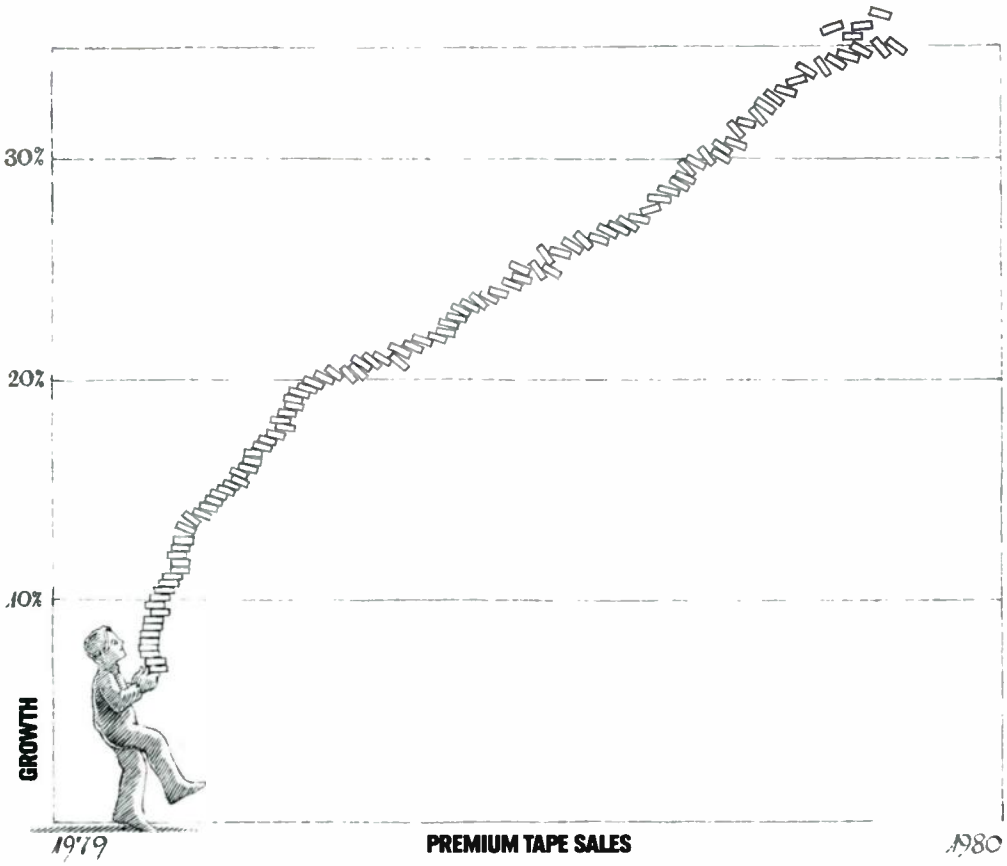
You may agree with these student engineers when you hear the AT813. Or you may not. But at these odds, you can't afford to overlook us. And for new studios just getting underway, who can't afford a roomful of top-dollar microphones, the AT813 is an effective way to achieve full multi-mike capability. Every studio, large or small, old or new, is a prime prospect for the AT813 and the complete line of Audio-Technica microphones. Write or call today for all the profitable details. You'll like our odds!

audio-technica.

INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. SA70 33 Shiawassee Avenue, Fairlawn, Ohio 44313 • 216/836-0246

THE ECONOMY MAY BE IN REVERSE, BUT TAPE SALES ARE STILL IN FAST FORWARD.



Blank audio cassette sales are getting to be very predictable. Every year, regardless of economic trends, it's the same old thing. Another record-breaking year.

One thing is changing though. Consumers are shifting from "cheapie" cassettes to premium. In fact, premium cassette sales enjoyed their biggest year ever in 1979 with sales of over $350 million.

As you might imagine, 1979 was also a good year for Maxell. Even in a soft economy, people will spend a little extra for a quality product.

Projected sales for 1980 indicate it'll be an even better year. Your customers will be putting even more of their money into premium cassettes like Maxell.

Maybe you should too.

IT'S WORTH IT.

Maxell Corporation of America 60 Oxford Drive Moonachie N.J. 07074

CIRCLE 99 ON READER SERVICE CARD

The Revox B77 is a full selection of tape machines.

The B77 is one machine and many. That's important to professional and industrial customers, who may require a variety of options or head configurations, but want to work with one transport and interchangeable boards for easier service and simpler parts inventory.

You can sell a B77 that's right for recording studios. Or pro or amateur musicians. Or broadcasters, schools and libraries. Theaters and concert halls. Security and surveillance. Even airports, ambulances and police.

Look at all that the Revox B77 lets you sell:

FULL RANGE OF SPEEDS; any two from 15 IPS for mastering to 15/16 IPS for logging or surveillance.

QUARTER OR HALF TRACK operation is available for professional, audiophile or industrial applications.

OPTIONAL DOLBY B removes objectionable high frequency noise. Double circuits permit decoded third-head monitoring.

RACK-MOUNTED OR PORTABLE. All B77's have folding handles and available rack-mounting flanges.

VOICE-ACTIVATED CONTROL saves tape in broadcast logging, surveillance, courtrooms, forensic pathology, municipal services, etc.

TIMER CONTROL permits recording or playback at pre-selected times.

AND MUCH MORE: Remote control • Special narrow bandwidth third track • Self-Sync • Stereo slide sync • Variable pitch • High and low-z mic and line inputs.

With all that flexibility, plus the legendary Studer quality, and tape-protecting features like motion-sensing logic-controlled switching, the B77 is a sure seller.

Anyone who needs to record sound is a B77 customer. If you're a Revox dealer, he's *your* customer.

STUDER REVOX

Studer Revox America, Inc.
1819 Broadway, Nashville, TN. 37203 (615) 329-9576
Offices: Los Angeles (213) 780-4234 / New York (212) 255-4462
In Canada: Studer Revox Canada, Ltd.

CIRCLE 74 ON READER SERVICE CARD

TROUBLESHOOTERS' BULLETIN

ELIMINATING HUM AND RFI

(1)

Hum and RFI pickup are often problems. When there is plenty of time, equipment and know-how, the precise causes and system entry points of these problems can be located and repaired. Unfortunately, these problems often occur when working in the field or during studio sessions. Here is a list of fast and simple procedures that can be tried to eliminate or reduce the level of hum or RFI.

(2)

1. Try to locate the problem by taking each channel or system module in and out of line. If the problem is in a single channel, see if you can leave that channel out of the system and use another channel for the same purpose.
2. Check the quality of the connections on all cables. Make sure to check wire-to-wire connections, wire-to-connector connections and the shield connections.
3. Make sure all connectors are completely and tightly engaged.
4. Make sure all screw and crimp type terminations and connectors are clean and tight.

(3)

5. Try repositioning or rerouting one or more of the cables or leads.
6. Try reversing the polarity of any two-pole AC plugs to the 110 V outlets. Just pull the plug out and turn it around and re-insert it.
7. Try putting a few twists in any unshielded wires, such as the twin lead wire often used to connect speakers and intercom circuits.
8. Try putting one or more bends, loops or curves in an offending cable.
9. Shortening or lengthening a problem cable

or substituting a different length cable may help an RFI problem.

10. In a real bind to shield a cable or circuit module, try using aluminum foil around the cable to form a shield. Use a clip lead to electrically connect the foil to a ground, such as an equipment chassis or electrical ground lead in the system.

11. Shunting a small capacitor (about .002 to .05 mfd.) across the AC power cable to the equipment may reduce the hum and RFI entering the system through the power mains.

NEIL LEWBEL
TECHNICAL WRITER

PILOT LAMP PROBLEMS

Pilot and indicator lamps show power to the unit or operating status of a particular module. So when the lamp flickers or doesn't light, the assumption is that the device is not working. The problem is, this assumption is not always true. Don't be fooled -- the pilot lamp circuit is usually somewhat independent of the functioning electronics. This can result in a

piece of equipment that operates properly with a defective pilot lamp or a malfunctioning device with a working pilot lamp.

If the pilot lamp stays dark or flickers, first check to see if the equipment is otherwise working properly. If it functions properly, suspect pilot lamp circuit problems.

NEIL LEWBEL
TECHNICAL WRITER

Continued next month

An answer to an especially common question can have several facets. We therefore asked two people who come at amplifiers from different angles to answer the following common consumer question.—Editor

What criteria should I use in selecting a power amp?

Although this question is typical of those I receive, in that the answer would appear to be a simple one, nothing is farther from the truth. The first thing that the end user has to determine is, "What is my application? What do I need my power amp to do?"

For example, someone installing a Muzak system in an office complex will have vastly different criteria from those in a recording studio. Industrial power amps are typically of low quality audio output, often having distortion characteristics of 5-10% THD. But in an elevator speaker system, the amp performs very acceptably. Other industrial applications, as in multiple speaker low level reinforcement or paging, might require a voltage distribution system for maximum power efficiency. In that case, a transformer coupled output might be desirable which could provide either 25 volts or 70.7 volts. Since not too many amps are made with transformers, you will find the choice very limited; from a Bogen style P.A. mixer amp which concentrates a brute force reliability and minimizes critical audio performance, to the McIntosh amps, which herald uncompromising audio quality. The dollars spent will guide the customer in what to buy.

In public address, or reinforcement situations, reliability and ruggedness are often the first concerns (not dismissing audio quality, however). An amplifier here will have to perform night after night, while being abused through man-handling, transportation, short circuited outputs, overdriven inputs and dropping from scaffolds. All manufacturers will swear to the roadworthiness of their products, but a little research with the P.A. companies will give you a handle on typical road wear. Fixed installation P.A. is a little less critical, but similar demanding performance should be met.

A power amp quality controversy does exist. Although both ends of the spectrum believe in the "sonic purity" or "transparency" necessary for a good listening situation, how you get there is the problem. Audiophiles (this won't apply to all audiophiles, but it's typical) swear that some amplifiers induce coloration into their audio outputs. There are a few power amp companies which cater to these audiophiles and manufacture highly specialized amplifiers for "purity of sound." I have seen a number of these amps put into recording studios, in different applications, and all too often, the amplifiers self-destruct minutes after turn-on. The bandwidth of these amps is often so wide that any quantity of RF detection in a studio installation passed into the power amps will result in severe nervous disorder for the amps or speakers.

The professional audio folks maintain their ground though, stating that, "You can't hear the difference between the amps!" Less than a year ago, UREI held the Great Amplifier Shoot-Out in Los Angeles, focusing on just this question: Is there a sonic difference between amplifiers? A roomful of the "best ears in the industry" gathered to listen and evaluate 10 major brands of amps on a blind A-B comparison. The results came in and there was a fairly even split as to which amp sounded best.

If you believe that one amplifier sounds better than another; great! Go for it, but when buying it, make sure of at least a few things first:

1. Specs: The manufacturers specifications are often deceiving, confusing and even down right wrong. They also are approaching theoretical limits of performance; .001% THD vs. .0015% THD. Can you hear the difference? Just make sure that the specs are in the ballpark of the amplifier's competition. The more specs, properly defined with references etc., the better. TIM%, although still in the debating stage, and slew rate (V/us) will give you a handle on transient handling capability.

2. Power Output: An essential criterion. Above all match the amp to the speaker! The speaker manufacturer will be of great help in letting you know the impedance characteristics vs. frequency; especially if you're bi-amping or tri-amping.

3. Output Impedance: Some amps have impedance taps for 4, 8, 16 ohms etc. for certain speakers and applications. Others have a single output with a nominally low output (.05 ohms to 1 ohm). Again, make sure the amp matches the speaker. Calculate the damping factor.

4. Short circuit protection is obvious, but many persons overlook it. The output should have some overvoltage/circuit/power protection to avoid self-destruction of the amplifier, and sometimes, in the case of direct-coupled outputs, to avoid the evaporation of year speakers. One amplifier recently claimed that with a dead short circuit across the speaker terminal, and full audio input, you can actually hear sound coming from the wire itself.

5. You will have to look into reliability yourself. Get opinions from users, who may have advice like the XYZ model #5 is great, but the XYZ model #10 is forever blowing up. Some manufacturers have a reputation for excellence in only one of their amps, although their line includes a dozen varieties.

6. Service and warranty are important. If the amplifier lies dead in the facility, who's gonna fix it?

7. Finally, the customer should be able to listen to the amp and his speakers before the purchase. The last thing he wants is a fabulous demonstration in the showroom only to hear the same amp on his new Borum Teatotaller Super Watters and hear something awful.

Winn Schwartau
Empirical Audio

If a customer has his speakers already and he wants to buy a power amp,

there are a couple of things he should know. He has to know what the impedance of his cabinets is and he has to know what kind of speakers are in the cabinet so he knows how much power they're able to handle and whether he's going to be biamping or running passive crossovers. Since power amplifiers are rated at various wattages and specified impedances, it's important to establish with the customer what the impedances of his speaker cabinets are so you can sell him a power amp that will put out the right amount of power for that cabinet.

One thing that you can't tell guys enough is that you should usually have more power than you need. A guy says, "Well, I've got a speaker and it's rated at 150 watts so I want to get a 150 watt power amp," and that's not what he wants to do. You want him to get a power amp that has more power so that he has headroom and some reserve.

Power amps are made in various sizes so it's kind of a game to match one with the other. If a guy's got a 150 watt speaker, then it's a good idea to get him an amp that's at least 200 watts.

One thing you have to be careful of is impedance rating. It's a two-part thing. Amplifiers are rated at a specified power and specified impedance. For instance, one amp may be rated at 350 watts at 4 ohms. Some other company may have an amplifier that's rated at 350 watts 2 ohms. Well, when you look at those two numbers, they're both 350 watts, but the first is actually a more powerful amp, because it's producing that power into a larger load. That's something that customers have to watch out for. Make sure when you're looking at the power output levels of the amplifiers that they're rated at similar impedances. If you have an 8 ohm speaker cabinet, look for the rating of the power amp at 8 ohms. Then you'll know how much power it's going to put into the speakers.

It's important to have a fan on the power amp. If an amplifier doesn't have a fan built in, one should be purchased. A good P.A. dealer will have fans in stock that he can install in the amp. When you're using an amp for a rock and roll band, it's got to be fan-cooled. You've got to move air through those things; otherwise, they overheat. The newer amps that are coming out now—Crown, Peavey, Biamp—have fans.

If a customer buys a rack-mounted amplifier, he should spend the extra money and get a case for it. I can't stress enough how important it is to put stuff in road cases. Whatever amount of money it costs the customer, he should do it because it's going to make a difference. He'd never carry his guitar around without a guitar case. It's unheard of. He'd be crazy to take his thousand dollar guitar and just grab it, throw it under his arm, maybe in the cardboard box that he bought it in and go to the club with it. Well, people don't realize it, but P.A. equipment works the same way. A thousand dollar power amp is just like a thousand dollar guitar. It's got to be inside something, protected from the rain, light, being thrown in the trunk with all that dirt and dust. The reasons are different. A guitar will get scratched and won't look as good, or you'll break it and the neck will break off. A power amp will get dirt inside it and the components will then fail. Dust is the worst enemy to any kind of electronic equipment. And broken equipment doesn't do anyone any good.

Gary Gand
Gary Gand Music

By Craig Anderton

SOLVING TYPICAL RECORDING PROBLEMS

Many musicians, after getting excited by the idea of having a recording studio in their home, take the plunge—and commit the necessary funds to put together a small studio. It's only then that they find out that for some reason, recording doesn't seem all that it's cracked up to be. These people don't realize that recording on tape is different from playing music, and that being a good musician doesn't necessarily guarantee that you will be a good recordist. As in any other field of endeavor, beginners will encounter certain hurdles that must be overcome; unfortunately, recording novices who attempt to find out more information about recording often end up frustrated from an inability to find instructional material that they can understand. So, the 4-track sits in a corner, collecting dust . . . and the musician goes on to other things until he or she manages to unload the deck on someone else who's starting out.

However, it doesn't have to be this way—and retailers are in a unique position to try and assist the customer. There are a few basic points you can get across that will really help out the novice recordist; the rest of the column deals with seven points which I feel can cause tremendous trouble if overlooked.

Sometimes the musician becomes overloaded when faced with something like a mixing board, and gives up before even finding out whether he or she can figure out what's going on. But the truth of the matter is that all electronic gizmos work on fairly similar principles, and that these principles can surely be grasped by anyone who is capable of doing something as complex as learning a musical instrument. Re-emphasize that while it takes a little time to become familiar with a new and different subject, after only a few months of practice the person will get started on the way to feeling at home with studio equipment. As long as a few very basic precautions are followed, there is little the musician can do to damage electronic devices. This means that he can feel free to experiment and the worst that can happen are some potentially bad sounds, not physical damage to the equipment. Learning recording is not like learning how to drive a car, where a mistake can land you upside down in a ditch . . . recording is much more forgiving.

Another problem is that people may not know how to get the maximum versatility out of equipment they already own. For example, if they don't know how to bounce from one track of the machine to another, they'll never be able to do things like squeeze 12 or more tracks out of a simple 4-track deck. Again, it helps to emphasize that a misplaced patch cord will almost certainly not produce a catastrophic error—just a lack of results, or strange-sounding results. Encourage experimentation; that's the least rigid way that I know of to learn about a given subject.

Don't forget that there are also a number of books on the subject of recording (which have been mentioned in previous installments), as well as *Modern Recording* magazine.

Sometimes a novice recordist will encounter a problem I call the "blank tape syndrome." The problem is that musicians usually don't have any trouble building on to something that already exists, but the prospect of facing a piece of blank tape may be too intimidating to allow the creative impulse to flourish. My solution to solving creative blocks is to simply do *anything*. Set up an experiment, such as seeing how a particular guitar sound comes across; try miking ambient sounds as opposed to direct sounds; try doubling parts and playing harmonies. More than likely, in the process of trying out some new procedures, new ideas will come along as well. Many times I've gone into the studio to simply test out a piece of new equipment, only to find out that it led to me coming up with some new kind of composition.

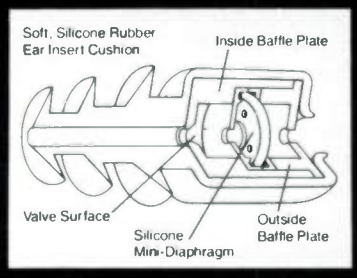
Even if the experiment does not result in a song, it is still a sort of vocabulary building for the musician. When you run across a distinctive sound, you can make a mental note of it and use it at a later time when it fits in perfectly to a particular piece.

While you'd think that level-setting would be a straightforward subject, it confuses many people who are first getting involved in recording. If someone comes in and says that their tapes are noisy, make sure they're not under-recording their levels. Most beginners just don't realize that VU meters are not all that accurate, and that the only way to tell whether the levels are adjusted correctly is to listen to the tape and see whether there is too much noise (corresponding to overly low levels), or a gritty kind of distortion (which corresponds to too "hot" a recording level). Having peak level indicators certainly

NORTON has the Sound of Profit!

Throughout the music industry, more people are hearing the name "Norton."

Musicians, sound men, engineers, concert goers... they're all asking for Norton Sonic II™ sound filters to



comfortably listen to high volume music without the danger of permanent ear damage.

Not an ear plug, Norton Sonic II™ sound filters are scientifically designed sound valves that let your customers hear and feel all the important elements of music. The highs. The lows. And everywhere in between!

Their unique and comfortable design even allows normal conversation to be heard while wearing them.

Sonic II™ sound filters are backed by a merchandising program that's right on key!

- Advertised in national consumer music publications the year round.
- Packed in attractive, fast-selling display cards that practically give the whole sales pitch for you.
- Available with handy rack display and informative 6-page fold-out brochure.

It's a great way to add extra profit to your daily sales! Don't wait any longer. Contact your music wholesaler or Norton direct. If you want to hear the complete money-making story...the sound of profit!

NORTON

Norton Company, Inc. Safety Products Division
P.O. Box 7500, 16624 Edwards RoadDept. SAM 7
Cerritos, CA 90701, Phone (213) 926-0545

Prepared by Bear Advertising Inc. Hollywood, Ca.

CIRCLE 97 ON READER SERVICE CARD

helps, but tape recorders are not yet including these on a universal basis; so, people should realize that setting the proper level can make the difference between a great tape and a mediocre one.

I've seen musicians blame themselves for not knowing how to get a good sound, when the problem was instead due to the tape they were using. Having already gone over this in previous columns, we won't dwell on the subject here; but if you have a dissatisfied customer on your hands, make sure that he's using good tape and running it at the highest possible speed (as well as setting the levels correctly).

The need for regular maintenance has been stressed in books, articles, columns, and instruction manuals virtually since the invention of magnetic tape, and yet there are still people who do not properly maintain their recorders. I've tried to figure out a reason for this, and I think I've got two plausible reasons. One is simply laziness, where someone just doesn't feel like taking the time to do things right. Unfortunately, there's nothing you can do about these people—you're best off encouraging them to take up stamp collecting, because if they're too lazy to clean their tape decks they're probably too lazy to have much of a future in recording. The other reason is that they perhaps clean their recorder heads, don't see any dirt on the end of the Q-tip, and figure they didn't need to clean it after all. Well, the problem is that if you *do* clean off a large clump of flaked oxide from the head, in a sense it's already too late since those particles have been causing abrasion prior to the time of the head-cleaning.

This is one of the most common topics I get in my reader mail—"How do I get a good vocal sound?" "My guitar sounds great coming out of the amp and terrible coming out of my tape deck." And so on. Here is where it's to your advantage to carry some of the accessories we've mentioned earlier. Once a bass player or vocalist hears how much better they sound on tape with a little limiting, and once they hear how much better the tape recorder accepts their signal, you'll probably have a sale right there. Much of the reason that professional tapes sound professional is due to the proper use of outboard equipment—particularly noise reduction, quality reverberation systems, limiting, and special effects such as flanging. While having these units doesn't automatically mean that you're going to work magic, once you learn how to use them effectively, a tape will have the potential to sound much more "professional."

When a customer asks for advice on recording, while it might be a temptation to sell an instant electronic "cure-all," in the long run this practice can be counter-productive. For example, if someone complains of noisy tapes and you reach for noise reduction unit instead of checking whether the person is using good tape and setting levels correctly, then the customer may notice a partial improvement in the sound—but nowhere near as much as if the basics were handled properly, and *then* noise reduction was added.

If, on the other hand, the musician does have the basics under control, then it adds a feeling of confidence to that person to know that they are at least proceeding along the right path. These are the folks who are ready for additional equipment in order to expand the given limits of their situation.

This is the end of our series on audio for musicians. I sincerely hope that I've conveyed the downright necessity for both musicians and retailers alike to become familiar with this growing phenomenon; there are a lot of home studios out there, and this is already making an impact on the music scene. The idea of do-it-yourself music is not only behind home recording, but is also behind a lot of the so-called "new wave" music that is at long last being recognized by the public as being a vital, and growing, offshoot of mainstream music. Home recording, if properly promoted, will only increase the pool of amateur and professional musicians in the world—a thought which I assume anyone in the music business would find encouraging. As we said way back in part 1, musicians like home recording because it makes them better and more capable musicians; retailers who handle home recording properly like it because it means increased sales and interest in other facets of music. Any effort expended now by music retailers towards the home recording market will surely pay off as home recording takes over a greater share of the overall music business. Those retailers who are most knowledgeable will end up having the greatest customer loyalty and repeat business—and a studio means repeat business, if only because tape always needs to be bought, new devices need to be tried out, and new gizmos come into being to create even more exotic effects.

THE ONE-KNOB SQUEEZER.

A compressor/limiter that gives you a free hand.

There are times in the life of every studio operator when an extra hand would make things a lot easier. It's for times like those that dbx designed its new Model 163 compressor/limiter. We call it the "one-knob squeezer" because it has only one control—to adjust the amount of compression desired. As you increase the compression ratio, the 163 automatically increases the output gain to maintain a constant output level. It's quite clearly the easiest-to-use compressor/limiter on the market.

But that's not all. Because the 163 is an "Over Easy" compressor/limiter, too. Which means that as the signal level crosses the threshold, the 163 gradually adds the desired amount of gain change over the range of several dB. The result is the most natural-sounding compression you've ever heard.

The 163 is as easy to install as it is to operate. It's light and compact—two may be rack mounted in a 1¾" space—and it interfaces easily with phono connectors.

But the easiest part of this "Over Easy" limiter is its cost. The nationally advertised value of the 163 is **$200.***
With the money you save on a pair of 163s, you can get two extra hands in the studio. You can hire yourself an assistant.

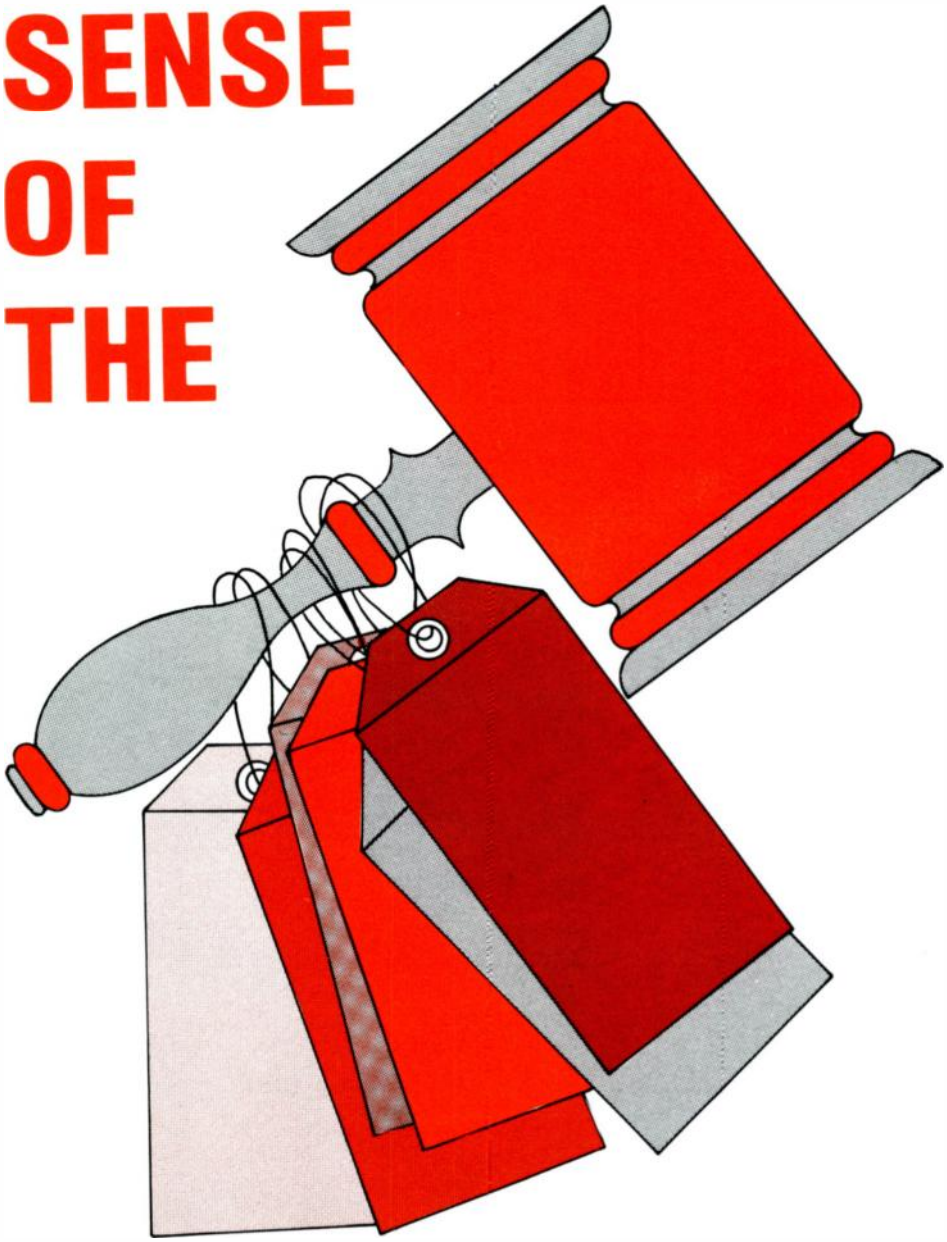
dbx, Incorporated,
71 Chapel Street,
Newton MA 02195,
617-964-3210

dbx
UNLOCK YOUR EARS

*Nationally advertised value. Actual prices are set by dbx dealers.

CIRCLE 92 ON READER SERVICE CARD

MAKING SENSE OF THE WARRANTY



Part 2

By Richard Silverman

The first article in this series dealt with various requirements under the Magnuson Moss Warranty Act. A familiarity with the meaning of certain terms used in the Act is essential to an understanding of the obligations that are imposed.

DEFINITIONS

Consumer Product. The Act defines "consumer product" as:

> . . . Any tangible personal property which is distributed in commerce and which is normally used for personal, family, or household purposes (including any such property intended to be attached to or installed in any real property without regard to whether it is so attached or installed).

The FTC Implementation and Enforcement Policy notes examples of consumer products as boats, photographic film and chemicals; clothing; appliances; jewelry; furniture; typewriters; motor homes; automobiles; mobile homes; vehicle parts and accessories; stereos; carpeting; small aircraft; toys; and food.

In its interpretations of the term "consumer product", the FTC has stated:

- The percentage of sales or the use to which a product is put by any individual buyer is not determinative. Thus, products which are used for *both* personal and commercial purposes come within the definition.
- Where it is unclear whether a particular product is covered under the definition, any ambiguity will be resolved in favor of coverage.
- Warranties on replacement parts and components are covered, but warranties on service are not covered. Thus, if a warrantly applies solely to a serviceman's workmanship in performing repairs, it will not be subject to the Act. However, where both the parts provided by the serviceman and the workmanship are covered, the warranty must comply with the Act.

The FTC has stated that "stereos" are consumer products. This is obviously true in the case of stereo equipment used for home entertainment. However, while professional sound equipment may theoretically be used in the home, such products are "normally" used for commercial purposes rather than "personal, family or household purposes," and we do not feel that they should be viewed in the same light as automobiles and typewriters.

Implied Warranty. Implied warranties must be distinguished from express warranties. Express warranties are promises actually made by a supplier, such as those contained in written warranties. On the other hand, implied warranties are those created by state law, regardless of any promise made by the supplier. For example, the implied warranty of "merchantability" requires that goods be fit for the ordinary purposes for which they are used. Thus, to take an obvious example, if a cassette deck contained a defect which prevented it from recording, that deck would not be fit for one of its ordinary purposes.

Incidental and Consequential Damages. Incidental and consequential damages are damages which are sometimes allowed in addition to the damages ordinarily awarded in breach-of-warranty cases. Incidental damages include expenses incurred by a buyer in the handling of defective goods which the buyer rejects. Thus, in an Illinois case, expenses of sorting defective lumber were allowed to a buyer who rejected the lumber. Consequential damages include losses resulting from the buyer's requirements which are known by the seller at the time of the sale (e.g., damages awarded for the spoining of frozen food due to a defective freezer). A second type of consequential damages includes personal injury or property damage resulting from a breach of warranty e.g., injury resulting from a fire caused by defective stereo equipment).

FULL AND LIMITED WARRANTIES

Warranties covered by the Act are designated either "full" or "limited." Some retailers are unsure of the difference between these two designations.

If a written warranty meets the federal minimum standards for warranty, it must be designated conspicuously as a "full [statement of duration] warranty." If it does not meet the federal minimum standards, it must be designated conspicuously as a "limited warranty." Under FTC interpretations, the designations must appear clearly and conspicuously as a caption or prominent title, separated from the text of the warranty.

Obligations Under Full Warranties. The federal minimum standards applicable to full warranties include the following:

- If a product fails to conform with the written warranty, the warrantor must remedy the product within a reasonable time, without charge.
- The warrantor may not impose any limitation on the duration of any implied warranty on the product.
- The warrantor may not exclude or limit consequential damages (defined above), unless the exclusion or limitation appears conspicuously on the warranty.
- If the warrantor is unable to repair a defective product after a reasonable number of attempts, the warrantor must either refund the consumer's money or replace the product without charge, at the consumer's option. If the warrantor replaces a component part of a consumer product, the replacement must include the installation of the part in the product without charge.

"Unreasonable Duties" Under Full Warranties. The Act contains other requirement applicable to full warranties. For instance, the warrantor may not impose any duty, other than notification, upon the consumer as a condition of obtaining service for a defective product—unless the duty is *reasonable.* The FTC interpreted a requirement that the consumer return a warranty registration card or a similar notice as *unreasonable.* Thus, a full warranty may not include such a provision. However, the warrantor may provide that the warranty be registered *at the consumer's option* as one possible means of providing the warrantor with proof of date of purchase. Any such suggestion to the consumer must include notice that failure to return the card will not affect the consumer's rights, so long as the consumer can show in a reasonable manner the date that the product was purchased.

In 1977, the FTC issued a proposed rule which sets forth eight different duties which would be considered unreasonable. The proposed rule has been revised by the Commission staff, and the staff's recommended final rule is being published as this article is being written. The third article in this series will discuss the recommended final rule.

Who Can Enforce Full Warranties? A question commonly asked is whether anyone other than the original purchaser may enforce a warranty. In the case of a full warranty, the warranty may be enforced by the original purchaser, any person, and any other person who is entitled by the terms of the warranty or under applicable State law to enforce it. (The FTC interpretations state that the only exception is when the duration of the warranty is not for a specific period of time but is instead stated to be effective for only as long as the original purchaser owns the product. In such cases, the warranty will expire automatically upon the transfer of the product.)

Limited Warranties. Many of the requirement imposed upon warrantors offering full warranties are inapplicable to limited warranties. Where a warranty is limited:

- The warrantor may impose a charge upon consumers for performing warranty work.
- If the written warranty has a reasonable duration, any implied warranties may be limited to the duration of the written warranty.
- The warrantor may limit the remedy of the consumer (i.e., to repair or replacement of the product, at the *warrantor's* option).
- The warrantor is not automatically required to permit the customer to elect either a refund or a replacement if the warrantor cannot fix the product in a reasonable number of attempts.
- Rights under the warranty may be limited to the original purchaser.
- The warrantor is not precluded from imposing "unreasonable duties" upon a consumer as a condition of securing warranty service. For example, the warrantor may require the consumer to register the warranty.

ADVERTISING OF WARRANTIES

In 1960, fifteen years before the passage of the Magnuson Moss Act, the FTC adopted Guides concerning the deceptive advertising of guarantees. (The FTC now prefers that the word "warranty" be used instead of "guarantee.") The Guides provide that whatever guarantees are advertised, there must be a clear and conspicuous disclosure of the following:

(a) The nature and extent of the guarantee. This includes disclosure of—

(1) What product or part of the product is guaranteed,

(2) What characteristics or properties of the designated product or part thereof are covered by, or excluded from the guarantee,

(3) What is the duration of the guarantee,

(4) What, if anything, any one claiming under the guarantee

must do before the guarantor will fulfill his obligation under the guarantee, such as return of the product and payment of service of labor changes; and

(b) The manner in which the guarantor will perform.

This consists primarily of a statement of exactly what the guarantor undertakes to do under the guarantee. Examples of this would be repair, replacement, refund. If the guarantor or the person receiving the guarantee has an option as to what may satisfy the guarantee this should be set out; and

(c) The identity of the guarantor. The identity of the guarantor should be clearly revealed in all advertising, as well as in any documents evidencing the guarantee. Confusion of purchases often occurs when it is not clear whether the manufacturer or the retailer is the guarantor.

In addition, the Guides require that whenever guarantees are adjusted on a pro rata basis, the advertising of the guarantee should give the basis for that pro rating. If the guarantee is based on a price different from what the purchaser said, the Guides require the clear and conspicuous disclosure of that price.

If the guarantor advertises "satisfaction or your money back," any conditions or limitations on the guarantee must be included in the advertisement.

If "lifetime guarantees" are advertised, the life referred to must be clear and conspicuous in the advertisement if it refers to any life other than that of the purchaser or the original user (e.g., a guarantee based upon the life of the item rather than the life of the purchaser).

Where an advertisment contains any guarantee of savings for prospective purchasers, e.g., "guaranteed lowest price in town," the advertisement must clearly and conspicuously tell what the guarantor will do if the savings are not realized—together with any time or other limitations that may be imposed. Thus, the "guaranteed lowest price in town" advertisement might be accompanied by the following disclosure:

> If within 30 days from the date that you buy your stereo equipment from our store, you purchase the identical machine in town for less, we will refund your money if you present a receipt to us.

The FTC may prescribe rules on the manner and form in which information on written warranties of consumer products are presented or displayed in advertising, labeling, point-of-sale material, etc., so as not to mislead the reasonable, average consumer. The FTC's Implementation and Enforcement Policy states that the Guides continue in effect until the FTC adopts such rules and thereafter unless superseded by the new rules.

A literal compliance with the Guides would require lengthy and legalistic advertising copy.

The goal of the Guides was to make certain that consumers were informed of warranty policies before they purchased products. However, since the text of warranties must be available to consumers before purchase (under the new pre-sale availability rules discussed in the first article of this series), the necessity for the Guides' required disclosures has been reduced.

The FTC staff has been considering the issue for some time, but no rules concerning advertising of warranties have been adopted as yet. We feel that when the rules are finally adopted, the number of disclosures set forth in the Guides will probably not be required. However, the rules will probably require the inclusion of enough information to prevent the advertisement from being deceptive. For example, if a turntable manufacturer offers a two-year limited warranty on its products, but the warranty does not cover damage to tonearms supplied with the turntables, advertising copy stating that "Our turntables are warranted for two years" might be considered deceptive. The addition of a few words could eliminate the problem, e.g., "Our turntables (except tonearms) are warranted for two years."

STATE LAW REQUIREMENTS

Does the Magnuson Moss Act prevent States from imposing their own warranty requirements? In 1975 and 1976, the State of California sought a determination of whether it could enforce certain California warranty statutes despite the passage of Magnuson Moss. The Federal Trade Commission rules that Magnuson Moss "preempts only warranty labeling and disclosure requirements of states, and that State warranty requirements which relate to warranty performance and not warranty labeling or disclosure of terms are *not* affected.

This decision dealt a blow to the hopes of those who were seeking a uniform body of law governing nationwide warrantors, who hoped to make unnecessary the need to comply with a multiplicity of State warranty laws.

The Commission also ruled that State labeling or disclosure requirements which do not pertain to *the text* of a written warranty are outside the scope of Magnuson-Moss. Thus, the Commission upheld a California requirement that warrantors give the location of their California service facilities by one of three prescribed methods. There was no requirement by the State that this information be given in the warranty document itself.

Finally, the Commission applied the "savings clause" of the Act which permits the Commission to uphold state labeling or disclosure requirements if the Commission finds that such requirements afford protection that is greater than the requirements of the Magnuson Moss Act; and do not unduly burden interstate commerce.

In an opinion issued in 1978, the FTC eroded the uniform warranty concept even further. In its ruling, the Commission cited as an example a situation where a State requires a written warranty with a one year duration. Since the warranty duration must be disclosed under the federal disclosure regulation, the one year duration would have to be included in warranty documents in that state, even if the warranty was of a different duration (e.g., six months) in the other forty-nine states.

Based upon these opinions, it is conceivable that warrantors will be required to use different warranty documents, depending upon the various State requirements. As a result of this potential nightmare, the Commission has received several petitions requesting a reconsideration of its interpretations of part 1 of the Magnuson Moss Act. The Commission is in the process of considering the matter, and it is hoped that the previous interpretations will be modified so as to make them less burdensome for warrantors operating on a national scale.

Richard B. Silverman is a partner in the Chicago law firm of Schulman, Silverman & Kreiter, Ltd. The firm specializes in counseling consumer electronics manufacturers and distributors on a wide range of subjects.

The new standard.

The TEAC A-3440

We set the old standard. In fact, we set the first standard. In 1969 we were the only company with the courage to make this commitment to the creative recordist: a 4-track ¼" multi-channel recorder with sync. Now, with the A-3440, our commitment is stronger than ever. The new standard.

WE BEGAN BY SIMPLIFYING SWITCHING PROCEDURES DRASTICALLY.

Now, you can concentrate more on your music and less on the mechanics of recording.

Instead of the old Rec Mode, Sync and Monitor switches, there is now a simple Function Select feature. So instead of having to simultaneously activate many different switches on each track—TAPE/SOURCE, PLAYBACK/RECORD, and dbx® ENCODE/DECODE—all functions are now controlled by a single Function Select button.

NEXT, WE BUILT IN MORE MONITORING FLEXIBILITY.

A headphone mixer is an integral part of the A-3440. Plug in your headphones and you can listen to any or all four tracks, and get a mono mix. An independent level control means you can adjust the mix volume.

AND THEN, WE ADDED THE RX-9 DBX UNIT

The A-3440 accepts an optional dbx unit, so you can add up to 30dB to the overall signal-to-noise ratio. (As mentioned, it's automatically tied to single Function Select button.)

FOR A FINAL TOUCH, THERE'S NOW A PITCH CONTROL.

The built-in pitch control gives you special effects by slowing down or speeding up the tape by 5%. It also means you can add instruments days or weeks after your initial recording, and tune the tape instead of tuning the piano.

BUT WE DIDN'T CHANGE EVERYTHING

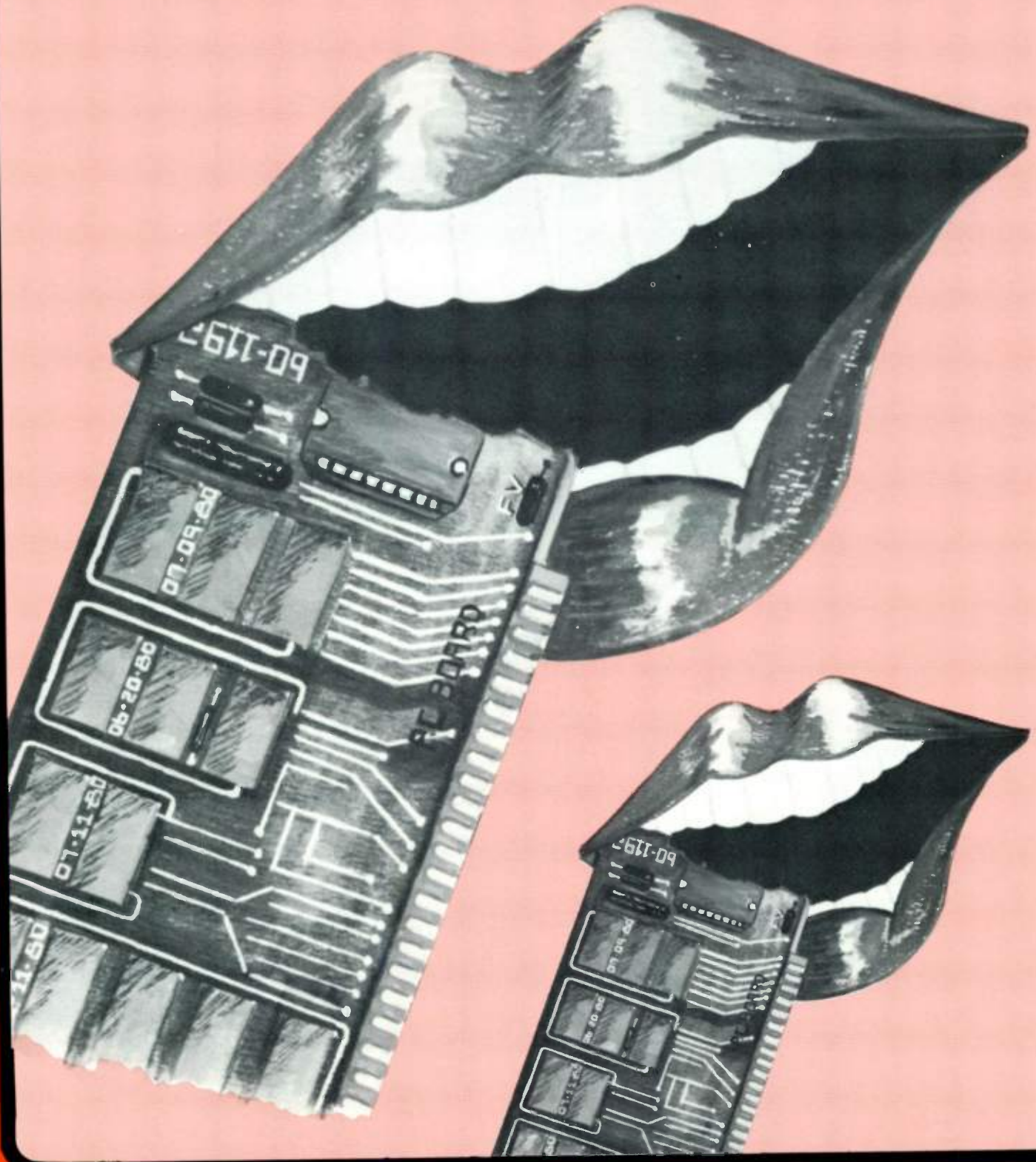
Micro-Switch Transport Controls, with optional remote, highly stable DC servo-controlled capstan motor for an absolute minimum of wow and flutter, expanded-scale VU Meters, and all the time-tested and studio-proven features that came with the A-3340 are still yours on the A-3440.

The new standard. At your TEAC dealer. Now.

MULTITRACK SERIES
TEAC Professional Products Group

®dbx is a trademark of dbx, Inc.

BEFORE



YOU BYTE:

Survey Business Computers

By J.O. Sharp

The microcomputer is one of the most useful tools ever to come along, and is especially helpful to the businessman in keeping tabs of most aspects of activity, such as payroll, inventory control and ordering, billing, and bill paying. Additionally, computers can be put to other uses to increase profits and market penetration, such as mailing list maintenance, or detailed product and sales analysis. A successfully-installed system can save both time and money, and as a bonus give management a clearer grasp on the details of the operation.

It all sounds too good to be true, and it sometimes is, since the road to smooth computing can be filed with pitfalls and potholes. A background in some of the problem areas is the best insurance against doing it all the hard way.

Computer systems consist of hardware and software. A typical business system's complement of hardware would be a computer (which includes both memory and the processor); a storage device (such as floppy disk drives); one or more terminals; and a printer. Software is the operating system which directs the activities of the computer. Typical software for a business system usually includes programs for payroll, accounts receivable , accounts payable, general ledger, and inventory. Other programs might be mailing list or customer list maintenance. Good hardware and good software can make all the difference in how satisfactory the ultimate performance of the computer system is, so each aspect bears examination.

The music and sound businesses are hardware-oriented, and we are often given to believing that problems can be solved by the acquisition of another piece of technology. Computing problems more often result from poorly-chosen programs, but there are hardware-related errors that can be crippling. The most critical decisions concern *capacity*, which is a function of the computer's speed, memory size, and storage capability. There is no set rule to say how much memory is enough —but a safe approach to the problem is to figure out what tasks the computer is supposed to tackle. If it is just needed to keep track of 30 inventory items and 20 accounts, a minimal system will do; the opposite extreme is a system which supports several terminals (bookkeeping, sales counter, shipping) and may be called upon to sort through thousands of transactions. It is questionable whether a computer is necessary at all in the first case, but it's really quite reasonable to get a business on computer while it's still manageably small. The primary concern here is to get enough capacity to grow into. Computerizing early on is perhaps the best of all situations, since "debugging" (the process of ridding the system of errors) can take place without upsetting the normal operations of an enterprise.

A typical system for a modest business might include 16K of memory, which is sixteen thousand bytes. A Radio Shack TRS-80 system would work well, and offers some expansion possibilities. But it won't support growth into the second example given above, since it is not designed to support multi-user, multi-tasking computing. A larger, multi-function system would probably include from

64K to 256K bytes of memory, since it may have to accommodate several terminals or devices on line at once. It would use at least two eight-inch disk drives, which store programs and data on floppy disks. Two drives are a necessity to facilitate copying and data transfers, such as updating daily sales records, or storing a monthly report. The storage capacity of these drives varies from about 200K bytes to up to 1,200K bytes (1.2 megaBytes), and the different formats are referred to as single, double, or quad density. Some drives use only one side of the floppy disks for storage, while the highest-capacity units use both. The small system could use either a standard audio cassette deck (a cheap portable does the trick) for storage, or mini-floppies, which are lower-capacity, lower-cost disk drives. But reloading from cassette, or changing disks constantly, would bog down the operation of the smaller system. A general guideline is to get as much disk storage as you can afford as part of your system, unless you don't foresee expansion beyond a particular level. Systems which are larger yet will require hard-disk storage. These disk drives offer almost unlimited storage potential, and sport prices from $5,000 on up. Recent breakthroughs have brought prices to this level; previously 20-26 megaBytes of storage set the user back at least ten grand! These large amounts of storage are a necessity for such operations as sorting ten-thousand-name mailing lists, or sending bills and maintaining accounts for hundreds of customers. Most readers won't need these systems right away.

Another critical hardware area is the printer. It is unfortunately true that the computer industry has not produced a reliable, low-cost unit which is totally satisfactory for small business use. Printers are of several types. The lowest-cost units print on aluminized paper, using a thermal printer. Their prices run from about $300 to $800. The next step up is to a dot-matrix printer. These use a series of pins to form different characters, which are printed with a typewriter-style ribbon. This print has a computer-like look to it. Reliable units start at about $895, with some newer units at around $600-$700. These cheaper units have almost no track record, and should be approached with caution.Heavier-duty business printers of this type tun about $1800-$2100. A good model in this category is the Texas Instruments 810 printer, although there are several other good printers from such makers as Centronics and Anadex in this range. New models appear regularly, since the computer industry is extremely volatile, making the music trade look positively sedate in comparison. The next step up is to "daisy-wheel" printers, which produce a typewriter-like copy, and usually offer interchangeable type faces. These are popular for word processing applications such as automatic letter writing. These units are not as fast as the better matrix printers, and are not particularly more reliable, since they often have more moving parts; the main application is for situations where letter-grade output is a necessity. These printers range in price from about $2,500 on up. There are various other high-speed devices, such as band printers, which are ultra-fast and expensive; there are also new technologies such as ink-jet printers which promise to lower the cost and increase the speed of letter-grade printers. But for most of the systems mentioned here the likely choices are either the thermal or dot matrix type of printers.

The thermal units are more reliable for low-cost applications. Their main limitations are the use of a more expensive and harder-to-read paper, and short line lengths in the less costly units. Line length can be a problem, since different programs are designed to print out with varying numbers of characters per line. Better printers have switches which can be set for the most common lengths. Common line lengths are 80, 96, 120 or 132 characters per line, and units which can accommodate these different formats are far more useful. Another difference to look for is in speed, usually stated in characters per second. This can sometimes be deceptively described, since the manufacturer will give a "best-case" figure. It takes longer to print a line of letters than a string of periods. More sophisticated printers can print in both directions, which speeds them up, since they don't have to return to the left-hand side to continue printing. Printers also use a variety of methods to hold paper, and they use a variety of different paper sizes. Try to pick a unit which uses a standard type of paper. The most common size is 9½" by 11", with perforated holes on both sides which the printer uses to advance the paper. The perforations detach to leave a standard 8½ by 11 inch sheet. Undersize of oversize papers can be difficult to find, or expensive. Better printers also have adjustable form feeds, so they can handle a variety of papers and forms such as invoices or labels. The quality of the print varies greatly from unit to unit; some matrix printers won't print the descending part of a "p", "y", "g", or other letter below the line. The result can sometimes be annoying, but it's more expensive to get a unit that prints descenders below the line, since it uses a bigger matrix, with more pins. Some printers can only print capital letters, which is also a nuisance. The printer will be in use much of the time in the typical system, so it is important to find one heavy-duty enough, and with the proper features, to do the job.

That leaves only two more pieces to the system: the terminal and the computer itself. A terminal usually consists of some type of display (usually CRT, better known as a t.v. screen) coupled with a keyboard for data entry. There are kits for low-cost keyboards, and some adapters which allow coupling a computer to a home television for display. A practical business terminal will usually integrate keyboard and CRT into one unit. Features and functions vary widely. More expensive terminals will include a computer of their own ("smart" terminals) which can speed interaction with the computer. Many keyboards have a separate "keypad" for numeric entry, which can be useful for bookkeeping as well as math computation; this looks somewhat like a calculator keyboard, and is to the right of the "typewriter" keyboard. There are many other features which a terminal may have, but the most important ones are the basic ones, such as a backspace key. It is a good idea to open up the cover and see just how the thing is built. Better units have separate circuit boards for the keyboard and the display, which makes servicing easier; on some units it may require extensive disassembly to change a circuit board or get to a part. It is to the credit of the manufacturers that most terminals are reliable, but we all know from experience that even the most reliable of products is not perfect. Other features which are more important in word processing use are "reverse video," half-intensity video, and special function keys. However, these are frills for most business use.

Finally the computer itself. It is unfortunate that software written for one brand of computer rarely runs on any other brand. It is also a fact that some units are far more popular than others. These two considerations lead

up to one very important consideration in choosing a computer: Is the software you want for your business available for the brand of computer you are thinking of buying? This puts several companies at an advantage when dealing with the smaller systems, specifically Radio Shack (TRS-80 and TRS-80 II), Apple, and Commodore (the PET). There is more software around for these three units than any of the other brands. Unfortunately these units may be somewhat limited in expansion capability, and are inadequate (with the exception of the larger Radio Shack) for most larger businesses, since they can't readily interface with larger disk drives, and can't hold a full 64K bytes of memory on board. Apple has a new system which may answer some or all of these needs. An alternative to these systems is to go to what are called "S-100 buss" computers. These have a frame which contains a power supply and input and output connectors, and a card case, Different cards containing memory, processors, video display boards, and other special-purpose functions can be plugged into these frames. A new disk drive will often be provided with a board which can be plugged in to interface it more or less instantly to an existing system. This method obviously allows for growth and expansion to a greater extent than self-contained systems like the TRS-80, but it is commensurately more expensive. Some of the more popular brands of this type are Vector, North Star, and Ohio Scientific, although this is hardly an exhaustive list. There is much excellent software for the S-100 compatible computers, although it should be emphasized that most software is not directly transferable from one brand to the other . . . so the choice of computers is closely related to the choice of software.

Before we move to software, another step up in computers should be dealt with. Larger systems use processors with more power, mainly in their ability to deal with bigger slices of information in each "gulp." These units are called "sixteen-bit" processors, as compared to the eight-bit processors used in all the computers described previously. Other large commercial computers may use 32 or more bits as their basic information format. This allows in most cases for higher-speed computation, and is desirable for most multi-tasking and multi-terminal systems. The most popular brand of the genre is DEC (Digital Equipment Corporation), and there is a large body of excellent, proven software for these machines. Some of it has been adapted for other units, such as the system offered by Alpha Micro Systems, which is also a 16-bit system. This brings us to the crucial topic of software selection.

Every operation that a computer does within the context of a business requires software, otherwise known as programs, which give the machinery a method of performing specific tasks. There are several sources for software, and the selection of an appropriate system will make all the difference in computerizing a business. There is potential for incredible hassle if software is not dealt with at the outset. The ideal situation is to be able to study a piece of software, and then shape the operations of the business to the requirements of the program. Regrettably, this is rarely the case. Several options exist. The user can study a program, and then request modifications to make it conform to special practices, or a software consultant can write a special program for a particular application. Needless to say, things can get pretty expensive rapidly, so here are some clues to getting ahold of a system which will do the job without bankrupting the business owner. First, study existing systems on the market. Keep in mind that many programs are available only for specific computers, although most can be "patched" to work with most widely-available units. It is important to sit down and operate the system that you plan to use in your business, or at least to have the personnel responsible for running the system get a hands-on demo of the system. This avoids numerous roadblocks, since the person experienced in the handling of the bills and accounts can often immediately perceive shortcomings or possible problems in the way that a give program handles the task. It also avoids a situation where the management is imposing a new, unproven system on unsuspecting employees. Many programs are limited in the number of entries which they can handle, so it is essential that a program be selected which covers both current and future needs in this respect.

There are also radical differences in the speed with which a program can perform its computations, and even greater differences in the amount of support materials available for different software. The best systems are interactive; that is, there is a constant "prompt" from the screen which tells the operator what the next step is in the program, and offers a multiple choice of options. Additionally, better programs are well-documented, so that most confusion can be cleared up with just a quick reference to the manual. Beware of systems which appear to be the by-product of someone's garage effort; the day may come when a question needs to be answered and the only person who knows the answers is on a trek in Nepal. Two points need to be re-emphasized: First—the system should make sense both to the operator and the business owners and managers. There is probably something amiss if too many excuses need to be made, or promises are made that "it will all work out." Common sense is a remarkable good aid in discerning what works and what doesn't. Second—be sure to use the system in a sample application. Almost all software packages include sample data for demonstration purposes, which afford an excellent opportunity to see if the program is even close to dealing with business in your way. It is likely that if the owner or manager of a business can not comfortably manipulate the proposed system that it will cause problems later on.

Another safeguard is to find businesses that are using a working system, and talk to the people involved in the running of the computer. Most computer stores and consultants who have successfully installed systems will have a list of satisfied customers for referral; presumably the computer should cure headaches rather than create them, and being the guinea pig for a new system or inexperienced "expert" is a sure source of migraines! A "consultant" or "systems engineer" can be invaluable if you have no background in computing, but it is essential to check the credentials of the expert in question, since anybody can call himself a programmer or consultant. It is likely that a consultant will have references, and these should be thoroughly explored, with lots of questions asked about problems and what kind of service to expect when the system turns out to have some kinks. The same goes for computer stores, some of which are stable, long-term operations who will back their equipment and software; others verge on fly-by-night status, and there is still some turnover in this industry.

If all has gone well up to this point, the field will have to be narrowed down; a system will have to be selected which

mates hardware with appropriate software, which has been modified as necessary to agree with the daily workings of the business. Now comes the critical moment—the day when the company "goes on computer"! An amazing number of people have blown it right at this point. The first consideration is backup. The current, pre-computer system that is in use should be maintained in simultaneous operation until it is established beyond a doubt that the computer is doing its job and promises to continue doing so. Some operations have found it simpler to transfer tasks to the computer one at a time rather than to try to do the whole thing at once. It is a maxim of the computer industry that "garbage in" yields "garbage out"; in other words, what you get out of the computer is only as good as what you feed into it. The act of buying a computer is no assurance that record-keeping problems are solved, and in fact problems can be compounded by computerizing in a situation which is already messy. So the second consideration is to be sure that "you've got your act together" before you implement the system.

There is no question that the computer is an invaluable aid to most businessmen. Through preliminary research coupled with hands-on experience with the anticipated system will result in an infinitely more satisfying outcome. The ability to establish a historical record of inventory patterns can be used to increase turns on merchandise, since slow-moving items stand out in an undeniable way; it is always possible to forgive a certain amp or guitar emotionally, but if it can't buy its place on the sales floor, the records will show it. Another advantage is the knowledge of the exact status of all accounts, both payable and receivable, so if somebody wants to throw their weight around, you know just how heavy they are in your terms. Similar information is available about sales; the performance of sales personnel can be reviewed along with the profitability of inventory items, and commissions can be automatically computed. These are only a few of the possibilities inherent in a working computer system, and the best news of all is that a good system should more than pay for itself in savings, both in man-hours and in capital more wisely invested. So it's worth doing the homework in advance, to get the most from your money and the time needed to get a system on line in your setting.

"The Bose 802 speaker is so versatile that it can be used in applications from churches to performing arts centers to discos.

"The speaker is very compact and aesthetically pleasing. Architects find it especially appealing. Performers love it because of the sound. We love it because it's simple to install and it saves us money and time in installation.

"Our clients like it because it works and it's reliable. You can just turn it on and forget about it. The size and simplicity make it about the only system that's practical to demonstrate on site before we make a sale. We can just bring them in and set them up on stands. Once my clients hear the Bose 802, they don't want me to take it back to my shop.

"Using Bose has opened up new avenues of business for us. Bose has helped build our reputation to what it is today."

Thank you. Jay

It's also nice to know the 802 has a smooth frequency response that holds down feedback and reduces the need for extensive system equalization.

But we think reading what Jay Bridgewater has to say is more likely to make a Bose believer out of you. Consider the Bose Model 802 when you need speakers for a church, theater, night club or disco. It will give you the kind of performance and appearance that will make you a Bose believer.

BOSE®

Better sound through research.

For the 802 Engineering Bulletin and a complete catalog of Bose Professional Products, send in the coupon below.

Bose Corporation, Dept. SA
The Mountain
Framingham, MA 01701

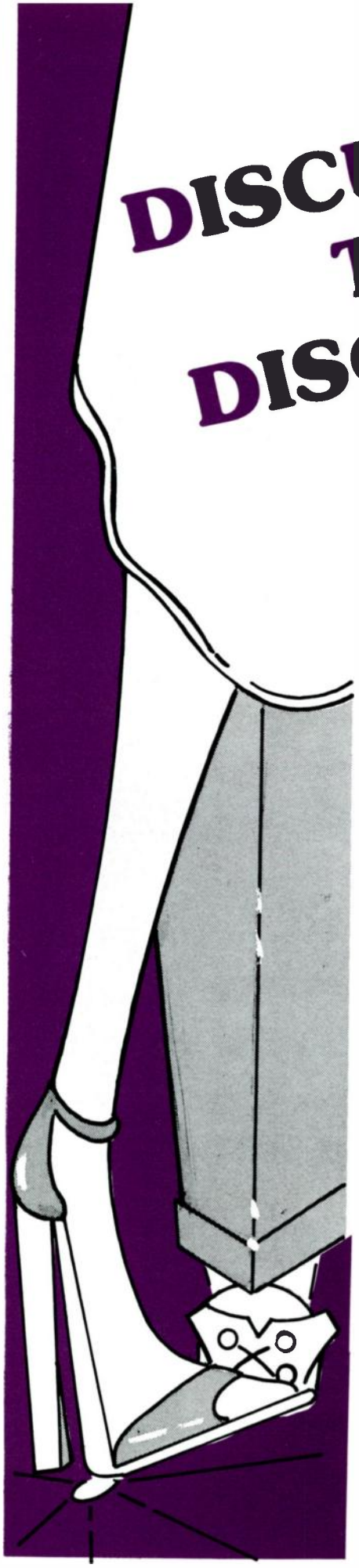
Please send me the 802 Engineering Bulletin and the complete Bose Professional Products Catalog, along with a list of your dealers and contractors.

Name: _____

Street: _____

City: _____ State: ____ Zip: ____

Tel: ( ) _____



DISCUSSIONS TO A DISCO BEAT

By N.I. Weinstock

You can find pro or con: Disco in some form will live forever or is altogether dead or dying. For some time, those who got into the business of selling disco, building disco, did it not only as a business, but because they loved disco. Then businessmen at all levels of sound began considering handling disco equipment of some type or other, if they were not already promoting disco as a portion of their sales. This alone says something for disco's presence; still the marketer feels far from secure. Even if he's making money at disco, he may not know exactly what he's doing right, or if he's doing something wrong.

I've talked with people on more sides of the disco market than I knew there were. When notes are compared, one finds that those who succeed at selling big money disco equipment are not necessarily traditional retailers. To a certain extent, disco breeds its own technical and sales people just as it does its own stars.

This piece may come on with the belief that the retailer can learn a lot from the new breed. But the breeders we talked to are not so sure. They're designers, contractors, engineers and salesmen rolled into entrepreneurs. They use the clubs or private home setups they've already built as references and, generally speaking, hold scorn for the audio retailer who sells disco in a part-time way.

"Retailers sell cheap disco equipment, and they'll get known for selling only that—cheap disco equipment. Someone who's worked at all in a disco can hear, immediately, the difference. If I can give just one word of advice: know the hell what you're doing. It's a finicky market, and if you don't carry excellent professional equipment, you may sell a little at first, . . . but it's like a guy selling Pope stickers. One day he'll sell a thousand, the next he'll be stuck with ten thousand." So said Jim Falk, who is responsible for Roseland in New York, and has built many other clubs.

We heard this sentiment echoed by others of these master builders, including Lee Windmiller, who's created sound systems of major clubs in the Chicago area, and who's firm has sold systems throughout Canada, Mexico, both coasts and the heartland. "The guy that decided all of a sudden he wants a disco in his home may not be so sophisticated. So he calls up his local hi-fi store and usually it ends up in disaster." Well, just as it seems only sensible that as disco has developed, club owners would get the sound done on a contract basis, the new breed would seem to have no contact to the old home market. Lee adds, "Maybe next year we'll put an ad in the yellow pages. The guy that's building a huge club is not going to look in the yellow pages. That business is all based on proposals and word-of-mouth."

With the dominance of these pro folks in the professional market, have the hi-fi stores responded to it?

"Well, it's really only a small percentage, a very small percentage," says a manager of one of the largest audio retailers in Los Angeles. "The number of people setting up their basements for disco is very small."

"So you don't plan any special strategy?" we asked. And most consulted store owners or managers would then talk about attracting the professional market. The logic seems valid: if you can brag that you had a hand in some popular discotheques, the customers of those clubs will come to you to buy their own equipment. But in practice, the professional market goes to the custom installers.

The custom installers have greatly varied backgrounds. They've come to disco either because they love it or they're some kind of visionary. They can design complete systems for sound and lighting effects, or work with other designers, and the ones that have achieved a lot of success place, invariably, a special emphasis on service.

We talked to Karin Hartman at Xenon in New York, to find out what that big club requires from the people who've sold, installed, and service their equipment. "Times are always changing in any entertainment field," she said, "and we change or add to our

system all the time. And things are constantly going wrong. Oh, in the beginning one gentleman was going to design all our special effects; his assistants wound up taking over. Many things happened and they couldn't finish—finally each special effect has been done by a different company.

"It's a big problem for service," she said. "Number one problem is dealing with companies that aren't in the area. Lots of the sound is from California, the effects company is in Buffalo. It's a lot more practical to use service people who don't have to fly in, so since then we try to switch service contracts to local companies.

"We have many things that are used elsewhere but we use them in different ways. When the club was started everything here was done by a limited group. Now anybody with an idea comes in and brings it to the boss; if he likes it . . . So we're changing all the time, and everybody works here."

A different perspective was offered by Bruce Barnes, manager of a disco within Zanadu, in Chicago. He came to disco from fine arts broadcasting, sold and installed the system at Zanadu, then liked it so much he stayed. "Out-of-house servicing is an unnecessary expense," he said. "The major problem I have found is that, while the initial system can sound great, the major difficulty is they like to play with it all the time. Sometimes amplifiers blow, but mostly there's the need for small adjustments—'It sounded great last week but now it sounds like hell.' And it's because some friend's drink spilled over—very rarely the d.j.

"Getting the d.j.'s to change styli, that's a big problem. If you're going every night, the stylus should be changed once a month, and everybody forgets.

"With my being an engineer, we're able to do some pretty cost effective things here. Like tracking at two and a half to three grams. Usually people track at a gram or a gram and a half, but I picked this up in working with radio stations. A, it puts more weight in the hand, and B, it protects the records more. We have some records played ten to fifteen times a week —even for a year, with no wear."

Bruce said that when it was time for any service he couldn't handle, or time for a change, that he'd go to Lee Windmiller.

We called on the Windmiller Service Corporation. "I was a physicist up until five years ago," Lee Windmiller said. "A good deal of our success, and my Ph.D., was in electronics. And then my whole family's always been in music. So, five years ago, we had a group of people in Chicago who did the total environment. Unfortunately, it was up to me to make it happen. Eventually I was getting involved in all aspects while others were getting out. But five years ago you'd deal with an individual who had a club or two, there'd be no designer, and you'd do everything. Nowadays there are big money people involved, chains of restaurants; a guy in L.A. had a club, and his designer might have been a fine restaurant designer, but, well, all the tables were fours. What happens if twelve deuces come in, or a big party. We get involved in those circumstances as a consultant. Traffic patterns, setting up seating—it's not the ordinary environment, but we understand it.

"It all started out to service electronics. Then we got involved in everything else pretty heavy—it starts with service calls at one a.m. Fortunately, we've decided we know what the commitment is. Twenty-four hours, even to a restaurant.

"There are some restaurants that do a lot more than background music, and just like a club, if the sound goes off it's a disaster. So, a lot of the sound systems are set up so there's no way all the sound can go off. And we've never had one go, out of hundreds. There has been no single failure."

We asked if he could compare his local area to the national market.

"Chicago has been more of a problem than most of our areas. They spend less money here, so the system is not as overdesigned. But then it's not so necessary—we can get somebody there in an hour or so.

"A couple of months ago a small system we did in Huntington, West Virginia needed a new amp, so we put one on an airplane. No, I don't think there's any problem with long distance service, because afterwards we went to another club in Charleston, that's very close. Their sound system had been out for two weeks, with a local service company. Some of these club owners don't like to pay the tarrif for someone to come down from Chicago, but there is, unfortunately, no decent number of good technicians.

"But Chicago people are a strange breed. They're not New Yorkers. They won't pay a twelve dollar cover. People scream at five and six dollars at the door. People are much more interested in knowing they're getting value for money. Sometimes people in California or New York seem to want to pay more for the same thing. Clubs don't gross here what those clubs gross. Maybe people are slightly more reserved? I don't know. But the amount of money spent on light and sound is considerably less. More money is spent on interior design here, though.

"I'm not terribly sure if it's not pretty much our fault. We demonstrated we can produce a pretty good sound system for a lot less. Of course when we do a disco farther away we overdesign, so we won't have to go out there again."

We asked him how he sold a new account.

"We take customers to a club we've already done. There is no showroom. Anyone is kidding themselves to go into a small room and say, 'Hey, that's a great speaker.' Look, we've never advertised. We're not one of the giants in disco. If you want to see what we've done I don't even discuss it. Here's the list of every club we've ever done —there are people we've done six or seven clubs for—but I give a prospective customer every name we've ever worked for. Hundreds. And he can call any of them or see any he wants. There's too many people running around now who take half the money to pay off the last five jobs, and we never need to do that. My clients are my recommendation.

"A designer will say, 'I want this . . .' And lots of people in this business are just equipment salesmen. The saleman will give him another, more costly piece of equipment, trying to put up a smokescreen. A lot of times, I advise against a bigger purchase. After I tell them what they're buying, they agree. I don't want to sell everybody thirty thousand dollars."

We asked what were the biggest problems he ran into, and they were all service problems: "In any disco we do now, the only person to be allowed in the booth is the d.j. That's it. Let anybody else in and you're asking for it. A good deal of problems are only because of that.

"Otherwise, we overdesign so that it's practically impossible for the whole system to break down at once. But if a system is overdesigned you can lose a lot of equipment before it's noticed! Then all of a sudden there are multiple failures. All because a d.j.

doesn't follow our instructions and check out the whole system at least once a week. They should do it every night: it's not hard. But at least once a week. Once you start trying to play the system on half the woofers, all of a sudden, hey!

"There was an older club in DeKalb, a big college town. I hadn't heard from him in a year and a half when he called and said that both amps needed repair, and only one speaker was working. Well, one amp had blown, with a speaker, maybe a year ago, and nobody'd noticed it. If they'd done any routine checks, they wouldn't have had to close down for a weekend while we fixed everything.

"You can call it an encroachment theory. Problems encroaching on equipment that needn't fail. Ninety percent of failures wouldn't happen if management did check-ups on schedule."

Lee said that he did not think audio stores would ever want to do the type of custom building he feels is necessary for the professional market. "We try to put the total design into the room. This business just takes a full time commitment that most people would never make."

We asked Jim Falk, who works out of suburban New Jersey, how he sold his systems and services, and we got a little different picture.

"Most of the larger contracts come from, first, legwork. Who's doing what, and you hear there's a disco going up on the East Side. We have a brochure, and we send them a letter, tell them who we've worked for in the past. We advertise in the yellow pages, but most of the big contracts come from talking to people in the business.

He said that the advertising was basically for the smaller contracts, which, including home installations, were getting more numerous. "I'd like to sell more equipment to the home market, but I'm not sure it's cost effective to install a small system."

We asked if he ever went into a discotheque and suggested changes.

"That's a standard line of approach, and you might get small jobs that way, but again, it's not cost effective."

Most of Jim's business is "in the city." He says, "The New York environment is good to work with. Customers are used to paying money for an effect that will bring people in. Generally, what you'll get in the Jersey clubs are star bursts, mirrored balls. . .

"We did some work for Studio 54's opening. Custom laser work. The contract was, that if it wasn't ready and working perfectly opening night—not a half hour later, but from the beginning—they didn't need it. In Jersey they want to slowly ease into things. Test the waters, see if it sells."

We asked how he chose whose equipment to carry, or how much to build himself.

"Well, by the basic component. You try and get equipment that is not seen in other discos. There's a cost effectiveness ratio working here, but if you succeed, you'll develop an audience. Our basic end is to build the speaker enclosures. To make the boxes more efficient, you fire the speakers through —for instance, we're putting in a thirty-two foot folded bass cabinet under the stage at Roseland. That's from the speakers to the opening of the cabinet. You can build a specific cabinet to cover a 140° throw."

Does he have any trademark effect?

"Well, I don't believe it would be possible to keep a thing for yourself if it was good, but, well, one thing we do would be to hide the system so it's not visible. At Roseland, everything is hidden behind drapes 15 feet up in the air. They weigh 1,000 to 1,500 pounds apiece, and they're fairly well hidden. You can't see them from the dance floor."

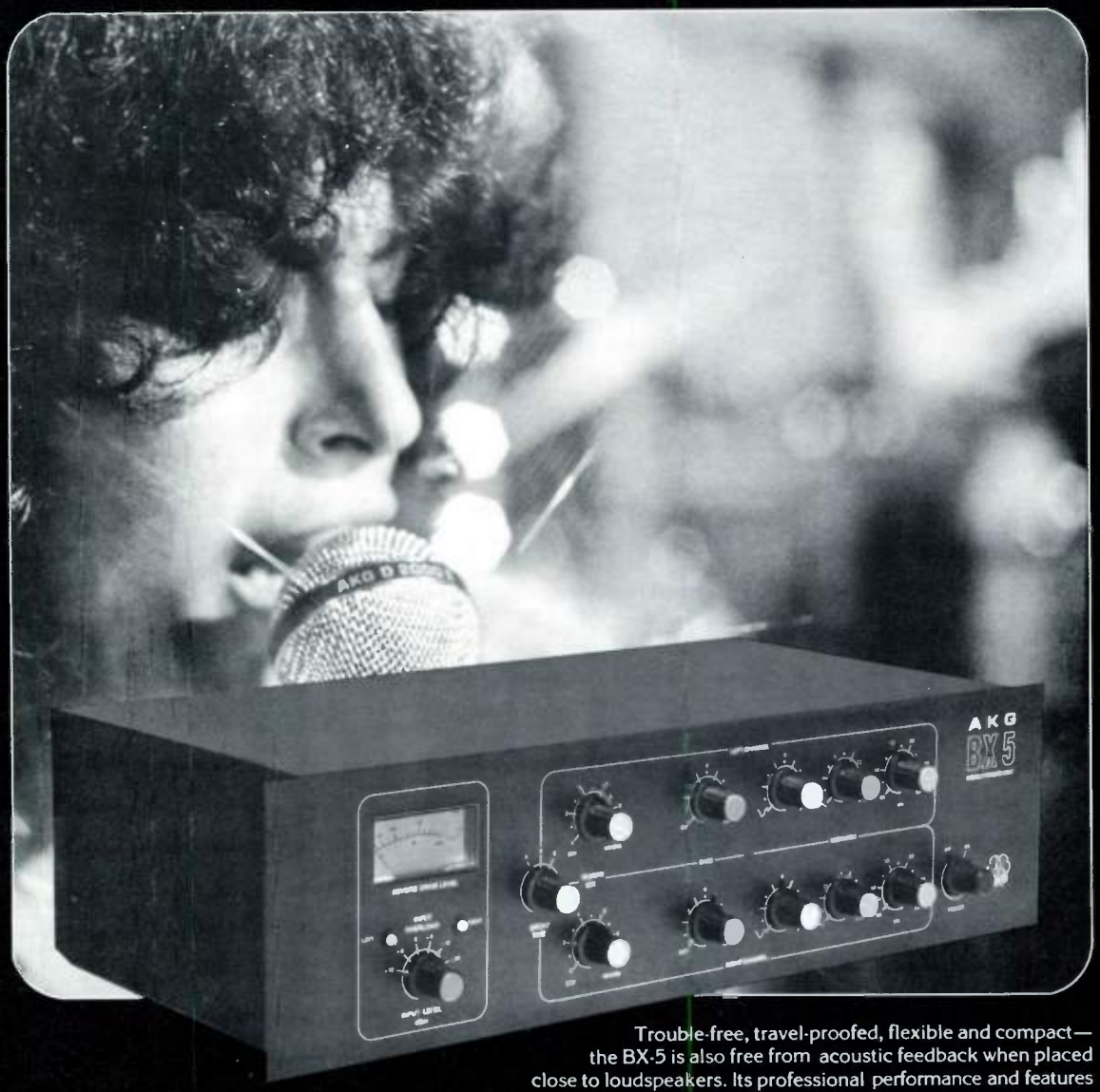
At Heavy Custom Sound and Light, in Brooklyn, the showroom is extensively equipped with packaged speaker systems and lighting effects, along with a variety of other components, but the firm is completely prepared to and usually does design and build custom systems. Their market includes more mobile disc jockeys and somewhat smaller scale disco buyers than any of the other custom builders we talked to.

If the direction of those who have been selling disco best is not toward the retail-level consumer, certainly the retailer who would serve the disco market is bound to use some of their techniques. A disco or club-like showroom may be a place to start. It's an investment of space and inventory, as well as an investment of a store's particular emphasis in the marketplace. A large store, with several showrooms, can accommodate a disco display without scaring away its other customers. As a spokesman at Harvey Sound in New York said, "Disco can be anything from somebody buying another turntable for parties to a twenty thousand dollar system, and we have to be prepared for it."

AKG®
acoustics

BX-5 Reverberation Unit

...featuring the world-renowned TTL system in a portable, rack-mountable design



Trouble-free, travel-proofed, flexible and compact—the BX-5 is also free from acoustic feedback when placed close to loudspeakers. Its professional performance and features far surpass any other reverb available in this price range.

AKG BX-Systems—in use in over 60% of recording studios world-wide

Exclusive Torsional Transmission Line—for incomparable sound "openness"

Flutter-free Performance—uncolored "natural" reverberation

Built-in Reverb/Dry Signal Mixing—controls blend of reverb and original sound

Built-in Equalization—bass contour and mid-range "parametric" controls to style the character of the reverb

PHILIPS AUDIO VIDEO SYSTEMS CORP.
A NORTH AMERICAN PHILIPS COMPANY
91 McKee Drive, Mahwah, N.J. 07430 • (201) 529-3800

AKG

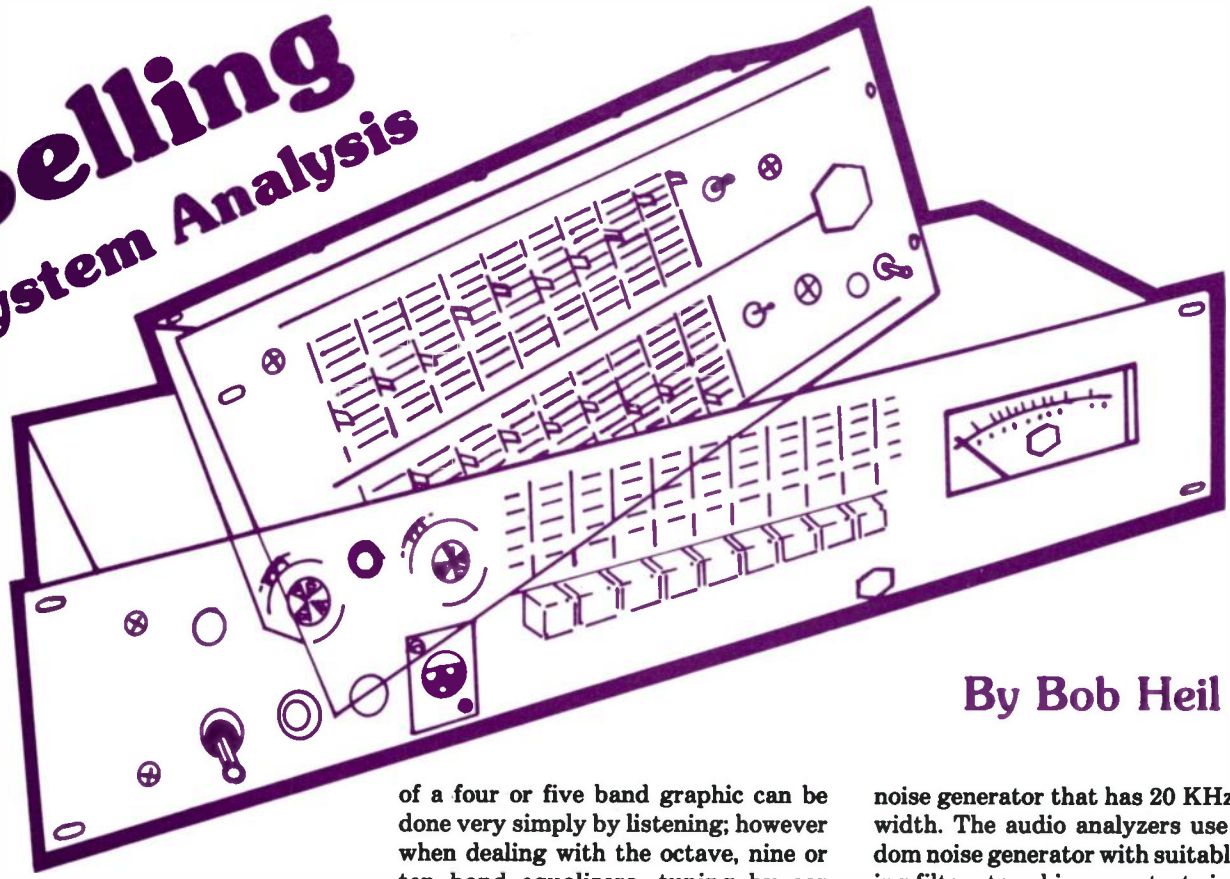
...the mark of professional quality

in microphones, headphones, phonocartridges, reverb units.

® AKG Akustische und Kino-Gerate GmbH, Austria

CIRCLE 95 ON READER SERVICE CARD

Selling System Analysis



By Bob Heil

The process of equalizing sound reinforcement systems has become a very accepted practice in today's world. By properly connecting the equalizer, great improvements in gain before feedback, program intelligibility, and overall naturalness can be applied to most systems.

These equalizers use passive or active filter networks spanning the audio spectrum. The filters range from as little as three up through complex twenty-seven band (⅓ octave) graphic equalizers. We also see narrow band notch and boost filters as well as parametric equalizers.

In a study of our market, over forty different models of octave band equalizers are shown to be available. They show up in home stereo products as well as professional studio applications. The most popular versions are the octave band "graphic" type using slide type controls instead of rotary controls, so their positions show a rough "graph" of the response curve. Most of the filters are centered on frequencies spaced logarithmically in increments of one octave; however several half and third octave units are available. These units are rather complex and, of course, more expensive.

The simplest form of equalizer is really no more than a good tone control used on most mixers. The adjustment of a four or five band graphic can be done very simply by listening; however when dealing with the octave, nine or ten band equalizers, tuning by ear becomes very difficult to achieve maximum effectiveness.

Proper test instruments to achieve near perfect results in tuning the sound system equalization to a particular room has been available for years. The test equipment is very expensive and rather difficult for non technical users to operate and understand.

Several manufacturers have real time analyzers simple enough for most all to use them and at a price not much more than a good microphone. It was a significant breakthrough for the sound reinforcement industry as now the retailer is able to sell an octave ten band equalizer and the audio analyzer to tell the customer how to *set* his equalizer, for not much more than you paid for some of the first equalizers a few years ago. Inflation certainly hasn't hit the equalization market.

Real time analyzers consist of bandpass filters (usually ten) feeding level detectors connected to a method of readout display. A signal from the sound system is necessary, so a pink noise generator is usually built in so the output of this generator can be patched to the input of your mixing console.

Random noise, as can be compared to the "hiss" heard between FM broadcast stations, is not flat in frequency response, so a special "pinking filter" is used to produce equal energy from the noise generator that has 20 KHz bandwidth. The audio analyzers use a random noise generator with suitable pinking filters to achieve our test signal for the system.

Readout is accomplished by means of several L.E.D. arrays. Some of the very expensive spectrum analyzers use oscilloscopes, multiplexers, and scanning devices.

THE ANALYZATION PROCESS

To make use of these devices, one has to connect the sound system together as normal, including a ten band octave equalizer. The output of the audio analyzer pink noise generator is connected to an input of your mixing console line input.

In order that the analyzer receive the proper signal from the speakers, a high quality instrumentation microphone is connected to the input of the analyzer.

It becomes highly important that you realize the microphone *must* be flat in response (heard at equal levels throughout the spectrum). Special attention must be given to this microphone, as the analyzation process will only be as good as the response of this microphone response. Therefore, using a microphone with very even response will give excellent results.

Place the analyzation microphone in a typical listener's position and simply follow through the equalizer-analyzer procedure as set out by the instructions. Basically, you will be tuning the

Figure 1

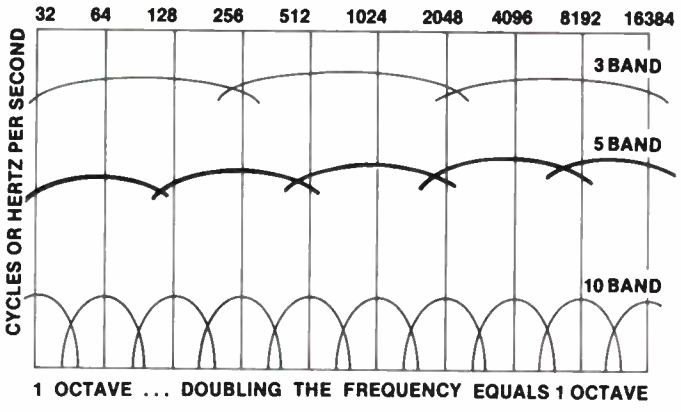
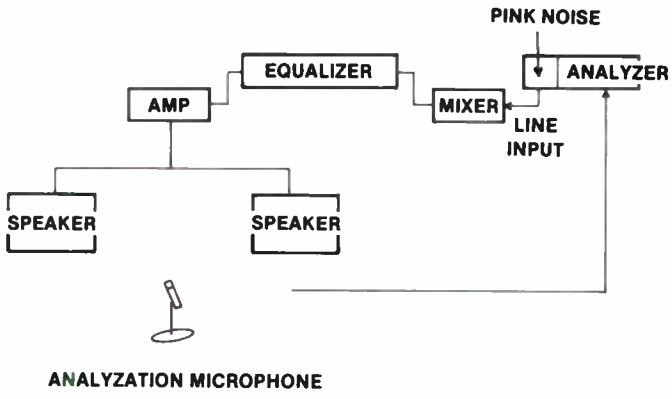


Figure 2



system by adjusting the equalizer settings that the analyzer reads-out to you.

OTHER USES

The audio analyzer can be used for other applications. It works well for checking frequency response of instruments, microphones, etc. as well as adjusting tone controls, and measuring speaker outputs.

The use of audio analyzers allows many to obtain maximum response from audio equipment with a minimum of time. Now that they are available for minimum dollar amounts, the retail sound reinforcement dealer can sell an analyzer-equalizer package to ensure that every equalizer will be used to its fullest extent. It also now allows fixed installations (churches, schools, and clubs) to be sold an audio analyzer as an integral part of their system. The dealer has more to offer at a far less price and allows the aggressive thinking dealer to have packages available that their competition doesn't even know about.

Figure 1 represents the difference between a three band, five band or ten band equalizer. As can be seen on the three or five band, a single control affects three or four octaves at one time, which is satisfactory for a tone control situation, but works against the system when trying to remove a single band of frequencies. The ten band equalizer has very narrow filter widths so neighboring octaves are not affected by one another, as is the case with the three or five band. Pulling down the 512 Hz control will *not* affect 256 or 1024 Hz. So we lose no energy at those two frequencies.

Figure 2 represents a setup using an analyzer microphone located in a good "listening" position for a system (usually about 20' in front of stage center).

Figure 3. Response of Church before Equalization

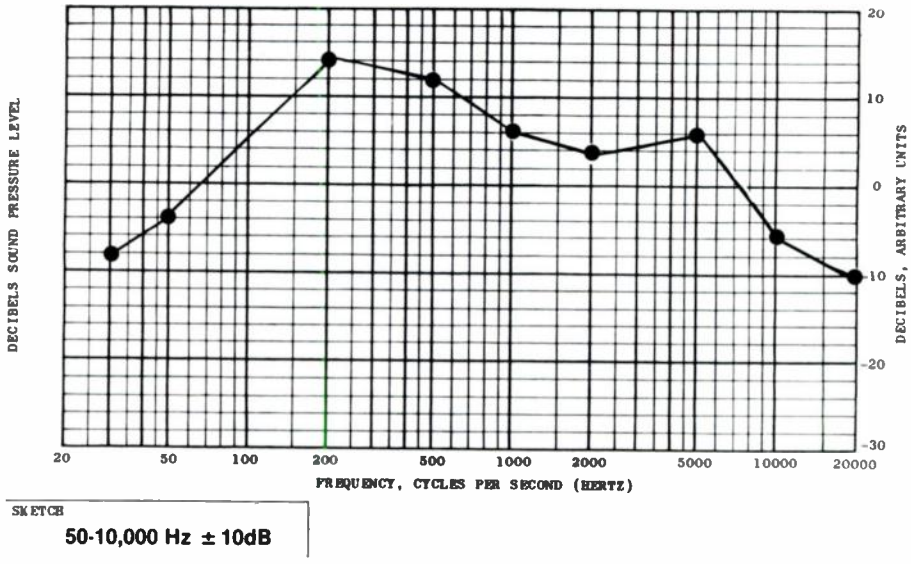
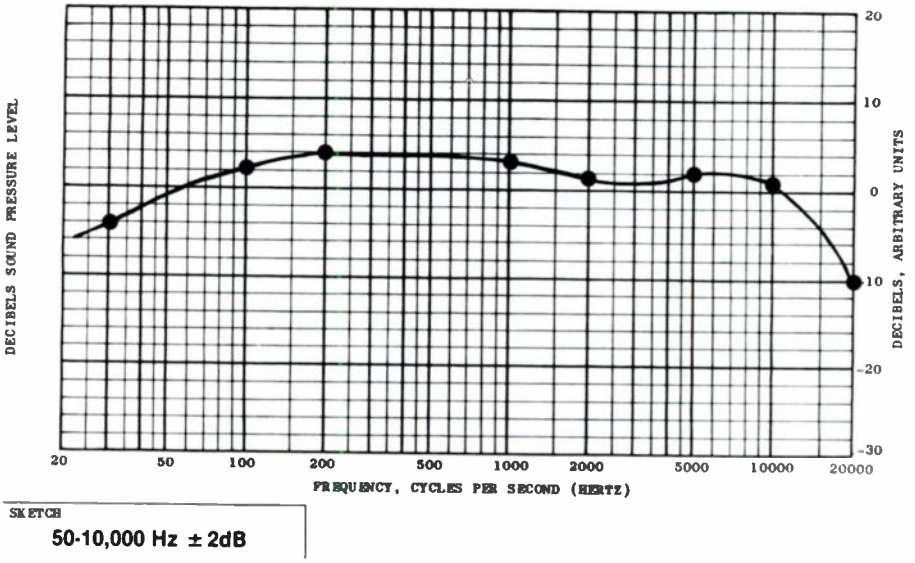


Figure 4. Response of Church after Equalization.



The SOUND SH

Shure Brothers is now offering for public consumption the Model A27M stereo microphone adapter that permits two microphones to be mounted on a single stand, thereby providing a convenient method of miking for stereo broadcasting, recording and sound reinforcement applications.

Use of the A27M permits horizontal coincident (mounted on the same axis) or closely spaced mounting of microphones in a wide range of directional angles. The A27M provides for vertical mic separation of 31.8 mm, 66.7 mm or 102 mm. Use of this adapter will improve the pickup of stereo ambience in comparison to other methods, such as two or more microphones widely spaced, or individual miking of instruments.

CIRCLE 1 ON READER SERVICE CARD

The latest offering from **ARP** instruments, makers of some of the best performance-oriented synthesizers on the market, is a 16-voice electronic piano. This new instrument represents something of a departure from the ARP product line in that the unit is not a synthesizer, although it does offer a wide range of keyboard voicings.

The piano has a 73-note standard wood keyboard. The maple action is specially designed and weighted such that it approximates very closely the "feel" and touch response of a traditional acoustic piano. This may not seem so important, but many pianists find the "cold" touch of electronic keyboards is not suited to their fingers. Indeed, the classically-trained player may have to spend months adjusting to the "all-or-nothing" response of some electronic instruments, much to the detriment of his or her technique developed on acoustic piano. For this reason, ARP has gone to great lengths to insure that the "feel" of the new piano is suitable and "traditional."

Some of the many available voicings of this unit are electric piano, acoustic piano, vibes, harpsichord and clavichord. Indications are that ARP will continue to develop this new concept in their design approach, and that other such keyboards will follow. Unlike some ARP products which require a rather extensive knowledge of electronic keyboard synthesis, the ARP piano is fully preset and requires only that the user be able to read and push a preset button.

CIRCLE 2 ON READER SERVICE CARD

Analog-Digital Associates (A/DA) has a voltage-controlled flanger on the market that is purported to be the quietest flanger available. This low noise level is due to the special circuitry developed by A/DA which eliminates background noise.

The A/DA flanger is equipped with the same sort of controls found on most other flangers: Manual, Range (referred to as "Width" on other flangers), Speed and Enhance (or "Regeneration" on other models). However,

OPPE

By Charlie Lawing

this flanger does have some unique features that are not found on other flangers.

First of all, there is the Even/Odd Harmonic selector, which allows the user a new dimension in ambience simulation. Perhaps even more important is the Voltage Control input. This input allows the user to control the delay time with either an externally applied voltage or the A/DA control pedal, which is an accessory foot pedal available at an additional cost.

The A/DA Flanger offers the musician a wide range of useful sounds, including vibrato, a rotating speaker effect, enhanced flanging sounds, jet sounds, and various filter matrices. The unit is housed in a cast aluminum case, with recessed controls, and can be powered by battery or AC outlet. The unit carries a one year warranty.

CIRCLE 4 ON READER SERVICE CARD

A new transformerless direct injection box is now available from **Audio and Design Recording, Inc.** This little gizmo allows the direct connection of almost any electronic instrument into a studio mixing console.

The unit features an automatic earth isolation, zero phase shift, no loading problems, no ringing and no transformer distortion. This direct box boasts a clean signal all the way down to 10 Hz, and improved transient response with no loss of signal level, supposedly due to the use of an active impedance converter. The transformerless direct box can be powered by a 9-volt battery or phantom power, if such a source is available where it is used.

CIRCLE 5 ON READER SERVICE CARD

SAE (Scientific Audio Electronics, Inc.) recently introduced a new series of power amplifiers developed to meet specific criteria necessary for the faithful reproduction of music in the real world. This development will be of little use to those of us who are not living in the real world, but for those of us who happen to be, the new "01" series from SAE is welcomed.

SAE engineers point out that their new amplifiers cannot be measured by standard testing procedures, which they contend fall short of approximating conditions in the field. SAE has changed the way distortion tests have been conducted in the past, preferring to recreate the constantly changing impedance of a speaker in actual operation instead of relying on a static (usually an 8 ohm resistive) test load.

As a result, the SAE "01" amplifiers have proven capable not only of driving the customary 8 ohm resistive load with a maximum of 0.025% THD and IM, they are also capable of driving 4 ohm and 2 ohm resistive loads. More importantly, the "01' series can drive all reactive loads in the same range.

Other test procedures, such as the use of symmetrical waveforms to represent the asymmetrical aperiodic waves which comprise all musical passages, have been modified by SAE engineers in the test lab. Their work led to development of three new amplifiers, the 2401, the 2301, and the 2201, which are rated at 250, 175 and 100 watts per channel, respectively, minimum RMS into 8 ohms. Frequency range

is from 20 Hz to 20 kHz with no more than 0.025% distortion. Each amplifier has an LED array which constantly monitors its output.

A few years ago things were pretty quiet in the guitar market. A few established names were at the front of the field, and there were no serious challenges to their superiority. Suddenly the whole thing exploded, and a flood of instruments became available, from the cheapest of imported imitations to the most exotic and meticulously crafted custom instruments.

Veillette-Citron was one of those manufacturers who entered the market with a small line of beautifully made instruments. In spite of intense competition in this area, they must be doing something right, because now they are expanding their line of guitars and basses.

Veillette-Citron now has three new guitars available: the Standard, the Classic and the Limited Edition. All of these instruments have dual-coil hum-cancelling pickups, Schaller tuning machines, a full body-length neck and quality woods.

The Standard comes with a sunburst satin or opaque black finish and chrome hardware. A clear satin finish is also available upon request. The Classic has all brass hardware, two-stage pickups, pull-pots, and 15 coats of clear lacquer over select maple and other woods. The Limited Edition has the same features as the Classic and is faced with contrasting 5/16" thick exotic hardwoods such as ebony, rosewood, and koa. Also, the laminations on the neck and head piece veneer are bookmatched to further enhance the beauty of the guitars and basses.

CIRCLE 7 ON READER SERVICE CARD

Electro-Voice, one of the steadiest and most consistent makers of high-quality audio equipment for musicians, has a new studio monitor on the market that was introduced to the public at the National Association of Broadcasters convention in Las Vegas. I am sure that this new Sentry 100 will be a safe bet for retailers!

Electro-Voice has been holding a winning hand for years, and it is obvious to me, at least,

that the designers at EV "know when to port 'em and when to abort 'em." At any rate, the Sentry 100 is a highly efficient speaker which not only lowers distortion, but produces sound pressure levels of compatible units with far less amplifier power. This should be of particular interest to those who have home recording studios, since they usually do not have a rack of high-wattage amplifiers to rely on. Musicians who want an exceptional pair of home stereo speakers will be interested as well.

Electro-Voice offers an optional hardware kit for rack and wall mounting the Sentry 100.

CIRCLE 8 ON READER SERVICE CARD

Modular Sound Systems Inc. has introduced the Bag End cabinet line—a modular concept with over 40 models, for uses in sound reinforcement, studio, and professional musical instruments. The cabinets are constructed from 13 ply birch plywood with a dark walnut oil finish. All hardware is flush mounted. A 9 ply birch cover is provided for storage and handling, along with machined aluminum speaker mounting hardware and expanded steel grills. Enclosures come loaded and pretested with JBL or Gauss drivers.

CIRCLE 9 ON READER SERVICE CARD

The **Soundcraftsmen** have a new "straight-line" signal processor preamplifier, the Model SP4000. A unique feature of the unit is the fact that it has four separate mono phono preamps, each completely independent of the other except for the mutally shared power supply. Most preamps with provisions for two phono inputs actually have only a two-way switched input, using only a single stereo preamp for whichever phono input is selected.

The SP4000 has a total of three external processing loops, one of which has in/out jacks on the front panel. The unit has a subsonic filter, switching capabilities for two tape decks, tuner and auxiliary selectors, and two front panel headphone jacks. The switching system on the front panel serves as a sort of patch bay, much like a studio mixing console.

The volume control is a high precision click-stopped potentiometer with notched steps that increase the volume uniformly with each click of the volume control. Each click stop has its own separate resistance network so that a precise percentage of output can be consistently applied at the user's preference.

CIRCLE 10 ON READER SERVICE CARD

The latest offering from the **Mitchell Speaker Company** is the Series 1 sound reinforcement and keyboard cabinet. This cabinet contains an 8-ohm 15" speaker and an extended range horn. Power handling capacity is 125 watts RMS, and the speaker system is fuse protected. Frequency response is 40 Hz to 18 kHz.

The Series 1 cabinet can be mounted on a tripod or stacked. The cabinet is made of 3/4" birch plywood, covered with black tolex and a steel mesh grill.

CIRCLE 11 ON READER SERVICE CARD

By Murray M. Silver, Jr.

DEALER DOSSIER

Reliable Music
Charlotte, North Carolina

Melvin Cohen, owner and general manager of Reliable Music, estimates that the sale of musical instruments and sound reinforcement is a $2 million a year business in the Charlotte, North Carolina area. If his figures are correct, sales in his neck of the woods increase at the rate of one quarter of a million dollars annually despite bleak economic indicators which would seem to prove the contrary. Cohen's 10,000 square foot facility fronting a main thoroughfare in the downtown district earns more than its fair share among eight competitors, and Cohen claims that while his major competition went bankrupt recently, he was showing a 15 percent increase over last year's figures. We ask, why does business boom for Reliable Music when their neighbors go bust?

Apparently, Cohen has no trade secret other than the combination of his experience in related fields and a few logically sound rules. He began by mixing sound for local concerts in the late sixties and then opened a night club, later moving into radio where he was program director of WYFM. At the same time, he was working in his father's pawn shop from which his present operation began.

"We had a thousand dollars worth of Kent guitars made in Japan which I sold out of a back room," Cohen relates. "Competition seventeen years ago consisted of a ma and pa store which sold guitars to country singers and we grew up around them by gearing our operation toward rock and roll."

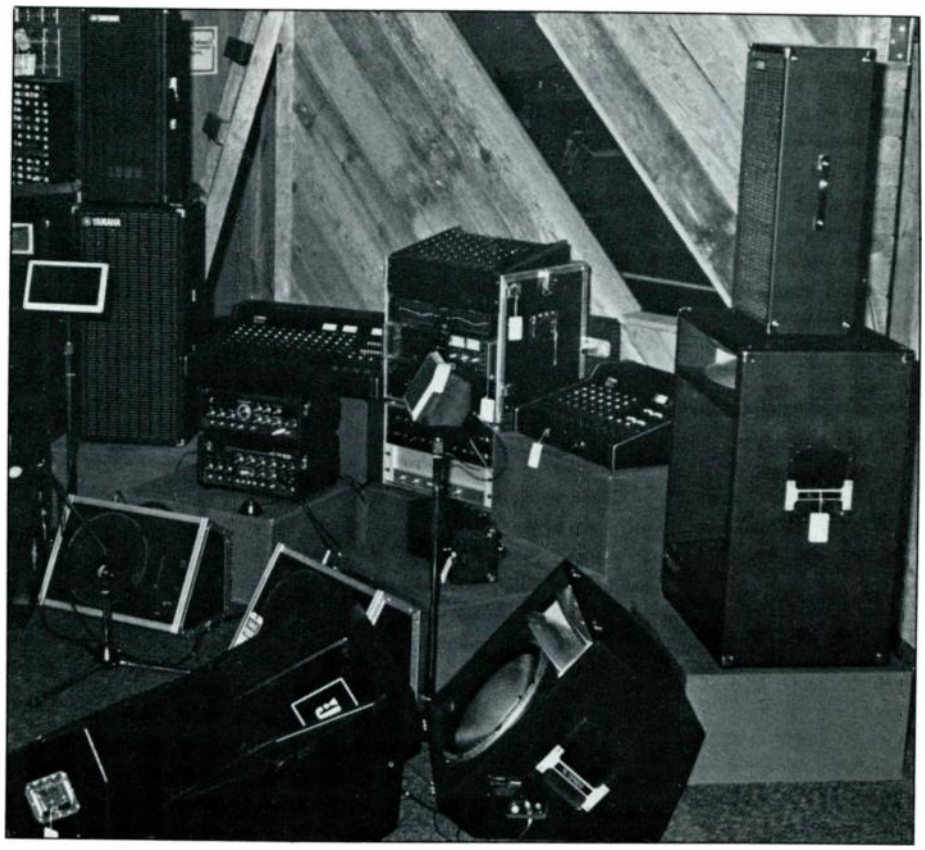
It wasn't until Cohen became the first dealer to nationally advertise Alembic products in Guitar Player Magazine that his business branched out in 1974. The influx of new business allowed him to move from the back room of his father's pawn shop into his present location, a former paint warehouse. Although his mail order business was responsible for his initial success, it has dwindled to a mere five percent of his current income.

The tremendous display area (8500 square feet) allows Cohen to effectively display each facet of his operation. He stocks a full line of accessories in and behind his front counters, including microphones, reverb and noise reduction systems, and the obligatory guitar strings and drumsticks and other assorted paraphernalia. The front of the store is devoted to displaying a full line of guitars and separate rooms house an acoustic guitar parlor and a keyboard demonstration studio.

The display of sound equipment is divided into three areas. The first contains small sound systems, self-contained units including low end mixers with built in power amps. The second island shows the separate component sytems, Altec cabinets, JBL horns, Yamaha consoles, and Marshall power amps, etc. A third area is devoted to an impressive arrangement of Yamaha and Biamp mixers.

Most of Cohen's stock is kept on the display floor or atop shelves which line the roof of the hangar-shaped building. Utility space has been transformed into repair shops for guitars and keyboards and as a workspace for customizing sound equipment.

A current pet project is under way to convert part of the store into a studio for the demonstration of recording



MUSIC & SOUND OUTPUT

It's time to take a good hard look around. Somewhere along the way we lost the true sense of what creating music and sound is all about. It's a human experience. It breathes, it sweats, it loves, it hurts, it explores, it dreams. Ask any performer, musician or soundmixer: he puts out all he's got, all the time. For the first time, his senses, his tastes, his talents are going to be explored in a magnificent, innovative showcase. One that will satisfy his search for quality and success. A magazine heightened and enlivened in editorial, pictorial, graphic and photographic content. A bold new magazine powered by the emotion, the excitement, the energy, the intellect and the fantasy of every musician and soundmixer.

Finally . . .

A magazine that reflects the emotion, the excitement, the intellect, the energy and the fantasy of every musician and sound mixer.

SPECIAL CHARTER SUBSCRIPTION OFFER

Music'/Sound Output is a bi-monthly magazine premiering in October with a newsstand price of $2.95. If you subscribe now you can save up to $7.70 off the newsstand price.

Charter Subscription price $10.00 for 6 issues.
Offer ends December 31st, 1980.

Regular subscription price: 6 issues $15.00
12 issues $27.00

Special Offer: get your premier issue (October/November) free. Subscribe before September 1st and receive a total of 7 issues for the charter subscription price of $10.00

Please Send Check or Money Order to:

Output
220 Westbury Ave.
Carle Place, N.Y. 11514

Name _____

Address _____ State _____

City _____ Zip _____

OUTPUT PUTS IT BACK IN

From the creators & former publishers of Modern Recording Magazine.

equipment. Customers will soon be permitted to place their hands on a Teac Tascam Series 15 board and tape their work on a Teac 80-8 using Crown equalizers and amplifiers. The finished product will be played back through JBL monitors.

Assisting Mel Cohen in the day-to-day operation of Reliable Music are ten employees, two of whom have complete authority to make decisions regarding their departments.

Cohen: I have a sound department manager who purchases the equipment, designs and approves installations and is my main engineer. I also have a manager for the MI division who purchases stock, approves trades and hires and fires the other salespeople. In return, these two managers receive a salary and a share of the store's profits. Essentially, they make it possible for me to act as controller and conduct paperwork without having to worry about what is going on out on the sales floor. We employ three salesmen for the guitar, keyboard and percussion departments. We have two full-time electronic repairmen and one full-time guitar repairman.

Can you define your market?

Cohen: We service a one hundred square mile radjus. Our average customer drives fifty miles to shop here. Our bread and butter is made up of the local circuit musicians playing in hotel bars and lounges, new wave basement bands, churches and hotels. Our most notable sales have been to supergroups touring this part of the country. We have sold guitars to Eric Clapton, Boston and Lynyrd Skynyrd. When equipment was stolen from The Who during their last tour, we rented them JBL drivers and Crown power amps.

To what extent do you facilitate local studios?

Cohen: We have established a number of production studios in the twenty thousand dollar range and have noticed an increase in the four and five thousand dollar home studio. The typical hobbyist is investing in four-track tape recorders and mixers and playing back through his stereo system.

What is Reliable's specialty?

Cohen: Our biggest growth has been realized in our sound reinforcement department which comprises at least sixty percent of our business. Recording equipment is included in that figure and all other departments add up to the remaining forty percent. Sound equipment was an untapped market

before we came along. We set the standard by which others design their systems. Before Reliable opened its doors, no one in this area had ever combined JBL speakers, Crown amps and Yamaha mixers into one system. Now it has become the norm. Of course, not everyone who walks in here has the money for a fine component sound system, so we begin by determining the customer's budget and attempt to sell exactly what he needs for the specific venues that he works in.

How do you educate the inexperienced buyer?

Cohen: We periodically conduct clinics featuring celebrity specialists. Carmine Appice conducted a drum clinic. The Dixie Dregs erected their entire stage setup in our store and discussed their instruments and demonstrated how they compose music by working up a completely new song while the customers listened and watched. Their roadies lectured on how to hook up sound equipment. We also had Oberheim conduct a synthesizer demonstration. On each occasion, audience participation is invited and we create a comfortable one-to-one atmosphere by issuing invitations and serving beer and wine.

National advertising is credited with establishing Reliable Music. How do you attract the local buyer on a continuous basis?

Cohen: Radio spots are the most effective. Television is too expensive and so is print when we weigh the cost of the newspaper ad against the return in new business. Our most popular advertising method has been a colorful T-shirt which has turned up on album covers. The added benefit to a T-shirt is that the customer directly pays for it, so our return is actually doubled.

Do you have a formula for how much should be spent on advertising?

Cohen: Absolutely. Two percent of sales is reinvested in advertising, no more, no less. That way we prevent making a fatal mistake of overextending our budget.

It might then be inferred that Reliable is highly budget-minded.

Cohen: Certainly. We are extremely dollar conscious. We stock only quality equipment and sell that which we'd like to own for our personal use. Customers these days are more cautious and that means they are holding out for top of the line products. They learn that it is far more costly to settle for cheaper equipment.

THE NEWSMAGAZINE FOR THE PROFESSIONAL END USER.

Special LA AES Convention Issue

Vol. 1 No. 5 — May 11, 1979

Pro Sound News

THE INTERNATIONAL NEWSMAGAZINE FOR THE PROFESSIONAL RECORDING & SOUND INDUSTRY

$$$ Circles Respond Favorably To Studio Needs

The banking world has not traditionally been the best friend of the recording industry. Studio owners have bemoaned the financial world's prejudice toward this industry for many years. Manufacturers and distributors have complained that banks just don't understand the studio business and especially don't realize the high resale value of recording equipment.

While the concerns are still very real, this situation has notably changed for the better in the leading studio centers of New York, Nashville, Los Angeles. Even the secondary locales are beginning to sense that, although there is still far to go, and although there is less credit available for business in general, in the more remote banking sectors, things are beginning to loosen up.

The banking and equipment issue was brought into the open in a letter to the *Pro Sound News* in its January issue, when [illegible] of Mid-Audio of Pekin, Illinois, [illegible] to the banks throughout [illegible] appeal to the banks throughout the country to value the importance, stability and significance of the recording field and to recognize the contributions this industry has made to important facets of their everyday lives. Milam maintained that it was high time the bankers responded to the recording studio business with a long deserved helping hand.

As evidence of the interest in this issue, Milam states he has received numerous phone calls and letters from *Pro Sound News* readers who share similar feelings and problems in dealing with the banking and leasing world. One studio in the Boston area used the magazine and letter to secure a loan from its bank. Others have been presenting it to their banks credit officers as living proof of how our industry has long been ignored and misunderstood by credit and loan institutions.

A recent sampling of opinion throughout the country reveals that though the issue is of less significance in

(continued on page 14)

NEVE Introduces Largest Standard Studio Console

The largest standard recording studio console in the professional audio industry will be manufactureed by Neve Electronics International, Ltd. of the United Kingdom. Recognizing the growing need for high quality 46 track recording, Neve announced details of a [illegible]-track console specifically designed to meet current professional requirements. The 8098 recording and mixdown console features an L-shaped design, which allows convenient utilization of the 56 input channels which have full equalization and Penny & Giles faders on each channel. The console also features a 48 track metering using VU, PPM, or Bargraph meters. It also contains all the usual features of Neve multi-track consoles such as full quadrophonic monitoring, a range of patch panel options, integral limiter/compressor effect units and other features.

Neve Electronics was started in England in 1962 by Rupert Neve, a design engineer. The company built custom consoles for recording studios in London and Europe. In 1970, Neve was formally introduced into the United

(continued on page 8)

MANY INNOVATIONS GREET ATTENDEES

Attendees of the 63rd Audio Engineering Society convention in Los Angeles from May 15-18 at the Los Angeles Hilton will be impressed by the many innovations covered in the technical sessions, and will be greeted by surprise introductions by several exhibitors.

In an interview with Tore Nordal, PRO SOUND NEWS learned that Rupert Neve Inc. will introduce a brand new line of standard range shelf consoles. The first two large music recording consoles to be displayed in Los Angeles are two boards, the model 8108 with 48 and 52 inputs with 48 track capability. The price range of these boards will be about $170,000 dollars. Mr. Nordal stated that the boards will be shipped in from England in time for the show. Nordal is pleased with the expansion of the AES show. He feels that as more manufacturers participate in these shows, it helps to increase attendance and give everyone much greater visability.

Technics, Matsushita (Panasonic) will occupy two display areas and one will be used exclusively for the display of its new professional reel to reel ¼-inch 4-channel PCM recorder. It will be unveiled at this show for the first time, according to Alman Cleeg.

Another first at the AES will be the

Maintenance Engineers Are New Superstars

For [illegible] time is money and down-time is *not* money. The importance of a skilled and readily available maintenance engineer has taken on

FOR THOSE RECORDING & SOUND PROFESSIONALS WHO WANT TO STAY ATTUNED.

YES—I want to receive my personal copy of PRO SOUND NEWS every month.

Please enter my subscription:

		DOMESTIC	FOREIGN
1 yr.	12 issues	$15.00	$30.00
2 yrs.	24 issues	$25.00	$40.00

1 Year — 12 issues
2 Years — 24 issues

Name _____

Street Address _____

City _____ Zip _____

State _____

Send Check Or Money Order To

Pro Sound News
220 Westbury Avenue
Carle Place, N.Y. 11514

PLEASE FILL OUT AND MAIL TODAY!

What has inflation done to your market?

Cohen: The local musician has been hurt most by inflation. He can't buy equipment as freely as he once could. Travel has become too expensive, and that cuts into his income. That's why we have moved into supplying broadcasters and churches. Churches pay no sales tax and radio and TV broadcasters pay only a one percent sales tax in North Carolina. Therefore, churches, radio stations and TV stations have the most money these days and they represent 15 percent of our sales. Broadcasters buy everything from mics and mixers to entire playback systems. The churches have purchased P.A.'s befitting discos and the discos are buying ever larger systems.

Inflation also prevents us from stocking a large inventory. If the economy should collapse, I don't want to get stuck with a lot of equipment. At this moment, I feel the economy is too shaky to tie up a lot of money in stock.

With three full-time repairmen, it is obvious that you place a premium on service.

Cohen: We service anything we sell and usually it's a same-day service. Our keyboard repairman was trained by Arp and Crown and our electronic repairmen graduated from courses conducted by JBL and Crown. In an instance where all or part of a sound system purchased here goes down, we will replace or loan out substitute units so that the working band won't suffer. It is a general rule that we don't loan equipment for any other circumstance. Murphy's law dictates that whatever is loaned out comes back scarred. Everyone in this store is very conscious of Murphy's law.

Your repairmen also customize equipment?

Cohen: Yes. We fabricate custom designed systems, rack mounts and panels, usually fitting sound systems into Anvil racks or custom wiring equipment to insure against improper hook-up. We have what we call "roadie wiring" that can only be connected one way, the right way, so that anybody can hook up the system without screwing it up. We change the connectors so that it is possible to plug them up backwards.

For the sound systems that Reliable installs, do you offer a maintenance program?

Cohen: With every studio or system installation, we sell a maintenance package. We offer 24-hour-a-day service to studios and discos within a 200 mile radius of Charlotte.

Do you have any complaints with the industry?

Cohen: I do not have a list of complaints. Our move into this store was a thoroughly planned operation and we had no difficulty in making the transition. Charlotte is basically three to four years behind the rest of the country and therefore I am able to watch what happens everywhere else and take advantage of other dealer's mistakes and fortunes. I monitor the east and west coast closely so that I can judge my own progress. Initially, the only problem I had was with a pesky manufacturer's rep who refused to sell me their hot moving guitars unless I agreed to buy their full line which also included P.A.'s and drums and a lot of other

ATTENTION RETAILERS:
Make 100% Profit . . . or *MORE*

A COMPREHENSIVE GUIDE TO THE MUSIC/RECORD BUSINESS

Compiled from Recording Institute of America's interviews with key executives and "hit-makers", plus Reference Directory and Dialogue's Viewpoints of industry "stars"

Listen to the industry "pros" describe the workings of the Music Business. Hear the most respected attorneys of the entertainment field define and discuss the legal terminology of Recording Contracts, Songwriter Contracts, Professional Management Contracts. Over 3½ hours of professional reference . . . could be the most important 200 minutes of your life!

Plus . . . RIA Reference Directory, including sample songwriter affiliation forms, sample artist contracts, writer contracts, etc., in addition to a Directory of Record Manufacturers, Music Publishers, Personal Managers, Producers and Booking Agents. Also **Record World's "Dialogues"** with over 50 candid interviews from **Record World** magazine, and a cross-section of "star" personality interviews.

You get all the above (retails nationally for $39.95) for as little as $18.00 (including library mailing carton).

A MUST FOR YOUR CUSTOMERS

ORDER FORM — MAIL TODAY!

For Quantities of 1-9 units . . . . . $20.00 per unit
WE PAY SHIPPING

For Quantities of 10 or more . . . . . $18.00 per unit
WE PAY SHIPPING

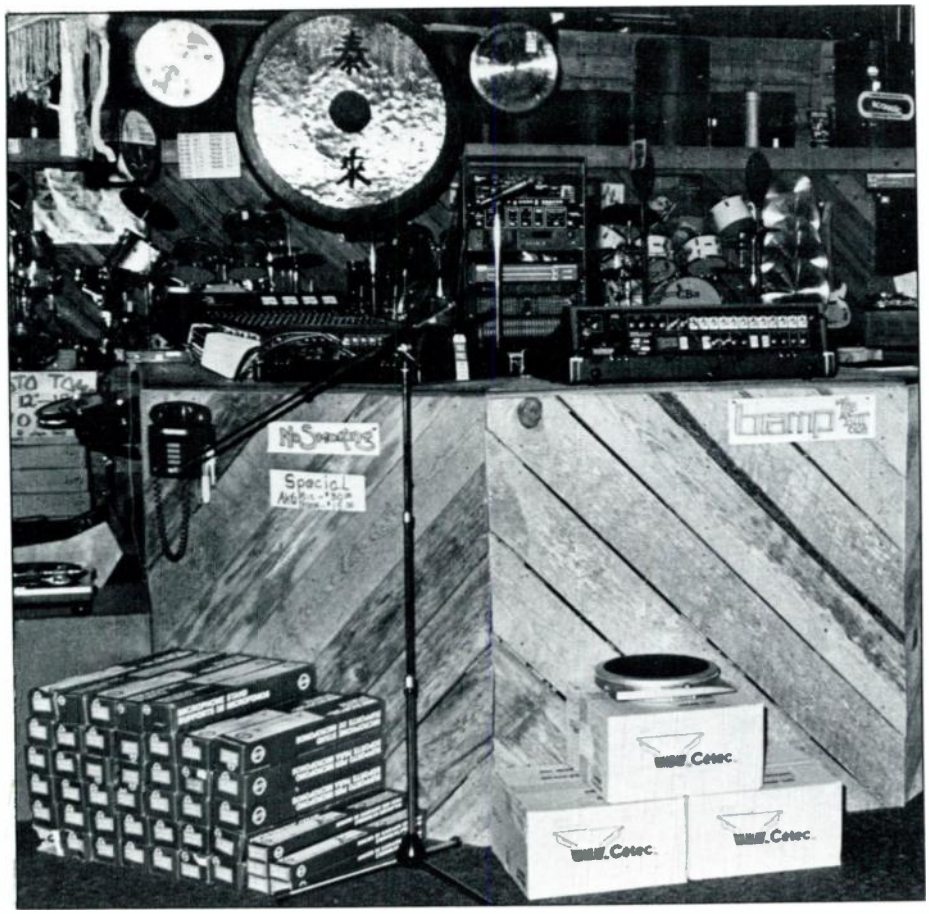
☐ PLEASE SEND _____ UNITS AT _____ EACH TO:

_____

_____

For large quantities or credit terms, write or call:
220 Westbury Avenue, Carle Place, New York (516) 334-7750

CIRCLE 67 ON READER SERVICE CARD



items I didn't want. I refused and he withheld the guitars. I was able to get the ones that I wanted from other dealers, though.

I look around and I'm not happy with the distribution of co-op ad dollars. There is no help to be had in the MI end and the MI and semi-pro musician dealer suffers. The home system dealers and the heavyweight dealers in the big cities can get co-op money, but the little guy in the small towns is ignored.

I backed off the national ad campaign because everyone started doing it and it became no longer effective. What else can a retail salesman offer but fast delivery, service and the lowest price? If you advertise a low price nationally, the manufacturers get upset and complain that you're ruining the market and they'll cut you off. Everyone makes the same claims these days, so what's the point?

We offer everything in the store at 25 percent off list price so that we can maintain competitive prices with mail order companies and major discounters.

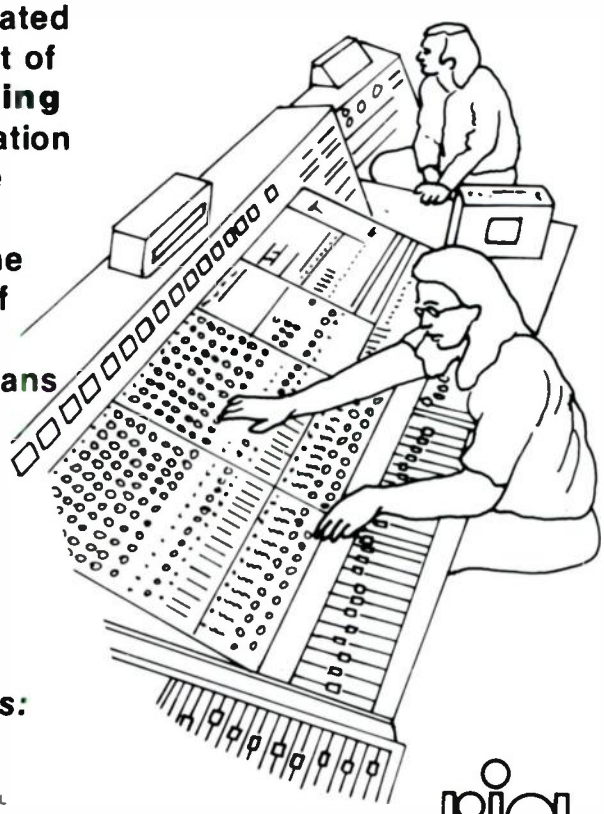
What will you do in order to maintain your position in the territory?

Cohen: The recording studio will boost the sale of recording equipment. We plan to invite twenty-five groups to come in and record demo tapes to promote understanding of studio technique. We also assist clubs and arenas with acoustic analysis and recommend solutions to problems of inadequate systems.

We sell everything a rock and roll band could ask for and stand behind it with quick and efficient service. We can install and customize sound systems, studio and broadcasting equipment and provide proper maintenance. We employ musicians, engineers and music-knowledgeable personnel who have practical experience with everything they sell. Each employee is a specialist in his field and most are trained by manufacturer's seminar programs. We create a market as much as we satisfy an already existing need, sometimes being the first to carry a particular line as with Alembic and B.C. Rich, and sometimes becoming a key dealer for major manufacturers such as Crown. Hopefully, we will one day separate the MI department and the sound reinforcement department into two different locations. Until that time, rock and roll musicians can get anything and everything under one roof at Reliable Music.

RIA, the largest and most respected network of studios offering courses in the art of multi-track recording.

When today's music conscious society made recording the new art of self-expression, the **RECORDING INSTITUTE OF AMERICA** created its national acclaimed ten week course in the art of multi-track recording, entitled **Modern Recording Techniques.** All classes are conducted on location at 16 and 24 track recording facilities. Under the guidance of professional recording engineers as instructors, the students see, hear, and apply the techniques of recording utilizing modern state of the art of equipment. This avocational course includes live recording sessions enabling musicians and creative audio enthusiasts the chance to experience, first hand, the new world of creative recording.



For information on RIA's Modern Recording Techniques course, call our local representative in the following cities:

AMES, IA
A & R Recording Studios
(515) 232-2991

ATLANTA, GA
Apogee Recording
(404) 522-8460

BALTIMORE, MD
Sheffield Rec'g Ltd, Inc.
(301) 628-7260

BIRMINGHAM, AL
Solid Rock Sound
(205) 854-4160

BOSTON, MA
Century Three Inc.
(617) 267-9800

BURLINGTON, VT
Starbuck/Ashley Rec'g
(802) 658-4616

CHARLOTTE, NC
Reflection Studio
(704) 377-4596

CHESAPEAKE, VA
Live Oak Sound
(804) 424-1372

COLUMBUS, OH
Mus-I-Col Rec'g
(614) 267-3133

DALLAS, TX
Sound One
(214) 742-2341

DETROIT, MI
RIA Detroit
(313) 779-1380

FRESNO, CA
Triad Recorders
(209) 237-7477

GREENVILLE/EASLEY, SC
Sounding Board
(803) 269-7012

HAYS, KS
Sunset Studios
(913) 625-9634

HONOLULU, HI
Audissey
(808) 521-6791

HOUSTON, TX
Sound Arts Rec'g
(713) 688-8067

JACKSONVILLE, FL
Cypress Rec'g Studios
(904) 246-8222

KNOXVILLE, TN
Thunderhead Sound
(615) 546-8006

LAS VEGAS, NV
Commercial Sound
(702) 384-1212

LA/ORANGE COUNTY, CA
United Audio
(714) 547-5466

MARIETTA, PA
Atlantic Sound Prod.
(717) 426-2637

NEW HAVEN/HARTFORD, CT
Trod Nossel Productions
(203) 269-4465

NEW YORK, NY
RIA
(516) 334-7750

NORTHERN NY STATE
Michelle Audio
(315) 769-2448

ORLANDO, FL
Aura Sound
(305) 298-2101

PADUCAH, KY
Audio Creations
(502) 898-6746

PHILADELPHIA, PA
Starr Recording
(215) 925-5265

PITTSBURGH, PA
Audio Innovators
(412) 474-6220

RICHMOND, VA
Alpha Audio
(804) 358-3852

SAN ANTONIO/AUSTIN, TX
ZAZ Rec'g Studio
(512) 432-9591

SANTEE/SAN DIEGO, CA
Natural Sound
(714) 448-6000

SEATTLE, WA
Holden, Hamilton & Roberts
(206) 632-8300

ST. LOUIS, MO.
KBK/Earth City Sound
(314) 291-4840

TULSA & OKLA. CITY, OK
Ford Audio and Acoustics
(405) 946-9966
(918) 939-0806

WESTBURY, NY
Don Casale Studio
(516) 333-7898

CANADIAN REPRESENTATIVES

MONTREAL, QUE
RIA
(516) 334-7750

OTTAWA, ONT
MARC Productions
(613) 741-9851

ST. PAULS, ONT
Maxim Canada
(519) 393-6998

TORONTO, ONT
Phase One Rec'g Studio
(416) 291-9553

ria

INDUSTRY UPDATE

Sony Corporation of Japan and Willi Studer of Switzerland have reached an agreement to support a common format in stationary-head digital audio recording. Studer will have access to Sony's digital tape recorder technology. The two companies are hoping their common format will find industry-wide acceptance as an international specification, and expect to explore possibilities for future research and development. Studer will soon add digital audio products to its production. Sony currently has a full line.

Bruce Marlin has been named Assistant Sales Manager of UREI. Marlin was previously Sales Manager for Westlake Audio.

BASF Systems has promoted **Robert Donadio**, Manager, Technical Development, to Director of Research and Development, a new position. Donadio has been with BASF since 1964. He developed BASF's 8-track lubricated tape formulation, and DPS, a duplicator tape formulation. He has also supervised the start-up of BASF System's Flexydisk and video tape production as well as the implementation of advanced computer tape formulations.

MXR Innovations, Inc. has moved to a new facility at 740 Driving Park Avenue in Rochester. The move represents a 500 percent increase in space and will allow for "significant expansion" of its research and development department.

Prosound '80, the exhibition of professional audio organized by Bastiste Exhibitions & Promotions, will be held at the West Centre Hotel in London, September 2 through 4, 1980.

Electro-Voice has named five new rep firms: Audio Resources; Silver Peak Marketing; Northern California Marketing; and New Breed Associates. All the firms except Silver Peak will be representing the full E-V and Tapco product mix. Silver Peak will be handling everything except high fidelity products.

James B. Lansing Sound has donated a pair of 4313 control monitor loudspeakers to Middle Tennessee State University for use in that institution's Recording Industry Management Program. The four year degree program includes courses in record merchandising, music industry law, and audio engineering.

The Sound Broadcasting Equipment Show sponsored by Audio & Design (Recording) Ltd. in association with Radio Month is to be held this year in Birmingham, England on September 30. Admission is restricted by invitation only.

Dolby Laboratories has available a three-page flyer for retailers titled "Explaining and Demonstrating Dolby Hx . . ." in addition to a four-page pamphlet directed toward consumers.

New studios admitted to the Association of Professional Recording Studios include Odyssey Recording Studios and The Music Works of London and Downtown Radio, the independent local radio station based in Belfast. The Point Recording Studio in London was granted affiliate membership.

Audio Pulse has moved to 4501 Arden Drive, El Monte, California 91731, increasing by more than 1300 square feet its production, engineering and quality control departments. In addition, the company has appointed three new representatives: Karet and Senescu, Rowson and Sendrak, and Browning and Company.

Paul Gordocki has been named Loudspeaker Product Marketing Manager for Marantz. Previously, Gordocki worked on the ESS Wins on Campus program and headed sales training for Cerwin-Vega in Canada.

Aurora Sound International has purchased a Los Angeles manufacturing plant of over 35,000 square feet. **Yuli Lespravsky** has been appointed Director of Manufacturing.

A 28-page brochure on PCM recording is being made available to "qualified audio professionals" by Studer Revox America. The booklet presents an overview of the digital recording process and discusses stage-by-stage operations. A copy of the brochure may be obtained by addressing a request on business letterhead to Studer Revox America, 1425 Elm Hill Pike, Nashville TN 37210.

Bob Bryan has been appointed to the Fort Worth headquarters staff of International Music Corporation. He will be product manager for Black Diamond Music Strings, and will be in charge of all distributor sales for North America.

Sequential Circuits has established a nationwide network of service centers to facilitate the maintenance and repair on the Prophet-5 and other SCI products. Centers have been set up in New York, Boston, Chicago, Cleveland, Toronto, D.C., Atlanta and Los Angeles, with more to open in the next few months.

ESS, Inc. has formed ESS Pro, the company's professional division. The new division will be headed by **Ewald J. Consen**, recently named Vice President of Sales and Marketing. Consen was with UREI and prior to that with James B. Lansing Sound.

Marvin Lazansky has been named Vice President of Sales at U.S. Pioneer Electronics Corp.

Scientific Audio Electronics, Inc. (SAE) will combine its Professional Products Division with the Consumer Productions Division. The professional products line will be added to the responsibilities of Vice President of Sales, **Warren Pompei. Mark D. Cohen**, formerly Director of the Professional Products Division, becomes National Sales Manager for SAE, SAE TWO and SAE Professional Products. **Vincent Dellamonica** has been appointed to the position of Export Sales Manager.

INDUSTRY UPDATE

MicMix Audio has expanded its plant in Dallas, doubling its size. The new space will be used for warehousing, office and assembly purposes.

Ken McKenzie has been appointed Corporate Director of Sales and Marketing for Emilar. McKenzie was formerly Vice President of Cetec Gauss.

BASF has announced plans to expand its production of its magnetic media. Despite previous announcements, mass production of the company's first generation LVR system will not be initiated, due to shifts in currency parities.

M. Hohner, Inc. has won a BOLI (Best On Long Island) Award and three Merit Citations for excellence in print advertising.

Dick Weber has been appointed General Manager of Whirlwind's Musical Division. Weber was formerly president of Ashly Audio. **Bob Martin** has been named National Sales Manager of Whirlwind.

Marty Levine has joined Teledyne Acoustic Research as East Coast Regional Sales Manager. Levine was formerly Northeast Regional Sales Manager at Bose Corporation.

White Instruments has appointed three new representatives: Richard S. Pass, Inc., Pete Finney Pro Marketing Co. and Rep Tech, Inc.

Derek Whiteman has been appointed Western Regional Manager of Rank Hi Fi Inc. He was formerly with the parent company in the United Kingdom, and has been affiliated with Moulthrop Sales in California.

Osamu Naka has been named Marketing Manager for Sony's Audio Products Division, with responsibility for the merchandising of all Sony hi-fi products.

Richard M. Weiner has been appointed Midwest Sales Manager for Mura Corporation's OEM Components Division. Weiner was formerly with APF Electronics as an Operations Manager.

David Roudebush has been named Professional Productions Manager for dbx, Incorporated.

Karen Leeds has been appointed Administrative Assistant.

AKG Acoustics has appointed Matrix Marketing, headed by **Cliff Miller** and **Doug Schauer**, for AKG and Neutrik.

Osawa & Co. (USA), Inc. has named President **Yoshiyuki Okamoto** Chairman of the Board and Cheif Executive Officer. Okamato also assumes a position on the Board of Directors of the parent company, J. Osawa & Co. Ltd., Tokyo.

Scott Heidbrink has been appointed Marketing Communications Copywriter at Altec Lansing. Heidbrink was formerly with Eisaman, Johns and Laws Advertising; prior to that he was with Revell, Inc.

Jonathan Kendall has joined Professional Sounds, Inc. in Washington, D.C., as Vice President in charge of Systems Design.

The 1st Delta Group, Bensenville, Illinois has been named sales representative for Hitachi audio components in northern Illinois and eastern Wisconsin.

Ronald Stanley has been named Southeast Regional Professional Products Sales Representative for Bose Corporation.

Electronic Martin/Korn & MacWay Laboratories of Belgium has formed a U.S. marketing subsidiary, KM Laboratories, Inc. The principals of the American company are **David Stebbings**, President, and **Janice Mundy**, Marketing Vice President.

CLASSIFIED

If you have a professional multi-track studio, and are interested in becoming a licensed representative for R.I.A.'s Modern Recording Techniques courses, call or write Mr. Chas Kimbrell, R.I.A., 220 Westbury Ave., Carle Place, NY 11514 (516) 334-7750. A large profit potential with low operating costs.

Classifieds should be sent to:
SOUND ARTS
Classified Dept.
220 Westbury Ave.
Carle Place, N.Y. 11514

NEW!

CLASSIFIED

SERVING THE CREATIVE AUDIO AND MUSIC ELECTRONICS INDUSTRY
SOUND ARTS

Classified Department

MANUFACTURERS—*Looking for sales, marketing or technical personnel*

RETAILERS—*Looking for new salesmen*

SALESMEN—*Looking for positions at manufacturing companies or other retail sales opportunities*

REPS—*Looking for new lines*

USE
SOUND ARTS CLASSIFIED

RATES
50c per word
$25 per inch
Minimum order is $5
Check or money order must accompany copy.

Classified ads should be sent to:
SOUND ARTS MERCHANDISING JOURNAL
Classified Dept.
220 Westbury Ave.
Carle Place, N.Y. 11514

Advertiser's Index

CHORUS

Chorus / kōr-əs / n

Something sung or uttered simultaneously by a number of persons or instruments.

DOD has redefined the chorus for musicians. The 21 millisecond delay gives effective doubling and the internal oscillators bend the pitch just enough to provide realistic multiple voices. We have included a compandor for whisper quiet operation even at line levels, and the effect foot switch is active so it switches quietly. There are two switchable speed controls that can speed up and slow down like a rotating speaker. However, the most dramatic feature is the synthesized stereo outputs. Go to your DOD dealer, plug in two amplifiers, a guitar and listen to the fullest stereo guitar sound you've ever heard.

Electronics Corp., 242 W. 2950 So.,
Salt Lake City, Utah 84115, Telephone (801) 485-8534

CIRCLE 83 ON READER SERVICE CARD


See the future of the electric guitar.
The ultimate custom guitar and bass kits from DiMarzio. Send $1.00 for our special color catalog.
DiMarzio®
Musical Instrument Pickups, Inc.
1388 Richmond Terrace
Staten Island, NY 10310
(212) 981-9286
CIRCLE 69 ON READER SERVICE CARD